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Health Level Seven Implementation Support Guide
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1 Introduction

1.1 PURPOSE

This document provides assistance to health care institutions, hospital information systems vendors, consultants and other support groups that are considering systems development and implementation activities in a multi-system environment using the Health Level Seven (HL7) protocol. This support guide includes the following information:

A. Planning Methodology

B. Design and Implementation Methodology

C. Overview of HL7 Version 2.2

D. Overview of HL7 Version 2.3

E. HL7 Transaction Checklist

F. HL7 Message Diagrams

G. Lower Layer Protocols

H. Helpful Hints

I. Case Studies

J. Sample Templates (RFI/RFP/Contract Points)

K. Frequently Asked Questions

The Support Guide represents the efforts of the HL7 Implementation Committee to develop support materials for organizations implementing or considering implementation of HL7 interfaces. Comments and suggestions regarding content or format are welcomed, and should be directed to the Implementation Committee Chairperson(s) listed at the end of the guide.

Please keep in mind that both the planning and design/implementation methodologies are intended to serve as general guides to help in planning and implementing HL7 interfaces. This guide should be used in conjunction with your standard systems development methodology.

This guide is also intended for use in conjunction with the HL7 interface standards specification document. The specification document is provided to all members of the HL7 organization. To join this organization and receive a registered copy of the current specification document, send a membership enrollment form and the appropriate fees to Health Level Seven.

This guide is not intended as a tool to validate or certify HL7 interfaces. As an American National Standards Institute (ANSI) accredited standards developing organization, HL7 has stated that the specification should be used as a tool in the development of interfaces. There currently exists no test or approved process by which an HL7 interface can be validated as compliant to the written specification. This is a function and responsibility of the individual entities (e.g., providers, vendors, and consultants) that

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contract for these interfaces. The HL7 organization may develop a certification process or compliance testing procedures in the future.

Institutions that are considering major systems development activities (e.g. comprehensive system upgrades/replacements), migration to an open systems architecture and/or integration of various clinical, financial or administrative systems with a central Hospital Information System (HIS) - and are considering HL7 as a mechanism for integrating these systems should refer to the planning component of the methodology. Institutions that have already made a decision to implement one or more HL7 interfaces in any type of an environment will also find certain information in the planning section useful, but should concentrate on the design and implementation sub-section of the implementation methodology covered in Chapter 3. HIS vendors should focus on the design and implementation sections, but may also consider reviewing the planning section as background.

1.2 HL7 BACKGROUND

HL7 was founded in 1987 to develop standards for the electronic interchange of clinical, financial and administrative information among independent health care oriented computer systems; e.g., hospital information systems, clinical laboratory systems, enterprise systems and pharmacy systems.

In the last three years, HL7's membership has grown to exceed 1,700 hospital, professional society, health care industry, and individual members including almost all of the major health care systems consultants and vendors. The HL7 Standard is supported by most system vendors and used in the majority of large U.S. hospitals today. It is also used internationally in such countries as Australia, Austria, Belgium, Finland, Germany, Holland, Israel, Japan, New Zealand, the Netherlands and the United Kingdom.

In June of 1994, HL7 was designated by the American National Standards Institute (ANSI) as an ANSI accredited standards developer. HL7 released its fourth version of the standard (Version 2.2) in December 1994. This consensus standard was balloted under ANSI rules and was approved as an ANSI Standard on February 8, 1996. Version 2.3, which was released on CD-ROM in April of 1997, was approved as an ANSI Standard on May 13, 1997.

1.3 HL7 TRANSACTIONS

The Version 2.3 Standard defines transactions for transmitting data about patient registration, admission, discharge and transfers, insurance, charges and payors, orders and results for laboratory tests, image studies, nursing and physician observations, diet orders, pharmacy orders, supply orders, master files, appointment scheduling, problem lists, clinical trial enrollments, patient permissions, voice dictations, advanced directives, and physiologic signals. Task forces in HL7 are also busy developing prototype transactions with new state of the art technologies such as CORBA and Microsoft's OLE objects.

1.4 COOPERATION WITH OTHER STANDARDS DEVELOPING ORGANIZATIONS

HL7 has a pure focus on health care informatics standards and cooperates closely with other standards developers such as American Society for Testing and Materials (ASTM), Accredited Standards Committee X12N, American College of Radiology (ACR), National Electrical Manufacturers Association (NEMA), National Council for Prescription Drug Programs (NCPDP), and Institute of Electronics and Electrical Engineers (IEEE) directly and via the ANSI Healthcare Informatics Standards Board (HISB). Examples of such cooperative efforts include cross-copyrights with ASTM and hosting joint working group meetings with IEEE, ACR-NEMA, X12N and NCPDP.

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HL7 has pioneered the provision of its minutes and standard drafts at no cost through Internet FTP servers on [mcis.duke.edu] Internet and supports a discussion group on the HL7@Virginia.EDU list server. We encourage other standards organizations to do the same.

1.5 OVERVIEW

This section is an excerpt from Chapter 1 of the HL7 Version 2.3 Standard and contains a description of the conceptual basis of the HL7 Standard, the approach to accommodating intra-site variations and evolutionary changes, and the way it has been structured in order to accommodate varying current and future communications environments.

1.5.1 HL7 Encoding Rules

Message formats prescribed in the HL7 encoding rules consist of data fields that are of variable length and separated by a field separator character. Rules describe how the various data types are encoded within a field and when an individual field may be repeated. The data fields are combined into logical groupings called segments. Segments are separated by segment separator characters. Each segment begins with a three-character literal value that identifies it within a message. Segments may be defined as required or optional and may be permitted to repeat. Individual data fields are found in the message by their position within their associated segments.

All data is represented as displayable characters from a selected character set. The ASCII displayable character set (hexadecimal values between 20 and 7E, inclusive) is the default character set unless modified in the MSH header segment. All the other special separators and other special characters are also displayable characters, except that the segment separator is the ASCII Carriage Return character.

1. There is nothing intrinsic to HL7 Version 2.3 or ASTM 1238 that restricts the legal data set to the printable ASCII characters. The former restriction was imposed to accommodate the limitations of many existing communication systems. Some existing systems would misinterpret some eight-bit characters as flow control characters instead of data. Others would strip off the eighth bit.
2. The European community (EC) has a need for printable characters (for example, the German oe, the French accent grave) that are not within the above-defined restricted data set. The personal computer market accommodates these alphabetic characters by assigning them to codes between 128 and 256, but it does this in many different ways. ISO 8859 is a 256-character set that does include all of the needed European letters and is a candidate for the European standards group. Where the Europeans define an eight-bit character set specification, HL7 will accept this data set in environments that require it, and can use it without complications.
3. Multi-character Codes:
    a. UNICODE - When communicants use UNICODE, and all characters are represented by the same number of bytes, all delimiters will be single characters of the specified byte length, and the Standard applies just as it does for single-byte length, except that the length of the characters may be greater than one byte.
    b. JIS X 0202 - ISO 2022 provides an escape sequence for switching among different character sets and among single-byte and multi-byte character representations. Japan has adopted ISO 2022 and its escape sequences as JIS X 0202 in order to mix Kanji and ASCII characters in the same message. Both the single- and multiple-byte characters use only the low order 7 bits in JIS Kanji code with JIS X 0202 in order to ensure transparency over all standard communication systems. When HL7 messages are sent as JIS X 0202, all HL7 delimiters must be sent as single-byte ASCII characters, and the

escape sequence from ASCII to Kanji and back again must occur within delimiters. In most cases the use of Kanji will be restricted to text fields.

There are other parts of the JIS X series that support Katakana (JIS X 0201/ISO IR 13), Romaji (JIS X 0201/ISO IR 14) and Kanji (JIS X 0208/ISO IR 87) and (JIS X 0212/ISO IR 159) that can be used in HL7 messages in the same manner as JIS X 0202.

c. In the case that a single country uses conflicting rules for representing multi-byte characters, it is up to the communicants to ensure that they are using the same set of rules.

The encoding rules distinguish between data fields that have the null value and those that are not present. The former are represented by two adjacent quotation marks, the latter by no data at all (i.e., two consecutive separator characters.) The distinction between null values and those that are not present is important when a record is being updated. In the former case the field in the database should be set to null; in the latter case it should retain its prior value. The encoding rules specify that if a receiving application cannot deal with a data field not being present, it should treat the data field as present but null.

The encoding rules specify that a receiving application should ignore fields that are present in the message but were not expected rather than treat such a circumstance as an error.

1.5.2 Local Variations

The HL7 Standard is intended to standardize data interchanges, not the underlying applications systems. This means that there will be a wide variety in the manner in which the Standard is applied in different institutions.

The requirement to support diversity within the Standard is addressed in these ways:

4. The only data fields that are required in the abstract messages are those necessary to support the logic of the relationships among the messages or their basic purpose. Many other fields are specified but made optional.
5. There are provisions within the specifications to add messages or portions of messages that are local to an institution. The conventions used for this are intended to prevent conflict with future versions of the specification.

1.5.3 Evolutionary Changes to the Standards

All standards must evolve as the applications they support change and as a result of experience using them. In recognition of this, the Standard includes a protocol version ID in all messages.

New transactions or data elements will be added to operational HL7 environments as a result of changes in the Standard or due to changes in the local implementation as permitted within the Standard. It is important that these changes be implementable at a site without requiring all communicating applications to upgrade simultaneously. The special provisions in the Encoding Rules for dealing with fields that are not present or unexpected are very important here. Because of them, new fields can be added first to the sending or source system; the receiving system will ignore the new fields until it has been updated to use them. Often, these rules also facilitate changing the receiving system first. Until the sending system is changed, the receiving system will find the new data field ‘not present’ and deal with this according to its rules for data not present.

Similarly, the HL7 Encoding Rules support changes in data field sizes. Fields are found within the message by examining separators, rather than by an offset. Changing the size of a field does not change the procedure used to detect subsequent fields.

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1.5.4 Applicability to File Transfers (Batch Processing)

Although the HL7 Standard is defined in terms of the client-server (remote operation) model, its standards are equally applicable to file transfers. One or more messages may be encoded according to the Encoding Rules, grouped in a file and transferred using external media, FTAM, FTP, Kermit, or any other file transfer protocol. Responses may be grouped in a file and similarly transmitted. Chapter 2 of the Standard provides the general mechanisms for the batch transmittal of HL7 messages.

1.5.5 Relationship to Other Protocols

A great deal of consideration has been given to the relationship between the HL7 Standard protocol and other protocols. There are three questions:

1. What is the relationship between the HL7 protocol and "lower layer," service protocols? In strict accordance with the ISO OSI model, HL7 should not replicate features of these protocols. This can even be construed to require HL7 to avoid replicating certain ISO layer 7 functionality contained in the Service Elements. However, it is the goal of the HL7 group to support health care communications in a wide variety of communications environments, including many that are not as complete as ISO will be one day.
2. What is the relationship between the HL7 Standard protocol and other applications protocols? Protocols of interest include the ASC X12 Standards for Electronic Document Interchange, the ASTM 1238-88 Standards for laboratory data reporting, the ACR/NEMA DICOM Standards for imaging and other aspects of Radiology Information Systems, the NCPDP standards for prescription drug programs and the IEEE P1157 Standards for medical data interchange ("MEDIX").
3. What is the relationship between the HL7 Standard and various proprietary health care protocols in use today?

1.5.5.1 Lower Layer Protocols

The HL7 Encoding Rules are substantially different from the ASN.1 Basic Encoding Rules (BER) documented in CCITT X.409 and X.209 and ISO 8825 or those employed in LU6.2 or RPC. This is because:

1. By definition, the HL7 encoding rules will be applied where the environment does not include software to do encoding. Without such software, the burden on applications programmers to develop messaging software that conforms to those encoding rules is onerous.
2. The encoding rules of these protocols depend on the assumption that lower level protocols provide transparency (i.e., all character codes can be transmitted without being changed by and of the lower levels). This assumption is often not met in the communications environments that must serve HL7 for the interim. The techniques that might be used to implement transparency in the Lower Level Protocol are difficult to implement in some present-day applications environments.

The notation chosen to document the message formats in the HL7 Standard is not the Abstract Syntax Notation1 (ASN.1) Basic Encoding Rules (BER) defined by ISO.

Contrary to other high level communications environments, there is no notion of association separate from the sending of the message from client to server and the response. This seems appropriate to the client-server model.

Whenever HL7 is applied in a networking environment, addressing will be an issue. This is equally true when it is applied on ISO Standards networks or proprietary networks. Although the Standard does not specify how this addressing will occur, it does provide certain data fields that will be of value in determining addresses. The fields MSH-5-receiving application, MSH-6-receiving facility, and MSH-11-processing ID, are located in the header of all HL7 messages. MSH-6-receiving-facility is intended for environments where multiple occurrences of the same application are being run on the same computer system or on the same network on behalf of different institutions or other organizational entities. MSH-11-processing ID is used where various versions of essentially the same application may reside on the same computer for different purposes. See HL7 table 0103 - Processing ID for recommended values.

The HL7 committee does not standardize the values for the MSH-5-receiving application and MSH-6-receiving facility at this time because there are so many variations in place in existing systems and because different kinds of environments (e.g., different countries) may have different required code sets. However, we strongly encourage the use of the HL7 suggested code sets where they are defined and we recognize that movement toward more standardized codes is essential for seamless communications.

1.5.5.2 Other Applications Protocols

The Working Group has given considerable attention to the relationship of the HL7 protocol and other protocols. A considerable liaison effort is underway. This is described below:

1. ACR/NEMA DICOM. The HL7 Working Group maintains an on-going liaison with the ACR/NEMA DICOM working group. HL7 and ACR/NEMA DICOM are both members of ANSI's HISB.
2. ASC X12 Standards for Electronic Document Interchange. X12 is a family of Standards that provide both general and specific descriptions for data interchange within a number of industries. The HL7 Encoding Rules are modeled on the X12 Standards, although there are differences. The HL7 Standard needs to accommodate on-line exchange of individual transactions on LANs. This difference, and certain applications issues, are responsible for the variance from X12. X12 has recently decided to follow the UN/EDIFACT encoding rules for all X12 standards produced in 1995 or later. However, at this time, this decision will not require retroactive maintenance activity on all existing X12 Standards Transaction Sets.

   X12N transactions that facilitate the transfer of health care claims and remittance information as well as benefit coordination, enrollment and verification are enjoying dramatically increased use. HL7 has elected to assume that all business transactions between institutions regarding the interchange of claims, benefits or other financial information are the responsibility of ASC X12N, the insurance subcommittee of X12.

   In February of 1994, HL7 and X12 signed an agreement to "improve coordination efforts and have identified that technical issues must be harmonized. Both groups agree to migrate to the appropriate level of resolution of potentially overlapping work by utilizing user and standards communities' and anticipated health care reform requirements."

   Since then, HL7 and X12 have created two bodies to address the goals of harmonization: (1) HL7 - X12N Coordinating Ad Hoc Steering Committee to oversee efforts, and (2) HL7 - X12N Joint Coordinating Committee to develop and implement specific plans to achieve harmonization. Both committees have convened a meeting in 1994 and will continue their work through 1997.
3. ASTM 1238.88 Laboratory Data Reporting. An active liaison effort between the ASTM committee and the Working group has resulted in minor changes in the ASTM specification to

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enhance compatibility, changes in the HL7 control specifications to enhance compatibility, and the development of the entire Ancillary Data Reporting chapter, developed jointly by the committees and built on the ASTM standards. This liaison has now extended to the point where both groups now have the permission to freely use the contents of each others standards efforts "in whole" within their own published standards.

Some distinctions are more in the terminology chosen than the actual message content. For example, the ASTM "sub-field delimiter" is generally used to separate repetitions of homogenous values. It is called a "repetition separator" in HL7. HL7 and ASTM are both members of ANSI's HISB.

4. NCPDP (National Council for Prescription Drug Programs). The NCPDP published standards for information processing for the pharmacy services section of the health care industry. HL7 and the NCPDP signed a Memo of Understanding on November 5, 1997 declaring common interests with respect to physician/pharmacist interface modeling and joint mapping. HL7 and the NCPDPD agreed to work to assure that community pharmacy content can be sent by either message standard. There is also interest in developing a joint patient medication profile message.

5. IEEE P1157 ("MEDIX"). The MEDIX committee is defining an application-level protocol similar in scope to HL7 but built strictly on the ISO protocol stack up to and including the Remote Operation Service Element (ROSE). HL7 varies from this approach by the decision not to depend on ROSE nor use the ASN.1 BER syntax notation. Despite the difference in approaches, the HL7 Working Group has regular liaison with the MEDIX committee. The Working Group has devised a format for the HL7 Standard that is relatively independent of the encoding rules chosen and easily translated into the ASN.1 notation. The transactions defined in this manner should be directly transferable to the MEDIX effort, and transaction messages encoded using the HL7 scheme should be translatable to transactions encoded using the BER. This should facilitate the creation of gateways between HL7 and other protocols.

   In addition, HL7 and MEDIX have agreed on a course for convergence. This will occur within the HL7 Abstract Message definitions. MEDIX has further agreed to use the HL7 abstract message definitions as defined in V2.1 as a starting point for the MEDIX message definitions.

   HL7, X12, NCPDP and IEEE are ANSI approved standards developers, and Versions 2.2 and 2.3 of the HL7 Standard have been balloted as ANSI standards.

1.5.5.3 Proprietary Protocols

With relation to proprietary protocols, the HL7 Standard is regarded as a migration path. The Working Group recognizes that migration requires effort, and that migration of all interfaces to HL7 at a particular facility may reasonably be accomplished in steps, rather than implementing an all-or-nothing approach at a particular point in time.

1.6 REFERENCE DOCUMENTS

This section is an excerpt from Chapter 1 of the HL7 Version 2.3 Standard.

1.6.1 ANSI Standards[1]

ANSI X3.30	1985 Representation for calendar date and ordinal date
ANSI X3.4	1986 Coded character sets - American National Standard code for information interchange (7-bit ASCII)
ANSI X3.43	1986 Information systems representation of local time of day for information interchange
ANSI X3.50	1986 Representations for U.S. customary, SI, and other units to be used in systems with limited character sets
ANSI X3.51	1986 Representations of universal time, local time differentials, and United States time zone references for information interchange

1.6.2 ISO Standards[2]

ISO 5218	1977 Information Interchange-Representation of Human Sexes
ISO 1000	1981 SI Units and Recommendations for the use of their multiples and of certain other units
ISO 2955	1983 Information processing-Representation of SI and other units in systems with limited character sets
ISO 8072	1986 Network Standards
ISO 8601	1988 Data elements and interchange formats - information interchange (representation of dates and times)
ISO 8859	1988 Information Processing- 8-bit single-byte coded graphic character sets
ISO 8859/1	1988 Information Processing-Latin Alphabet No. 1
ISO 8859/2	1988 Information Processing-Latin Alphabet No. 2
ISO 8859/3	1988 Information Processing-Latin Alphabet No. 3
ISO 8859/4	1988 Information Processing-Latin Alphabet No. 4
ISO 8859/5	1988 Information Processing-Latin/Cyrillic Alphabet
ISO 8859/6	1988 Information Processing-Latin/Arabic Alphabet
ISO 8859/7	1988 Information Processing-Latin/Greek Alphabet
ISO 8859/8	1988 Information Processing-Latin/Hebrew Alphabet
ISO 8859/9	1988 Information Processing-Latin Alphabet No. 5
JAS2020	A subset of ISO2020 used for most Kanji transmissions
JIS X 0202	ISO 2022 with escape sequences for Kanji

1.6.3 Codes and Terminology Sources

ACR	Index for Radiological Diagnosis, Revised 3rd Edition
CPT4	Current Procedural Terminology[3]
CAS	USAN 1990 and the USP dictionary of drug names[4]
EUCLIDES	European standard for clinical laboratory data exchange[5]
Home Health	Home Healthcare Classification System (Virginia Saba, EdD, RN, Georgetown U. School of Nursing, Washington DC)
HIBCC	Standard for electronic business data interchange

[1] Available from American National Standards Institute, 11 West 42nd Street, New York, NY 10036

[2] Available from ISO 1 Rue de Varembe, Case Postale 56, CH 1211, Geneve, Switzerland

[3] Available from American Medical Association, P O Box 10946, Chicago, IL 60610

[4] William M. Heller, Ph.D., Executive Editor. Available from United States Pharmacopeial Convention, Inc., 12601 Twinbrook Parkway, Rockville, MD 20852.

[5] Available from G. De Moor, M.D., Dept. of Medical Informatics 5K3, State University Hospital Gent, De Pintelaan 185, B 9000 GENT, BELGIUM

ICCS	Commission on Professional and Hospital Activities
ICD-9	International Classification of Diseases, 9th Revision
ICD9-CM	International Classification of Diseases, Clinical Modification Manual of Clinical Microbiology[6]
NANDA	North American Nursing Diagnosis Association, Philadelphia PA
NDC	National drug codes[7]
NIC	Nursing Interventions Classification, Iowa Intervention Project. U. of Iowa
NLM	Unified Medical Language[8]
Omaha System	Omaha Visiting Nurse Association, Omaha NE
Read	Clinical Classification of Medicine[9]
SNOMED III	Systemized Nomenclature of Medicine[10]
WHO	Drug Codes[11]
UMDNS	Universal Medical Device Nomenclature System[12]
FDA K10	Device Codes Device and analyte process codes[13]
LOINC	Laboratory Object Identifier and Numerical Code[14]

1.6.4 Other Applicable Documents

ASTM E31.12 Draft Dec 1990 - A Standard Specification for Representing Clinical Laboratory Test and Analyte Names Draft[15]

ASTM E1467-91 Standard Specification for Transferring Digital Neurophysiological Data Between Independent Computer Systems[16]

ASTM E1394 A Standard Specification for Transferring Information Between Clinical Instruments and Computer Systems[17]

ASTM E1381 Standard Specification for the Low-level Protocol to Transfer Messages between Clinical Instruments and Computer Systems[18]

McDonald CJ, Hammond WE: Standard formats for electronic transfer of clinical data. Annals of Internal Medicine 1989; 110(5):333-335.

International Union of Pure and Applied Chemistry/International Federation of Clinical Chemistry. The Silver Book: Compendium of terminology and nomenclature of properties in clinical laboratory sciences. Oxford: Blackwell Scientific Publishers, 1995.

LOINC Committee. Logical Observation Identifier Names and Codes. Indianapolis: Regenstrief Institute and LOINC Committee, 1995. c/o Kathy Hutchins, 1001 West 10th Street RG-5, Indianapolis, IN 46202. 317-630-7433. Available via FTP/Gopher

[6] Available from American Society for Microbiology, 1913 Eye St., NW, Washington, D.C. 20006.
[7] Available from the National Drug Code Directory, FDA, Rockville, MD, and other sources
[8] Available from National Library of Medicine, 8600 Rockville Pike, Bethesda, MD 20894
[9] Available from James D. Read, MB, ChB, DRCOG, MRCGP, General Medical Practitioner, Park View Surgery, 26-28 Leicester Rd., Loughborough, Leicestershire LE11 2AG.
[10] Available from American College of Pathology, Skokie, IL
[11] Available from INTDIS, P O Box 26, S-751 03 Uppsele, Sweden
[12] Available from ECRI, 5200 Butler Pike, Plymouth Meeting, PA 19462
[13] Available from Dept. of Health & Human Services, FDA, Rockville, MD 20857
[14] Available from LOINC Committee. Logical Observation Identifier Names and Codes. Indianapolis: Regenstrief Institute and LOINC Committee, 1995. c/o Kathy Hutchins, 1001 West 10th Street RG-5, Indianapolis, IN 46202. 317-630-7433. Available via FTP/Gopher (dumccss.mc.duke.edu/standards/HL7/termcode/loinclab) and the World Wide Web (http://dumccss.mc.duke.edu/standards HL7/termcode/loinclab/)
[15] Available from American Society for Testing and Materials (ASTM) 1916 Race St., Philadelphia, PA 19103-1187
[16] Available from American Society for Testing and Materials (ASTM) 1916 Race St., Philadelphia, PA 19103-1187
[17] Available from American Society for Testing and Materials (ASTM) 1916 Race St., Philadelphia, PA 19103-1187
[18] Available from American Society for Testing and Materials (ASTM) 1916 Race St., Philadelphia, PA 19103-1187

(dumccss.mc.duke.edu/standards/HL7/termcode/loinclab) and the World Wide Web (http://dumccss.mc.duke.edu/standards HL7/termcode/loinclab/)

Forrey AF, McDonald CJ, DeMoor G, Huff SM, Leavelle D, Leleand D et al. Logical Observation Identifier Names and Codes (LOINC) database, A public use set of codes and names for electronic reporting of clinical laboratory test results. Clin Chem 1996; 42:81-90.

1.7 PUBLISHED HEALTH CARE INFORMATICS STANDARDS

- Application Protocol for Electronic Exchange in Healthcare Environments, Version 1.0, 1987
- Application Protocol for Electronic Exchange in Healthcare Environments, Version 2.0, 1989
- Application Protocol for Electronic Exchange in Healthcare Environments, Version 2.1, 1990
- Application Protocol for Electronic Exchange in Healthcare Environments, Version 2.2, 1994
- Application Protocol for Electronic Exchange in Healthcare Environments, Version 2.3, 1997
- HL7's Implementation Support Guide for Version 2.1, 1992
- HL7's Implementation Support Guide for Version 2.2, 1995
- HL7's Implementation Support Guide for Version 2.3, 1998

1.8 EXPECTED PUBLICATIONS

Application Protocol for Electronic Exchange in Healthcare Environments, Version 3.0, 2000

1.9 HL7 SPONSORED MEETINGS

HL7 has been meeting regularly since March 1987. HL7 meetings have generally been held three times each year in January, April and September. The traditional meeting schedule is as follows: an introductory Tutorial on HL7 is provided on Monday; Working Group meetings convene on Tuesday through Friday morning. HL7's Fall meeting also includes a Plenary meeting (on Monday) with Working Group Meetings convening Tuesday through Friday morning

A schedule of recent and future HL7 Working Group meetings is provided below:

HL7 MEETING DATES	LOCATION
January, 1998	New Orleans, LA
April, 1998	Baltimore, MD
September, 1998	San Diego, CA
January, 1999	Orlando, FL
April, 1999	Toronto, Ontario

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1.10 KEY CONTACTS

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Mission (Draft)
The Control/Query committee is responsible for defining the details of the message transport services including encoding rules and auxiliary protocols, maintenance of common datatypes, definition of the query framework, and definition of the framework for master files support.

There is a process meta-model for control/query. For each main topic/project project described below, we will determine the use cases and work with the M&M TC to complete the process meta-model.

Projects

- Network Protocol
- Data Type Definition
- Security
- Interversion Compatibility

- Query Mechanism
- Master Files

IMPLEMENTATION

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Mission
Develop and update the Implementation and Support Guide. The guide provides assistance to health care institutions, hospital information system vendors, consultants, and other support groups that are considering system development and implementation activities using the HL7 protocol. The guide will be published in conjunction with each version of the HL7 standard.

INFORMATION MANAGEMENT (MEDICAL RECORDS)

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Mission
The goal of the Medical Records/Information Management Technical Committee is to define messages to support the messaging needs of the health information management/medical records functions. The Committee is comprised of individuals representing vendors of information systems (computer based systems), health information management professionals and other stakeholders, including other allied health professionals and physicians.

Projects
This committee constructs Domain Information Models (DIMs) and messages which can be communicated to and from systems which serve the needs of the health information management/medical record functions of health care organizations.

INTER-ENTERPRISE

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Mission
The Inter-Enterprise Technical Committee defines messages and transactions to support cross-functional processing requirements of health care enterprises. This group will also act as a liaison between other functioning technical committees making proposals and/or recommendations to facilitate transactions flowing across multiple health care enterprises.

Projects

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The Scheduling project defines abstract messages for the purpose of communicating various events related to the scheduling of appointments for services and associated resources. The Patient Referral project defines the message set used in patient referral communications between mutually exclusive health care entities.

MODELING AND METHODOLOGY

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Mission

The Modeling and Methodology Committee is responsible for creating and maintaining the HL7 message development methodology and facilitating its use, and maintaining a Reference Model that reflects the shared models that are developed and used by the HL7 Functional Committees.

Projects

- Modeling Tools Selection
- Harmonization Process Definition
- Modeling and Methodology Facilitation

ORDERS/OBSERVATIONS COMMITTEE

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Mission

The goal of the Orders/Observations Technical Committee is to define messages to support the order communication and observation reporting processing requirements between the stakeholders in the health care organization regarding patients, non-patients, people, other species, or inanimate objects. These messages are not limited to intra-organizational transactions, but may cross organizational boundaries.

Projects

The initial scope of this committee is to migrate the contents of Chapters 4 and 7 from V2.3 to V3.0. To that end the committee will define the respective models as described in the Message Development Framework.

- Migration
- Short-term fixes
- Medical device interfacing project proposal

- Non-patient orders

PATIENT ADMINISTRATION/FINANCIAL MANAGEMENT

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Mission

The goal of the Patient Administration and Financial Management (PAFM) technical committee is to define messages to support the "administrative" (that is, patient management, ADT) and "financial" (that is, patient accounting, billing) processing requirements of health care providers.

The Patient Administration projects will define the messages needed to support the identification, maintenance and movement of patients throughout the health care provider environments. This explicitly excludes the X12 subject domain and third party entities (e.g., payers and government).

The Financial Management projects will define the messages needed to support the identification and maintenance of patient accounting data (including contract management) throughout the health care provider environments.

Projects

Patient administration projects:

- Communicate the collection and maintenance of person demographic data
- Communicate the collection and maintenance of persons or entitied related to the patient
- Communicate the collection and maintenance of patient encounter (visit) data
- Communicate the collection and maintenance of location tracking data
- Communicate specific identifier maintenance information
- Communicate associated patient administration master file data
- Communicate the collection and maintenance of data for a master patient index

Financial Management projects:

- Create and maintain patient account information (include guarantor, insurance, diagnoses
- and procedure data)
- Communicate detail financial transactions (e.g., charges, credits, adjustments)
- Communicate regulatory information (include UB, DRG and accident data)
- Communicate associated financial management master file data

PATIENT CARE

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Mission

The goal of Patient Care is to define messages to support the needs for communicating information regarding the creation, management, execution and the quality of diagnostic and therapeutic care.

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Projects
The scope for Patient Care is a subset of the healthcare delivery and management processes. The scope includes activities related to assessing and evaluating the patient/member, establishing the diagnosis/problem, developing and managing a plan of care/service/action, administering care or treatment based on the plan, documenting the administration of the plan of care, managing compliance and exception reporting, and reporting of clinical results/outcomes. The scope also includes the development and maintenance of "standardized" pathways/protocols, as well as support for concurrent/retrospective quality and/or outcomes analysis and management.

The scope includes the ability to support the information needs of activities such as scheduling, patient tracking, and orders and results. The scope does not assume stewardship of messages generated by these external activities. A goal of this committee is to continue to take advantage of and extend messages developed by other HL7 committees rather than develop redundant and independently maintained message components.

VOCABULARY

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Mission
To identify, organize and maintain coded vocabulary terms used in HL7 messages.

Projects
Provide an organization and repository for maintaining a coded vocabulary that, when used in conjunction with HL7 and related standards, will enable the exchange of clinical data and information so that sending and receiving systems have a shared, well defined, and unambiguous knowledge of the meaning of the data transferred.

SPECIAL INTEREST GROUPS

AUTOMATED DATA

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Mission
The goal of the Automated Data (SIG) is to support the message development efforts of the Technical Committees with respect to the transfer of automated physiologic data - in particular waveforms. The scope of the SIG will be limited to insuring that the V2.3 content relative to the transmission of waveform data is carried forward in V3 of the standard.

Projects
Support the technical committees to insure that V2.3 content relative to the transmission of Waveform data (Chapters 2 and 7) is carried forward in V3 of the HL7 standard.

CONFORMANCE
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Mission
The SIG Conformance will provide mechanisms for:
- Specification of conformance to HL7 via message profiles
- Registration of HL7 message profiles by HL7

Projects
- Define the form and content of an HL7 message profile document which is to be submitted for registration. This will include both static and dynamic conformance statements.
- Establish criteria for the submission of profiles, including but not limited to, evidence of implementation by two or more independent vendors.
- With approval of the HL7 Executive and Steering committees, submit registered HL7 message profiles for recognition by other international organizations involved in the progression of standards profiles including, but not limited to, EWOS and ISO JTC1.

DECISION SUPPORT
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Mission

Decision support (DS) refers to those functions, which utilize data available in a health care enterprise, that facilitate and support decision making. *Decision makers* may be individuals or computer programs, including all stakeholders such as health care practitioners, nurses, pharmacists, quality assurance personnel, and other administrative personnel.

The *domains* for DS include the support of *clinical* decisions, *financial* decisions, or *administrative* decisions. The *mode of interaction* for decision support system functionality may be real-time, just-in-time, or retrospective/asynchronous. The *scope* of data involved may be patient-centric or aggregate across populations. Example DS applications are: patient-centered alerting/reminding, the automated tracking of complex electronic guidelines, cost-benefit analysis, outcome analysis, etc. Decision support applications often draw inferences or conclusions from diverse data elements and multiple data sources, and thus have a requirement for data that is represented in a controlled and semantically meaningful fashion.

The role of the Decision Support SIG is to (a) identify the scope and range of data elements required for the functionality of DS applications, (b) work with other SIGs or outside organizations to identify appropriate controlled vocabularies for encoding those data elements, (c) identify or define messages (and objects) required to support the specific information exchange needs of DS applications, both as feeders to DS applications and as output from DS applications.

Projects

- Patient-centered near-real-time alerts
- Population and interpretation of data warehouse used for Decision Support.

HOME HEALTH

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Mission

The goal of the Home Health/Long Term Care SIG is to support message development efforts of the TCs to meet the needs of our interest groups (Home Health Agencies, Long Term Care facilities, Hospices, Assisted Living facilities, Managed Care Organizations, Adult Day Care facilities, and other non-inpatient admitted facilities).

Projects

- The group will develop its own use cases and scenarios to use as a reference for the members when representing the group's interests at Technical Committee meetings.
- We will advance the model of Home Health/Hospice and Long Term and other non-hospital based care through collaboration with technical committee and inclusion of our needs in the committee's DIM.

IMAGE MANAGEMENT

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Mission
The purpose of the Image Management SIG is to provide a focus for convergence of HL7 and DICOM. The College of American Pathologists and the American Society for Gastrointestinal Endoscopy will participate in the SIG, along with the American College of Radiology and other professional specialty societies. Strong multi-specialty participation will ensure that HL7 specifications for the Imaging System - Information System (ISIS) interface will be compatible with DICOM, MEDICOM, and JIRA standards, and that all diagnostic and therapeutic imaging contexts are supported.

The Image Management SIG recommends SNOMED (Systematized Nomenclature of Human and Veterinary Medicine) as the primary terminology resource for the coded-entry Data Elements of both Standards.

Projects
To this end the Image Management SIG is developing a framework for the development of an HL7 and DICOM interoperability model. The framework leverages the work done in development of the HL7 v 3.0 Task Force's Message Development Framework (MDF).

MPI MEDIATION
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Mission
The goal of the MPI Mediation SIG is to recommend improvements or extensions to the HL7 specifications which support mediation among local MPI's (master patient indices). The specification will describe processes by which a unique individual can be identified and coordinated across multiple internal and external systems – both existing and future.

Projects
The MPI Mediation SIG will focus on the business functions which are to be addressed. The general boundaries of this effort will include:

- the description of an implied structure
- the necessary service requests with their attendant responsibilities and roles
- the need to quickly provide useful specifications
- the ability to support multiple identifiers, both for cross-referencing and for grouping
- the ability to support persons as well as other "entities"
- the "hooks" for access control

OBJECT BROKER TECHNOLOGIES
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Mission
The charter of the group is to facilitate prototype implementations of HL7 in Object Brokering Technologies. Examples of Object Brokering Technologies include OLE 2.0 (Microsoft), CORBA (Object Management Group), Distributed Objects (NextSTEP), Object Broker (DEC), and OpenDOC (industry consortium).

Projects
The general plan is to select some specific transactions that are relatively simple, develop a specification based on HL7 V2.2, then develop vendor-specific specifications and implementations. The choice of vendors will be made by the individual HL7 members doing the development of the prototypes.

SECURE TRANSACTIONS

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Mission
This group will focus on the use of HL7 in communications environments where there is a need for authentication, encryption, non-repudiation, and digital signature. This group will focus on the mechanisms for secure HL7 transactions and not on standardizing security policies. It will, however, ensure that the mechanisms are present to implement security policies. It will report to HL7 on available options and recommend actions that the organization may take to address these needs. The early activities of the group will include reviewing the work of other standards groups in this area including, but not necessarily limited to, ANSI X3, ASTM, CEN, CPRI, X12, HL7 Germany, U.N. Edifact, and the general Internet community.

Projects
The Scope of the Secure Transactions SIG is network and internet security of HL7 transactions at the application level independent of underlying transport.

SGML/XML
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Mission
The HL7-SGML Initiative is a special interest group of HL7 formed to create the standard for the use of

SGML in all domains of health care. This standard will comply with ISO 8879 (SGML). Participation is open to all parties.

Projects

- Create and coordinate the development of a comprehensive document architecture for health care
- Educate the healthcare community in the capabilities and utility of SGML-based informatio
- Develop, coordinate, and maintain a framework for interoperable Document Type Definitions (DTDs) for use in health care and health care standards including HL7
- Coordinate and cooperate with other SGML initiatives where appropriate
- Enable and promote the use of these standards and to make the standard as widely available as possible
- Represent health care in SGML standards activities/evolution
- Promote longevity of all information encoded according to these guidelines
- Ensure that the document architecture standards comply with and not be out of conformance with HL7

1.11 INTERNET RESOURCES

1.11.1 General Information

Homepage: http://www.hl7.org

Duke website: http://www.mcis.duke.edu/standards/HL7/hl7.htm

To join the list server: Send e-mail to:

majordomo@virginia.edu
Subject line may contain anything you want
First line must read “subscribe HL7”

1.11.2 Homepages for Technical Committees and Special Interest Groups

Control/Query:
http://www.mcis.duke.edu/standards/HL7/committees/control-query/index.htm

Image Management:
http://www.mcis.duke.edu/standards/HL7/committees/image-management/im-home.html

Object Broker Technologies:
http://www.mcis.duke.edu/standards/HL7/committees/SIGOBT/obt.html

Quality Assurance:
http://www.mcis.duke.edu/standards/HL7/committees/quality-assurance/missions/missions.htm

Secure Transactions:
http://www.mcis.duke.edu/standards/HL7/committees/secure/index.html

SGML/XML:
http://www.mcis.duke.edu/standards/HL7/committees/sgml/index.html

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1.12 SUGGESTIONS AND COMMENTS

The HL7 Implementation Committee welcomes comments and suggestions for improving the implementation support guide. Feedback should be sent to:

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2
Planning Methodology

2.1 INTRODUCTION

The planning component of the methodology is structured as a general guide that outlines key activities that should be considered by a health care organization when planning for the acquisition and/or replacement of various systems/applications in an HL7 environment. It begins with project planning and organization considerations, then takes the reader through vendor evaluation and selection. (The implementation methodology begins with interface design and continues through to interface testing and conversion). Multiple vendor systems can be implemented using the HL7 Standard.

Point-to-point interfaces can be implemented with a direct physical connection, or over a shared physical connection such as a LAN. Interfaced applications from disparate vendors may even reside on the same CPU. Linking applications in any environment requires the development of interfaces.

This component of the methodology has been developed in a manner that is intended to be comprehensive enough to be utilized in both types of environments. In addition to addressing some of the general issues associated with any type of systems planning project, the methodology also addresses many of the planning issues specifically associated with implementation of an HL7 environment, and developing interfaces in this type of environment.

The methodology has been enhanced to include the evaluation and implementation of interface engine products. There is a broad array of interface engine products now in the marketplace offered by both HIS vendors and niche vendors. These products have been growing in popularity and usage as they can facilitate the integration of multiple systems. Interface engines can address the problems created by vendors speaking different "flavors" of HL7, as well as vendors who do not support HL7 at all, or do so at a prohibitively high price. Interface engines can also link systems which have lower level protocol incompatibilities (e.g., one vendor uses TCP/IP and another vendor RS232) or data model incompatibilities (e.g., accommodation code is a two character field in the registration system but only a one character field in the order entry system). Finally, interface engines can serve as message routers, determining which systems on the network should receive messages and delivering them accordingly. Routing may be simple, based solely on HL7 trigger event (e.g., lab and pharmacy always receive admit messages) or complex, based on the data contained within the message (e.g., ICU receives admit data only if patient service is ICU).

It is critical when planning for implementation of a multi-system environment that an overall systems strategy and technical architecture be established. These strategies will help guide the health care institution through critical issues such as how information technology will be utilized to support business goals and objectives, whether an HL7 approach is appropriate for your organization and what the overall technical architecture of the organization will be. Considerations related to these activities are included within this section of the methodology. However, these considerations are not intended to be comprehensive.

The planning methodology contains the following sections:

A. Planning and Organization

B. Business Strategy and Performance Measures

C. Information Needs and Application Requirements

D. Technical Architecture

E. Organization Strategy

F. Migration Strategy

G. Cost/Benefit Analysis

H. Vendor Evaluation and Selection

Additional information regarding systems planning considerations, as well as the pros and cons of both networked and traditional point-to-point environments, is available in many of the health care technology publications, as well as through health care information consulting firms. These references should be considered in conjunction with the HL7 methodology when conducting a systems planning/evaluation project.

2.2 PLANNING AND ORGANIZATION

The purpose of this section is to ensure that an overall work program has been developed which defines the activities to be completed, the overall project time frame and resource requirements. These activities are also intended to ensure that executive management understands and supports the project.

2.2.1 Project Organization

2.2.1.1 Define Scope Of Project

Communicate the intended project scope and approach to senior management and obtain their approval for the project.

2.2.1.2 Determine Resource Requirements

Identify the personnel skill and experience requirements for the project. Identify and arrange for any necessary outside expertise.

2.2.1.3 Establish Advisory Committee

Establish a Management Advisory Committee to oversee and guide the project. Verify that the budgetary estimates have been incorporated into any necessary capital/operating budget plans.

2.2.2 Work Plan

2.2.2.1 Develop Project Plan

Develop a detailed work program for the planning project which identifies all of the necessary work steps, responsibilities, deliverables, time frames and budgets.

2.2.2.2 Assign Resource Requirement

Identify the internal personnel for the project, and identify and arrange for any necessary outside expertise.

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2.2.2.3 Define Status Reporting Requirements

Define the method, schedule and distribution list for project status reports and updates. Establish variance limits for immediate escalation.

2.2.2.4 Prototype/Demonstration

Conduct demonstrations (e.g., development of a prototype or visits to HL7 sites) as necessary in order to demonstrate the value and functionality of an HL7 environment.

2.3 BUSINESS STRATEGY/PERFORMANCE MEASURES

The purpose of this section is to ensure that overall business goals and objectives of the health care institution have been considered in conjunction with technical planning for an HL7 environment. These activities are also intended to establish a framework for identifying, establishing and measuring costs, benefits and organizational impacts associated with the implementation of an HL7 environment.

2.3.1 Business Strategy

2.3.1.1 Prototype/Demonstration

Review the key strategic objectives and mission of the institution, the organizations' business needs and the size of the organization (e.g., anticipated growth, available budget). Ensure these items are understood and taken into consideration in establishing the overall systems strategies.

2.3.1.2 Streamline Current Operations

Identify any opportunities to streamline existing operations prior to initiating specific systems development activities. This will help maximize the benefits of new system implementations, and the integration of these systems.

2.3.1.3 Develop I.S. Strategy

Establish an overall information systems strategy (e.g., open architecture, single vendor, shared/contract services, multiple vendor (interfaced), etc.). This strategy will be critical in guiding subsequent vendor selection, design and implementation activities. Document the pros, cons and implications of the various overall systems strategy options as part of this process, and communicate these to executive management.

2.3.1.4 Develop Security Strategy

Establish a high-level security strategy regarding system access and controls. This is a necessary activity within any systems development project, but is even more critical when moving to a multi-vendor environment, particularly in a decentralized environment.

2.3.2 Performance Measures

2.3.2.1 Develop Benefits Checklist

Develop a checklist of criteria for evaluating benefits, impacts, costs and priorities for the subsequent systems development projects/applications. Review this information with executive

management in order to obtain their approval and support. This information should be used to help guide subsequent project direction and decisions.

2.3.2.2 Establish Benefit Criteria

Establish measurement tools and specific benefit benchmarks (e.g., existing baseline measures) in order to assess and determine the level of success that is being achieved during the selection and implementation processes.

2.4 INFORMATION NEEDS AND APPLICATION REQUIREMENTS

The purpose of this section is to ensure that the current systems status and functional requirements of the institution are understood, and are being taken into consideration during the planning process. During these activities, existing and planned transaction volumes should be determined in order to anticipate data storage and communication requirements.

2.4.1 Current Status Assessment - Information Needs And Systems

2.4.1.1 Document Current Environment

Document the overall current systems status in terms of existing applications, hardware, communications, and growth potential.

2.4.1.2 Identify Functional Information Requirements

Identify and document the information needs of each functional area considering system replacement/acquisition. Also identify, understand and evaluate the extent to which these needs are being satisfied by the current systems. Consider future business and technology plans, as well as any simplified work flows and policies/procedures, when identifying information needs.

2.4.2 Current Status Assessment - Technical Architecture

2.4.2.1 Identify Transaction Volume/Capacity

Research and document both current and projected transaction and data volumes. Following this, review and assess the current hardware and communications capacities in light of the information needs identified.

2.4.3 Application And Technology Requirements

2.4.3.1 Identify Application Information Requirements

Group information needs into various applications in order to identify the types of systems and potential options available.

2.4.3.2 Identify Application Technology Use

Identify and document the needs for any specific technologies, and map each required technology to the various applications.

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2.4.3.3 Assess Staff

A current assessment of the available personnel skills related to the systems environment selected should also be conducted.

2.4.3.4 Identify Application For Replacement/Modification

Determine which (if any) of the current information systems (applications) will be replaced. The institution should also identify existing systems/applications that may require modifications in order to implement an HL7 environment.

2.5 TECHNICAL ARCHITECTURE

The purpose of this section is to identify the overall technical environment in which the interface(s) will be developed. It is also intended to provide for development of a technology and communications infrastructure into which the various applications will be integrated.

2.5.1 Technology Requirements

2.5.1.1 Identify User Technology

Review the specific user technology requirements (e.g., image processing and bedside automation) identified during the previous tasks, and identify the implications on the overall technical architecture (e.g., image processing would require high speed/high capacity transmission lines).

2.5.1.2 Establish Technical Strategies

Establish overall strategies for each of the following technical architecture components:

- Processing architecture (distributed/cooperative and centralized)
- Data Storage (centralized/decentralized)
- Hardware platforms
- Workstation technology
- Communications (see below)
- Systems development strategy (e.g., package, custom and productivity aids)

2.5.1.3 Identify Additional Hardware/Software

Identify any major hardware and systems software components that will be necessary to support the intended environment. (Note: User needs, required technologies, and transaction volumes should be considered in this phase).

2.5.2 Communications/Network Strategy

2.5.2.1 Establish Communications Strategy

Establish an overall communications strategy in order to provide a framework for interfacing various systems. HL7 interfaces can be supported in a variety of communications environments including local area network, direct connect, or single processor environments. (Note: User needs, required technologies and transaction volumes should be considered in establishing the network strategy and in selecting components).

2.5.2.2 Define Communications Protocols

Define the communications protocols (including HL7) to be utilized through all 7 levels of the OSI model. The costs and benefits of using HL7 versus other standards and/or individual interfaces should be understood and evaluated. In situations where multiple standards will be permitted, all such protocols should be defined. This will help ensure compatibility and enable easier incorporation of future systems/applications. If standards other than HL7 will be accepted at the 7th level, the process for any necessary translations should be outlined.

2.5.2.3 Assess Need For Integration Tools

Perform a preliminary assessment of the need for integration tools based on user technology requirements, technical strategy, communications strategy, and communications protocols. Factors to consider at this point are obvious obstacles to integration (e.g., legacy vendor does not support HL7).

2.5.2.4 Evaluate Cabling Options

Consider and evaluate various physical cabling options (e.g., fiber, coaxial, twisted pair). Select one or more based upon user needs, technology requirements, and transaction volumes.

2.5.2.5 Define Network Management Requirements

Define responsibility for network management and control. Also identify the approach for data storage (e.g., centralized/decentralized), along with controls for ensuring data integrity.

2.5.2.6 Identify Communications Hardware/Software

Identify and document all of the necessary additional communications components. This may include network adapter cards, wiring hubs, bridges, routers, repeaters, additional cabling, or specialized communications servers.

2.5.2.7 Identify Character Translation Requirements

Identify character translation requirements (e.g., ASCII to EBCDIC).

2.6 ORGANIZATION STRATEGY

The purpose of this section is to ensure the organization has been adequately prepared for any changes implied by the new systems. Additionally, this section provides for considerations related to the design and implementation project staffing and organization.

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2.6.1 Organizational Considerations

Consider and document the potential impact of the overall systems direction on current organization structure and human resource policies and procedures. For example, will new jobs/positions be required, or will existing jobs/positions be changed as a result of the selected system's architecture (user and MIS).

Assess the ability of the organization to undergo the operational changes enabled by implementation of any system(s). Based upon this assessment, develop an action to facilitate this process. In addition, establish an organization that will help the organization maximize system benefits.

Consider and document the potential impact of a different overall systems strategy in terms of data ownership, integrity and responsibility. This may have implications related to the division of traditional systems responsibilities between MIS and user departments. For example, establish or change responsibilities for systems development and maintenance to reflect the overall system's direction.

2.6.2 Project Staffing And Organization

Identify the necessary personnel skills and resources to implement and operate/maintain the new system(s), and establish plans to obtain these skills and resources. Also identify the need for any systems integrator and vendors for design/implementation. Clearly define the expected role of the systems integrator and/or vendors.

2.6.3 Training And Conversion Planning

Establish an overall user training plan and methodology for user training if changes resulting from implementation of the HL7 interface(s) will be visible to the user community. Establish an overall communications strategy to convey project progress to the user community and management.

Establish an overall MIS training program to provide support for an HL7 environment.

Establish conversion plans as necessary for existing systems, data bases and files. Decide what data needs to be converted. Include conversion approaches for archived data. Specify methods for acquisition of data elements not available in old systems, if appropriate.

2.7 MIGRATION STRATEGY

The purpose of the migration strategy is to establish a plan for migrating from the current systems environment to HL7 environment. It is intended to serve as a high-level planning guide and will need to be supported by a detailed conversion plan for each specific system installation and interface.

2.7.1 Project Timing And Sequence

Identify and prioritize all of the required projects/ systems/interfaces, and establish an overall installation/conversion sequence. Develop overall time frames and planning charts for each project, including production dates and priorities for individual systems.

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2.7.2 HL7 Transition Strategy

2.7.2.1 Establish An Overall Transition Plan

The transition plan for the migration to an HL7 environment should include:

- The approach for integrating current systems with planned systems, including an assessment of how migration to HL7 will affect the functionality of the systems involved with the implementation(s).
- The approach for conversion: Decide if any current systems will be migrated to the HL7 environment before any new systems will be implemented, or if the new systems will be implemented in this environment first with the current systems to follow.
- Identification of any required HL7 translation products that may be necessary during the transition period, or on an on-going basis.
- The versions and chapters of HL7 that will be implemented.

2.7.2.2 Determine Interface Environment

Based upon the technical architecture established earlier, a decision will need to be made regarding whether the HL7 interfaces will be developed in a network environment, a point-to-point environment or some combination. Decide whether HL7 interfaces will be implemented at the lower level protocol, the encoding rules level, the abstract message level or some combination.

2.8 COST/BENEFIT ANALYSIS

The purpose of this section is to conduct a high-level cost/benefit analysis in order to document the economic impact of implementing the new systems/architecture.

2.8.1 Costs

2.8.1.1 Operating/Maintenance Costs

Identify and document the costs of operating/maintaining the current systems as a basis for comparison.

2.8.1.2 One Time And Ongoing Costs

Identify and document all of the one-time and ongoing costs associated with the effort of implementation, including:

- Hardware/Software/Communications (use the output from sections 2.5.1.3 and 2.5.2.6.)
- Installation
- Internal Personnel (use the output from section 2.6.2.)
- Interface

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- Consulting/Vendors
- Facility
- Other
- Hardware/Software Maintenance
- Opportunity costs and the time value of money

2.8.2 Benefits

Establish target benefits for the project(s). Both tangible and intangible benefits should be included in these targets.

Develop a benefits realization plan in order to help the organization manage the project and associated activities in a manner that enables attainment of the target benefits.

Obtain agreement from user departments and executive management that the target benefits are reasonable, and establish responsibilities/accountabilities for achieving the benefits.

2.8.3 Summary

Prepare an overall summary economic analysis and review this with senior management prior to finalizing vendor contracts and initiating design/installation projects.

2.9 VENDOR EVALUATION AND SELECTION

The purpose of this section is to identify the considerations associated with developing evaluation criteria to issue to potential systems and technology vendors, as well as considerations associated with evaluating and selecting various vendors.

While you may begin preliminary discussions with interface engine vendors prior to selection of your application vendor(s), the majority of your interface engine evaluation should take place following the selection of your application vendor(s). This will enable you to directly address solutions to your specific integration issues.

2.9.1 Evaluation Criteria

Develop evaluation criteria that describe the functional and technical requirements of the desired system(s). The evaluation criteria should include the following:

- A description of the current and planned technical environments of the hospital.
- A list of the specific interfaces required, specifically requesting that the vendors utilize the HL7 standard for interfaces addressed by the standard.
- Requests for the vendors to indicate specific pricing for each of the HL7 interfaces, and the scope of work included at that pricing (e.g., programming/testing/training).
- A clear definition of the responsibilities of the vendors.

- Skill level and availability of experienced resources.

The evaluation and selection of interface engine products should include the evaluation criteria listed above as well as the following criteria:

- Performance guarantees that the vendor is willing to make for interface throughput.
- Interface monitoring capabilities (e.g., status screens and visual, audible, or print alerts when interface(s) go down).
- Restart/recovery and a commitment regarding system up time.
- A clear understanding of configuration tools and flexibility. Provide the vendor with anticipated scenarios during product demonstrations and view the effort required to accomplish the desired results.
- Clear definition of what vendor provides in standard libraries to facilitate configuration (e.g., interface scripts, HL7 data dictionaries, etc.).
- Product documentation and training.

2.9.1.1 Assess Need For Assistance

Consider the need for a systems integrator to help coordinate implementation. If one is required, specific requirements (including skills) for the integrator should be identified and communicated.

2.9.1.2 General Vendor Evaluation/Selection

Establish criteria and weighting factors for evaluating and selecting the vendor(s), and obtain agreement from MIS, users and management.

Review vendor responses in order to ensure the vendors have adequately addressed/responded to the established criteria. During the selection process MIS, users and management should be involved. The selection process should also include reference calls/checks on each of the vendors.

Consider the following during the evaluation process:

- Functional and technical requirements of the system.
- Overall hospital technical architecture
- Likely impact on the organization (User and MIS)
- Potential costs and benefits of each option/vendor

2.9.2 HL7 Criteria

2.9.2.1 Vendor's Experience

Investigate and document the vendor's experience with HL7 interfaces, and consider this information during the selection process. If selecting an interface engine, understand the interface engine vendor's experience with your specific application systems and interfaces.

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2.9.2.2 Vendor Response Review

Review vendor responses in order to ensure the following is included:

- HL7 interface pricing, including a description of activities and time included within the quoted price
- References from HL7 activities and a list of delivered HL7 interfaces, including version installed, chapters and segments included and level at which the interface was developed
- Scope of vendor responsibilities
- Information/support required from other vendors in order to complete the HL7 interface(s)

2.9.2.3 Software Modification Review

Identify any modifications to the vendor's (application) software, which will be required to enable the HL7 interface(s). Estimate the cost of required modifications, as well as the impact on the application system functionality. Identify those modifications that could be handled by an interface engine and estimate the effort to configure the engine in-house or the cost to contract that effort out to the vendor.

3 Implementation Methodology

3.1 INTRODUCTION

The implementation methodology outlines key activities that should be considered and planned for when developing and/or implementing an HL7 interface. It also includes some activities specific to the installation of an interface engine. It begins with the design and development activities involved in creating an HL7 interface then outlines the planning steps required for an organization to install and support HL7 interfaces.

HL7, as a specification, provides a guideline to develop and implement interfaces between various applications. The implementation of these interfaces will be specific to the site and applications involved. It is, therefore, necessary for the health care organization implementing HL7 interfaces to manage the application of the HL7 specification with all parties involved.

HL7 may be implemented to replace an existing custom interface, for a new application, or as part of a total system replacement. The level to which the HL7 interface is visible to users will vary with the nature and extent of the implementation. This guide takes a 'broad brush' approach by attempting to cover a wide variety of possible implementations. Readers of this guide should therefore review and apply those sections which are most appropriate.

3.2 INTERFACE DEVELOPMENT

3.2.1 Project Planning

3.2.1.1 Identify Tasks

Document tasks to be completed during the implementation phase of the project. Also determine interdependencies among tasks to assist in scheduling and resource allocation. Depending on the number of interrelated projects going on at your institution, external projects (e.g., network design and installation, and interface engine selection and installation) may have a direct impact on your application and interface installation. Make sure that interdependencies between the projects are understood and that resource requirements and dates are determined with the global picture in mind.

3.2.1.2 Identify Resources

Identify those resources necessary to complete the tasks defined, including resources under your direct control and those from other internal, or external, areas (e.g., networking or communications department, technical services, and consultants). Use the output from section 2.6.1, "Organizational Considerations."

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3.2.1.3 Develop Schedule

Within the context of the overall project, and relative to resource availability and task interdependencies, determine the due dates and/or duration times for all tasks. From this, develop the implementation schedule and publish. Distribute this schedule to the clinical area management as well as information systems. Also share the schedule with vendors involved in the implementation so that they are clear as to what is expected of them and when. The schedule should be updated and redistributed on a regular basis.

3.2.1.4 Review/Revise Internal Standards

Review, and revise as necessary, internal standards regarding interface development including migration, conversion, change control, restart/recovery and backup.

3.2.1.5 Attend Interface Engine Training

If installing an interface engine, it is a good idea to complete product training prior to finalizing interface specifications. This will enable you to take specific interface engine capabilities into account when designing the interfaces, and should reduce specification modifications later on.

3.3 FUNCTIONAL DESIGN

3.3.1 Develop Interface Descriptions

Document general functional descriptions of the interfaces to be developed, including the applications, systems, departments, and vendors involved. List the perceived or anticipated benefits of the interface.

It is very important that decisions made during interface design be thoroughly and clearly documented and kept up to date. Interface programming, testing, support, maintenance, and upgrades will all be facilitated by detailed, accurate design documentation.

3.3.2 Complete HL7 Transaction Checklists For Each Interface

Appendix A contains a template of a design checklist that can be used to document key design decisions.

3.3.2.1 Define Trigger Events By Application

Using the current (or agreed upon) HL7 Standard, define all trigger events to be used through the interface. This should come directly from functional descriptions and analysis of current work and data flow as well as vendor capabilities to support. For example, an ADT vendor that does not provide “Leave of Absence” functionality in their registration system will not support triggers A21 (Patient Goes on a Leave of Absence) and A22 (Patient Returns from a Leave of Absence). Also make sure to document what action in the originating system triggers specific transactions over the interface.

3.3.2.2 Identify Required HL7 Segments

For each trigger event, define the HL7 segments required for the interface. Common segments can be defined once and referenced in each trigger event as needed.

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3.3.2.3 Identify Data Elements/Characteristics

For each segment, define the data elements that will be utilized and indicate whether they are required or optional. Reconcile naming differences, lengths, data types, table values, and internal segmentation for each element.

3.3.2.4 Identify Extra ('Z') Segment Requirements

Identify required data elements not available within the HL7 specification. Define and document extra ('Z') segments across applications to include these elements.

The use of 'Z' Segments is highly discouraged as they are extremely costly to maintain, especially as the application and HL7 advance over time. They should be used only if there is no other way in HL7 to communicate the information.

3.3.3 Document And Resolve Functional Interface Issues

Document and resolve inconsistencies between applications. These may include data elements of different types (text vs. code), non-passable edits or error correction, and non-automatable processes. These inconsistencies may be handled manually with modified user procedures, by customization of one or more vendors' code, or by the use of an interface engine.

3.3.4 Develop Restart/Recovery Approach

Develop procedures to handle downtime situations, system and interface restart, recovery and re-synchronization, and disaster or contingency planning. If installing an interface engine, develop comprehensive procedures for downtime and recovery keeping in mind that interface engine downtime will mean that all of your interfaces passing through the engine will also be down. Analyze potential points of failure and consider keeping spare parts to facilitate quick recovery.

3.3.5 Develop Failure Mode/Response Approach

Review the ability of each system to detect/correct errors, and report those errors to the remote system. Since the set of error codes in the current version of HL7 is user-defined, a set of error codes should be agreed upon to represent certain failure conditions. The failure condition that is represented by each code must be understood, and the handling of each error condition must be specified.

3.3.6 Develop Migration Approach

Define overall approach for migration of the developed interfaces to production. Include separate communications mechanisms, if needed, parallel testing and acceptance criteria.

3.3.7 Develop User Access/Security Approach

Define overall approach for user access to and the security of interfaced systems. Include single vs. multiple point of entry and number of log ins and passwords.

3.3.8 Obtain User Review And Acceptance

Document and present for approval the entire functional design documentation, including applied HL7 specifications, new/modified manual procedures, and any vendor code modifications.

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3.4 TECHNICAL DESIGN

3.4.1 Define Required Hardware Platforms

Document existing hardware environment for applications to be interfaced. Document modifications, as needed, to each system.

3.4.2 Document Communications Design

3.4.2.1 Select Lower Level Protocol

The interface will be built on top of some media and access method. HL7 interfaces exist at the seventh, or application, layer of the OSI model. As such, they require the support of some lower level protocol (LLP). It is important for each site to select an LLP that meets the needs of the interface and fits into the overall telecommunications strategy and architecture of the company.

Things to consider include the time frame for installation, existing staff experience/expertise, long-range communications strategy, and cost. Also there may be existing LLP that can be utilized with little or no disruption to the overall environment.

3.4.2.2 Define Communications Hardware

Once the lower level protocol has been identified, define any additional communications hardware required. This may include network adapter cards, wiring hubs, bridges, routers, repeaters, additional cabling, or specialized communications servers.

3.4.3 Define Workstation Requirements

Determine requirements for workstations to be used with the interfaced systems.

3.4.4 Define Application/Facility Names

Define and document application or facility names for identification during interface development, testing and implementation. These names may be used in interface lookup tables or in the messaging of the protocol.

3.4.5 Design Programs/Lower Level Protocol

Design programs to interact or operate with the lower level protocol. This may include programs at the transport level to communicate with the hardware, or using the application program interface of third party lower level protocol software.

3.4.6 Application Level (HL7)

Design programs to format or translate messages into HL7 format. This will come directly from the analysis of the trigger events, segments and data elements completed in section 3.3.2. Design should include specifics regarding message acknowledgment procedures.

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3.4.6.1 Application Code Modifications (As Needed)

Design modifications to vendor application code and interface engine configuration files as needed to resolve inconsistencies or support special needs.

3.4.7 Define/Document Specifications

Develop detailed specifications per the above analysis and design. This should include who (vendor/internal/consultant) will be involved and what specifically will be done. Design specifications and responsibilities should be formally approved by all involved parties.

3.4.8 Develop Implementation And Testing Approach

Define high-level implementation and testing strategies. This should be reviewed with all parties (users, resources, etc.). This document should include all procedures, processes, criteria, data, and documentation to be used. This approach will be finalized as part of the implementation phase of the project.

3.4.8.1 Define The Testing Methodology

- Approach
- Documentation required
- Procedures
- End user system performance (response time parameters)
- Test model

3.4.8.2 Define Test Data

- Test data bases
- Test files
- Methods of test data creation
- Storage and recovery of test data

3.4.8.3 Testing Software Aides

Identify and apply as appropriate:

- Emulators, if required
- Editors
- Test data generators
- Test results comparer
- Dump facility

3.4.8.4 Testing Environment

Establish the following as appropriate:

- Isolate hardware
- Use of live system
- Location

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3.4.9 Testing

3.4.9.1 Testing Support

Identify resources and skills necessary for test team. Assign as appropriate. Use output from section 3.2.1.2, "Identify Resources."

3.4.9.2 Test Conditions

Outline the requirements for each possible condition to be tested. Document potential conditions as they arise throughout the entire development process. Additional conditions may be added during the testing process to identify unanticipated conditions. Fault-insertion testing procedures should be documented.

3.4.9.3 Expected Results

Document the expected results for each test, including output to another process and performance of the interface. This provides the method for verifying the result.

3.4.9.4 Testing Worksheet

Develop a document that will be used as a checklist during testing. It should provide step-by-step tasks including the setup and execution of the tests as well as expected results.

3.4.10 Finalize Migration Approach

Review and finalize the high-level migration approach defined during functional design. Detail the process and timetable for parallel testing, identify pilot users, separate or shared communications, and production cutover. Use the output from section 3.3.5, "Develop Migration Approach."

3.4.11 Finalize User Access/Security Approach

Review and finalize user access and security approach. This includes technical requirements to provide single or multiple points of entry, and resolution of log ins and passwords. Use the output from section 3.3.6, "Develop User Access/Security Approach."

3.4.12 Conduct Review And Obtain Acceptance For Technical Design

Document and present for approval entire technical design, including lower level protocol, communications hardware, programs, testing, migration and access approaches.

3.4.13 Conduct Review And Obtain Acceptance For Functional Performance

Document and present for approval the entire functional performance specification including:

- End user response time
- Data integrity/data flow
- Availability
- User access acceptance

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3.5 PROGRAM DEVELOPMENT

The following section applies to those persons involved with program development. Program development should begin only after the technical design has been completed and approved. The development serves to provide the actual program code used for the interface and also to provide documentation that accurately reflects this code. If any interface engine is being installed, it includes the development of site-specific configuration and supporting documentation. Documentation, though often overlooked, is an important tool for both supporting and upgrading your system. Alter documentation to reflect any program changes.

3.5.1 Program Architecture

Develop an overall program architecture to identify all the functions of the program. This will be used for the detailed design of the program. The design may indicate multiple modules (subroutines) to handle specific functions. Use the design documents generated in section 3.4.5, "Design Programs/Lower Level Protocols."

Minimal functions should include:

- Build HL7 messages.
- Parse HL7 messages.
- Interface to program handling the lower level protocol.
- Interface to program handling the application.
- Error handling/trapping.

3.6 IMPLEMENTATION

3.6.1 Site Preparation

3.6.1.1 Physical

This involves any physical changes necessary to implement the interface, including modifications to physical workspace or computer room, additional furniture or equipment racks, and reservation of space for training or testing. (Use output from section 3.4.1, "Define Required Hardware Platforms" and section 3.4.2.2, "Define Communications Hardware").

3.6.1.2 Technical

This includes technical changes to the existing environment, such as the addition of or modifications to cabling, communications closets and lighting or power/electrical requirements.

3.6.2 Select/Install Lower Level Protocol

Interfaces can be implemented in a number of environments, including among applications on a single processor, point-to-point between systems, or over a network. In most cases, the interface will be built on top of some media and access method. HL7 interfaces exist at the seventh, or application, layer of the OSI model. As such, they usually require the support of some lower level protocol (LLP). Things to consider include the current environment, time frame for installation, existing staff experience/expertise, long-range communications strategy, and cost. Use the output from section 3.4.2.1, "Select Lower Layer Protocol."

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3.6.3 Select/Install Hardware

Hardware includes upgrades to and/or purchases of new hardware components such as memory or disk, CPU, communications boards, networking hardware (e.g., bridges, routers, gateways, modems, multiplexers, etc.), workstations and printers. Make sure to take delivery and installation lead times into account when planning your order dates for any hardware components.

3.6.4 Select/Install Software

Software includes not only HL7 interface code for each application, but also additions or modifications to system or application software, communications software and perhaps network management or diagnostic software.

3.6.5 Network/Communication Testing

After selecting and installing the hardware, you have software and lower level protocol necessary for the interface, the basic communications environment. This should include testing point-to-point connection, virtual circuits, concurrent access and volume stress. Devices such as line monitors and network 'sniffers' should be employed to generate and monitor basic (lower level protocol) traffic. This unit-type test of the communications equipment will facilitate interface testing and isolation of problems during integration and parallel testing.

3.6.6 Policies/Procedures

3.6.6.1 Develop Policies

Update policy manuals with managerial policies regarding the interfacing of various source systems via the HL7 protocol. The company should provide clear guidelines and rationale for use of open systems or open architecture, and develop or modify policies accordingly.

3.6.6.2 Develop Operating Procedures

3.6.6.2.1 Change Control

Define procedures for maintenance of interface code, installation of new HL7 versions, and modifications to applications software. Control the environment and fully test new releases or updates.

3.6.6.2.2 Restart/Recovery

Define procedures to handle downtime situations, system and interface restart, recovery and re-synchronization, and disaster or contingency planning.

3.6.6.2.3 Backup/Restore

Backup and restore procedures are even more important, and should be developed or modified as needed to ensure data integrity and recoverability.

3.6.6.2.4 Table Maintenance

The addition of new application systems may increase the number of duplicate tables or dictionaries stored in multiple systems. In order to minimize transactions that are rejected by the

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interfaces due to unsynchronized tables, develop procedures to control the order and frequency of table maintenance in application systems.

3.6.6.2.5 Security

Define procedures to control, update and monitor security at each entry point (e.g., application systems, operating system, network, interface engine).

3.6.6.3 User Procedures

Review the new data flow and interface with users in light of current user procedures. Modify these procedures as needed. Typically this will require changing manual procedures that are no longer necessary for double entry into different system.

3.6.7 Conduct Training

3.6.7.1 User Training

An HL7 interface can be implemented with little impact on application system users, or may require significant changes in workflow and operation. This is dependent on the scope of the effort, (from the migration of an existing interface to HL7 through complete application system replacement). The impact can vary from transparent to major. Selection and use of the following sections depends on the nature and scope of the interface being implemented.

3.6.7.1.1 Review Changes In User Operation

Review operational changes in the user department related to new or redefined user procedures. This review should be from a training perspective in order to develop classes or materials to assist in the transition to the interfaced system.

3.6.7.1.2 Develop Training Material

Develop necessary training material from information gathered through development of user procedures and review of operational changes. Material will be employed during training in use of interfaced systems.

3.6.7.1.3 Schedule Training

Once training materials are available, schedule training. Training should be scheduled conveniently for users. It should also be scheduled over a period of weeks with time between sessions for users to get comfortable with the changes and develop a deep understanding. Training can also be scheduled during parallel testing (after all major bugs have been addressed). This allows for the overall schedule to be compressed by overlapping these functions.

The schedule should also account for preparing the training facility. This may include temporary cabling and workstations, or off-hours use of production areas.

Training should be conducted close to the actual implementation date so any new methods are still fresh when new systems are brought into production.

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3.6.7.1.4 Develop User Manual

As a final step in the training process, each department should receive a user manual. This manual should cover standard, daily operations, departmental specific procedures and a reference to available support. The manual may also contain reference or look-up tables for departmental data entry.

3.6.7.1.5 Conduct Training

Training should be held at the user site, but away from user work area for initial sessions. This allows users to concentrate on training without disruption. Training should be hands-on with the interfaced systems (in test or debug mode, if available). Class size should be kept small and consider using two trainers. This allows for more interaction and assistance. In the last phase of training have training staff rotate through the production areas to address on-the-spot, impromptu questions.

3.6.7.2 Support Staff Training

3.6.7.2.1 Environment

In many cases, the MIS support staff must be introduced to HL7 concepts and environment. They must understand the change in philosophy and direction, and how HL7 fits into the long-term strategy of the organization.

3.6.7.2.2 Application

Once the support staff is acclimated to the HL7 approach, they must become familiar with the application areas. In larger shops this is a matter of coordination between the interface and support groups. In most shops, however, this means the support team must work closely with the end users and the vendors. A thorough knowledge of the application systems will be invaluable throughout the implementation period and for ongoing support.

3.6.7.2.3 HL7

It is very important for the support staff to have a thorough understanding of HL7, its role in open systems and its use in interface development. This group must be able to look into the messages and diagnose problems, perform maintenance and foresee the impact of updates to application software or new HL7 releases.

3.6.7.2.4 Interfaces And Interface Engine

Support staff should understand the interfaces that will be implemented and the specific usage and role of the interface engine in your environment.

3.6.7.2.5 Develop Support Reference Manual/Library

Develop manual for support staff that applies the technical education received to specific operations for each system affected by the transition to HL7. This manual should assist help desk personnel in addressing support calls. Establish a library of related materials to assist in problem resolution.

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3.6.8 Go-Live Planning

3.6.8.1 Finalize Support Staffing Plan

Develop a list of all of the support responsibilities for the new system(s) and interfaces including items such as end-user help desk support, routine maintenance, and interface monitoring. Determine FTE and skill requirements for all support responsibilities. Identify personnel who will be responsible for support and develop training program to address any skills deficiencies.

3.6.8.2 Conversion Preparation

Develop a checklist to be used during the cutover to the new environment. Re-assess go-live dates, resource requirements, etc. Go-live dates and resources will need to be consistently monitored from this point forward and adjustments made as necessary depending on the project's progress.

3.6.9 Testing/Acceptance

Alert all vendors beforehand to your testing dates so that they can schedule the required resources to support you during the testing phases.

3.6.9.1 Conversion Testing

Test all conversion processes, both automated and manual. Compare actual results to expected results. Validate actual results during the functional interface and parallel testing activities.

3.6.9.2 Functional Interface Testing

Functional interface testing involves testing the data flow from all systems through the interface(s) to the receiving system. This will take on various forms depending on whether the system includes a series of point-to-point interfaces or uses a broadcast, store-and-forward machine. Interface testing and interface engine configuration testing will be closely linked as it will be difficult to test interfaces without the interface engine and vice versa.

3.6.9.3 Stress/Volume Testing

Following functional testing, the interfaces and the interface engine, if applicable, should be stress tested by simulating peak transaction volumes. Carefully monitor interface throughputs during the test to assess the interfaces' and interface engine's abilities to keep up during peaks in transaction processing.

3.6.9.4 Restart/Recovery Testing

Using restart/recovery procedures developed in section 3.6.6.2.2, force downtime situations and recover using documented procedures.

3.6.9.5 Parallel Testing

Once functional interface testing is complete, the interface should be brought up in a mirror production environment and parallel tested, if possible, with the existing systems and environment. Specific transactions should be identified to be entered into both systems.

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3.6.9.6 Test Results

Document the testing results in a summarized fashion. This document may be used to review the results of the testing and determine whether additional testing is required.

3.6.9.7 User Review And Acceptance

After successful testing, schedule a review meeting with all users to discuss the results of testing and training and to outline the support structure and procedures. Encourage discussion among users to promote common understanding of operations and responsibilities. Reach consensus with all users that the interface is acceptable.

3.6.9.8 Sign Off

Once the users are comfortable with the stability of the system and the support available, obtain sign off as acceptance of a completed interface. It may be necessary to schedule multiple meetings with different application areas and get sign off from each.

3.7 PRODUCTION CUTOVER

The system is ready for cutover into production following the successful completion of all of the other tasks.

3.7.1 Data Conversion

Perform data conversion, which may include initial data load or conversion of data format.

3.7.2 Go Live

Using the conversion checklist developed in section 3.6.8.2, disconnect old or previous system and run full production under the new interfaces (integrated systems).

3.7.3 Post Implementation Support

3.7.3.1 Help Desk

Establish the help desk as planned in section 3.6.8,."Go-Live Planning." Staff the help desk with support people trained in the environment, applications and HL7. The help desk should provide assistance to users, troubleshoot problems and answer general questions. Track help desk calls by department, user and application to identify shortcomings in training or systematic problems.

3.7.3.2 Maintenance

Transfer system maintenance to the resources identified and trained in section 3.6.7.2.2.

3.8 BENEFITS REALIZATION

3.8.1 Benefits Realization

Review cost/benefit analysis completed at the start of the project and analyze each anticipated benefit for realization. Document how this benefit was achieved or why it was not and quantify

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the realized benefits. List additional benefits realized that were not detailed at the project start. Summarize intangible benefits such as improved employee morale.

3.8.1.1.1 Ongoing Review/Evaluation

Define a mechanism for ongoing review and evaluation of the project. This may include periodic meetings with staff and end users to discuss changes in operations.

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4

HL7 Version 2.2 Overview

4.1 INTRODUCTION

The purpose of this chapter is to provide information regarding new features and capabilities present in Version 2.2 of the HL7 specification, migration considerations, and future focus areas. The first section contains a question and answer section authored by HL7 technical committee co-chairs. The second section contains a chapter by chapter description of the differences between the HL7 Version 2.2 Standard and the HL7 Version 2.1 Standard.

4.2 VERSION 2.2 QUESTIONS AND ANSWERS

4.2.1 ADT/Finance (responses by Robert Evola)

4.2.1.1 What was the driving force behind the creation of version 2.2? In comparison with version 2.1, what advantages does it offer?

The ADT and Finance portions of the specification were incomplete regarding functionality and data. Among the more significant changes:

- The Merge Segment was added to the Transfer events (A06 & A07)
- Next of Kin Segment was added to the Patient Query (A19) event
- Additional fields were added to the PID segment to handle newborn baby information for UB92 that were formerly in the PV2 segment
- Next of Kin was made more generic to handle any person associated with the patient
- A new UB2 segment was added in the finance chapter to handle UB92 fields that were never accommodated in the 2.1 version
- In general, the specification was cleaned up, descriptions expanded, and data made more consistent

As a result of the changes, it should be easier to understand and implement the standard. Also, functions and data not accommodated in the past are now provided eliminating the need to put these in Z segments.

4.2.1.2 What does version 2.2 not address at this time? Will they be covered in 2.3 or 3.0?

Much of the emphasis and discussion regarding ADT concerns the fact that ADT requirements change significantly as health care moves out of the hospital and into an enterprise setting. In addition, much discussion centers around persons that may or may not be patients at some time, but need to be accommodated.

These requirements are not currently addressed in the standard. Version 2.3 will focus on these requirements, while hoping to retain backward compatibility. Version 3.0 will allow us the opportunity to redefine the transaction sets correctly, according to a revised data mode.

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4.2.1.3 What key criteria should be used in determining if members should upgrade to 2.2 or stay with 2.1? What key functional issues would drive this migration?

Since the majority of 2.2 centered around clarification and specification cleanup, with few new capabilities, it may make sense to continue to implement 2.1 and use Z segments where needed. I primarily take this position because 2.3 looks as though it will entail a significant change. If one needs to consider enterprise related issues, it may make sense to defer modifications to existing interfaces until 2.3.

4.2.1.4 When is version 2.2 likely to be available from vendors?

Good question! I don't know. As a vendor myself, knowing there will be significant changes in 2.3, I'm of the opinion to hold development of 2.2 and go right to 2.3 instead. Right now, 2.1 is working just fine for us. Each vendor will need to consider that question based on the merits of what's already available and working.

4.2.2 Order Entry/Clinical Observation (responses by Hans Buitendijk)

4.2.2.1 What was the driving force behind the creation of version 2.2? In comparison with version 2.1, what advantages does it offer?

In version 2.2 we added Pharmacy, Dietary, and Supply messages/segments. The introduction of a Master File shell enabled us to define an Observation Master File segment set that will further support exchange of definition data. These additions greatly expanded the applications that HL7 can support. Additionally, many data elements and clarifications were provided to make the chapters more complete and easier to read.

4.2.2.2 What does version 2.2 NOT address at this time? What known needs will NOT be covered and will they be in future releases such as 2.3 or 3.0?

Version 2.2 does not address some of the event triggering, order/result status synchronization, and order occurrence/instances issues that have been brought up. It is my expectation that these will not be addressed until version 3.0 since these issues touch on the structure of current HL7 order/result messages and segments. Version 2.3 will provide extensions to Observation Master File segments, Pharmacy segments, and various other segments. New messages will be introduced for Clinical Trial communication.

4.2.2.3 What key criteria should be used in determining if members should upgrade to 2.2 or stay with 2.1? What key functional issues would drive this migrations?

Some basic criteria are obvious. If one wants to support any of the new segments, it is best to upgrade. The question is much more difficult for other areas. If someone has Z-segments to address data elements that are now in the standard and that's all you need, why upgrade? I cannot define any criteria other than market pressure from vendors who did implement 2.2 as a driving force to upgrade. If an interface works and provides the features you want, why mess with it?

4.2.2.4 If known, when is version 2.2 likely to be available from vendors? When should members look for these features in vendor interfaces? Will version 2.2 be ahead of vendor application software functionality in some cases?

There are vendors out there that already support new version 2.2 features. They opted to make assumptions about the likelihood of the standard and went ahead and developed their 2.2 interfaces prior to the publication of the final specification. With minor adjustments, these vendors support version 2.2 although not necessarily for all messages and segments. This will

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make it very difficult to determine who supports or does not support version 2.2: it depends on the area. Members should start to look for version 2.2 interfaces today. However, they should also determine whether they need version 2.2 today across the board. At times, version 2.2 will be ahead of vendors and at times vendors are ahead of version 2.2 (Z-segments will still be required with version 2.2).

4.2.3 Control/Query (responses by Mark Shafarman)

4.2.3.1 New Features

4.2.3.1.1 Organization of the chapter:

The former chapter 5 (queries) has been merged into chapter 2. The resulting text has been extensively reorganized and edited for clarity.

4.2.3.1.2 Acknowledgments: enhanced mode

The HL7 acknowledgment paradigm has been extended to distinguish both accept and application acknowledgments, as well the conditions under which each is required. With a positive accept acknowledgment, the receiving system commits the message to safe storage in a manner that releases the sending system from the need to resend the message. After the message has been processed by the receiving system, an application acknowledgment may be used to return the resultant status to the sending system.

This new enhanced mode allows the original 2.1 acknowledgment modes (both regular and deferred) as options. It also allows communicating systems to specify the use of any combination of accept and application acknowledgments on the basis of the following new fields in the MSH segment:

- Accept acknowledgment type
- Application acknowledgment type

which are defined by the following table:

Table 0155 Accept/application acknowledgment conditions

Value	Description
AL	Always
NE	Never
ER	Error/reject conditions only
SU	Successful completion only

Note: If Accept acknowledgment type and Application acknowledgment type are omitted (or are both null), the original Acknowledgment Mode rules are used. The MSA segment's Acknowledgment code has been adjusted as follows to support the enhanced acknowledgment mode:

Value	Description
AA	Original mode: Application Accept Enhanced mode: Application Acknowledgment: Accept
AE	Original mode: Application Error Enhanced mode: Application Acknowledgment: Error
AR	Original mode: Application Reject Enhanced mode: Application Acknowledgement: Reject
CA	Enhanced mode: Accept Acknowledgment: Commit Accept
CE	Enhanced mode: Accept Acknowledgment: Commit Error
CR	Enhanced mode: Accept Acknowledgment: Commit Reject

Optionality: A new value, conditional (on the trigger event) has been defined (in addition to the current values of required and optional)

Table usage and definition has been extended and clarified. Appearance of different types of tables in the text has been standardized.

Changes to HL7 Datatypes:

Minor changes or extensions have been made to the following datatypes: TS time stamp, AD address, CK composite ID with check digit, CN composite ID number and name, CE coded element.

4.2.3.1.3 New HL7 Datatypes:

- CF coded element with formatted values: extension of CE for "coded, standard" text
- RP reference pointer: allows reference to non-ASCII data object on another system (e.g. image)
- TQ timing quantity: moved from chapter 4 to Control/Query
- MO money: allows non-US denominations.

4.2.3.1.4 Use of escape sequences in text fields: documentation has been improved

The former Chapter 5 (queries and display messages) has been integrated into chapter 2.

Acknowledging batches: a new explanatory section on this topic has been added.

4.2.3.1.5 Other New Fields:

4.2.3.1.5.1 MSH segment: Country code.

Definition: Defines the country of origin for the message. It will be used primarily to specify default elements, such as currency denominations. ISO 3166 provides a list of country codes that may be used.

4.2.3.1.5.2 MSA segment: Error condition

Definition: CE field allowing the acknowledging system to use a user-defined error code to further specify AR or AE type acknowledgments. This field is a generalized replacement for MSA-3-text message.

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4.2.3.1.6 QRF segment: additional query filters.

4.2.3.1.6.1 Which date/time qualifier

Definition: Specifies type of date referred to in QRF-2-when data start date/time and QRF-3-when data end date/time.

Value	Description
ORD	Order date/time
CAN	Cancellation date/time
SCHED	Schedule date/time
COL	Collection date/time, equivalent to film or sample collection date/time
RCT	Specimen receipt date/time, receipt of specimen in filling ancillary (i.e., Lab)
REP	Report date/time, report date/time at filling ancillary (i.e., Lab)
ANY	Any date/time within a range

4.2.3.1.6.2 Which date/time status qualifier

Definition: Specifies status type of objects selected in date range defined by QRF-2-when data start date/time and QRF-3-when data end date/time).

Value	Description
PRE	Preliminary
REP	Report completion date/time
CFN	Current final value, whether final or corrected
FIN	Final only (no corrections)
COR	Corrected only (no final with corrections)
ANY	Any status

4.2.3.1.6.3 Date/time selection qualifier

Definition: Allows specification of certain types of values within the date/time range.

Value	Description
1ST	First value within range
ALL	All values within the range
LST	Last value within the range
REV	All values within the range returned in reverse chronological order (This is the default if not otherwise specified.)

The above three fields also appear in new versions in the URS segment (with R/U prepended to their names).

4.2.3.1.7 New Section: Miscellaneous HL7 tables.

Tables used across all chapters. Currently contains only the yes/no table.

4.2.3.1.8 New message examples

Master file update examples: with original and enhanced acknowledgment protocol.

4.2.3.2 Control/Query Future Issues and Directions

Inclusion of alternate character sets within HL7 messages. HL7 intends to allow the use of alternate character sets in a manner that is consistent with other US standards groups (such as ASTM E1238-94) and with various international standards groups (such as CEN/TC-251).

4.2.3.2.1 Now part of scope for HL7 v. 2.3

Investigate extending the HL7 query paradigm to include a subset of SQL defined on an implicit table structure consistent with a subset of current HL7 segment definitions.
Now part of scope for HL7 v. 2.3
Rationalization and clarification of event structures.
Now part of scope for HL7 v. 3
Creation of a network server for HL7 tables so that updates to them can be made public immediately, rather than waiting until the publication of the next version of the standard.

4.2.3.2.2 Now part of scope for HL7 v. 3

Extensions to the encoding rules. Allowing more than a single set of coding rules.
Now part of scope for HL7 v. 3
Message construction and modeling rules.
Now part of scope for HL7 v. 3
Usage of Object brokering paradigms in creating and managing HL7 objects (e.g. OLE and CORBA).
Now part of scope for HL7 v. 3

4.2.3.3 What are the advantages of HL7 Control/Query v. 2.2 over v. 2.1?

The main advantage comes with the flexibility that the new acknowledgment paradigms give implementors.

Depending on the need of the implementors, other new features may be of critical importance:

the new datatypes or enhanced datatypes
the new query filter fields
the new optionality value of “conditional”
other new fields in various segments (as noted above)

4.2.3.3.1 How to decide whether to upgrade from v. 2.1.

If one of the new features is critical to your implementation, or to future implementations, this is a good reason to upgrade.

4.2.3.3.2 Key functional issues in migration from v. 2.1.

The control/query issues tend to be less concerned with the application areas, and more concerned with the structure of data or generic inter-application message protocol functionality.

4.2.3.3.3 When should this be available from vendors?

In general, the availability of new features should be demand driven.

4.2.3.3.4 When should members look for v. 2.2 availability?

In general, the availability of new features should be demand driven.

4.2.3.3.5 Will some new features be ahead of vendor’s implementations?

Probably yes.

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4.2.4 Master Files (responses by Mark Shafarman)

4.2.4.1 Why Master Files transactions?

In an open-architecture health care environment there often exists a set of common reference files used by one or more application systems. Such files are called master files. Some common examples of master files in the health care environment include:

a) doctor master file
b) system user (and password) master file
c) location (census and clinic) master file
d) device type and location (e.g., workstations, terminals, printers, etc.)
e) lab test definition file
f) exam code (radiology) definition file
g) charge master file
h) patient status master
i) patient type master

These common reference files need to be synchronized across the various applications at a given site. The Master Files messages provide a way of maintaining this synchronization by specifying a standard for the transmission of this data between applications.

It is important to note that the HL7 Master Files specification provides a general framework for transferring master files data. This framework is independent of the definition of a particular master file. If a site needs to synchronize a master file that has not yet been defined by HL7, Z-segments may be used (specified by local agreement).

The master files chapter has responsibility for defining site-wide HL7 master files, such as the location file; individual application-specific chapters have responsibility for defining application level HL7 master files. In HL7 2.2, the master files chapter has defined both staff (STF) and practitioner (PRA) segments which may be used to synchronize staff and health practitioner master files data. The Order Entry/Results reporting chapter has defined test/observation master segments (Omx segments where x varies from 1 to 6): see appendix B of chapter 7). It is expected that other HL7 master files segments will be defined for future HL7 versions.

4.2.4.1.1 How to decide whether to upgrade from v. 2.1.

If you need to transmit master files data at your site, you should upgrade to use the HL7 master files messages.

4.2.4.1.2 Key functional issues in migration from v. 2.1.

None, unless the enhanced acknowledgment paradigm is needed.

4.2.4.1.3 When should this be available from vendors?

In general, the availability of new features should be demand driven.

4.2.4.1.4 When should members look for v. 2.2 availability?

In general, the availability of new features should be demand driven.

4.2.4.1.5 Will some new features be ahead of vendor's implementations?

Probably yes.

4.3 SUMMARY BY CHAPTER OF CHANGES FROM VERSION 2.1 TO 2.2

4.3.1 Chapter 2 - Control/Query

Enhanced Mode Acknowledgement
Queries moved from Chapter 5
Communication Environment

4.3.1.1 New Data Types

CF code-element with formatted values
RP reference pointer
TQ timing quantity
MO money

4.3.1.2 Processing

Immediate processing is now known as original processing
Deferred Processing is now known as deferred two phase
Enhanced Processing is new

4.3.1.3 Message/Segments/Tables

Event	Name	New	Change	Description
0104	Version ID		x	Table - added value: 2.2
0076	Message types		x	Table - added: RAR, RAS, RDE, RDR, RDS, RGV, RGR, RER, ROR, RRA, RRD, RRE, RRG
0008	Acknowledgement Code		x	Table - values added: CA, CE, CR
0048	What Subject Filter		x	Table - new values added:: ARN, APM, APA, NCK, NSC, MST, RAR, RER, RDR, RGR, ROR

4.3.1.4 Data Elements

Segment/Seq	Name	New	Change	Description
MSH-5	Receiving Application		x	Length changed from 15 to 30
MSH-7	Date/Time of Message		x	Length changed from 19 to 26
MSH-9	Message Type		x	Datatype changed from ID to CM
MSH-12	Version ID		x	Datatype changed from NM to ID
MSH-15	Accept Acknowledgement Type	x		
MSH-16	Application Acknowledgement Type	x		
MSH-17	Country Code	x		
MSA-6	Error Condition	x		
ERR-1	Error Code and Location		x	Datatype changed from ID to CM
QRD-1	Query Date/Time		x	Length changed from 19 to 26
QRD-6	Deferred Response Date/Time		x	Length changed from 19 to 26
QRD-7	Quantity Limited Request		x	Length changed from 19 to 26
QRF-2	When Data Start		x	Length changed from 19 to 26

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Segment/Seq	Name	New	Change	Description
	Date/Time			
QRF-3	When Data End Date/Time		x	Length changed from 19 to 26
QRF-6	Which Date/Time Qualifier	x		
QRF-7	Which Date/Time Status Qualifier	x		
QRF-8	Date/Time Selection Qualifier	x		
URD-1	R/U Date/Time		x	Length changed from 19 to 26
URS-2	R/U When Data Start Date/Time		x	Length changed from 19 to 26
URS-3	R/U When Data End Date/Time		x	Length changed from 19 to 26
URS-6	R/U Which Date/Time Qualifier	x		
URS-7	R/U Which Date/Time Status Qualifier	x		
URS-8	R/U Date/Time Selection Qualifier	x		
DSC-1	Continuation Pointer		x	Length changed from 60 to 180
ADD-1	Addendum Continuation Pointer		x	Length changed from 60 to 64K
FHS-7	Date/Time of File Creation		x	Length changed from 19 to 26
FTS-1	File Batch Count		x	Datatype changed from ST to NM
BHS-7	Batch Creation Date/Time		x	Length changed from 19 to 26
BTS-3	Batch Totals		x	Now repeating
NTE-3	Comment		x	No longer required - length changed from 120 to 64K - Datatype changed from TX to FT

4.3.2 Chapter 3 - Admission, Discharge, and Transfer

4.3.2.1 Message/Segments/Tables

Event	Name	New	Change	Description
A01	Admit a patient		x	Message
A02	Transfer a patient		x	Message
A03	Discharge a patient		x	Message
A04	Register a patient		x	Message
A05	Preadmit a patient		x	Message
A06	Transfer an outpatient to inpatient		x	Message
A07	Transfer an inpatient to outpatient		x	Message
A08	Update patient information		x	Message
A09	Patient departing		x	Message
A10	Patient arriving		x	Message
A11	Cancel admit		x	Message
A12	Cancel transfer		x	Message
A13	Cancel discharge		x	Message
A14	Pending admit		x	Message
A15	Pending transfer		x	Message
A16	Pending discharge		x	Message

Event	Name	New	Change	Description
A17	Swap patients		x	Message
A18	Merge patient info		x	Message - NO LONGER USED
A19	Patient query		x	Message
A21	Patient goes on a "leave of absence"		x	Message
A22	Patient returns from a "leave of absence"		x	Message
A23	Delete a patient record		x	Message
A24	Link Patient Information		x	Message
A25	Cancel pending discharge	x		Message
A26	Cancel pending transfer	x		Message
A27	Cancel pending admit	x		Message
A28	Add person information	x		Message
A29	Delete person information	x		Message
A30	Merge person information	x		Message
A31	Update person information	x		Message
A32	Cancel patient arriving	x		Message
A33	Cancel patient departing	x		Message
A34	Merge patient information - patient ID only	x		Message
A35	Merge patient information - account number only	x		Message
A36	Merge patient information - patient ID & account number	x		Message
A37	Unlink patient information	x		Message
PV2	Patient visit additional information	x		Segment
AL1	Allergy	x		Segment
0003	Event codes		x	Table - many new values added: A25 thru A37, M01 thru M03, Q05, R04
0004	Patient Class		x	Table - new values added: R, B

4.3.2.2 Data Elements

Segment/Seq	Name	New	Change	Description
EVN-2	Date/Time of event		x	Length changed from 19 to 26
EVN-3	Date/Time Planned Event		x	Length changed from 19 to 26
EVN-3	Operator ID	x		
PID-3	Patient ID (internal ID)		x	may repeat, datatype changed from CK to CM
PID-4	Date of Birth		x	8 DT changed to 26 TS
PID-21	Mothers Identifier	x		
PID-25	Birth order	x		
PID-26	Citizenship	x		
PID-27	Veterans Military Status	x		
PID-22	Ethnic Group	x		
PID-24	Multiple Birth Indicator	x		
PID-23	Birth Place	x		
PID-12	County Code		x	Kept in for backwards compatibility only
PV1-3	Assigned patient location		x	Datatype changed from ID to CM
PV1-6	Prior patient location		x	Datatype changed from ID to CM

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Segment/Seq	Name	New	Change	Description
PV1-11	Temporary location		x	Datatype changed from ID to CM
PV1-19	Visit number		x	Length changed from 4 to 15
PV1-20	Financial Class		x	Changed from 11 ID to 50 CM
PV1-31	Bad Debt agency code		x	Datatype changed from ST to ID
PV1-36	Discharge disposition		x	Length changed from 2 to 3
PV1-37	Discharged to location		x	Changed from 2 ID to 25 CM
PV1-42	Pending Location		x	Datatype changed from ID to CM
PV1-43	Prior Temporary Location		x	Datatype changed from ID to CM
PV1-44	Admit Date/Time		x	Length changed from 19 to 26
PV1-45	Discharge Date/Time		x	Length changed from 19 to 26
PV1-50	Alternate visit ID	x		
NK1-3	Relationship		x	Changed 15 ST to 60 CE
NK1-6	Business phone number	x		
NK1-7	Contact role	x		
NK1-8	Start date	x		
NK1-9	End date	x		
NK1-10	Next of kin job title	x		
NK1-11	Next of kin job code/class	x		
NK1-12	Next of kin employee number	x		
NK1-13	Organization name	x		
NPU-1	Bed location		x	Datatype changed from ID to CM
MRG-1	Prior patient ID - Internal		x	Changed from 16 CK to 20 CM
MRG-2	Prior alternative patient ID		x	Datatype changed from CK to ST
MRG-4	Prior patient ID - external	x		

4.3.3 Chapter 4 - Order Entry

4.3.3.1 Messages/Segments/Tables

Msg/Segment	Name	New	Change	Description
ORM	General Order		x	Message - added AL1 and notation corrected
ORR	Order Response		x	Message - added ERR
RDE	Pharmacy encoded order	x		message
RDS	Pharmacy dispense	x		message
RGV	Pharmacy give	x		message
RAS	Pharmacy administration	x		message
ROR	Pharmacy prescription order response	x		response to query
RAR	Pharmacy adminsitration info	x		response to query
RDR	Pharmacy dispense info	x		response to query
RER	Pharmacy encoded info	x		response to query
RGR	Pharmacy dose info	x		response to query
ODS	Dietary orders, suplements and preferences segment	x		Segment
ODT	Diet tray instructions	x		Segment
RQ1	Requisition detail-1	x		segment
RQD	Requisition detail	x		segment
RXO	Pharmacy Prescription	x		segment
RXR	Pharmacy Route	x		segment

Msg/Segment	Name	New	Change	Description
RXC	Pharmacy Component	x		segment
RXE	Pharmacy Encoded order	x		segment
RXD	Pharmacy Dispense	x		segment
RXG	Pharmacy Give	x		segment
RXA	Pharmacy Administration	x		segment
RX1	Pharmacy Order		x	Segment - DELETED
ORO	Order Other		x	Segment - DELETED
0065	Specimen action code		x	Deleted values: C, N
0070	Source of specimen		x	New values:
0074	Diagnostic Source section		x	New values
0159	Diet type	x		
0160	Tray type	x		
0161	Allow substitution	x		
0162	Route of administration	x		
0163	Administrative site	x		
0164	Administration device	x		
0165	Administration method	x		
0166	Pharmacy component type	x		
0167	Substitution Status	x		

4.3.3.2 Data Elements

Segment/Seq	Name	New	Change	Description
ORC-1	Order control		x	Datatype changed from ST to ID
ORC-2	Placer Order Number		x	Changed from Optional to Conditional
ORC-3	Fillter Order Number		x	Changed from Optional to Conditional
ORC-5	Order Status		x	Datatype changed from ST to ID
ORC-6	Response Flag		x	Datatype changed from ST to ID
ORC-7	Quantity/Timing		x	Datatype changed from CM to TQ
ORC-9	Date/Time of Transaction		x	Length changed from 19 to 26
ORC-15	Order Effective Date/Time	x		
ORC-16	Order control code reason	x		
ORC-17	Entering organization	x		
ORC-18	Entering device	x		
ORC-19	Action by	x		
OBR-2	Placer order number		x	Optional changed to conditional
OBR-3	Filler order number		x	Optional changed to conditional
OBR-5	Priority		x	Datatype changed from ST to ID
OBR-6	Requested Date/Time		x	Length changed from 19 to 26
OBR-7	Observation Date/Time		c	Length changed from 19 to 26
OBR-8	Observation End Date/Time		x	Length changed from 19 to 26
OBR-11	Specimen action code		x	Datatype changed fr4om ST to ID
OBR-12	Danger Code		x	Datatype changed from CM to CE
OBR-14	Specimen received date/time		x	Length changed from 19 to 26 - Changed from Required to Conditional
OBR-16	Ordering provider		x	Length changed from 60 to 80
OBR-22	Results Rpt/Status Chng - Date/Time		x	Length changed fr4om 19 to 26 - Changed from Required to Conditional
OBR-26	Parent Result		x	Datatype changed from CE to CM
OBR-27	Quantity/Timing		x	Datatype changed from CM to TQ
OBR-28	Result copies to		x	Length changed from 80 to 150

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Segment/Seq	Name	New	Change	Description
OBR-32	Principal Result Interpreter		x	Datatype changed from CN to CM
OBR-33	Assistant Result Interpreter		x	Datatype changed from CN to CM
OBR-34	Technician		x	Datatype changed from CN to CM
OBR-35	Transcriptionist		x	Datatype changed from CN to CM
OBR-36	Scheduled Date/Time		x	Length changed from 19 to 26

4.3.4 Chapter 5 - Query

All contents of chapter 5 were moved to chapter 2

4.3.5 Chapter 6 - Finance

4.3.5.1 Messages/Segments/Tables

Msg/Segment	Name	New	Change	Description
BAR	Add & Purge Patient Accounts (P01)		x	Message - added: PV2, AL1, OBX, IN2, IN3, UB2
DFT	Post detail financial transactions (P03)		x	Message - added: PV2, OBX
IN2	Insurance additional info	x		segment
IN3	Insurance additional info - certification	x		segment
UB2	UB92 data	x		segment
0137	Mail claim party	x		table

4.3.5.2 Data Elements

Segment/Seq	Name	New	Change	Description
FT1-3	Transaction Batch ID		x	Length changed from 5 to 10
FT1-13	Department Code		x	Changed from 16 ST to 60 CE
FT1-19	Diagnosis code		x	Changed from 8 ID to 60 CE
FT1-23	Filler order number	x		
DG1-4	Diagnosis date/time		x	Length changed from 19 to 26
DG1-7	Major diagnosis category		x	Changed from 4 ST to 60 CE
DG1-11	Outlier type		x	Changed from 2 ID to 60 CE
DG1-15	Diagnosis/DRG priority	x		
DG1-16	Diagnosing clinician	x		
PRI-1	set ID		x	no longer repeating
PRI-5	Procedure date/time		x	Length changed from 19 to 26
PRI-14	Procedure priority	x		
GT1-2	Guarantor number		x	Datatype changed from ID to CK
GT1-20	Guarantor Organization	x		
IN1-7	Insurance co phone number		x	May repeat up to 3 times
IN1-29	Verification date/time		x	Changed from 8 DT to 26 TS
IN1-30	Verification by		x	Datatype changed from CM to CN
IN1-35	Company Plan Code		x	Datatype changed from ST to ID
IN1-42	Insured's Employment Status		x	Datatype changed from ID to 60 CE
IN-45	Verification Status	x		
IN1-46	Prior Insurance Plan ID	x		
ACC-1	Accident date/time		x	Length changed from 19 to 26
UB1-2	Blood deductible (43)		x	Datatype changed from ST to NM

Segment/Seq	Name	New	Change	Description
UB1-3	Blood furn-pints of (40)		x	Datatype changed from ST to NM
UB1-4	Blood replaced-pints (41)		x	Datatype changed from ST to NM
UB1-5	Blood not rplcd-pints (42)		x	Datatype changed from ST to NM
UB1-6	Co-insurance days (25)		x	Datatype changed from ST to NM
UB1-8	Covered days (23)		x	Datatype changed from ST to NM
UB1-9	Non covered days (24)		x	Datatype changed from ST to NM
UB1-10	Value amount and code		x	Datatype changed from CM to ID
UB1-11	Number of grace days		x	Datatype changed from ST to NM
UB1-16	Occurrence (28-32)		x	Datatype changed from ID to CM

4.3.6 Chapter 7 - Observation Reporting

4.3.6.1 Messages/Segments/Tables

Msg/Segment	Name	New	Change	Description
ORU			x	Message - removed the MSA
OM1	Test/Observation Master - General	x		Segment
OM2	Test/Observation Master - Numeric Observation	x		Segment
OM3	Test/Observation Master - Categorical	x		Segment
OM4	Test/Observation Master - Observations that require specimens	x		Segment
OM5	Test/Observation Master - Observation batteries	x		Segment
OM6	Test/Observation Master - Observations that are claculated from other observations	x		Segment
0125	Value types		x	Table - new values added: DT, RP, NM, TQ, ID, SI, CM, CQ, CF, MO
0085	Observation result status codes		x	Table - new value added: U

4.3.6.2 Data Elements

Segment/Seq	Name	New	Change	Description
OBX-2	Value type		x	Changed from optional to required
OBX-4	Observation sub-id		x	Changed from optional to conditional
OBX-5	Observational values		x	Changed from required to conditional - Datatype changed from ST to *varies
OBX-6	Units		x	Changed from 20 ST to 60 CE
OBX-8	Abnormal Flags		x	Datatype changed from ST to ID
OBX-12	Date last Obs Normal Values		x	Length changed from 19 to 26
OBX-13	User defined access checks	x		
OBX-14	Date/time of the Observation	x		
OBX-15	Producer's ID	x		
OBX-16	Responsible Observer	x		

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4.3.7 Chapter 8 - Master Files

4.3.7.1 Messages/Segments/Tables

Msg/Segment	Name	New	Change	Description
MFN	Master file notification	x		Message
MFD	Master files delayed application acknowledgement	x		Message
MFQ	Master file query	x		Message
MFK	Master file application acknowledgement	x		Message
MFR	Master files response	x		Message
MFI	Master file identification	x		Segment
MFE	Master file entry	x		Segment
MFA	Master file acknowledgment	x		Segment
STF	Staff Identification	x		Segment
PRA	Practitioner detail	x		Segment

5
HL7 Version 2.3 Overview

5.1 INTRODUCTION

The purpose of this chapter is to provide information regarding new features and capabilities present in Version 2.3 of the HL7 specification, migration considerations, and future focus areas. The first section contains a question and answer section authored by HL7 technical committee co-chairs. The second section contains a listing of new and changed tables and chapter by chapter descriptions of the differences between the HL7 Version 2.3 Standard and the HL7 Version 2.2 Standard and provides descriptions of chapters new with Version 2.3

5.2 VERSION 2.3 QUESTIONS AND ANSWERS

5.2.1 Control Query (responses by Mark Shafarman)

5.2.1.1 What was the driving force behind the creation of version 2.3? In comparison with version 2.2, what advantages does it offer?

Version 2.3 offers:

- New datatypes, especially the 'x'-tended versions of PN, CN, etc, and the encapsulated data used in wave-form transmissions in chapter 7 of the Standard
- Enhanced query functionality (especially 'virtual-table' queries and 'encapsulated query language' queries (note: some new segments too)
- Clearer definitions of tables (including the ID/IS datatype distinctions
- Support for other character sets

5.2.1.2 Are there any functional issues that should be addressed prior to implementing this chapter?

Users should implement Version 2.3 if they need the new functionality. The primary implementation issues are not in backwards compatibility, because most new information is just that, new, and the 2.3 backwards compatibility clarified definition covers how to interpret those areas where it is an issue.

5.2.2 Financial Management (responses by Freida Hall)

5.2.2.1 What was the driving force behind the creation of version 2.3? In comparison with version 2.2, what advantages does it offer?

Additional messages were added and message constructs were extended to allow greater specificity in the intent of the message, and to report additional information.

Segments were added or extended to provide improved reporting capability. For example, DG1 and DRG information, previously reported in a single segment is now reported via two separate segments. Person attribute information was added for the Guarantor (GT1 segment) and Insured (IN2 segment). The insurance segments were extended to improve reporting capability.

5.2.2.2 What does version 2.3 not address at this time? Will these issues be covered in the next release?

Version 2.3 plans are to address internationalization of the standard for demographic information. Inclusion of additional financial claim type information is also being evaluated. The identification of data for billing or administrative purposes, versus clinical purposes, is needed for harmonization of the model. The PAFM working group continues to gain representation from different groups such as X12, Home Care, Physician Practice Management, etc. Hopefully, this will be a positive influence to broaden the scope of the Finance chapter to address the needs of varied markets.

5.2.2.3 What key criteria should be used in determining if members should upgrade to version 2.3 or stay with version 2.2? What key functional issues would drive this migration?

The need for use of the additional message or extended constructs defined in Version 2.3 is a key criterion. Also, whether the additional information in the extended segments is essential for the functionality of downstream systems. Finally, in an enterprise scenario where guarantors and insured persons are populated in the enterprise, the extended segments in HL7 2.3 facilitate better person information to the enterprise. The GT1 and IN1 segments now contain identifiers for the person (similar to PID.3.)

5.2.3 Master Files (responses by Mark Shafarman)

5.2.3.1 What was the driving force behind the creation of version 2.3? In comparison with version 2.2, what advantages does it offer?

Chapter 8 provides updates to 2.2 master files and includes some new master files.

5.2.3.2 Are there any functional issues that should be addressed prior to implementing this chapter?

You should implement Version 2.3 if your users need the new functionality. The primary implementation issues are not in backwards compatibility, because most new information is just that, new, and the 2.3 backwards compatibility clarified definition covers how to interpret those areas where it is an issue.

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5.3 SUMMARY BY CHAPTER OF CHANGES FROM VERSION 2.2 TO 2.3

5.3.1 New Tables

The chart below lists all tables new with Version 2.3

Table Number	Table Name
0119	Anesthesia code
0188	Operator ID
0200	Name type
0201	Telecommunication use code
0202	Telecommunication equipment type
0203	Identifier type
0204	Organizational name type
0205	Price type
0206	Segment action code
0207	Processing mode
0208	Query response status
0209	Relational operator
0210	Relational conjunction
0211	Alternate character sets
0212	Nationality
0213	Purge status
0214	Special program codes
0215	Publicity code
0216	Patient status
0217	Visit priority
0218	Charge adjustment
0219	Recurring service
0220	Living arrangement
0222	Contact reason
0223	Living dependency
0224	Transport arranged
0225	Escort required
0227	Manufacturers of vaccines
0228	Diagnosis classification
0229	DRG Payor
0230	Procedure functional type
0231	Student status
0232	Insurance company contact reason
0233	non-concur code/description
0234	Report timing
0235	Report source
0236	Event report to
0237	Event qualification
0238	Event seriousness
0239	Event expected
0240	Event consequence
0241	Patient outcome
0242	Primary observer's qualification
0243	Identity may be divulged

Table Number	Table Name
0244	Single use device
0245	Product problem
0246	Product available for inspection
0247	Status of evaluation
0248	Product source
0249	Generic product
0250	Relatedness assessment
0251	Action taken in response to the event
0252	Casualty observations
0253	Indirect exposure mechanism
0254	Kind of quantity
0255	Duration categories
0256	Time delay post challenge
0257	Nature of challenge
0258	Relationship modifier
0259	Modality
0260	Patient location type
0261	Location equipment
0262	Privacy level
0263	Level of care
0264	Location department
0265	Specialty type
0267	Days of the week
0268	Override
0269	Charge on indicator
0270	Document type
0271	Document completion status
0272	Document confidentiality status
0273	Document availability status
0275	Document storage status
0276	Appointment reason codes
0277	Appointment type codes
0278	Filler status codes
0279	Allow substitution codes
0280	Referral priority
0281	Referral type
0282	Referral disposition
0283	Referral status
0284	Referral category
0285	Insurance company ID codes
0286	Provider role
0287	Action code
0288	Census tract
0289	County/parish
0290	MIME base64 encoding characters
0291	Subtype of referenced data
0292	Vaccines Administered
0293	Billing category
0294	Time selection criteria parameter class codes
0295	Handicap
0296	Language

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Table Number	Table Name
0300	Namespace ID
0301	Universal ID
0302	Point of care
0303	Room
0304	Bed
0305	Person location type
0306	Location status
0307	Building
0308	Floor
0309	Coverage type
0311	Job status
0312	Policy scope
0313	Policy source
0315	Living will
0316	Organ donor
0317	Annotations
0319	Department cost center
0320	Item natural account code
0321	Dispense method
0322	Completion status
0323	Action code
0324	Location characteristic ID
0325	Location relationship ID
0326	Visit indicator
0327	Job class
0328	Employee classification
0329	Quality method
0330	Marketing basis
0331	Facility type
0332	Network source type
0333	Drivers license issuing authority
0334	Disabled person
0335	Repeat pattern
0336	Referral reason
0337	Certification status
0338	Practitioner ID number type
4001	Repeat pattern

5.3.2 Changes To Existing Tables

Table #	Table Name	Description of Change
0003	Event type code	Added the following values: A38, M03-M08, RAR, RDR, RER, RGR, ROR, PO5, PO6, Q03, S01,-S05, T01-T09, V01-V04, W01-W02, X01
0017	Transaction type	Added the following suggested values: CG, CD, PY, AJ
0036	Units of measure	Table deleted
0038	Order status	Added the following value: A
0048	What subject filter	Added the following values: GOL, PRB, SAL, SBK, SBL, SOP, SSA, SSR, VXI
0052	Diagnosis type	Added the following suggested values: A,W,F
0053	Diagnosis coding method	Removed the following value: I9
0070	Specimen source codes	Table name changed from Source of Specimen to Specimen Source Codes; added the following values: BIFL, BLDC, BPU, BLDV, DIAF, DOSE, DUFL, EARW, EYE, EXHLD, GAS, IHG, ISLT, LIQ, PAFL, PAT, PPP, PRP, RT, TLGI, TLNG, TSMI, TUB, UMED, URNS, USUB, WAT, XXX; deleted the following values: PER, TISL, TISP, TISU, TISC
0074	Diagnostic service section ID	Added the following values: ICU, LAB, and RAD
0076	Message type	Added the following values: ADR, CRM, CSU, EDR, ERP, EQQ, PPG, PPP, PPT, MDM, MFN, MFK, MFD, MFQ, MFR, OSR, PEX, PGL, PIN, PPR, RCI, RCL, RGR, REF, RQC, RQP, RPA, RPI, RPL, RPR, RQA, RQI, RRI, SIU, SPQ, SQM, SQR, SRM, SRR, TBR, VQQ, VXQ, VXX, VXR, VXU, PPV, PRR, PTR, QCK, SUR
0083	Outlier type	Added the following suggested values: D,C
0086	Plan ID	Table name changed from Plan type to Plan ID
0090	Procedure type	Table deleted
0092	Re-admission indicator	Removed the following value: null
0093	Release information code	Added the following value: null
0098	Type of agreement	Added the following values: S,U,M
0104	Version ID	Added the following value: V2.3
0106	Query/response format code	Added the following value: T; table name changed from Query format code to Query/response format code
0119	Order control codes and their meaning	Added the following values: FR, AF, DF, FU, OF, UA, OE
0123	Result Status	Added the following value: A
0125	Value type	Added the following values: CP, CX, ED, SN. XAD, XCN, XON, XPN, XTN; deleted the following values: TQ, ID, SI, CM, CQ
0131	Contact role	Added the following values: CP, EP, BP, PR
0133	Procedure practitioner type	Added the following values: SN, PS, AS
0137	Mail claim party	Added the following values: E, G, I, O P
0156	Which date/time qualifier	Table name changed from Date/time qualifier to Which date/time qualifier; deleted the following value: CAN
0162	Route of administration	Added the following values: EP, ET, IMR, IB, ICV, MM, NP, NT, OTH, PF, RM, SD, VM, WND, *; deleted the following values: IM, IN, IO, IP, IS, IT, IV
0166	Rx component type	Added the following values: 0, 1, 2, 3

Table #	Table Name	Description of Change
0167	Substitution status	Added the following values: 4, 5, 7, 8
0171	Citizenship	Table name changed from Country code to Citizenship
0173	Coordination of benefits	Added the following values: CO, IN
0174	Nature of test/observation	Added the following values: P, f, A. SC
0175	Master file identifier code	Added the following values: CMA, CMB, LOC, OMA, OMB, OMC, OMD; deleted the following values: OM1-OM6
0190	Address type	Added the following values: N, F
0191	Type of data	Added the following values: image, audio, application
0193	Amount class	Added the following values: AT, LM, PC, UL

5.3.3 Chapter 2 - Control Query

5.3.3.1 New Data Types

SN	Structured numeric
IS	Coded value for user defined tables
HD	Hierarchic designator
EI	Entity identifier
PL	Person location
PT	Processing type
CX	Extended composite ID with check digit
XCN	Extended composite ID number and name
XAD	Extended address
XPN	Extended person name
XON	Extended composite name and ID number for organizations
XTN	Extended telecommunications number
CD	Channel definition
MA	Multiplexed array
NA	Numeric array
ED	Encapsulated data
CP	Composite price
FC	Financial class
QSC	Query selection criteria
QIP	Query input parameter list
RCD	Row column definition
DLN	Driver's license number
JCC	Job code/class
VH	Visiting hours
PPN	Performing person time stamp
DR	Date/time range
RI	Repeat interval
SCV	Scheduling class value pair

5.3.3.2 New Sections

- Section 2.10.2 - Version compatibility definition
- Section 2.15.1 - Display vs record-oriented queries (original model, embedded query language, virtual table, and stored procedure queries) and event replay requests has been expanded to include a sub section on Interactive continuation (2.15.4)
- Section 2.19 - ENHANCED MODE QUERY MESSAGES

- Section 2.21 QUERY MESSAGE IMPLEMENTATION CONSIDERATIONS
- Section 2.22 QUERY ERROR RESONSE
- Section 2.23.4 - Modes for updating via repeating segments is new
- Section 2.25.4, "Query Examples" has been updated to include the following new subsections: 2.25.2, "Enhanced mode query examples," 2.25.4.2.1, "Embedded query language (using SQL), virtual table and stored procedure queries with tabular response," 2.25.4.2.2, "Embedded query language query," 2.25.4.2.3, "Virtual table query," 2.25.4.2.4, "Stored procedure request," 2.25.4.2.6, "Embedded query language continuation", 2.25.4.2.7, "Virtual table query continuation," 2.25.2.8, "Stored procedure request query continuation," 2.25.4.2.12, "Embedded query language (EQL), virtual table, and store procedure error response, 2.25.4.2.13, "Event replay error response."

5.3.3.3 Messages/Segments

Event	Name	New	Change	Description
Q01	EQQ - embedded query language query	X		Message
Q01	VQQ - virtual table query	X		Message
Q01	SPQ - stored procedure request	X		Message
Q01	RQQ - event replay query	X		Message

5.3.3.4 Data Elements

Segment/Seq	Name	New	Change	Description
MSH-3	Sending application		X	Length changed from 15 to 180, Data type changed from ST to HD
MSH-4	Sending facility ID		X	Length changed from 20 to 180, data type changed from ST to HD
MSH-5	Receiving application		X	Length changed from 30 to 180, data type changed from ST to HD
MSH-6	Receiving facility		X	Length changed from 30 to 180, data type changed from ST to HD
MSH-11	Processing ID		X	Length changed from 1 to 3, data type changed from ID to PT
MSH-18	Character set	X		
MSH-19	Principal language of message	X		
QRD-8	Who subject filter		X	Length changed from 20 to 60, data type changed from ST to XCN
QRD-9	What subject filter		X	Length changed from 3 to 60, data type changed from ID to CE
QRD-10	What department data code		X	Length changed from 20 to 60, data type changed from ST to CE
QRF-4	What user qualifier		X	Length changed from 20 to 60
QRF-5	Other QRY subject filter		X	Length changed from 20 to 60
QRF-6	Which date/time filter		X	Table - removed value CAN
QRF-9	When quantity/timing filter	X		
URD-3	R/U who subject definition		X	Length changed from 20 to 60, data type changed from ST to XCN
URD-4	R/U what subject definition		X	Length changed from 3 to 60, data type changed from ID to CE
URD-5	R/U what department code		X	Length changed from 20 to 60, data type changed from ST to CE

Segment/Seq	Name	New	Change	Description
URS-9	R/U quantity/timing qualifier	X		
DSP-1	Set ID-DSP		X	Element Name changed from Set ID-Display Data to Set ID - DSP
NTE-1	Set ID-NTE		X	Element Name changed from Set ID-Notes and Comments to Set ID-NTE
EQL-1	Query tag	X		
EQL-2	Query/response format code	X		
EQL-3	EQL query name	X		
EQL-4	EQL query statement	X		
VTQ-1	Query tag	X		
VTQ-2	Query/response format code	X		
VTQ-3	VT query name	X		
VTQ-4	Virtual table name	X		
VTQ-5	Selection criteria	X		
RDF-1	Number of columns per row	X		
RDF-2	Column description	X		
RDT-1	Column value	X		
SPR-1	Query tag	X		
SPR-2		X		
SPR-3	Stored procedure name	X		
SPR-4	Input parameter list	X		
ERQ-1	Query tag	X		
ERQ-2	Event identifier	X		
ERQ-3	Input parameter list	X		

5.3.4 Chapter 3 - Patient Administration

Changed name of chapter from Admission, Discharge, and Transfer to Patient Administration

5.3.4.1 Messages/Segments/Tables

Event	Name	New	Change	Description
A01	ADT/ACK - admit/visit notification		X	Message - added PD1, DB1, DRG and ROL segments. Changed name from Admit a patient to admit/visit notification.
A02	ADT/ACK transfer a patient		X	Message - added PD1 and DB1 segments.
A03	ADT/ACK - discharge/end visit		X	Message - added PD1, DB1, DG1, DRG, PR1 and ROL segments. Changed name from Discharge a patient to Discharge/end visit.
A04	ADT/ACK - register a patient		X	Message - added PD1, DB1, DRG and ROL segments
A05	ADT/ACK - pre-admit a patient		X	Message - added PD1, DB1, DRG, and ROL segments
A06	ADT/ACK - change an outpatient to an inpatient		X	Message - added PD1, DB1, DRG, and ROL segments. Changed name from Transfer an outpatient to inpatient to Change an outpatient to an inpatient.

Event	Name	New	Change	Description
A07	ADT/ACK - change an inpatient to an outpatient		X	Message - added PD1, DB1, DRG, and ROL segments. Changed name from Transfer a inpatient to outpatient to Change an inpatient to an outpatient
A08	ADT/ACK - update patient information		X	Message - added PD1, DB1, DRG and ROL segments
A09	ADT/ACK - patient departing - tracking		X	Message - added PD1 and DB1 segments, message name changed from Patient Departing to Patient Departing - Tracking
A10	ADT/ACK - patient arriving - tracking		X	Message - Added PD1 and DB1 segments. Changed name from patient arriving to Patient arriving - tracking
A11	ADT/ACK - cancel admit/visit notification		X	Message - Added PD1 and DB1 segments. Changed name from Cancel admit to Cancel admit/visit notification.
A12	ADT/ACK - cancel transfer		X	Message - added PD1 and DB1 segments
A13	ADT/ACK - cancel discharge/end visit		X	Message - added PD1, DB1, DRG and ROL segments. Changed name from Cancel discharge to Cancel discharge/end visit.
A14	ADT/ACK - pending admit		X	Message - added PD1, DB1, DRG and ROL segments
A15	ADT/ACK - pending transfer		X	Message - added PD1 and DB1 segments
A16	ADT/ACK - pending discharge		X	Message - added PD1, DB1, and DRG segments
A17	ADT/ACK - swap patients		X	Message - added PD1 and DB1 segments
A18	ADT/ACK - merge patient information		X	Message - added PD1 segment
A19	QRY/ADR - patient query		X	Message - added segment QRF, PD1, DB1, DRG and ROL segments to the response.
A21	ADT/ACK - patient goes on a “leave of absence”		X	Message - added PD1 and DB1 segments
A22	ADT/ACK - patient returns from a “leave of absence”		X	Message - added PD1 and DB1 segments
A23	ADT/ACK - delete a patient record		X	Message - added PD1 and DB1 segments
A24	ADT/ACK - link patient information		X	Message - added PD1 and DB1 segments
A25	ADT/ACK - cancel pending discharge		X	Message - added PD1 and DB1 segments
A26	ADT/ACK - cancel pending transfer		X	Message - added PD1 and DB1 segments
A27	ADT/ACK - cancel pending admit		X	Message - added PD1 and DB1 segments
A28	ADT/ACK - add person information		X	Message - added PD1, DB1, DRG and ROL segments
A29	ADT/ACK - delete person information		X	Message - added PD1 and DB1 segments
A30	ADT/ACK - merge person information		X	Message - added PD1 segment
A31	ADT/ACK - update		X	Message - added PD1, DB1, DRG, and ROL

Event	Name	New	Change	Description
	person information			segments
A32	ADT/ACK - cancel patient arriving - tracking		X	Message - added PD1 and DB1 segments. Changed name from Cancel patient arriving to Cancel patient arriving - tracking.
A33	ADT/ACK - cancel patient departing - tracking		X	Message - added PD1 and DB1 segments. Changed name from Cancel patient departing to Cancel patient departing - tracking.
A34	ADT/ACK - merge patient information - patient ID only		X	Message - added PD1 segment
A35	ADT/ACK - merge patient information - account number only		X	Message - added PD1 segment
A36	ADT/ACK - merge patient information - patient ID & account number		X	Message - added PD1 segment
A37	ADT/ACK - unlink patient information		X	Message - added PD1 and DB1 segments
A38	ADT/ACK - cancel pre-admit	X		Message
A39	ADT/ACK - merge person - external ID	X		Message
A40	ADT/ACK - merge patient - internal ID	X		Message
A41	ADT/ACK - merge account - patient account number	X		Message
A42	ADT/ACK - merge visit - visit number	X		Message
A43	ADT/ACK - move patient information - internal ID	X		Message
A44	ADT/ACK- move account information - patient account number	X		Message
A45	ADT/ACK - move visit information - visit number	X		Message
A46	ADT/ACK - change external ID	X		Message
A47	ADT/ACK - change internal ID	X		Message
A48	ADT/ACK - change alternate patient ID	X		Message
A49	ADT/ACK - change patient account number	X		Message
A50	ADT/ACK - change visit number	X		Message
A51	ADT/ACK - change alternate visit ID	X		Message
PD1	Patient additional demographic	X		Segment
DB1	Disability	X		Segment
NK1	Next of kin/associated		X	Segment - name changed from Next of Kin to

Event	Name	New	Change	Description
	parties			Next of Kin/Associated Parties

5.3.4.2 Data Elements

Segment/Seq	Name	New	Change	Description
EVN-1	Event type code		X	Optionality changed from R to B
EVN-2	Recorded date/time		X	Element Name changed from Date/time of event to Recorded date/time
EVN-4	Event reason code		X	Data type changed from ID to IS.
EVN-5	Operator ID		X	Length changed from 5 to 60. Data type changed from ID to XCN
EVN-6	Event occurred	X		
PID-2	Patient ID (External ID)		X	Length changed from 16 to 20. Data type changed from CK to CX.
PID-3	Patient ID (Internal ID)		X	Data type changed from CM to CX
PID-4	Alternate patient ID - PID		X	Element Name changed from Alternate patient ID to Alternate patient ID-PID, length changed from 12 to 20, data type changed from ST to CX
PID-5	Patient name		X	Data type changed from PN to XPN, repetition changed to Y
PID-6	Mother's maiden name		X	Length changed from 30 to 48, data type changed from ST to XPN
PID-7	Date/time of birth		X	Element name changed from Date of birth to Date/time of birth
PID-8	Sex		X	Data type changed from ID to IS
PID-9	Patient alias		X	Data type changed from PN to XPN
PID-10	Race		X	Data type changed from ID to IS
PID-11	Patient address		X	Data type changed from AD to XAD, repetition changed from Y/3 to Y
PID-12	Country code		X	Data type changed from ID to IS
PID-13	Phone number - home		X	Data type changed from TN to XTN, repetition changed from Y/3 to Y
PID-14	Phone number-business		X	Data type changed from TN to XTN, repetition changed from Y/3 to Y
PID-15	Primary language		X	Element Name changed from Language/Patient to Primary Language, length changed from 25 to 60, data type changed from ST to CE
PID-16	Marital status		X	Data type changed from ID to IS
PID-17	Religion		X	Data type changed from ID to IS
PID-18	Patient Account Number		X	Data type changed from CK to CX
PID-20	Driver's license number-patient		X	Element Name changed from Driver's Lic Num-Patient to Driver's License Number-Patient, data type changed from CM to DLN
PID-21	Mother's identifier		X	Data type changed from CK to CX, repetition changed to Y
PID-22	Ethnic group		X	Length changed from 1 to 3, data type changed from ID to IS
PID-23	Birth place		X	Length changed from 25 to 60
PID-26	Citizenship		X	Length changed from 3 to 4, data type changed from ID to IS

Segment/Seq	Name	New	Change	Description
PID-28	Nationality	X		
PID-29	Patient death date and time	X		
PID-30	Patient death indicator	X		
PV1-1	Set ID-PV1		X	Element name changed from SET ID-Patient Visit to SET ID-PV1
PV1-2	Patient class		X	Data type changed from ID to IS
PV1-3	Assigned patient location		X	Length changed from 12 to 80, data type changed from CM to PL
PV1-4	Admission type		X	Data type changed from ID to IS
PV1-5	Preadmit number		X	Data type changed from ST to CX
PV1-6	Prior patient location		X	Length changed from 12 to 80, data type changed from CM to PL
PV1-7	Attending doctor		X	Data type changed from CN to XCN, repetition changed to Y
PV1-8	Referring doctor		X	Data type changed from CN to XCN, repetition changed to Y
PV1-9	Consulting doctor		X	Data type changed from CN to XCN
PV1-10	Hospital service		X	Data type changed from ID to IS
PV1-11	Temporary location		X	Length changed from 12 to 80, data type changed from CM to PL
PV1-12	Preadmit test indicator		X	Data type changed from ID to IS
PV1-13	Readmission indicator		X	Data type changed from ID to IS
PV1-14	Admit source		X	Data type changed from ID to IS
PV1-15	Ambulatory status		X	Data type changed from ID to IS
PV1-16	VIP indicator		X	Data type changed from ID to IS
PV1-17	Admitting doctor		X	Data type changed from CN to XCN, repetition changed to Y
PV1-18	Patient type		X	Data type changed from ID to IS
PV1-19	Visit number		X	Length changed from 15 to 20, data type changed from NM to CX
PV1-20	Financial class		X	Data type changed from CM to FC, repetition changed from Y/4 to Y
PV1-21	Charge price indicator		X	Data type changed from ID to IS
PV1-22	Courtesy code		X	Data type changed from ID to IS
PV1-23	Credit rating		X	Data type changed from ID to IS
PV1-24	Contract code		X	Data type changed from ID to IS
PV1-28	Interest code		X	Data type changed from ID to IS
PV1-29	Transfer to bad debt code		X	Data type changed from ID to IS
PV1-31	Bad debt agency code		X	Data type changed from ID to IS
PV1-34	Delete account indicator		X	Data type changed from ID to IS
PV1-36	Discharge disposition		X	Data type changed from ID to IS
PV1-38	Data type		X	Data type changed from ID to IS
PV1-39	Servicing facility		X	Data type changed from ID to IS
PV1-40	Bed status		X	Data type changed from ID to IS, optionality changed from O to B
PV1-41	Account status		X	Data type changed from ID to IS
PV1-42	Pending location		X	Length changed from 12 to 80, data type changed from CM to PL
PV1-43	Prior temporary location		X	Length changed from 12 to 80, data type changed from CM to PL
PV1-50	Alternate visit ID		X	Data type changed from CM to CX
PV1-51	Visit indicator	X		

Segment/Seq	Name	New	Change	Description
PV1-52	Other health care provider	X		
PV2-1	Prior pending location		X	Length changed from 12 to 80, data type changed from CM to PL, optionality changed from O to C
PV2-7	Visit user code		X	Data type changed from ID to IS
PV2-8	Expected admit date/time		X	Length changed from 8 to 26, data type changed from DT to TS, element name changed from Expected Admit Date to Expected Admit Date/Tim
PV2-9	Expected discharge date/time		X	Length changed from 8 to 26, data type changed from DT to TS, element name changed from Expected Discharge Date to Expected Discharge Date/Time
PV2-10	Estimated length of inpatient stay	X		
PV2-11	Actual length of inpatient stay	X		
PV2-12	Visit description	X		
PV2-13	Referral source code	X		
PV2-14	Previous service date	X		
PV2-15	Employment illness related indicator	X		
PV2-16	Purge status code	X		
PV2-17	Purge status date	X		
PV2-18	Special program code	X		
PV2-19	Retention indicator	X		
PV2-20	Expected number of insurance plans	X		
PV2-21	Visit publicity code	X		
PV2-22	Visit protection indicator	X		
PV2-23	Clinic organization name	X		
PV2-24	Patient status code	X		
PV2-25	Visit priority code	X		
PV2-26	Previous treatment date	X		
PV2-27	Expected discharge disposition			
PV2-28	Signature on file date	X		
PV2-29	First similar illness date	X		
PV2-30	Patient charge adjustment code	X		
PV2-31	Recurring service code	X		
PV2-32	Billing media code	X		
PV2-33	Expected surgery date & time			
PV2-34	Military partnership code	X		
PV2-35	Military non-availability code	X		
PV2-36	Newborn baby indicator	X		
PV2-37	Baby detained indicator	X		
NK1-1	Set ID-NK1		X	Element name changed from Set ID-Next of Kin to Set ID-NK1
NK1-2	Name		X	Data type changed from PN to XPN,

Segment/Seq	Name	New	Change	Description
				repetition changed to Y
NK1-4	Address		X	Data type changed from AD to XAD, repetition changed to Y
NK1-5	Phone number		X	Data type changed from TN to XTN, repetition changed from Y/3 to Y
NK1-6	Business phone number		X	Data type changed from TN to XTN, repetition changed to Y
NK1-10	Next of kin/associated parties job title		X	Field name changed from Next of Kin Job Title to Next of Kin/Associated parties Job Title
NK1-11	Next of kin/associated parties job code/class		X	Data type changed from CM to JCC, element name changed from Next of Kin Job Code/Class to next of Kin/Associated Parties Job Code/Class
NK1-12	Next of kin/associated parties employee number		X	Data type changed from ST to CX; element name changed from Next of Kin Employee Number to next of Kin/Associated Parties Employee Number
NK1-13	Organization name		X	Data type changed from ST to XON, repetition changed to Y
NK1-14	Marital status	X		
NK1-15	Sex	X		
NK1-16	Date/time of birth	X		
NK1-17	Living dependency	X		
NK1-18	Ambulatory status	X		
NK1-19	Citizenship	X		
NK1-20	Primary language	X		
NK1-21	Living arrangement	X		
NK1-22	Publicity indicator	X		
NK1-23	Protection indicator	X		
NK1-24	Student indicator	X		
NK1-25	Religion	X		
NK1-26	Mother's maiden name	X		
NK1-27	Nationality	X		
NK1-28	Ethnic group	X		
NK1-29	Contact reason	X		
NK1-30	Contact person's name	X		
NK1-31	Contact person's phone number	X		
NK1-32	Contact person's address	X		
NK1-33	Next of kin/associated party's identifiers	X		
NK1-34	Job status	X		
NK1-35	Race	X		
NK1-36	Handicap	X		
NK1-37	Contact person social security number	X		
AL1-1	Set ID-AL1		X	Element name changed from Set ID-Allergy to Set ID-AL1
AL1-2	Allergy type		X	Data type changed from ID to IS
AL1-4	Allergy severity		X	Data type changed from ID to IS

Segment/Seq	Name	New	Change	Description
NPU-1	Bed location		X	Length changed from 12 to 80, data type changed from CM to PL, removed table 0079
NPU-2	Bed status		X	Data type changed from ID to IS
MRG-1	Prior patient ID- internal		X	Data type changed from CM to CX, repetition changed to Y
MRG-2	Prior alternate patient ID		X	Length changed from 16 to 20, data type changed from ST to CX, repetition changed to Y
MRG-3	Prior patient account number		X	Data type changed from CK to CX
MRG-4	Prior patient ID-external		X	Length changed from 16 to 20, data type changed from CK to CX
MRG-5	Prior visit number	X		
MRG-6	Prior alternate visit ID	X		
MRG-7	Prior patient name	X		

5.3.5 Chapter 4 - Order Entry

5.3.5.1 Messages/Segments

Event	Name	New	Change	Description
O01	ORM - general order		X	Message - added PD1, PV2, IN1, IN2, IN3, GT1, DG1and CT1
O02	ORR - general order response		X	Message - added CT1
Q06	OSQ/OSR - query response for order status	X		Message
ORM	Dietary Order		X	Message - added PD1, PV2, IN1, IN2, IN3, and GT1
ORM	Stock requisition order		X	Message - added PD1, PV2, IN1, IN2, IN3, and GT1
ORM	Nonstock requisition order		X	Message - added PD1, PV2, IN1, IN2, IN3, and GT1
ORM	Pharmacy prescription message		X	Message - added PD1, PV2, IN1, IN2, IN3, and GT1
O01/ O02	RDE/RRE - pharmacy/ treatment encoded order message		X	Message - added PD1, PV2, IN1, IN2, IN3, GT1, and CTI
001/002	RGV - pharmacy/treatment give message		X	Message - added PV2
O01/ O02	RDS - pharmacy/ treatment dispense message		X	Message - added PD1 and PV2
O01/ O02	RAS/RRA - pharmacy/ treatment administration message		X	Message - added PD1, PV2, CTI
V01	VXQ - query for vaccination record	X		Message
V02	VXX - returning multiple PID matches	X		Message
V03	VXR - vaccination record	X		Message

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Event	Name	New	Change	Description
	response			
V04	VXU - unsolicited vaccination record update	X		Message

5.3.5.2 Data Elements

Segment/Seq	Name	New	Change	Description
ORC-2	Placer order number		X	Length changed from 75 to 22, data type changed from CM to EI
ORC-3	Filler order number		X	Length changed from 75 to 22, data type changed from CM to EI
ORC-4	Placer group number		X	Length changed from 75 to 22, data type changed from CM to EI
ORC-10	Entered by		X	Length changed from 80 to 120, data type changed from CN to XCN
ORC-11	Verified by		X	Length changed from 80 to 120, data type changed from CN to XCN
ORC-12	Ordering provider		X	Length changed from 80 to 120; data type changed from CN to XCN
ORC-13	Enterer's location		X	Data type changed from CM to PL
ORC-14	Call Back phone number		X	Data type changed from TN to XTN
ORC-19	Action by		X	Length changed from 80 to 120, data type changed from CN to XCN
BLG-1	When the charge		X	Length changed from 15 to 40
BLG-3	Account ID		X	Data type changed from CM to CK
OBR-1	Set ID-OBR		X	Field name changed from Set ID-Observation Request to Set ID-OBR
OBR-2	Placer order number		X	Data type changed from CM to EI
OBR-3	Filler order number		X	Data type changed from CM to EI, optionality changed from R to C
OBR-4	Universal service ID		X	Optionality changed from O to R
OBR-5	Priority			Optionality change from O to B
OBR-6	Requested date/time		X	Optionality changed from C to B
OBR-8	Observation end date/time		X	Optionality changed from C to O
OBR-10	Collector identifier		X	Data type changed from CN to XCN
OBR-13	Relevant clinical info		X	Optionality changed from C to O
OBR-14	Specimen received date/time		X	Optionality changed from O to C
OBR-16	Ordering provider		X	Data type changed from CN to XCN
OBR-17	Order callback phone number		X	Data type changed from TN to XTN
OBR-21	Filler Field 2		X	Optionality changed from C to O
OBR-22	Results rpt/status chng - date/time		X	Optionality changed from O to C
OBR-24	Diagnostic serv sect ID		X	Optionality changed from C to O
OBR-25	Result status		X	Optionality changed from O to C
OBR-26	Parent result		X	Length changed from 200 to 400
OBR-28	Result copies to		X	Data type changed from CN to XCN
OBR-29	Parent		X	Field name changed from Parent Number to Parent
OBR-32	Principal result interpreter		X	Length changed from 60 to 200
OBR-33	Assistant result interpreter		X	Length changed from 60 to 200
OBR-34	Technician		X	Length changed from 60 to 200

Segment/Seq	Name	New	Change	Description
OBR-35	Transcriptions		X	Length changed from 60 to 200
OBR-37	Number of sample containers	X		
OBR-38	Transport logistics of collected sample	X		
OBR-39	Collector's comment	X		
OBR-40	Transport arrangement responsibility	X		
OBR-41	Transport arranged	X		
OBR-42	Escort required	X		
OBR-43	Planned patient transport comment	X		
ODT-2	Service period		X	Length changed from 30 to 60
RQD-2	Item code - internal		X	Optionality changed from O to C
RQD-3	Item code - external		X	Optionality changed from O to C
RQD-4	Hospital item code			Optionality changed from O to C
RQD-7	Dept. cost center		X	Data type changed from ID to IS, added table 0319
RQD-8	Item natural account code		X	Data type changed from ID to IS, added table 0320
RQ1-2	Manufactured ID		X	Optionality changed from O to C
RQ1-3	Manufacturer's catalog			Optionality changed from O to C
RQ1-4	Vendor ID			Optionality changed from O to C
RQ1-5	Vendor catalog			Optionality changed from O to C
RXO-8	Deliver-to location		X	Length changed from 12 to 200; Optionality changed from C to O
RXO-10	Requested dispense code		X	Optionality changed from C to O
RXO-11	Requested dispense amount		X	Optionality changed from C to O
RXO-12	Requested dispense units		X	Optionality changed from C to O
RXO-14	Ordering physician's DEA number		X	Data type changed from CN to XCN
RXO-15	Pharmacists/treatment supplier's verifier ID		X	Data type changed from CN to XCN
RXO-18	Requested give strength	X		
RXO-19	Requested give strength units	X		
RXO-20	Indication	X		
RXO-21	Requested give rate amount	X		
RXO-22	Requested give rate units	X		
RXC-4	Component units		X	Length changed from 20 to 60
RXC-5	Component strength	X		
RXC-6	Component strength units	X		
RXE-2	Give code		X	Added table 0292
RXE-8	Deliver-to location		X	Length changed from 12 to 200
RXE-13	Ordering provider's DEA number		X	Data type changed from CN to XCN
RXE-14	Pharmacist/treatment supplier's verifier number		X	Data type changed from CN to XCN, optionality changed from C to O, element name changed from Pharmacist Verifier ID to Pharmacist/Treatment Supplier's Verifier Number
RXE-15	Prescription number		X	Optionality changed from R to C

Segment/Seq	Name	New	Change	Description
RXE-21	Pharmacy/treatment supplier's special dispensing instructions		X	Element name changed from Pharmacy Special Dispensing Instructions to Pharmacy/Treatment Supplier's Special Dispensing Instructions
RXE-25	Give strength	X		
RXE-26	Give strength units	X		
RXE-27	Give indication	X		
RXE-28	Dispense package size	X		
RXE-29	Dispense package size units	X		
RXE-30	Dispense package method	X		Added table 0292
RXD-2	Dispense/give code		X	
RXD-7	Prescription number		X	Data type changed from NM to ST, Optionality changed from C to R
RXD-9	Dispense notes		X	Data type changed from CE to ST, Optionality changed from C to O
RXD-10	Dispensing provider		X	Data type changed from CN to XCN
RXD-13	Dispense-to location		X	Length changed from 12 to 200
RXD-16	Actual strength	X		
RXD-17	Actual strength unit	X		
RXD-18	Substance lot number	X		
RXD-19	Substance expiration date	X		
RXD-20	Substance manufacturer date	X		
RXD-21	Indication	X		
RXD-22	Dispense package size	X		
RXD-23	Dispense package size units	X		
RXD-24	Dispense package method	X		
RXG-4	Give code		X	Added table 0292
RXG-9	Administration notes		X	Optionality changed from C to O
RXG-10	Substitution status		X	Length changed from 20 to 1
RXG-11	Dispense-to location		X	Length changed from12 to 200, data type changed from ID to CM
RXG-13	Pharmacy/treatment supplier special administration instructions		X	Element name changed from Pharmacy Special Administration Instructions to Pharmacy/Treatment Supplier Special Administration Instructions
RXG-17	Give strength	X		
RXG-18	Give strength units	X		
RXG-19	Substance lot number	X		
RXG-20	Substance expiration date	X		
RXG-21	Substance manufacturer name	X		
RXG-22	Indication	X		
RXA-5	Administered code		X	Added table 0292
RXA-9	Administration notes		X	Optionality changed from C to O
RXA-10	Administering provider		X	Data Type changed from CN to XCN
RXA-11	Administered-at location		X	Length changed from 12 to 200, data type changed from ID to CM
RXA-13	Strength	X		
RXA-14	Administered strength units	X		

Segment/Seq	Name	New	Change	Description
RXA-15	Substance lot number	X		
RXA-16	Substance Expiration Date	X		
RXA-17	Substance manufacturer name	X		
RXA-18	Substance refusal reason	X		
RXA-19	Indication	X		
RXA-20	Completion status	X		
RXA-21	Action code	X		
RXA-22	System entry date/time	X		

5.3.6 Chapter 6 - Financial Management

5.3.6.1 Messages/Segments

Event	Name	New	Change	Description
P01	BAR/ ACK - add patient record		X	Message - name changed from Add and update patient accounts to add patient account; Message added PD1, DB1, DRG, ROL
P02	BAR/ACK - purge patient accounts			Message - added PD1 and DB1
P03	DFT/ACK - post detail financial transactions		X	Message - added PD1, DB1, PR1, ROL, DG1, DRG, GT1, IN1, IN2, IN3, ACC
P05	BAR/ACK - update account	X		Message
P06	BAR/ACK - end account (P06)	X		Message
DRG	Diagnosis related group	X		Segment

5.3.6.2 Data Elements

Segment/Seq	Name	New	Change	Description
FT1-1	Set ID - FT1		X	Element name changed from Set ID - financial transaction to Set ID - FT1
FT1-4	Transaction date		X	Length changed from 8 to 26, data type changed from DT to TS
FT1-5	Transaction posting date		X	Length changed from 8 to 26, data type changed from DT to ST
FT1-6	Transaction type		X	Data type changed from ID to IS
FT1-7	Transaction description		X	Length changed from 20 to 80, data type changed from ID to CE
FT1-8	Transaction description		X	Optionality changed from C to O
FT1-9	Transaction description - alot		X	Optionality changed from O to B
FT1-10	Transaction quantity		X	Length changed from 4 to 6
FT1-11	Transaction amount - extended		X	Data Type changed from NM to CP
FT1-12	Transaction amount - unit		X	Data type changed from NM to CP
FT1-14	Insurance plan ID		X	Length changed from 8 to 60, data type changed from ID to CE
FT1-15	Insurance amount		X	Data type changed from CM to CP
FT1-16	Assigned patient location		X	Length changed from 12 to 80, data type changed from NM to PL
FT1-17	Fee schedule		X	Data type changed from ID to IS

Segment/Seq	Name	New	Change	Description
FT1-18	Patient type		X	Data type changed from ID to IS
FT1-19	Diagnosis code		X	Length changed from 8 to 60
FT1-20	Performed by code		X	Length changed from 60 to 120, data type changed from CN to XCN
FT1-21	Ordered by code		X	Length changed from 60 to 120, data type changed from CN to XCN
FT1-22	Unit cost		X	Data Type changed from NM to CP
FT1-23	Filler order number		X	Length changed from 75 to 22, data type changed from CM to EI
FT1-24	Entered by code	X		
FT1-25	Procedure Code	X		
DG1-1	Set ID - DG1			Element name changed from Set ID - diagnosis to Set ID - DG1
DG1-3	Diagnosis code		X	Length changed from 8 to 60, data type changed from ID to CE
DG1-4	Diagnosis description		X	Optionality changed from O to B
DG1-6	Diagnosis type		X	Data type changed from ID to IS element name changed from Diagnosis /DRG Type to Diagnosis Type
DG1-7	Major diagnostic category		X	Optionality changed from O to B
DG1-8	Diagnostic related group		X	Length changed from 4 to 60, data type changed from ID to CE, optionality changed from O to B
DG1-9	DRG approval indicator		X	Optionality changed from O to B
DG1-10	DRG grouper review code		X	Data Type changed from ID to IS, optionality changed from O to B
DG1-11	Outlier type		X	Optionality changed from O to B
DG1-12	Outlier days		X	Optionality changed from O to B
DG1-13	Outlier cost		X	Data Type changed from NM to CP, optionality changed from O to B
DG1-14	Grouper version and type		X	Optionality changed from O to B
DG1-15	Diagnosis priority		X	Element Name changed from Diagnosis/DRG Priority to Diagnosis Priority; Optionality changed from O to B
DG1-16	Diagnosing clinician		X	Data type changed from CN to XCN, repetition changed to Y
DG1-17	Diagnosis classification	X		
DG1-18	Confidential indicator	X		
DG1-19	Attestation date/time	X		
PR1-1	Set ID - PR1		X	Element name changed from Set ID - Procedure to Set ID - PR1
PR1-2	Procedure coding method		X	Data type changed from ID to IS, no longer repeats
PR1-3	Procedure code		X	Length changed from 10 to 80, data type changed from ID to CE, no longer repeats
PR1-4	Procedure description		X	Optionality changed from O to B, no longer repeats
PR1-6	Procedure functional type		X	Data type changed from ID to IS, table changed from 0090 to 0230, element name changed from Procedure Type to Procedure Functional Type

Segment/Seq	Name	New	Change	Description
PR1-8	Anesthesiologist		X	Length changed from 60 to 120, data type changed from CN to XCN, optionality changed from O to B, repetition changed to Y
PR1-9	Anesthesia code		X	Data Type changed from ID to IS
PR1-11	Surgeon		X	Length changed from 60 to 120, data type changed from CN to SCN, optionality changed from O to B, repetition changed to Y
PR1-12	Procedure practitioner		X	Length changed from 60 to 230, data type changed from CM to XCN, optionality changed from O to B
PR1-13	Consent code		X	Length changed from 2 to 60, data type changed from ID to CE
PR1-15	Associated diagnosis code	X		
GT1-1	Set ID - GT1		X	Element name changed from Set ID - guarantor to Set ID - GT1
GT1-2	Guarantor number		X	Length changed from 20 to 59, data type changed from CK to CX, repetition changed to Y
GT1-3	Guarantor name		X	Data type changed from PN to XPN, repetition changed to Y
GT1-4	Guarantor spouse name		X	Data type changed from PN to XPN, repetition changed to Y
GT1-5	Guarantor address		X	Data type changed from AD to XAD, repetition changed to Y
GT1-6	Guarantor ph num-home		X	Data type changed from TN to XTN, repetition changed from Y/3 to Y
GT1-7	Guarantor ph num-business		X	Data type changed from TN to XTN, repetition changed from Y/3 to Y
GT1-8	Guarantor date/time of birth		X	Length changed from 8 to 26, data type changed from DT to TS, element name changed from Guarantor Date of Birth to Guarantor Date/Time of Birth
GT1-9	Guarantor sex		X	Data type changed from ID to IS
GT1-10	Guarantor type		X	Data type changed from ID to IS
GT1-11	Guarantor relationship		X	Data type changed from ID to IS
GT1-16	Guarantor employer name		X	Length changed from 45 to 130, data type changed from ST to XPN, repetition changed to Y
GT1-17	Guarantor employer address		X	Data type changed from AD to XAD
GT1-18	Guarantor employer phone number		X	Data type changed from TN to XTN, repetition changed to Y
GT1-19	Guarantor employee ID number		X	Data type changed from ST to CX, repetition changed from Y/3 to Y, element Name changed from Guarantor Employee ID Num to Guarantor Employee ID Number
GT1-20	Guarantor employment status		X	Data Type changed from ID to IS
GT1-21	Guarantor organization name		X	Length changed from 60 to 130, data type changed from ST to XON,

Segment/Seq	Name	New	Change	Description
				repetition changed to Y, element name changed from Guarantor Organization to Guarantor Organization Name
GT1-22	Guarantor billing hold flag	X		
GT1-23	Guarantor credit rating code	X		
GT1-24	Guarantor death date and time	X		
GT1-25	Guarantor death flag	X		
GT1-26	Guarantor charge adjustment code	X		
GT1-27	Guarantor household annual income	X		
GT1-28	Guarantor household size	X		
GT1-29	Guarantor employer ID number	X		
GT1-30	Guarantor marital status code	X		
GT1-31	Guarantor hire effective date	X		
GT1-32	Employment stop date	X		
GT1-33	Living dependency	X		
GT1-34	Ambulatory status	X		
GT1-35	Citizenship			
GT1-36	Primary language	X		
GT1-37	Living arrangement	X		
GT1-38	Publicity indicator	X		
GT1-39	Protection indicator	X		
GT1-40	Student indicator	X		
GT1-41	Religion	X		
GT1-42	Mother's maiden name	X		
GT1-43	Nationality	X		
GT1-44	Ethnic group	X		
GT1-45	Contact person's name	X		
GT1-46	Contact person's telephone number	X		
GT1-47	Contact reason	X		
GT1-48	Contact relationship	X		
GT1-49	Job title	X		
GT1-50	Job code/class	X		
GT1-51	Guarantor employer's organization name	X		
GT1-52	Handicap	X		
GT1-53	Job status	X		
GT1-54	Guarantor financial class	X		
GT1-55	Guarantor race	X		
IN1-1	Set ID - IN1		X	Element name changed from Set ID - insurance to Set ID - IN1
IN1-2	Insurance plan ID		X	Length changed from 8 to 60, data type changed from ID to CE
IN1-3	Insurance company ID		X	Length changed from 6 to 59, data type changed from ST to CX, repetition

Segment/Seq	Name	New	Change	Description
				changed to Y
IN1-4	Insurance company name		X	Length changed from 45 to 130, data type changed from ST to XON, repetition changed to Y
IN1-5	Insurance company address		X	Data type changed from AD to XAD, repetition changed to Y
IN1-6	Insurance co. contact person		X	Data type changed from PN to XPN, repetition changed to Y, element name changed from Insurance Co. Contact Pers to Insurance Co. Contact Person
IN1-7	Insurance co. phone Number		X	Data Type changed from TN to XTN, repetition changed from Y/3 to Y
IN1-9	Insured's group emp ID		X	Length changed from 35 to 130, data type changed from ST to XON, repetition changed to Y
IN1-10	Insured's group emp name		X	Data type changed from ST to CX, repetition changed to Y
IN1-11	Insured's group emp name		X	Length changed from 45 to 130, data type changed from ST to XON, repetition changed to Y
IN1-15	Plan type		X	Length changed from 2 to 3, data type changed from ID to IS
IN1-16	Name of insured		X	Data type changed from PN to XPN, repetition changed to Y
IN1-17	Insured's relationship to patient		X	Data type changed from ID to IS
IN1-18	Insured's date of birth		X	Length changed from 8 to 26, data type changed from DT to TS
IN1-19	Insured's address		X	Data type changed from AD to XAD, repetition changed to Y
IN1-20	Assignment of benefits		X	Data type changed from ID to IS
IN1-21	Coordinator of benefits		X	Data type changed from ID to IS
INI-25	Report of Eligibility Flag		X	Element name changed from Report of Eligibility Code to Report of Eligibility Flag
IN1-27	Release information code		X	Data type changed from ID to IS
IN1-30	Verification by		X	Data type changed from CN to XCN
IN1-31	Type of agreement code		X	Data type changed from ID to IS
IN1-32	Billing status		X	Data type changed from ID to IS
IN1-35	Company plan code		X	Data type changed from ID to IS
IN1-37	Policy deductible		X	Data type changed from NM to CP
IN1-38	Policy limit - amount		X	Data type changed from NM to CP, optionality changed from O to B
IN1-40	Room rate - semi-private		X	Data type changed from NM to CP, optionality changed from O to B
IN1-41	Room rate - private		X	Data type changed from NM to CP, optionality changed from O to B
IN1-43	Insured's sex		X	Data type changed from ID to IS
IN1-44	Insured's employer address		X	Data type changed from AD to XAD, repetition changed to Y
IN1-46	Prior insurance plan ID		X	Data type changed from ID to IS
INI-47	Coverage type	X		
INI-48	Handicap	X		

Segment/Seq	Name	New	Change	Description
INI-49	Insured's ID number	X		
IN2-1	Insured's employee ID		X	Length changed from 15 to 59, data type changed from ST to CX, repetition changed to Y
IN2-2	Insured's social security number		X	Length changed from 9 to 11, data type changed from NM to ST
IN2-3	Insured's employer name		X	Length changed from 60 to 130, data type changed from CN to XCN, repetition changed to Y
IN2-4	Employer information data		X	Data type changed from ID to IS
IN2-5	Mail claim party		X	Data type changed from ID to IS, repetition changed to Y
IN2-6	Medicare health ins card number		X	Data type changed from NM to ST
IN2-7	Medicaid case name		X	Data type changed from PN to XPN, Repetition changed to Y
IN2-8	Medicaid case number		X	Data type changed from NM to ST
IN2-9	Champus sponsor name		X	Data type changed from PN to XPN, Repetition changed to Y
IN2-10	Champus ID number		X	Data type changed from NM to ST
IN2-11	Dependent of Champus recipient		X	Length changed from 1 to 80, data type changed from ID to CE
IN2-14	Champus service		X	Data type changed from ID to IS
IN2-15	Champus rank/grade		X	Data type changed from ID to IS
IN2-16	Champus status		X	Data type changed from ID to IS
IN2-21	Blood deductible		X	Data type changed from NM to ST
IN2-22	Special coverage approval name		X	Data type changed from PN to XPN, repetition changed to Y
IN2-24	Non-covered insurance code		X	Data type changed from ID to IS
IN2-25	Payor ID		X	Length changed from 6 to 59; data type changed from ST to CX; repetition changed to Y
IN2-26	Payor subscriber ID		X	Length changed from 6 to 59; data type changed from ST to CX; repetition changed to Y
IN2-27	Eligibility source		X	Data type changed from IS to ID
IN2-31	Living dependency	X		
IN2-32	Ambulatory status	X		
IN2-33	Citizenship	X		
IN2-34	Primary language	X		
IN2-35	Living arrangement	X		
IN2-36	Publicity indicator	X		
IN2-37	Protection indicator	X		
IN2-38	Student indicator	X		
IN2-39	Religion	X		
IN2-40	Mother's maiden name	X		
IN2-41	Nationality	X		
IN2-42	Ethnic group	X		
IN2-43	Marital status	X		
IN2-44	Insured's employment start date	X		

Segment/Seq	Name	New	Change	Description
IN2-45	Insured's employment stop date	X		
IN2-46	Job title	X		
IN2-47	Job code/class	X		
IN2-48	Job status	X		
IN2-49	Employer contact person name	X		
IN2-50	Employer contact person phone number	X		
IN2-51	Employer contact reason	X		
IN2-52	Insured's contact person's name	X		
IN2-53	Insured's contact person telephone number	X		
IN2-54	Insured's contact person reason	X		
IN2-55	Relationship to the patient start date	X		
IN2-56	Relationship to the patient stop date	X		
IN2-57	Insurance co. contact reason			
IN2-58	Insurance co. contact phone number	X		
IN2-59	Policy scope	X		
IN2-60	Policy source	X		
IN2-61	Patient member number	X		
IN2-62	Guarantor's relationship to insured	X		
IN2-63	Insured's telephone number - home	X		
IN2-64	Insured's telephone number	X		
IN2-65	Military handicapped program	X		
IN2-66	Suspend flag	X		
IN2-67	Copay limit flag	X		
IN2-68	Stoploss limit flag	X		
IN2-69	Insured organization name and ID	X		
IN2-70	Insured employer organization name and ID	X		
IN2-71	Race	X		
IN2-72	HCFA patient relationship to insured	X		
IN3-1	Set ID - IN3		X	Element Name changed from Set ID - insurance certification to Set ID - IN3
IN3-2	Certification number		X	Length changed from 25 to 59, data type changed from ST to CX
IN3-3	Certified by		X	Data type changed from CN to SCN, repetition changed to Y
IN3-8	Operator		X	Data type changed from CN to XCN, repetition changed to Y

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Segment/Seq	Name	New	Change	Description
IN3-12	Non-concur code/description		X	Added table 0233
IN3-14	Physician reviewer		X	Data type changed from CN to XCN, repetition changed to Y
IN3-16	Certification contact phone number16		X	Data type changed from TN to XTN, repetition changed from Y/3 to Y
IN3-19	Certification agency phone number		X	Data type changed from TN to XTN, repetition changed from Y/3 to Y
IN3-23	Second opinion status		X	Data type changed from ID to IS
IN3-24	Second opinion documentation received		X	Data type changed from ID to IS, repetition changed to Y
IN3-25	Second opinion physician		X	Data type changed from CN to XCN, repetition changed to Y
ACC-2	Accident code		X	Length changed from 2 to 60, data type changed from CE to ID
ACC-4	Auto accident state	X		
ACC-5	Accident job related indicator	X		
ACC-6	Accident death indicator	X		
UB1-1	Set ID - UB1		X	Element name changed from Set ID - UB82 to Set ID - UB1
UB1-2	Blood deductible (43)		X	Optionality changed from O to B
UB1-7	Condition code (35-39)		X	Length changed from 2 to 14; Data Type changed from ID to IS
UB1-10	Value amount and code (46-49)		X	Data Type changed from ID to CM
UB1-12	Spec program indicator (44)		X	Length changed from 2 to 60, data type changed from ID to CE
UB1-13	PSRO/UR approval indicator (87)		X	Length changed from 1 to 60, data type changed from ID to CE
UB1-17	Occurrence span (33)		X	Length changed from 2 to 60, data type changed from ID to CE
UB2-3	Condition code (24-30)		X	Data type changed from IS to ID
UB2-6	Value amount & code		X	Data type changed (39-41), added table 0153
UB2-17	Special visit count	X		

5.3.7 Chapter 7 - Observation Reporting

5.3.7.1 Messages/Segments

Event	Name	New	Change	Description
P07/ P08	Product experience	X		Message
P09	Summary product experience report	X		Message
C01	CRM - register a patient on a clinical trial	X		Message
C02	CRM - cancel a patient registration on clinical trial	X		Message
C03	CRM - correct/update registration information	X		Message
C04	CRM - patient has gone off a clinical trial	X		Message
C05	CRM - patient enter phase of clinical trial	X		Message
C06	CRM - cancel patient entering a phase	X		Message
C07	CRM - correct/update phase information	X		Message
C08	CRM - patient has gone off phase of clinical trial	X		Message
C09	CSU - automated time intervals for reporting, like monthly	X		Message
C10	CSU - patient completed the clinical trial	X		Message
C11	CSU - patient completes a phase of the clinical trial	X		Message
C12	CSU - update/correction of patient order/result information	X		Message
CSR	Clinical study registration	X		Segment
CSP	Clinical study phase	X		Segment
CSS	Clinical study data schedule	X		Segment
CTI	Clinical trial identification	X		Segment
CM0	Clinical study master	X		Segment
CM1	Clinical study phase master	X		Segment
CM2	Clinical study schedule master	X		Segment
PES	Product experience sender	X		Segment
PEO	Product experience observation	X		Segment
PCR	Possible causal relationship	X		Segment
PSH	Product summary header	X		Segment
PDC	Product detail country	X		Segment

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Event	Name	New	Change	Description
FAC	Facility	X		Segment

5.3.7.2 Data Elements

Segment/Seq	Name	New	Change	Description
OBR-2	Placer order number		X	Length changed from 75 to 22, data type changed from CM to EI
OBR-3	Filler order number		X	Length changed from 75 to 22; Data Type changed from CM to EI
OBR-10	Collector identifier		X	Data type changed from CN to XCN
OBR-16	Ordering provider		X	Length changed from 60 to 80, data type changed from CN to XCN
OBR-17	Order callback phone number		X	Data type changed from TN to XTN
OBR-26	Parent result		X	Length changed from 200 to 400
OBR-28	Result copies to		X	Data type changed from CN to XCN
OBR-32	Principal result interpreter		X	Length changed from 60 to 200
OBR-33	Assistant result interpreter		X	Length changed from 60 to 200
OBR-34	Technician		X	Length changed from 60 to 200
OBR-35	Transcriptions		X	Length changed from 60 to 200
OBR-37	Number of sample containers	X		
OBR-38	Transport logistics of collected sample	X		
OBR-39	Collector's comment	X		
OBR-40	Transport arrangement responsibility	X		
OBR-41	Transport arranged	X		
OBR-42	Escort required	X		
OBR-43	Planned patient transport comment	X		
OBX-1	Set ID - OBX		X	Length changed from 4 to 10
OBX-3	Observation identifier		X	Length changed from 80 to 590
OBX-7	References range		X	Length changed from 60 to 10
OBX-8	Abnormal flags		X	Length changed from 10 to 5
OBX-10	Nature of abnormal test		X	Length changed from 5 to 2
OBX-11	Observ result status		X	Length changed from 2 to 1

OBX-16	Responsible observer		X	Length changed from 60 to 80, data type changed from CN to XCN
OBX-17	Observation method	X		

5.3.8 Chapter 8 - Master Files

5.3.8.1 Messages/Segments

Event	Name	New	Change	Description
MFN/ MFR	Test observation master file	X		Message
MFN/ MFK	Patient location master file	X		Message
MFN/ MFK	Charge description master file	X		Message
MFN/ MFK	Clinical trials master file	X		Message
OM1	General	X		Segment
OM2	Numeric observation	X		Segment
OM3	Categorical test/observation	X		Segment
OM4	Observations that require specimens	X		Segment
OM5	Observation batteries	X		Segment
OM6	Observations that are calculated from other observations	X		Segment
LOC	Patient location master	X		Segment
LCH	Location characteristic	X		Segment
LRL	Location relationship	X		Segment
LDP	Location department	X		Segment
LCC	Location charge code	X		Segment
CDM	Charge description master	X		Segment
PCR	Pricing	X		Segment
CM0	Clinical study master	X		Segment
CM1	Clinical study phase	X		Segment
CM2	Clinical study schedule	X		Segment

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5.3.8.2 Data Elements

Segment/Seq	Name	New	Change	Description
MFI-2	Master file application identifier		X	Length changed from 60 to 180, data type changed from ID to HD
MRE-4	Primary key value - MFE		X	Length changed from 60 to 200, data type changed from CE to Varies
STF-1	Primary key value - STF		X	Element name changed from Primary Key Value to Primary Key Value - STF
STF-2	Staff ID code		X	Data type changed from CE to CX
STF-3	Staff name		X	Data type changed from PN to XPN
STF-4	Staff type		X	Data type changed from ID to IS
STF-5	Sex		X	Data type changed from ID to IS
STF-6	Date/time of birth		X	Element name changed from Date of Birth to Date/Time of Birth
STF-10	Phone		X	Data type changed from TN to XTN
STF-11	Office/home address		X	Data type changed from AD to XAD
STF-17	Marital status	X		
STF-18	Job title	X		
STF-19	Job code/class	X		
STF-20	Employment status	X		
STF-21	Additional insured on auto	X		
STF-22	Driver's license number - staff	X		
STF-23	Copy auto ins	X		
STF-24	Auto ins. expires	X		
STF-25	Date last DMV review	X		
STF-26	Date next DMV review	X		
PRA-1	Primary key value - PRA		X	Element name changed from PRA - Primary Key Value to Primary Key Value - PRA
PRA-8	Date entered practice	X		

5.3.9 Chapter 9 (responses by Wayne Tracy)

5.3.9.1 What was the driving force behind the creation of chapter 9?

The Medical Records/Information Management technical committee was formed to provide input and content to the HL7 standard that would support information exchange between systems supporting the medical records department and other systems within the health care enterprise. These systems could include functionality delivered within more general purpose systems or stand-alone departmental systems.

5.3.9.2 What functionality does it offer?

The chapter exists for the first time within Version 2.3. The scope of the content includes messages concerning the distribution of the content and status of transcribed documents that are treated as content of the medical record and are thus limited to documents about a single patient typically dictated by a physician or allied health professional. In the typical setting a number of documents are generated in this fashion including:

- Medical history and physicals (H&Ps)
- Progress notes
- Consultation reports
- Operative notes/records
- Procedure notes (including medical imaging interpretation and surgical pathology reports)
- Discharge summary

5.3.9.3 Are there any functional issues that should be addressed prior to implementing this chapter?

There have been numerous implementations to date. We are unaware of any limitations which require resolution prior to implementing this chapter other than the normal issues associated with any other HL7 interface including creating a unique identifier for each feeder and recipient systems and populating these IDs within the message header (MSH segment).

5.3.10 Chapter 10

No information submitted by co-chair.

5.3.11 Chapter 11

No information submitted by co-chair

5.3.12 Chapter 12 (responses by Karen Keeter)

5.3.12.1 What was the driving force behind the creation of chapter 12?

This chapter was created to support the communication of primary care provider information typically required by and generated by physicians and nurses. These include assessment, problem and goal oriented records and data - at this time supporting clinical problems, goals, and pathways. The chapter was developed following an assessment, supported by the Orders TC, in which it was agreed that there was not adequate support for these capabilities in other chapters of HL7.

5.3.12.2 What functionality does it offer?

The Patient Care chapter offers support for the following trigger events:

- PC1 - PPR - PC/ Problem Add
- PC2 - PPR - PC/ Problem Update
- PC3 - PPR - PC/ Problem Delete
- PC4 - QRY- PC/ Problem Query
- PC5 - PRR - PC/ Problem Response
- PC6 - PGL - PC/ Goal Add
- PC7 - PGL - PC/ Goal Update
- PC8 - PGL - PC/ Goal Delete
- PC9 - QRY - PC/ Goal Query
- PCA - PPV - PC/ Goal Response,
- PCB - PPP - PC/ Pathway (Problem-Oriented) Add
- PCC - PPP - PC/ Pathway (Problem-Oriented) Update
- PCD - PPP - PC/ Pathway (Problem-Oriented) Delete
- PCE - QRY - PC/Pathway (Problem-Oriented) Query
- PCF - PTR - PC/ Pathway (Problem-Oriented) Query Response
- PCG - PPG - PC/ Pathway (Goal-Oriented) Add

- PCH - PPG - PC/ Pathway (Goal-Oriented) Update
- PCJ - PPG - PC/ Pathway (Goal-Oriented) Delete
- PCK - QRY - PC/ Pathway (Goal-Oriented) Query
- PCL - PPT - Pathway (Goal-Oriented) Query Response

5.3.12.3 Are there any functional issues that should be addressed prior to implementing this chapter?

The implementator will need to determine whether or not the applications, systems or institution which they will be communicating with supports a problem oriented or a goal oriented perspective. Depending on the type of solution, the messages utilized may vary. For example, an application supporting a problem oriented view would be sent the Problem Oriented Add/Delete/Update/query, whereas a application supporting a goal oriented view would be sent Goal Oriented add/delete/update/query messages.

Appendix A
HL7 Transaction Checklist

A.1 HL7 TRANSACTION CHECKLIST

The message transaction checklist documents the trigger events and messages defined by Version 2.3 of the HL7 standard. The checklist contains:

- a cover sheet describing the products being interfaced and the general characteristics of the interface
- a message checklist to help establish:
  - which HL7 transactions will be used in the interface
  - who will be the originator of each message
  - the required and optional segments that will be sent in each of the messages
- a detailed list of all HL7 segment types identifying, by field:
  - sequence number
  - item number
  - field name
  - required field indicator or placeholder for selecting optional fields
  - data type
  - field length
    - > maximum used
    - > maximum allowable
  - repeating field indicator or placeholder for maximum number of repetitions
  - variable name assigned to field on the sending system
  - variable name of field on the receiving system
  - table number (if applicable)
  - notes

The checklist can be used during the development of an HL7 interface. Once the health care organization's data flow needs are established, the appropriate HL7 transactions can be selected from the checklist. Each transaction can be reviewed to determine which of the optional fields will be included in the message (the required fields -- which must be included in the message -- are already marked with an "R"). Descriptive information about the field (e.g., maximum character length, repeating/non-repeating field, type of time/date notation, etc.) can be determined and documented on the checklist. The checklist also provides space to document the variable names assigned to corresponding fields on each system.

A checklist and cover sheet should be completed for each interface being designed, including interfaces that broadcast to more than one system. In the case of broadcast interfaces, every effort should be made to agree on a single format for the message from the sender.

Certain messages may include different segments and fields, depending on the trigger event (e.g., Pharmacy Orders and Lab Orders both use the same message). Complete copies of the message selection/definition documentation for each trigger event. In the interest of conserving paper, only one copy of each segment definition is included in the checklist. Copy the appropriate segment definitions for each message to be implemented.

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A 'Z' segment line is included at the bottom of each message to document site-specific segments. The location and name of the segment should be indicated for the message if 'Z' segments are used.
The checklist does not replace the HL7 Interface Standards document. Refer to the HL7 standard throughout the design and development process. Keep in mind that the HL7 checklist and the HL7 standard itself may be interpreted differently by individual vendors as they apply the standard to the events and data that their systems process. It is essential that all parties involved in an interface reach agreement on its details. The HL7 checklist can facilitate that discussion.

As the health care community gains experience implementing HL7 interfaces, the HL7 standard will evolve to both clarify its usage and expand its scope. The HL7 Implementation Committee is very interested in learning about your experience implementing the HL7 standard. Please direct your comments to the people listed at the end of this document.

This checklist is available to HL7 members in electronic format from the HL7 office at 3300 Washtenaw Ave., Suite 227, Ann Arbor, MI 48104-4250. Phone number (734) 677-7777.

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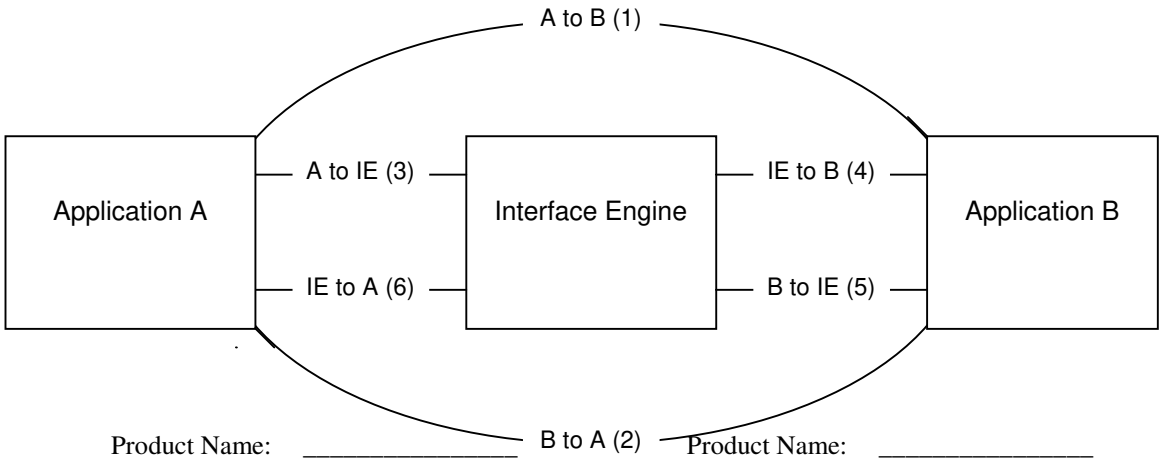
A.2 HL7 INTERFACE CHECKLIST COVER SHEET

Describing the interface between:

Application A: HL7 Compliant?

Application B: HL7 Compliant?



Product Name: _____ Product Name: _____
Hardware: _____ Hardware: _____
Protocol: _____ Protocol: _____
Product Name: _____ Hardware: _____

Checklist completed on: / / Agreed to by:

_____ _____

_____ _____

_____ _____

Changes completed on: / /

Agreed to by: _____ _____

_____ _____

_____ _____

Note: System "A" and "B" are used to designate the sender/receiver in the message checklist section of the document.

A.3 GENERAL INTERFACE DESCRIPTION

A.3.1 Delimiters

	HL7	SYSTEM A	SYSTEM B
Segment Terminator	<CR>	<CR>	<CR>
Field Separator	| (hex 0D)		
Component Separator	^		
Sub-Component Separator	&		
Repetition Separator	~		
Escape Character	\		

Note: The interface must still parse the incoming message for the delimiters. These delimiters may differ in each individual message. This section provides a mechanism for deciding on and documenting the (various) delimiters that will be used and identifying any related issues early (e.g., conflicts with ASCII characters being used that have special meaning in EBCDIC).

A.3.2 Data Type Descriptions

Category/ Data Type	Data Type Name	Notes/Format	Application A	Application B
Alphanumeric				
ST	String			
TX	Text data			
FT	Formatted text			
Numerical				
CQ	Composite quantity with units	<quantity (NM)> ^ <units (CE)>		
MO	Money	<quantity (NM)> ^ <denomination (ID)>		
NM	Numeric			
SI	Sequence ID			
SN	Structured numeric	<comparator> ^ <num1 (NM)> ^ <separator/suffix> ^ <num2 (NM)>		
Identifier				
ID	Coded values for HL7 tables			
IS	Coded value for user-defined tables			
HD	Hierarchic designator	<namespace ID (IS)> ^ <universal ID (ST)> ^ <universal ID type (ID)> Used only as part of EI and other data types.		

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Category/ Data Type	Data Type Name	Notes/Format	Application A	Application B
EI	Entity identifier	<entity identifier (ST)> ^ <namespace ID (IS)> ^ <universal ID (ST)> ^ <universal ID type (ID)>		
RP	Reference pointer	<pointer (ST) > ^ < application ID (HD)> ^ <type of data (ID)> ^ *<subtype (ID)>*		
PL	Person location	<point of care (IS)> ^ <room (IS)> ^ <bed (IS)> ^ <facility (HD)> ^ < location status (IS)> ^ <person location type (IS)> ^ <building (IS)> ^ <floor (IS)> ^ <location description (ST)>		
PT	Processing type	<processing ID (ID)> ^ <processing mode (ID)>		
Date/Time				
DT	Date	YYYY[MM[DD]]		
TM	Time	HH[MM[SS[.S[S[S[S]]]]]][+/-ZZZZ]		
TS	Time stamp	YYYY[MM[DD[HHMM[SS[.S[S[S[S]]]]]]]][+/-ZZZZ] ^ <degree of precision>		
Code Values				
CE	Coded element	<identifier (ST)> ^ <text (ST)> ^ <name of coding system (ST)> ^ <alternate identifier (ST)> ^ <alternate text (ST)> ^ <name of alternate coding system (ST)>		
CF	Coded element with formatted values	<identifier (ID)> ^ <formatted text (FT)> ^ <name of coding system (ST)> ^ <alternate identifier (ID)> ^ <alternate formatted text (FT)> ^ <name of alternate coding system (ST)>		
CK	Composite ID with check digit	<ID number (NM)> ^ <check digit (NM)> ^ <code identifying the check digit scheme employed (ID)> ^ < assigning authority (HD)>		
CN	Composite ID number and name	<ID number (ST)> ^ <family name (ST)> ^ <given name (ST)> ^ <middle initial or name (ST)> ^ <suffix (e.g., JR or III) (ST)> ^ <prefix (e.g., DR) (ST)> ^ <degree (e.g., MD) (ST)> ^ <source table (IS)> ^ <assigning authority (HD)>		
CX	Extended composite ID with check digit	<ID (ST)> ^ <check digit (ST)> ^ <code identifying the check digit scheme employed (ID)> ^ < assigning authority (HD))> ^ <identifier type code (IS)> ^ < assigning facility (HD)		

Category/ Data Type	Data Type Name	Notes/Format	Application A	Application B
XCN	Extended composite ID number and name	In Version 2.3, use instead of the CN data type. <ID number (ST)> ^ <family name (ST)> ^ <given name (ST)> ^ <middle initial or name (ST)> ^ <suffix (e.g., JR or III) (ST)> ^ <prefix (e.g., DR) (ST)> ^ <degree (e.g., MD) (ST)> ^ <source table (IS)> ^ <assigning authority (HD)> ^ <name type code (ID)> ^ <identifier check digit (ST)> ^ <code identifying the check digit scheme employed (ID)> ^ <identifier type code (IS)> ^ <assigning facility (HD)>		
Generic				
CM	Composite	No new CM's are allowed after HL7 Version 2.2. Hence there are no new CM's in Version 2.3.		
Demographics				
AD	Address	<street address (ST)> ^ < other designation (ST)> ^ <city (ST)> ^ <state or province (ST)> ^ <zip or postal code (ST)> ^ <country (ID)> ^ <address type (ID)> ^ <other geographic designation (ST)>		
PN	Person name	<family name (ST)> ^ <given name (ST)> ^ <middle initial or name (ST)> ^ <suffix (e.g., JR or III) (ST)> ^ <prefix (e.g., DR) (ST)> ^ <degree (e.g., MD) (ST)>		
TN	Telephone number	[NN] [(999)]999-9999[X99999][B99999][C any text]		
XAD	Extended address	In Version 2.3, replaces the AD data type. <street address (ST)> ^ <other designation (ST)> ^ <city (ST)> ^ <state or province (ST)> ^ <zip or postal code (ST)> ^ <country (ID)> ^ < address type (ID)> ^ <other geographic designation (ST)> ^ <county/parish code (IS)> ^ <census tract (IS)>		
XPN	Extended person name	In Version 2.3, replaces the PN data type. <family name (ST)> ^ <given name (ST)> ^ <middle initial or name (ST)> ^ <suffix (e.g., JR or III) (ST)> ^ <prefix (e.g., DR) (ST)> ^ <degree (e.g., MD) (ST)> ^ <name type code (ID) >		

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Category/ Data Type	Data Type Name	Notes/Format	Application A	Application B
XON	Extended composite name and ID number for organizations	<organization name (ST)> ^ <organization name type code (IS)> ^ <ID number (NM)> ^ <check digit (NM)> ^ <code identifying the check digit scheme employed (ID)> ^ <assigning authority (HD)> ^ <identifier type code (IS)> ^ <assigning facility ID (HD)>		
XTN	Extended telecommunications number	In Version 2.3, replaces the TN data type. [NNN] [(999)]999-9999 [X99999] [B99999] [C any text] ^ <telecommunication use code (ID)> ^ <telecommunication equipment type (ID)> ^ <email address (ST)> ^ <country code (NM)> ^ <area/city code (NM)> ^ <phone number (NM)> ^ <extension (NM)> ^ <any text (ST)>		
Specialty/Chapter Specific				
Waveform				
CD	Channel definition	For waveform data only, see Chapter 7, Section 7.15.3. <channel identifier (*)> ^ <channel number (NM)> & <channel name (ST)>> ^ <electrode names (*) > ^ <channel sensitivity/units (*) > ^ <calibration parameters (*)> ^ <sampling frequency (NM)> ^ <minimum/maximum data values (*)>		
MA	Multiplexed array	For waveform data only, see Chapter 7, Section 7.15.2. <sample 1 from channel 1 (NM)> ^ <sample 1 from channel 2 (NM)> ^ <sample 1 from channel 3 (NM)> ...~<sample 2 from channel 1 (NM)> ^ <sample 2 from channel 2 (NM)> ^ <sample 2 from channel 3 (NM)> ...~		
NA	Numeric array	For waveform data only, see Chapter 7, Section 7.15.1. <value1 (NM)> ^ <value2 (NM)> ^ <value3 (NM)> ^ <value4 (NM)> ^ ...		
ED	Encapsulated data	Supports ASCII MIME-encoding of binary data. <source application (HD) > ^ <main type of data (ID)> ^ <data subtype (ID)> ^ <encoding (ID)> ^ <data (ST)>		

Price data		
CP	Composite price	In Version 2.3, replaces the MO data type. <price (MO)> ^ <price type (ID)> ^ <from value (NM)> ^ <to value (NM)> ^ <range units (CE)> ^ <range type (ID)>
Patient Administration/Financial Information		
FC	Financial class	<financial class (ID)> ^ <effective date (TS)>
Extended Queries		
QSC	Query selection criteria	<name of field (ST)> ^ <relational operator (ID)> ^ <value (ST)> ^ <relational conjunction (ID)>
QIP	Query input parameter list:	<field name (ST) > ^ <value1 (ST) & value2 (ST) & value3 (ST) ...>
RCD	Row column definition:	<HL7 item number (ST)> ^ <HL7 data type (ST)> ^ <maximum column width (NM)>
Master Files		
DLN	Driver's license number	<license number (ST)> ^ <issuing state, province, country (IS)> ^ <expiration date (DT)
JCC	Job code/class	<job code (IS)> ^ <job class (IS)>
VH	Visiting hours	<start day range (ID)> ^ <end day range (ID)> ^ <start hour range (TM)> ^ <end hour range (TM)>
Medical Records/Information Management		
PPN	Performing person time stamp:	<ID number (ST)> ^ <family name (ST)> ^ <given name (ST)> ^ <middle initial or name (ST)> ^ <suffix (e.g., JR or III) (ST)> ^ <prefix (e.g., DR) (ST)> ^ <degree (e.g., MD) (ST)> ^ <source table (IS)> ^ <assigning authority (HD)> ^ <name type code(ID)> ^ <identifier check digit (ST)> ^ <code identifying the check digit scheme employed (ID)> ^ <identifier type code (IS)> ^ <assigning facility (HD)> ^ < date/time action performed (TS)>
Time Series:		
DR	Date/time range	Scheduling Chapter Only: <range start date/time (TS)> ^ <range end date/time (TS)>

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RI	Repeat interval	Scheduling Chapter Only: <repeat pattern (IS)> ^ <explicit time interval (ST)>
SCV	Scheduling class value pair	Scheduling Chapter Only: <parameter class (IS)> ^ <parameter value (IS)>
TQ	Timing/quantity	For timing/quantity specifications for orders, see Chapter 4, Section 4.4. <quantity (CQ)> ^ <interval (*)> ^ <duration (*)> ^ <start date/time (TS)> ^ <end date/time (TS)> ^ <priority (ID)> ^ <condition (ST)> ^ <text (TX)> ^ <conjunction (ID)> ^ <order sequencing (*)>

Note: The HL7 Standard allows for different data formats for each of these data types. This section provides a place to document general attributes of each data type format.

A.3.3 Presentation

ASCII / EBCDIC: _____

A.4 MESSAGE CHECKLIST

The message checklist lists each HL7 message together with its required and optional message segments. Select the HL7 messages for the interface from this checklist. Decide which of the optional segments will be used. Make a copy of the segment checklist for each of the required and chosen segments and decide which fields to use in the interface.

Each message listed is presented by HL7 specification chapter. In most cases, the message name is provided, with the trigger event/name in parentheses. A blank line is provided after each message name to be checked off if that message will be included in the interface. Under each message is a message selection section. This section lists all the required and optional segments in the message. Under the OPT heading, the following are valid values.

R – Required to Process the Message
C – Conditionally Required
O – Optional
Z – Can support it with custom code
N – Not Supported

For you convenience, we have indicated the segments that are required by HL7. (If the segment is optional, a blank line is provided. A check mark can be used to indicate that an optional segment will be used in the interface.)

The messages described in the checklist are based on the final, balloted Version 2.3 of the HL7 Interface Standard published April 3, 1997.

A.4.1 Control Section

A.4.1.1 ACK - General Acknowledgment Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					

A.4.1.2 MCF - Delayed Acknowledgment Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					

A.4.1.3 QRY – Query Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
QRD	Query Definition	R				
QRF	Query Filter					
DSC	Continuation Pointer					

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A.4.1.4 DSR - Display Response Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					
QRD	Query Definition					
QRF	Query Filter					
DSP	Display Data					
DSC	Continuation Pointer					

A.4.1.5 Q05 – Unsolicited Display Update Message (UDM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
URD	Results/Update Definition	R				
URS	Results/Update Selection Criteria					
DSP	Display Data					
DSC	Continuation Pointer					

A.4.2 Admission, Discharge, and Transfer Messages

A.4.2.1 A01 - Admit a Patient (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
NK1	Next of Kin					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info.)					
DB1	Disability Information					
OBX	Health Information					
AL1	Allergy Information					
DG1	Diagnosis Information					
PR1	Procedures					
ROL	Role					
GT1	Guarantor Information					
IN1	Insurance Information					

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
IN2	Insurance Information - Add'l. Info.					
IN3	Insurance Information - Cert.					
ACC	Accident Information					
UB1	Universal Bill Information					
UB2	Universal Bill 92 Information					
Z__						

A.4.2.2 A02 - Transfer a Patient (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info.)					
DB1	Disability Information					
OBX	Health Information					

A.4.2.3 A03 – Discharge a Patient (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
DG1	Diagnosis Information					
DRG	Diagnosis Related Group					
PR1	Procedures					
ROL	Role					
OBX	Health Information					

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A.4.2.4 A04 - Register A Patient (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
NK1	Next of Kin					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info.)					
DB1	Disability Information					
OBX	Health Information					
AL1	Allergy Information					
DG1	Diagnosis Information					
DRG	Diagnosis Related Group					
PR1	Procedures					
ROL	Role					
GT1	Guarantor Information					
IN1	Insurance Information					
IN2	Insurance Information – Add'l. Info					
IN3	Insurance Information – Cert.					
ACC	Accident Information					
UB1	Universal Bill Information					
UB2	Universal Bill 92 Information					

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A.4.2.5 A05 - Pre-Admit a Patient (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
NK1	Next of Kin					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					
AL1	Allergy Information					
DG1	Diagnosis Information					
DRG	Diagnosis Related Group					
PR1	Procedures					
ROL	Role					
GT1	Guarantor Information					
IN1	Insurance Information					
IN2	Insurance Information - Add'l. Info					
IN3	Insurance Information - Cert.					
ACC	Accident Information					
UB1	Universal Bill Information					
UB2	Universal Bill 92 Information					

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A.4.2.6 A06 - Transfer an Outpatient-to Inpatient (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information					
NK1	Next of Kin					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
DRG	Diagnosis Related Group					
OBX	Health Information					
AL1	Allergy Information					
DG1	Diagnosis Information					
DRG	Diagnosis Related Group					
PR1	Procedures					
ROL	Role					
GT1	Guarantor Information					
IN1	Insurance Information					
IN2	Insurance Information - Add'l. Info					
IN3	Insurance Information - Cert.					
ACC	Accident Information					
UB1	Universal Bill Information					
UB2	Universal Bill 92 Information					

A.4.2.7 A07 - Transfer an Inpatient-to Outpatient (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information					
NK1	Next of Kin					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
DRG	Diagnosis Related Group					
OBX	Health Information					
AL1	Allergy Information					
DG1	Diagnosis Information					
DRG	Diagnosis Related Group					
PR1	Procedures					
ROL	Role					
GT1	Guarantor Information					
IN1	Insurance Information					
IN2	Insurance Information - Add'l. Info					
IN3	Insurance Information - Cert.					
ACC	Accident Information					
UB1	Universal Bill Information					
UB2	Universal Bill 92 Information					

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A.4.2.8 A08 - Update Patient Information (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
NK1	Next of Kin					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					
AL1	Allergy Information					
DG1	Diagnosis Information					
DRG	Diagnosis Related Group					
PR1	Procedures					
ROL	Role					
GT1	Guarantor Information					
IN1	Insurance Information					
IN2	Insurance Information - Add'l. Info					
IN3	Insurance Information - Cert.					
ACC	Accident Information					
UB1	Universal Bill Information					
UB2	Universal Bill 92 Information					
Z__						

A.4.2.9 A09 - Patient Departing (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					
DG1	Diagnosis Information	B				

A.4.2.10 A10 - Patient Arriving (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					
DG1	Diagnosis Information	B				

A.4.2.11 A11 - Cancel Admit (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					
DG1	Diagnosis Information	B				

A.4.2.12 A12 - Cancel Transfer (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					
DG1	Diagnosis Information	B				

A.4.2.13 A13 – Cancel Discharge (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?

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Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
NK1	Next of Kin					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					
AL1	Allergy Information					
DG1	Diagnosis Information					
DRG	Diagnosis Related Group					
PR1	Procedures					
ROL	Role					
GT1	Guarantor Information					
IN1	Insurance Information					
IN2	Insurance Information - Add'l. Info					
IN3	Insurance Information - Cert.					
ACC	Accident Information					
UB1	Universal Bill Information					
UB2	Universal Bill 92 Information					

A.4.2.14 A14 - Pending Admit (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
NK1	Next of Kin					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					
AL1	Allergy Information					
DG1	Diagnosis Information					
DRG	Diagnosis Related Group					
PR1	Procedures					
ROL	Role					
GT1	Guarantor Information					
IN1	Insurance Information					
IN2	Insurance Information - Add'l. Info					
IN3	Insurance Information - Cert.					
ACC	Accident Information					
UB1	Universal Bill Information					
UB2	Universal Bill 92 Information					

A.4.2.15 A15 - Pending Transfer (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					
DG1	Diagnosis Information	B				

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A.4.2.16 Pending Discharge (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					
DG1	Diagnosis Information					
DRG	Diagnosis Related Group					

A.4.2.17 A17 - Swap Patients (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					

A.4.2.18 A18 - Merge Patient Information (ADT) Originator (A or B)

Retained for backward compatibility

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information					
PV1	Patient Visit	R				

A.4.2.19 A19 - Patient Query (QRY/ADR)

A.4.2.19.1 ***QRY*** Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
QRD	Query Definition	R				
QRF	Query Filter					

A.4.2.19.2 ADR

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					
QRD	Query Definition	R				
QRF	Query Filter					
EVN	Event Type					
PID	Patient Identification	R				
PD1	Additional Demographics					
NK1	Next of Kin					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					
AL1	Allergy Information					
DG1	Diagnosis Information					
DRG	Diagnosis Related Group					
PR1	Procedures					
ROL	Role					
GT1	Guarantor Information					

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
IN1	Insurance Information					
IN2	Insurance Information - Add'l. Info					
IN3	Insurance Information - Cert.					
ACC	Accident Information					
UB1	Universal Bill Information					
UB2	Universal Bill 92 Information					
DSC	Continuation Pointer					

A.4.2.20 A20 - Bed Status Update (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
NPU	Non-Patient Update	R				

A.4.2.21 A21 - Patient Goes on "Leave Of Absence" (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					

A.4.2.22 A22 - Patient Returns from LOA (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					

A.4.2.23 A23 - Delete a Patient Record (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					

A.4.2.24 A24 - Create a Patient Link (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit					
DB1	Disability Information					
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit					
DB1	Disability Information					

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A.4.2.25 A25 - Cancel Pending Discharge (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					

A.4.2.26 A26 - Cancel Pending Transfer (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					

A.4.2.27 A27 - Cancel Pending Admit (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					

A.4.2.28 A28 - Add Person Information (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
NK1	Next of Kin					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					
AL1	Allergy Information					
DG1	Diagnosis Information					
DRG	Diagnosis Related Group					
PR1	Procedures					
ROL	Role					
GT1	Guarantor Information					
IN1	Insurance Information					
IN2	Insurance Information – Add'l. Info					
IN3	Insurance Information – Cert.					
ACC	Accident Information					
UB1	Universal Bill Information					
UB2	Universal Bill 92 Information					
Z__						

A.4.2.29 A29 - Delete Person Information (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					

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A.4.2.30 A30 - Merge Person Information (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information	R				

A.4.2.31 A31 - Update Person Information (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
NK1	Next of Kin					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					
AL1	Allergy Information					
DG1	Diagnosis Information					
DRG	Diagnosis Related Group					
PR1	Procedures					
ROL	Role					
GT1	Guarantor Information					
IN1	Insurance Information					
IN2	Insurance Information - Add'l. Info					
IN3	Insurance Information - Cert.					
ACC	Accident Information					
UB1	Universal Bill Information					
UB2	Universal Bill 92 Information					
Z__						

A.4.2.32 A32 - Cancel Patient Arriving (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					

A.4.2.33 A33 Cancel Patient Departing (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					

A.4.2.34 A34 - Merge Patient Information - ID Only (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information	R				

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A.4.2.35 A35 - Merge Patient Info - Acct. # Only (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information	R				

A.4.2.36 A36 - Merge Pat. Info - Pat. ID & Acct. # (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information	R				

A.4.2.37 A37 - Un-Link Patient Information (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit					
PID	Patient Identification	R				
PD1						
PV1	Patient Visit					

A.4.2.38 A38 - Cancel Pre-Admit (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
NK1	Next of Kin					
PV1	Patient Visit	R				
PV2	Patient Visit (Additional Info)					
DB1	Disability Information					
OBX	Health Information					
DG1	Diagnosis Information					
DRG	Diagnosis Related Group					

A.4.2.39 A39 - Merge Person - External ID (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information	R				
PV1	Patient Visit					

A.4.2.40 A40 - Merge Person - Internal ID (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information	R				
PV1	Patient Visit					

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A.4.2.41 A41 - Merge Account - Patient Account Number (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information	R				
PV1	Patient Visit					

A.4.2.42 A42 - Merge Visit - Visit Number (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information	R				
PV1	Patient Visit					

A.4.2.43 A43 - Move Patient Information - Internal ID (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information	R				

A.4.2.44 A44 - Move Account Information-Patient Account Number (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information	R				

A.4.2.45 A45 - Move Visit Information - Visit Number (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information	R				
PV1	Patient Visit					

A.4.2.46 A46 - Change External ID (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information	R				

A.4.2.47 A47 - Change Internal ID (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information	R				

A.4.2.48 A48 - Change Alternate Patient ID (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information	R				

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A.4.2.49 A49 - Change Patient Account Number (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information	R				

A.4.2.50 A50 - Change Visit Number (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information	R				
PV1	Patient Visit	R				

A.4.2.51 A51 - Change Alternate Visit ID (ADT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
MRG	Merge Information	R				
PV1	Patient Visit	R				

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A.4.3 Order Messages

A.4.3.1 O01- General Order Message (ORM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
NTE	Notes and Comments					
PID	Patient Identification					
PD1	Additional Demographics					
NTE	Notes and Comments					
AL1	Allergy					
PV1	Patient Visit					
PV2	Patient Visit (Additional Info)					
IN1	Insurance Information					
IN2	Insurance Information - Add'l. Info					
IN3	Insurance Information - Cert.					
GT1	Guarantor Information					
AL1	Allergy Information					
ORC	Common Order	R				
OBR	Observation Request					
NTE	Notes and Comments					
OBX	Results					
NTE	Notes and Comments					
CTI	Clinical Trial Identification					
BLG	Billing					

A.4.3.2 O02 - General Order Response to any ORM (ORR) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					
NTE	Notes and Comments					
PID	Patient Identification					
NTE	Notes and Comments					
ORC	Common Order					
OBR	Observation Request					
NTE	Notes and Comments					

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A.4.3.3 O01 - Dietary Order Message (ORM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
NTE	Notes and Comments					
PID	Patient Identification					
PD1	Additional Demographics					
NTE	Notes and Comments					
PV1	Patient Visit					
PV2	Patient Visit (Additional Info)					
IN1	Insurance Information					
IN2	Insurance Information - Add'l. Info					
IN3	Insurance Information - Cert.					
GT1	Guarantor Information					
AL1	Allergy Information					
ORC	Common Order	R				
ODS	Dietary Orders					
NTE	Notes and Comments					
OBX	Results					
NTE	Notes and Comments					
ORC	Common Order					
ODT	Diet Tray					
NTE	Notes and Comments					

A.4.3.4 Q06 - Query Response for Order Status (DSR) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					
NTE	Notes and Comments					
QRD	Query Definition	R				
QRF	Query Filter					
PID	Patient Identification					
NTE	Notes and Comments					
ORC	common Order	R				
OBR	Observation Request					
NTE	Notes and Comments					
CTI	Clinical Trial Identification					
DSC	Continuation Pointer					

A.4.3.5 O02 - Dietary Order Response (ORR) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					
NTE	Notes and Comments					
PID	Patient Identification					
NTE	Notes and Comments					
ORC	Common Order					
ODS	Dietary Orders					
NTE	Notes and Comments					
ORC	Common Order					
ODT	Diet Tray					
NTE	Notes and Comments					

A.4.3.6 O01 - Stock Requisition Order (ORM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
NTE	Notes and Comments					
PID	Patient Identification					
PD1	Additional Demographics					
NTE	Notes and Comments					
PV1	Patient Visit					
PV2	Patient Visit (Additional Info)					
IN1	Insurance Information					
IN2	Insurance Information - Add'l. Info					
IN3	Insurance Information - Cert.					
GT1	Guarantor Information					
AL1	Allergy Information					
ORC	Common Order	R				
RQD	Requisition Detail					
NTE	Notes and Comments					
OBX	Results					
NTE	Notes and Comments					
BLG	Billing					

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A.4.3.7 O02 - Stock Requisition Order Response (ORR) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					
NTE	Notes and Comments					
PID	Patient Identification					
NTE	Notes and Comments					
ORC	Common Order					
RQD	Requisition Detail					
NTE	Notes and Comments					

A.4.3.8 O01 - Non-Stock Requisition Order (ORM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
NTE	Notes and Comments					
PID	Patient Identification					
PD1	Additional Demographics					
NTE	Notes and Comments					
PV1	Patient Visit					
PV2	Patient Visit (Additional Info)					
IN1	Insurance Information					
IN2	Insurance Information - Add'l. Info					
IN3	Insurance Information - Cert.					
GT1	Guarantor Information					
AL1	Allergy Information					
ORC	Common Order	R				
RQD	Requisition Detail					
RQ1	Requisition Detail - 1					
NTE	Notes and Comments					
OBX	Results					
NTE	Notes and Comments					
BLG	Billing					

A.4.3.9 O02 - Non-Stock Requisition Response (ORR) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					
NTE	Notes and Comments					
PID	Patient Identification					
NTE	Notes and Comments					
ORC	Common Order					
RQD	Requisition Detail					
RQ1	Requisition Detail - 1					
NTE	Notes and Comments					

A.4.3.10 O01 - Pharmacy/Treatment Order (ORM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
NTE	Notes and Comments					
PID	Patient Identification					
PD1	Additional Demographics					
NTE	Notes and Comments					
PV1	Patient Visit					
PV2	Patient Visit (Additional Info)					
IN1	Insurance Information					
IN2	Insurance Information - Add'l. Info					
IN3	Insurance Information - Cert.					
GT1	Guarantor Information					
AL1	Allergy Information					
ORC	Common Order	R				
RXO	Pharmacy/Treatment Order					
NTE	Notes and Comments					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					
NTE	Notes and Comments					
OBX	Results					
NTE	Notes and Comments					
BLG	Billing					

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A.4.3.11 O02 - Message for Pharmacy/Treatment (ORR) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					
NTE	Notes and Comments					
PID	Patient Identification					
NTE	Notes and Comments					
ORC	Common Order					
RXO	Pharmacy/Treatment Order					
NTE	Notes and Comments					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					
NTE	Notes and Comments					

A.4.3.12 O01 - Pharmacy/Treatment Encoded Order (RDE) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
NTE	Notes and Comments					
PID	Patient Identification					
PD1	Additional Demographics					
NTE	Notes and Comments					
PV1	Patient Visit					
PV2	Patient Visit (Additional Info)					
IN1	Insurance Information					
IN2	Insurance Information - Add'l . Info					
IN3	Insurance Information - Cert.					
GT1	Guarantor Information					
AL1	Allergy Information					
ORC	Common Order	R				
RXO	Pharmacy/Treatment Prescription Order					
NTE	Notes and Comments					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component (for RXO)					
NTE	Notes and Comments					
RXE	Pharmacy/Treatment Encoded Order					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component (for RXE)					
OBX	Results					
NTE	Notes and Comments					
CTI	Clinical Trial Identification					

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A.4.3.13 O02 - Pharmacy Prescription Response (RRE) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					
NTE	Notes and Comments					
PID	Patient Identification					
NTE	Notes and Comments					
ORC	Common Order					
RXE	Pharmacy/Treatment Encoded Order					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					

A.4.3.14 O01 - Pharmacy/Treatment Dispense (RDS) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
NTE	Notes and Comments					
PID	Patient Identification					
PD1	Additional Demographics					
NTE	Notes and Comments					
AL1	Allergy					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
ORC	Common Order	R				
RXO	Pharmacy/Treatment Order					
NTE	Notes and Comments					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					
NTE	Notes and Comments					
RXE	Pharmacy/Treatment Encoded Order					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					
RXD	Pharmacy Dispense	R				
RXR	Pharmacy Route					
RXC	Pharmacy Component					
OBX	Results					
NTE	Notes and Comments					

A.4.3.15 O02 - Pharmacy/Treatment Dispense Acknowledgment (RRD)

Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					
NTE	Notes and Comments					
PID	Patient Identification					
NTE	Notes and Comments					
ORC	Common Order					
RXD	Pharmacy/Treatment Dispense					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					

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A.4.3.16 O01 - Pharmacy/Treatment Give Message (RGV) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
NTE	Notes and Comments					
PID	Patient Identification					
NTE	Notes and Comments					
AL1	Allergy					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
ORC	Common Order	R				
RXO	Pharmacy /Treatment Order					
NTE	Notes and Comments					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					
NTE	Notes and Comments					
RXE	Pharmacy/Treatment Encoded Order					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					
RXG	Pharmacy/Treatment Give					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					
OBX	Observation/Results					
NTE	Notes and Comments					

A.4.3.17 O02 - Pharmacy/Treatment Give Acknowledgment (RRG) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					
NTE	Notes and Comments					
PID	Patient Identification					
NTE	Notes and Comments					
ORC	Common Order					
RXG	Pharmacy/Treatment Give					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					
NTE	Notes and Comments					

A.4.3.18 O02 - Pharmacy/Treatment Administration Message (RAS) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
NTE	Notes and Comments					
PID	Patient Identification					
PD1	Additional Demographics					
NTE	Notes and Comments					
AL1	Allergy					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
ORC	Common Order	R				
RXO	Pharmacy/Treatment Order					
NTE	Notes and Comments					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					
NTE	Notes and Comments					
RXE	Pharmacy/Treatment Encoded Order					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					
RXA	Pharmacy/Treatment Administration					
RXR	Pharmacy/Treatment Route					
OBX	Observation/Result					
NTE	Notes and Comments					
CTI	Clinical Trial Identification					

A.4.3.19 O02 - Pharmacy Administration Acknowledge (RRA) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					
NTE	Notes and Comments					
PID	Patient Identification					
NTE	Notes and Comments					
ORC	Common Order					
RXA	Pharmacy/Treatment Administration					
RXR	Pharmacy/Treatment Route					

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A.4.3.20 ROR - Pharmacy/Treatment Order Response (ROR) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					
QRD	Query Definition					
QRF	Query Filter					
PID	Patient Identification					
NTE	Notes and Comments					
ORC	Common Order					
RXO	Pharmacy/Treatment Order					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					
DSC	Continuation Pointer					

A.4.3.21 RAR - Pharmacy/Treatment Administration Information (RAR)

Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					
NTE	Notes and Comments					
QRD	Query Definition					
QRF	Query Filter					
PID	Patient Identification					
NTE	Notes and Comments					
ORC	Common Order					
RXE	Pharmacy/Treatment Encoded Order					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					
RXA	Pharmacy/Treatment Administration					
RXR	Pharmacy/Treatment Route					
DSC	Continuation Pointer					

A.4.3.22 RDR - Pharmacy/Treatment Dispense Information (RDR) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					
NTE	Notes and Comments					
QRD	Query Definition					
QRF	Query Filter					
PID	Patient Identification					
NTE	Notes and Comments					
ORC	Common Order					
RXE	Pharmacy/Treatment Encoded Order					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					
RXD	Pharmacy/Treatment Dispense					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					
DSC	Continuation Pointer					

A.4.3.23 RGR - Pharmacy/Treatment Dose Information (RGR) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					
QRD	Query Definition					
QRF	Query Filter					
PID	Patient Identification					
NTE	Notes and Comments					
ORC	Common Order					
RXE	Pharmacy/Treatment Encoded Order					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					
RXG	Pharmacy/Treatment Give					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					
DSC	Continuation Pointer					

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A.4.3.24 RER - Pharmacy/Treatment Encoded Order Information (RER)

Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					
QRD	Query Definition					
QRF	Query Filter					
PID	Patient Identification					
NTE	Notes and Comments					
ORC	Common Order					
RXE	Pharmacy/Treatment Encoded Order					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					
RXG	Pharmacy/Treatment Give					
RXR	Pharmacy/Treatment Route					
RXC	Pharmacy/Treatment Component					
DSC	Continuation Pointer					

A.4.3.25 V01 - Query for Vaccination Record (VXQ) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
QRD	Query Definition					
QRF	Query Filter					

A.4.3.26 V02 - Response to Vaccination Query Returning Multiple PID Matches (VXX) - Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
QRD	Query Definition					
QRF	Query Filter					
PID	Patient Identification					
NK1	Next of Kin/Associated Parties					

A.4.3.27 V03 - Vaccination Record Response (VXR) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
QRD	Query Definition					
QRF	Query Filter					
PID	Patient Identification					
PD1	Additional Demographics					
NK1	Next of Kin/Associated Parties					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
IN1	Insurance Information					
IN2	Insurance Information - Add'l. Info					
IN3	Insurance Information - Cert.					
ORC	Common Order					
RXA	Pharmacy/Treatment Administration					
RXR	Pharmacy/Treatment Route					
OBX	Observation/Result					
NTE	Notes and Comments					

A.4.3.28 V04 - Unsolicited Vaccination Record Update (VXU) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
NK1	Next of Kin/Associated Parties					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
IN1	Insurance Information					
IN2	Insurance Information - Add'l. Info					
IN3	Insurance Information – Cert.					
ORC	Common Order					
RXA	Pharmacy/Treatment Administration					
RXR	Pharmacy/Treatment Route					
OBX	Observation/Result					
NTE	Notes and Comments					

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A.4.4 Financial Management

A.4.4.1 P01 - Add Patient Accounts (BAR) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit					
PV2	Patient Visit – Additional Info					
DB1	Disability Information					
OBX	Health Information					
AL1	Allergy Information					
DG1	Patient Diagnosis					
DRG	Diagnosis Related Group					
PR1	Procedures					
ROL	Role					
GT1	Guarantor					
NK1	Next of Kin					
IN1	Insurance					
IN2	Insurance - Additional Info					
IN3	Insurance - Cert. Info					
ACC	Accident Information					
UB1	Universal Bill Information					
UB2	Universal Bill Information					

A.4.4.2 P02 - Purge Patient Accounts (BAR) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit					
DB1	Disability Information					

A.4.4.3 P03 - Detail Financial Transaction (DFT) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
DB1	Disability Information					
OBX	Health Information					
FT1	Financial Transaction					
PR1	Procedures					
ROL	Role					
DG1	Diagnosis					
DRG	Diagnosis Related Group					
GT1	Guarantor Information					
IN1	Insurance Information					
IN2	Insurance Information - Add'l. Info					
IN3	Insurance Information - Cert.					
ACC	Accident Information					

A.4.4.4 P04 - Generate Bills and A/R Statements (QRY) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
QRD	Query Definition	R				
QRF	Query Filter					
DSC	Continuation Pointer					

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A.4.4.5 P05 - Update Account (BAR) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
DB1	Disability Information					
OBX	Health Information					
AL1	Allergy Information					
DG1	Diagnosis					
DRG	Diagnosis Related Group					
PR1	Procedures					
ROL	Role					
GT1	Guarantor Information					
NK1	Next of Kin/Associated Parties					
IN1	Insurance Information					
IN2	Insurance Information - Add'l. Info					
IN3	Insurance Information - Cert.					
ACC	Accident Information					
UB1	Universal Bill Information					
UB2	Universal Bill 92 Information					

A.4.4.6 P06 - End Account (BAR) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PV1	Patient Visit					

A.4.5 Ancillary Data Reporting

A.4.5.1 R01 - Unsolicited Transmission of an Observation Message (ORU)

Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PID	Patient Identification					
PD1	Additional Demographics					
NTE	Notes and Comments					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
ORC	Order Common					
OBR	Observations Report ID	R				
NTE	Notes and Comments					
OBX	Result					
NTE	Notes and Comments					
CTI	Clinical Trial Identification					
DSC	Continuation Pointer					

A.4.5.2 R02, R04 - Query for Results of Observation (QRF)

Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
QRD	Query Definition	R				
QRF	Query Filter					
PID	Patient Identification					
NTE	Notes and Comments					
ORC	Order Common					
OBR	Observations Report ID	R				
NTE	Notes and Comments					
OBX	Result					
NTE	Notes and Comments					
CTI	Clinical Trial Identification					
DSC	Continuation Pointer					

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A.4.5.3 C01 - Clinical Study Registration (CRM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PID	Patient Identification					
PV1	Patient Visit					
CSR	Clinical Study Registration	R				
CSP	Clinical Study Phase					

A.4.5.4 C02 - Cancel Patient Registration on Clinical Trial (CRM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PID	Patient Identification					
PV1	Patient Visit					
CSR	Clinical Study Registration	R				
CSP	Clinical Study Phase					

A.4.5.5 C03 - Correct /Update Registration Information (CRM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PID	Patient Identification					
PV1	Patient Visit					
CSR	Clinical Study Registration	R				
CSP	Clinical Study Phase					

A.4.5.6 C04 - Patient Has Gone Off Clinical Trail (CRM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PID	Patient Identification					
PV1	Patient Visit					
CSR	Clinical Study Registration	R				
CSP	Clinical Study Phase					

A.4.5.7 C05 - Patient Enters Phase of Clinical Trail (CRM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PID	Patient Identification					
PV1	Patient Visit					
CSR	Clinical Study Registration	R				
CSP	Clinical Study Phase					

A.4.5.8 C06 - Cancel Patient Entering a Phase (CRM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PID	Patient Identification					
PV1	Patient Visit					
CSR	Clinical Study Registration	R				
CSP	Clinical Study Phase					

A.4.5.9 C07 - Correct/Update Phase Information (CRM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PID	Patient Identification					
PV1	Patient Visit					
CSR	Clinical Study Registration	R				
CSP	Clinical Study Phase					

A.4.5.10 C08 - Patient Has Gone Off Phase of Clinical Trial (CRM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PID	Patient Identification					
PV1	Patient Visit					
CSR	Clinical Study Registration	R				
CSP	Clinical Study Phase					

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A.4.5.11 C09 - Automated Time Intervals for Reporting (CSU) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
NTE	Notes and Comments					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
CSR	Clinical Study Registration	R				
CSP	Clinical Study Phase					
CSS	Clinical Study Data Schedule					
ORC	Common Order					
OBR	Observation Battery	R				
OBX	Observation Results					
ORC	Common Order					
RXA	Pharmacy Administration					
RXR	Pharmacy Route					

A.4.5.12 C10 - Patient Completes Clinical Trail (CSU) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
NTE	Notes and Comments					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
CSR	Clinical Study Registration	R				
CSP	Clinical Study Phase					
CSS	Clinical Study Data Schedule					
ORC	Common Order					
OBR	Observation Battery	R				
OBX	Observation Results					
ORC	Common Order					
RXA	Pharmacy Administration					
RXR	Pharmacy Route					

A.4.5.13 C11 - Patient Completes a Phase of Clinical Trail (CSU) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
NTE	Notes and Comments					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
CSR	Clinical Study Registration	R				
CSP	Clinical Study Phase					
CSS	Clinical Study Data Schedule					
ORC	Common Order					
OBR	Observation Battery	R				
OBX	Observation Results					
ORC	Common Order					
RXA	Pharmacy Administration					
RXR	Pharmacy Route					

A.4.5.14 C12 - Update/Correction of Patient Order/Result Information (CSU) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
NTE	Notes and Comments					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
CSR	Clinical Study Registration	R				
CSP	Clinical Study Phase					
CSS	Clinical Study Data Schedule					
ORC	Common Order					
OBR	Observation Battery	R				
OBX	Observation Results					
ORC	Common Order					
RXA	Pharmacy Administration					
RXR	Pharmacy Route					

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A.4.5.15 P07 - Unsolicited Initial Individual Product Experience Report (PEX)

Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
NTE	Notes and Comments					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
PES	Product Experience Sender	R				
PEO	Product Experience Observation	R				
PCR	Potential Causal Relationship	R				
RXE	Pharmacy/Treatment Encoded Order					
RXR	Pharmacy/Treatment Route					
RXA	Pharmacy/Treatment Administration					
RXR	Pharmacy/Treatment Route					
PRB	Detail Problem					
OBX	Observation/Result					
NTE	Notes and Comments					
NK1	Associated Parties					
RXE	Pharmacy/Treatment Encoded Order					
RXR	Pharmacy/Treatment Route					
RXA	Pharmacy/Treatment Administration					
RXR	Pharmacy/Treatment Route					
PRB	Detail Problem					
OBX	Observation/Result					
CSR	Clinical Study Registration					
CSP	Clinical Study Phase					

A.4.5.16 P08 - Unsolicited Update Individual Product Experience Report (PEX)

Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PD1	Additional Demographics					
NTE	Notes and Comments					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
PES	Product Experience Sender	R				
PEO	Product Experience Observation	R				
PCR	Potential Causal Relationship	R				
RXE	Pharmacy/Treatment Encoded Order					
RXR	Pharmacy/Treatment Route					
RXA	Pharmacy/Treatment Administration					
RXR	Pharmacy/Treatment Route					
PRB	Detail Problem					
OBX	Observation/Result					
NTE	Notes and Comments					
NK1	Associated Parties					
RXE	Pharmacy/Treatment Encoded Order					
RXR	Pharmacy/Treatment Route					
RXA	Pharmacy/Treatment Administration					
RXR	Pharmacy/Treatment Route					
PRB	Detail Problem					
OBX	Observation/Result					
CSR	Clinical Study Registration					
CSP	Clinical Study Phase					

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A.4.5.17 F09 - Summary Product Experience Report (SUR) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
FAC	Facility	R				
PSH	Product Summary Header	R				
PDC	Product Detail Country	R				
PSH	Product Summary Header	R				
FAC	Facility					
PDC	Product Detail Country					
NTE	Notes (for PCR)					
ED	Encapsulated Data	R				

A.4.6 Master File Maintenance

A.4.6.1 MFN - Master Files Notification (MAD, MDL, MUP, MDC, MAC, REP, WPD)

Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MFI	Master File Identification	R				
MFE	Master File Entry	R				
Z__		R				

A.4.6.2 MFK - Master File Acknowledgment Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Acknowledgment	R				
ERR	Error					
MFI	Master File Identification	R				
MFA	Master File Acknowledgment					

A.4.6.3 MFD - Master File Delayed ACK (MFA) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MFI	Master File Identification	R				
MFA	Master File Acknowledgment					

A.4.6.4 MSA - Message Acknowledgment — Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Acknowledgment	R				
ERR	Error					

A.4.6.5 MFQ - Master Files Query (QRY) — Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
QRD	Query Definition	R				
QRF	Query Filter					
DSC	Continuation					

A.4.6.6 MFR- Master Files Response — Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					
QRD	Query Definition	R				
QRF	Query Filter					
MFI	Master File Identification	R				
MFE	Master File Entry	R				
Z___						
DSC	Continuation					

A.4.6.7 MFN - Staff and Practitioner Notification (M02) — Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MFI	Master File Identification	R				
MFE	Master File Entry	R				
STF	Staff Identification	R				
PRA	Practitioner Detail					

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A.4.6.8 MFN - Test/Observation Master File (M03) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MFI	Master File Identification	R				
MFE	Master File Entry					
OM1	General Segment					
OM2	Numeric Observation					
OM3	Categorical Test/Observation					
OM4	Observations That Require Specimens					
OM5	Observation Batteries					
OM6	Observations Calculated From Other Observations					

A.4.6.9 MFN - Patient Location Master File (M05) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MFI	Master File Identification	R				
MFE	Master File Entry					
LOC	Patient Location Master	R				
LCH	Location Characteristics					
LRL	Location Relationship					
LDP	Location Department					
LCH	Location Characteristics					
LCC	Location Charge Code					

A.4.6.10 MFN - Charge Description Master File (M04) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MFI	Master File Identification	R				
MFE	Master File Entry					
CDM	Charge Description Master					
PRC	Price					

A.4.6.11 CMA - Clinical Study with Phases and Schedules (M06) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MFI	Master File Identification	R				
MFE	Master File Entry					
CM0	Clinical Study Master					
CM1	Clinical Study Phase					
CM2	Clinical Study Schedule					

A.4.6.12 CMB - Clinical Study without Phases but with Schedules (M06) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MFI	Master File Identification	R				
MFE	Master File Entry					
CM0	Clinical Study Master					
CM2	Clinical Study Schedule					

A.4.7 Medical Records/Information Management

A.4.7.1 T01 - Original Document Notification (MDM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PV1	Patient Visit	R				
TXA	Document Notification	R				

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A.4.7.2 T02 - Original Document Notification and Content (MDM)

Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PV1	Patient Visit	R				
TXA	Document Notification	R				
OBX	Observation/Result (one or more required)	R				

A.4.7.3 T03 - Document Status Change Notification (MDM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PV1	Patient Visit	R				
TXA	Document Notification	R				

A.4.7.4 T04 - Document Status Change Notification and Content (MDM)

Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PV1	Patient Visit	R				
TXA	Document Notification	R				
OBX	Observation/Result (one or more required)	R				

A.4.7.5 T05 - Document Addendum Notification (MDM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PV1	Patient Visit	R				
TXA	Document Notification	R				

A.4.7.6 T06 - Document Addendum Notification and Content (MDM)

Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PV1	Patient Visit	R				
TXA	Document Notification	R				
OBX	Observation/Result (one or more required)	R				

A.4.7.7 T07 - Document Edit Notification (MDM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PV1	Patient Visit	R				
TXA	Document Notification	R				

A.4.7.8 T08 - Document Edit Notification and Content (MDM)

Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PV1	Patient Visit	R				
TXA	Document Notification	R				
OBX	Observation/Result (one or more required)	R				

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A.4.7.9 T09 - Document Replacement Notification (MDM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PV1	Patient Visit	R				
TXA	Document Notification	R				

A.4.7.10 T10 - Document Replacement Notification and Content (MDM)

Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PV1	Patient Visit	R				
TXA	Document Notification	R				
OBX	Observation/Result (one or more required)	R				

A.4.7.11 T11 - Document Cancel Notification (MDM) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
EVN	Event Type	R				
PID	Patient Identification	R				
PV1	Patient Visit	R				
TXA	Document Notification	R				

A.4.7.12 T12 - Document Query (QRY/DOC)

A.4.7.12.1 QRY *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
QRD	Query Definition	R				
QRF	Query Filter					

A.4.7.12.2 DOC *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment	R				
ERR	Error					
QRD	Query Definition	R				
EVN	Event Type					
PID	Patient Identification	R				
PV1	Patient Visit	R				
TXA	Document Notification	R				
OBX	Observation					
DSC	Continuation Pointer					

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A.4.8 Scheduling

A.4.8.1 S01 - Request New Appointment Booking (SRM/SRR)

A.4.8.1.1 Schedule Request (SRM) *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
ARQ	Appointment Request Information	R				
APR	Appointment Preferences					
NTE	Notes and Comments					
PID	Patient Identification	R				
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
OBX	Observation					
DG1	Diagnosis Information					
RGS	Resource Group	R				
AIS	Appointment Information - Service					
APR	Appointment Preferences					
NTE	Notes and Comments					
AIG	Appointment Information - General Resource					
APR	Appointment Preferences					
NTE	Notes and Comments					
AIL	Appointment Information - Location Resource					
APR	Appointment Preferences					
NTE	Notes and Comments					
AIP	Appointment Information - Personnel Resource					
APR	Appointment Preferences					
NTE	Notes and Comments					

A.4.8.1.2 Scheduled Request Response *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment					
ERR	Error					
SCH	Schedule Activity Information					
NTE	Notes and Comments					
PID	Patient Identification	R				
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
DG1	Diagnosis Information					
RGS	Resource Group	R				
AIS	Appointment Information - Service					
NTE	Notes and Comments					
AIG	Appointment Information - General Resource					
NTE	Notes and Comments					
AIL	Appointment Information - Location Resource					
NTE	Notes and Comments					
AIP	Appointment Information - Personnel Resource					
NTE	Notes and Comments					

A.4.8.2 S02 - Request Appointment Rescheduling

See A.4.8.1

A.4.8.3 S03 - Request Appointment Modification

See A.4.8.1

A.4.8.4 S04 - Request Appointment Cancellation

See A.4.8.1

A.4.8.5 S05 - Request Appointment Discontinuation

See A.4.8.1

A.4.8.6 S06 - Request Appointment Deletion

See A.4.8.1

A.4.8.7 S07 - Request Addition of Service/Resource on Appointment

See A.4.8.1

A.4.8.8 S08 - Request Modification of Service/Resource on Appointment

See A.4.8.1

A.4.8.9 S09 - Request Cancellation of Service/Resource on Appointment

See A.4.8.1

A.4.8.10 S10 - Request Discontinuation of Service/Resource on Appointment

See A.4.8.1

A.4.8.11 S11 - Request Deletion of Service/Resource on Appointment

See A.4.8.1

A.4.8.12 S12 - Notification of New Appointment (SIU) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
SCH	Schedule Activity Information					
NTE	Notes and Comments					
PID	Patient Identification	R				
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
OBX	Observation					
DG1	Diagnosis Information					
RGS	Resource Group	R				
AIS	Appointment Information - Service					
NTE	Notes and Comments					
AIG	Appointment Information - General Resource					
NTE	Notes and Comments					
AIL	Appointment Information - Location Resource					
NTE	Notes and Comments					
AIP	Appointment Information - Personnel Resource					
NTE	Notes and Comments					

A.4.8.13 S13 - Notification of Appointment Rescheduling

See A.4.8.12

A.4.8.14 S14 - Notification of Appointment Modification

See A.4.8.12

A.4.8.15 S15 - Notification of Appointment Cancellation

See A.4.8.12

A.4.8.16 S16 - Notification of Appointment Discontinuation

See A.4.8.12

A.4.8.17 S17 - Notification of Appointment Deletion

See A.4.8.12

A.4.8.18 S18 - Notification of Addition of Service/Resource on Appointment

See A.4.8.12

A.4.8.19 S19 - Notification of Modification of Service/Resource on Appointment

See A.4.8.12

A.4.8.20 S20 - Notification of Cancellation of Service/Resource on Appointment

See A.4.8.12

A.4.8.21 S21 - Notification of Discontinuation of Service/Resource on Appointment

See A.4.8.12

A.4.8.22 S22 - Notification of Deletion of Service/Resource on Appointment

See A.4.8.12

A.4.8.23 S23 - Notification of Blocked Schedule Time Slots

See A.4.8.12

A.4.8.24 S24 - Notification of Opened (Unblocked) Schedule Time Slots

See A.4.8.12

A.4.8.25 S26 - Notification that Patient Did Not Show Up for Scheduled Appointment

See A.4.8.12

A.4.8.26 S25 - Schedule Query (SQM/SQR)

A.4.8.26.1 SQM *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
QRD	Query Definition					
QRF	Query Filter					
ARQ	Appointment Request					
APR	Appointment Preferences					
PID	Patient Identification					
RGS	Resource Group					
AIS	Appointment Information - Services					
APR	Appointment Preferences					
AIG	Appointment Information - General Resource					

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
APR	Appointment Preferences					
AIP	Appointment Information - Personnel Resource					
APR	Appointment Preferences					
AIL	Appointment Information - Location Resource					
APR	Appointment Preferences					

A.4.8.26.2 SQR *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment					
ERR	Error					
QAK	Query Acknowledgment					
SCH	Schedule Activity Information					
NTE	Notes and Comments					
PID	Patient Identification	R				
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
DG1	Diagnosis Information					
RGS	Resource Group	R				
AIS	Appointment Information - Service					
NTE	Notes and Comments					
AIG	Appointment Information - General Resource					
NTE	Notes and Comments					
AIP	Appointment Information - Personnel Resource					
NTE	Notes and Comments					
AIL	Appointment Information - Location Resource					
NTE	Notes and Comments					
DSC	Continuation Pointer					

A.4.9 Patient Referral

A.4.9.1 I01 - Request for Insurance Information (RQI/RPI)

A.4.9.1.1 RQI *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PRD	Provider Data					
CTD	Contact Data					
PID	Patient Identification	R				
NK1	Next of Kin/Associated Parties					
GT1	Guarantor Information					
IN1	Insurance Information					
IN2	Insurance Information - Additional Info					
IN3	Insurance Information - Cert.					
NTE	Notes and Comments					

A.4.9.1.2 RPL *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment					
PRD	Provider Data					
CTD	Contact Data					
PID	Patient Identification	R				
NK1	Next of Kin/Associated Parties					
GT1	Guarantor Information					
IN1	Insurance Information					
IN2	Insurance Information - Additional Info					
IN3	Insurance Information - Cert.					
NTE	Notes and Comments					

A.4.9.2 I02 - Request/Receipt of Patient Selection Display List (RQI/RPL)

A.4.9.2.1 RQI *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PRD	Provider Data					
CTD	Contact Data					
PID	Patient Identification	R				
NK1	Next of Kin/Associated Parties					
GT1	Guarantor Information					
IN1	Insurance Information					
IN2	Insurance Information - Additional Info					
IN3	Insurance Information - Cert.					
NTE	Notes and Comments					

A.4.9.2.2 RPL *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment					
PRD	Provider Data					
CTD	Contact Data					
NTE	Notes and Comments					
DSP	Display Data					
DSC	Continuation Pointer					

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A.4.9.3 I03 - Request/Receipt of Patient Selection List (RQI/RPR)

A.4.9.3.1 RQI *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PRD	Provider Data					
CTD	Contact Data					
PID	Patient Identification	R				
NK1	Next of Kin/Associated Parties					
GT1	Guarantor Information					
IN1	Insurance Information					
IN2	Insurance Information - Additional Info					
IN3	Insurance Information - Cert.					
NTE	Notes and Comments					

A.4.9.3.2 RPR *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment					
PRD	Provider Data					
CTD	Contact Data					
PID	Patient Identification					
NTE	Notes and Comments					

A.4.9.4 I04 - Request for Patient Demographic Data (RQP/RPI)

A.4.9.4.1 RQP *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PRD	Provider Data					
CTD	Contact Data					
PID	Patient Identification	R				
NK1	Next of Kin/Associated Parties					
GT1	Guarantor Information					
NTE	Notes and Comments					

A.4.9.4.2 RPI *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment					
PRD	Provider Data					
CTD	Contact Data					
PID	Patient Identification					
NK1	Next of Kin/Associated Parties					
GT1	Guarantor Information					
IN1	Insurance Information					
IN2	Insurance Information - Additional Info					
IN3	Insurance Information - Cert.					
NTE	Notes and Comments					

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A.4.9.5 I05 Request for Patient Clinical Information (RQC/RCI)

A.4.9.5.1 RQC *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
QRD	Query Definition					
QRF	Query Filter					
PRD	Provider Data					
CTD	Contact Data					
PID	Patient Identification	R				
NK1	Next of Kin/Associated Parties					
GT1	Guarantor Information					
NTE	Notes and Comments					

A.4.9.5.2 RCI *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment					
QRD	Query Definition					
QRF	Query Filter					
PRD	Provider Data					
CTD	Contact Data					
PID	Patient Identification					
DG1	Diagnosis Information					
DRG	Diagnosis Related Group					
AL1	Allergy Information					
OBR	Observation Request					
NTE	Notes and Comments					
OBX	Observation/Result					
NTE	Notes and Comments					
NTE	Notes and Comments					

A.4.9.6 I06 - RQC/RCL - Request/Receipt of Clinical Data Listing

A.4.9.6.1 RQC *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
QRD	Query Definition					
QRF	Query Filter					
PRD	Provider Data					
CTD	Contact Data					
PID	Patient Identification	R				
NK1	Next of Kin/Associated Parties					
GT1	Guarantor Information					
NTE	Notes and Comments					

A.4.9.6.2 RCL *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment					
QRD	Query Definition					
QRF	Query Filter					
PRD	Provider Data					
CTD	Contact Data					
PID	Patient Identification					
DG1	Diagnosis Information					
DRG	Diagnosis Related Group					
AL1	Allergy Information					
NTE	Notes and Comments					
DSP	Display Data					
DSC	Continuation Pointer					

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A.4.9.7 I07 - Unsolicited Insurance Information (PIN) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PRD	Provider Data					
CTD	Contact Data					
PID	Patient Identification					
NK1	Next of Kin/Associated Parties					
GT1	Guarantor Information					
IN1	Insurance Information					
IN2	Insurance Information - Additional Info					
IN3	Insurance Information - Cert.					
NTE	Notes and Comments					

A.4.9.8 I08 - Request for Treatment Authorization Information (RQA/RPA)

A.4.9.8.1 RQA *Originator (A or B*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
RF1	Referral Information					
AUT	Authorization Information					
CTD	Contact Data					
PRD	Provider Data					
CTD	Contact Data					
PID	Patient Identification					
NK1	Next of Kin/Associated Parties					
GT1	Guarantor Information					
IN1	Insurance Information					
IN2	Insurance Information - Additional Info					
IN3	Insurance Information - Cert.					
ACC	Accident Information					
DG1	Diagnosis Information					
DRG	Diagnosis Related Group					
AL1	Allergy Information					
PR1	Procedure					
AUT	Authorization					
CTD	Contact Data					
OBR	Observation Request					
NTE	Notes and Comments					
OBX	Observation/Result					
NTE	Note and Comments					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
NTE	Notes and Comments					

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A.4.9.8.2 RPA *Originator (A or B*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment					
RF1	Referral Information					
AUT	Authorization Information					
CTD	Contact Data					
PRD	Provider Data					
CTD	Contact Data					
PID	Patient Identification					
NK1	Next of Kin/Associated Parties					
GT1	Guarantor Information					
IN1	Insurance Information					
IN2	Insurance Information - Additional Info					
IN3	Insurance Information - Cert.					
ACC	Accident Information					
DG1	Diagnosis Information					
DRG	Diagnosis Related Group					
AL1	Allergy Information					
PR1	Procedure					
AUT	Authorization					
CTD	Contact Data					
OBR	Observation Request					
NTE	Notes and Comments					
OBX	Observation/Result					
NTE	Note and Comments					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
NTE	Notes and Comments					

A.4.9.9 I09 - Request for Modification to an Authorization

See A.4.9.8

A.4.9.10 I10 - Request for Cancellation of an Authorization

See A.4.9.8

A.4.9.11 I12 - Patient Referral (REF/RRI)

A.4.9.11.1 REF *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
RF1	Referral Information					
AUT	Authorization Information					
CTD	Contact Data					
PRD	Provider Data					
CTD	Contact Data					
PID	Patient Identification					
NK1	Next of Kin/Associated Parties					
GT1	Guarantor Information					
IN1	Insurance Information					
IN2	Insurance Information - Additional Info					
IN3	Insurance Information - Cert.					
ACC	Accident Information					
DG1	Diagnosis Information					
DRG	Diagnosis Related Group					
AL1	Allergy Information					
PR1	Procedure					
AUT	Authorization					
CTD	Contact Data					
OBR	Observation Request					
NTE	Notes and Comments					
OBX	Observation/Result					
NTE	Note and Comments					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
NTE	Notes and Comments					

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A.4.9.11.2 RRI *Originator (A or B)*

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment					
RF1	Referral Information					
AUT	Authorization Information					
CTD	Contact Data					
PRD	Provider Data					
CTD	Contact Data					
PID	Patient Identification					
ACC	Accident Information					
DG1	Diagnosis Information					
DRG	Diagnosis Related Group					
AL1	Allergy Information					
PR1	Procedure					
AUT	Authorization					
CTD	Contact Data					
OBR	Observation Request					
NTE	Notes and Comments					
OBX	Observation/Result					
NTE	Note and Comments					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
NTE	Notes and Comments					

A.4.9.12 I13 - Modify Patient Referral

See A.4.9.11.

A.4.9.13 I14 - Cancel Patient Referral

See A.4.9.11.

A.4.9.14 I15 - Request Patient Referral Status

See A.4.9.11.

A.4.10 Patient Care

A.4.10.1 PC6 - PC / Patient Goal (PGL) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PID	Patient Identification					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
GOL	Detail Goal					
NTE	Notes and Comments (Goal)					
VAR	Variance (Goal)					
ROL	Role (Goal)					
VAR	Variance (Role)					
PTH	Detail Pathway					
VAR	Variance (Pathway)					
OBX	Observation/Result					
NTE	Notes and Comments					
PRB	Detail Problem					
NTE	Notes and Comments (Problem)					
VAR	Variance (Problem)					
ROL	Role (Problem)					
VAR	Variance (Role)					
OBX	Observation					
NTE	Notes and Comments					
ORC	Common Order					
OBR	Order Detail					
NTE	Notes and Order Detail Comments					
VAR	Variance (Order)					
OBX	Observation/Result					
NTE	Notes and Comments (Observation)					
VAR	Variance (Observation/Result)					

A.4.10.2 PC7 - PC / Goal Update (PGL)

See A.4.10.1.

A.4.10.3 PC8 - PC / Goal Delete (PGL)

See A.4.10.1.

A.4.10.4 PC1 - PC / Patient Problem Add (PPR) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PID	Patient Identification					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
PRB	Detail Problem					
NTE	Notes and Comments (Problem)					
VAR	Variance (Problem)					
ROL	Role (Problem)					
VAR	Variance (Role)					
PTH	Detail Pathway					
VAR	Variance (Pathway)					
OBX	Observation/Result					
NTE	Notes and Comments					
GOL	Detail Goal					
NTE	Notes and Comments (Goal)					
VAR	Variance (Goal)					
ROL	Role (Goal)					
VAR	Variance (Role)					
OBX	Observation					
NTE	Notes and Comments					
ORC	Common Order					
OBR	Order Detail					
NTE	Notes and Order Detail Comments					
VAR	Variance (Order)					
OBX	Observation/Result					
NTE	Notes and Comments (Observation)					
VAR	Variance (Observation/Result)					

A.4.10.5 PC2 - PC / Problem Update (PPR)

See A.4.10.4.

A.4.10.6 PC3 - PC / Problem Delete (PPR)

See A.4.10.4.

A.4.10.7 PCB - -PC / Patient Pathway (Problem-Oriented) Add (PPP)

Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PID	Patient Identification					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
PTH	Pathway Detail					
NTE	Notes and Comments (Pathway)					
VAR	Variance (Pathway)					
ROL	Role (Pathway)					
VAR	Variance (Role)					
PRB	Detail Problem					
NTE	Notes and Comments					
VAR	Variance (Problem)					
ROL	Role					
VAR	Variance (Role)					
OBX	Observation/Result					
NTE	Notes and Comments					
GOL	Detail Goal					
NTE	Notes and Comments (Goal)					
VAR	Variance (Goal)					
ROL	Role (Goal)					
VAR	Variance (Role)					
OBX	Observation					
NTE	Notes and Comments					
ORC	Common Order					
OBR	Order Detail					
NTE	Notes and Order Detail Comments					
VAR	Variance (Order)					
OBX	Observation/Result					
NTE	Notes and Comments (Observation)					
VAR	Variance (Observation/Result)					

A.4.10.8 PCC - PC / Pathway (Problem-Oriented) Update (PPP)

See A.4.10.7

A.4.10.9 PCD - PC / Pathway (Problem-Oriented) Delete (PPP)

See A.4.10.7

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A.4.10.10 PCG - PC / Patient Pathway (Goal-Oriented) Add (PPG) - Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
PID	Patient Identification					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
PTH	Pathway Detail					
NTE	Notes and Comments (Pathway)					
VAR	Variance (Pathway)					
ROL	Role (Pathway)					
VAR	Variance (Role)					
GOL	Detail Goal					
NTE	Notes and Comments (Goal)					
VAR	Variance (Goal)					
ROL	Role (Goal)					
VAR	Variance (Role)					
OBX	Observation					
NTE	Notes and Comments					
PRB	Detail Problem					
NTE	Notes and Comments					
VAR	Variance (Problem)					
ROL	Role					
VAR	Variance (Role)					
OBX	Observation/Result					
NTE	Notes and Comments					
ORC	Common Order					
OBR	Order Detail					
NTE	Notes and Order Detail Comments					
VAR	Variance (Order)					
OBX	Observation/Result					
NTE	Notes and Comments (Observation)					
VAR	Variance (Observation/Result)					

A.4.10.11 PCH - PC / Pathway (Goal-Oriented) Update (PPG)-

See A.4.10.10

A.4.10.12 PCJ - PC / Pathway (Goal-Oriented) Delete (PPG)

See A.4.10.10

A.4.10.13 PC4 - Patient Care Problem Query (QRY) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
QRD	Query Definition					
QRF	Query Filter					

A.4.10.14 PC5 - Patient Problem Response (PRR) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment					
ERR	Error					
QRD	Query Definition					
PID	Patient Identification					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
PRB	Detail Problem					
NTE	Notes and Comments (Problem)					
VAR	Variance (Problem)					
ROL	Role (Problem)					
VAR	Variance (Role)					
PTH	Detail Pathway					
VAR	Variance (Pathway)					
OBX	Observation					
NTE	Notes and Comments					
GOL	Detail Goal					
NTE	Notes and Comments					
VAR	Variance (Goal)					

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Seg	Name	OPT	App A	Repeat?	App B	Repeat?
ROL	Role					
VAR	Variance (Role)					
OBX	Observation/Result					
NTE	Notes and Comments					
ORC	Common Order					
OBR	Order Detail					
NTE	Notes and Order Detail Comments					
VAR	Variance (Order)					
OBX	Observation/Result					
NTE	Notes and Comments (Observation)					
VAR	Variance (Observation/Result)					

A.4.10.15 PC9 - Patient Goal Query (QRY) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
QRD	Query Definition					
QRF	Query Filter					

A.4.10.16 PCA - Patient Goal Response (PPV) Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment					
ERR	Error					
QRD	Query Definition					
PID	Patient Identification					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
GOL	Detail Goal					
NTE	Notes and Comments (Goal)					
VAR	Variance (Goal)					
ROL	Role (Goal)					
VAR	Variance (Role)					
PTH	Detail Pathway					
VAR	Variance (Pathway)					
OBX	Observation					
NTE	Notes and Comments					
PRB	Detail Problem					
NTE	Notes and Comments					
VAR	Variance (Problem)					
ROL	Role					
VAR	Variance (Role)					
OBX	Observation/Result					
NTE	Notes and Comments					
ORC	Common Order					
OBR	Order Detail					
NTE	Notes and Order Detail Comments					
VAR	Variance (Order)					
OBX	Observation/Result					
NTE	Notes and Comments (Observation)					
VAR	Variance (Observation/Result)					

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A.4.10.17 PCE - Patient Pathway (Problem-Oriented) Query (QRY)

Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
QRD	Query Definition					
QRF	Query Filter					

A.4.10.18 PCF - Patient Pathway (Problem-Oriented) Response (PTR)

Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment					
ERR	Error					
QRD	Query Definition					
PID	Patient Identification					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
PTH	Detail Pathway					
NTE	Notes and Comments					
VAR	Variance (Pathway)					
ROL	Role					
VAR	Variance (Role)					
PRB	Detail Problem					
NTE	Notes and Comments					
VAR	Variance (Problem)					
ROL	Role					
VAR	Variance (Role)					
OBX	Observation					
NTE	Notes and Comments					
GOL	Detail Goal					
NTE	Notes and Comments (Goal)					
VAR	Variance (Goal)					
ROL	Role (Goal)					
VAR	Variance (Role)					
OBX	Observation					
NTE	Notes and Comments					
ORC	Common Order					
OBR	Order Detail					
NTE	Notes and Order Detail					

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
	Comments					
VAR	Variance (Order)					
OBX	Observation/Result					
NTE	Notes and Comments (Observation)					
VAR	Variance (Observation/Result)					

A.4.10.19 PCK - Patient Pathway (Goal-Oriented) Query (QRY)

Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
QRD	Query Definition					
QRF	Query Filter					

A.4.10.20 PCL - Patient Pathway (Goal-Oriented) Response (PPT)

Originator (A or B)

Seg	Name	OPT	App A	Repeat?	App B	Repeat?
MSH	Message Header	R				
MSA	Message Acknowledgment					
ERR	Error					
QRD	Query Definition					
PID	Patient Identification					
PV1	Patient Visit					
PV2	Patient Visit - Additional Info					
PTH	Detail Pathway					
NTE	Notes and Comments					
VAR	Variance (Pathway)					
ROL	Role					
VAR	Variance (Role)					
GOL	Detail Goal					
NTE	Notes and Comments (Goal)					
VAR	Variance (Goal)					
ROL	Role (Goal)					
VAR	Variance (Role)					
OBX	Observation					
NTE	Notes and Comments					
PRB	Detail Problem					
NTE	Notes and Comments					
VAR	Variance (Problem)					

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Seg	Name	OPT	App A	Repeat?	App B	Repeat?
ROL	Role					
VAR	Variance (Role)					
OBX	Observation					
NTE	Notes and Comments					
ORC	Common Order					
OBR	Order Detail					
NTE	Notes and Order Detail Comments					
VAR	Variance (Order)					
OBX	Observation/Result					
NTE	Notes and Comments (Observation)					
VAR	Variance (Observation/Result)					

A.4.11 Introduction to Z Segments

HL7 allows for the development of segments and messages to address data that the Standard doesn't support. More detailed information appears in the HL7 Standard Version 2.3, Chapter 2 – *Control/Query*.

A.4.11.1 When to Create Z Segments

Create Z segments when an interface requires the communication of data currently not defined in the standard. Data currently defined by the standard **may not** be communicated on a Z segment. For example, patient name is currently defined on the PID segment, and therefore cannot be a part of a Z segment.

A.4.11.2 How to Develop New Z Segments

Follow these rules when defining Z segments.

1. Include data elements related to a single object (entity) on a segment. Group logically related data, such as *patient demographic information*, *insurance information*, or *census information*. Following are guidelines for identifying related data (listed in preferred usage order):
    - Group data into Z segments that correspond to entities or objects (e.g., Visit, Patient, Patient Account).
    - Group data into Z segments that correspond to tables.
    - Group data into Z segments that correspond to files.
2. Use existing Z segments before defining new ones.
3. Include an identifier for the Z segment indicating the object of the data, or a Z segment preceding it to address identification.
4. Document whether the data should be proposed to the HL7 committee for inclusion in the Standard. (If it is not a unique data requirement fitting a unique use, then it should be proposed for the Standard.)

A.4.11.3 Creating Z Segments for New Releases of HL7

HL7 encoding and interpreting rules apply to Z segments. Segment compatibility must be maintained within releases of HL7 (2.X) but not necessarily within versions of HL7 (V 3.0). Add data elements to the end of currently defined Z segments for associated attributes of defined entities (if data is related to that segment). For example, if you have defined an insurance Z segment, ZIN. An interface requires additional insurance data that HL7 does not support (for example, insured's dog's name). Add this additional data (insured's dog's name) to the end of the currently defined ZIN segment. This process should prevent transaction rejections since HL7 rules say you should ignore fields you don't expect. It will also make management easier for both the developer and the customer.

Once HL7 includes within the Standard the data contained on Z segments, the interface may send data on both the HL7 segment and the Z segments. This will support backward compatibility for existing users of the interface software.

The following example[1] illustrates the process:

Version 2.1

ZIN (User Insurance Record)

SQ	LEN	DT	OPT	RP#	TBL	ELEMENT NAME
1	5	CK				Employer Insurance Code
2	**20**	**CK**				**Employer Identification Number**
3	25	CK				Employer Name
4	**2**	**IS**				**Employer Information Code**
5	5	CK				Ins Payor ID
6	4	CK				Ins Payor SubID
7	1	CK				Ins Eligibility Source

HL7 defines the following data on the IN2 effective with HL7 Version 2.3.

IN2 – insurance additional information

SQ	LEN	DT	OPT	RP#	TBL	ELEMENT NAME
2	**59**	**CX**				**Insured's Employee ID**
4	**1**	**IS**			**0139**	**Employer Information Data**

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Define the Following Z Segment:

ZIN - The standard implementation requires the interface to send identical values of the data on the IN2 and the ZIN segment. The interface may send null values on the ZIN for positions 2 and 4 if the interface does not need to support prior releases (2.1) of the interface.

[1] The examples in this text are to assist in the understanding of the standard implementation. It is not intended for the examples to represent a specific application interpretation.

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ZIN (User Insurance Record)

SQ	LEN	DT	OPT	RP#	TBL	ELEMENT NAME
1	5	CK				Employer Insurance Code
2	20	CK				Employer Identification Number
3	25	CK				Employer Name
4	2	IS				Employer Information Code
5	5	CK				Ins Payor ID
6	4	CK				Ins Payor SubID
7	1	CK				Ins Eligibility Source

Interface ABC requires additional insurance data not defined on any HL7 segment.

Add the data to the end of the ZIN Segment.

ZIN (User Insurance Record)

SQ	LEN	DT	OPT	RP#	TBL	ELEMENT NAME
1	5	CK				Employer Insurance Code
2	20	CK				Employer Identification Number
3	25	CK				Employer Name
4	2	IS				Employer Information Code
5	5	CK				Ins Payor ID
6	4	CK				Ins Payor SubID
7	1	CK				Ins Eligibility Source
8	**1**	**TX**				**Gu Ins Rel Cov Code**
9	**10**	**TX**				**GG CNTC Co Phone Number**

A.4.12 How to Use Z Segments in Messages

Use Z Segments in the following ways:

- Appended to an existing HL7 message.
- Within a Z message.

A.4.12.1 Placing Z Segments in Existing HL7 Messages

Use the following guideline when placing Z segments in existing HL7 messages:

1. Place Z Segments at the end of the hierarchy to which they pertain. The following examples illustrate the placement of Z segments in a message.

A01 - Admit a Patient – with Z Segment Usage

Segment	Segment Name
MSH	Message Header
EVN	Event Type
PID	Patient Identification
[{NK1}]	Next of Kin
PV1	Patient Visit
[PV2]	Patient Visit – Additional Info
[{OBX}]	Observation Result
[{AL1}]	Allergy Information
[{DG1}]	Diagnosis Information
[{PR1}]	Procedures
[{GT1}]	Guarantor Information
[{IN1	Insurance Information
[IN2]	Insurance Information – Addit Info*
[IN3]	Insurance Information – Cert
[{ZIN}] for IN1, IN2, IN3	Z Additional Insurance User Record
[ACC]	Accident Information
[UB1]	B82 Information
[{ZVS}]	Z Additional Visit Information

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ORU - Unsolicited Transmission of an Observation – with Z Usage

Segment	Segment Name
MSH	Message Header
{	
[	
PID	Patient Identifier
[{NTE}]	Notes and Comments
[{PV1}]	Patient Visit
[{ZVS}]	Z Additional Visit Info
]	
{	
[ORC]	Order Common
OBR	Observations Report ID
{[NTE]}	Notes and Comments
[{ZBR}]	Z Additional Observation Info
{	
[OBX]	Result
{[INTE]}	Notes and Comments
}	
}	
}	
[DSC]	Continuation Pointer

* The *any seg* slot can be filled by a segment appropriate to the type of order being placed, e.g., OBR, ORO, RX1 (in V2.2).

2. Z segments should always appear in the same order. Order may effectively be defined by development date. For example, the A01 message (Version 2.2) contains a ZIN segment effective 3/31/94. On 12/31/94, a version 2.2 interface requires additional insurance data. This data is not related to the current insurance entity. Create a ZI1 segment, and place the ZI1 segment after the ZIN segment for messages that require the additional data.
3. Z segments may repeat on a particular message (following the encoding rules).[2]
4. Z segments may be used on multiple messages.

A.4.13 Creating Z Messages

Z messages are needed to convey information that does not have a trigger event or convey meaning as defined in the standard. For example, an interface may require transacting a message to indicate end of day, closing the census.

It is possible for a Z message to be comprised entirely of standard segments. If a defined segment exists that contains the data needed, then this segment should be used.

[2] Use standard HL7 procedures for indicating optional and repeating segments (e.g., use delimiters for optional segment place holding).

A.4.14 Management of Z Data

Management is needed to ensure that application areas don't define different segments with the same identifier and/or don't define different segments with the same data.

A.4.15 Z Segment Form

Section 1 - Administrative Section
To be completed by requester.

Name _____ Department _____
Date _____ Application _____
Extension _____ Project/Interface _____
Mail Code _____ Propose to HL7: Yes No

Use this Z segment form to initiate the development of a new Z segment or to add data to an existing Z segment. This form consists of three sections. The first section is an administrative section; the second section is the data section that provides a template for documenting the data; and the third section is a dictionary to assist in the completion of the data section.

1. Business Requirement/Purpose

   _____

   _____

   _____

   _____

2. Is the data defined on an existing HL7 Segment? Yes No

   If yes, please indicate the segment(s)._____

3. Is the data defined on an existing Z Segment? Yes No

   If yes, please indicate the segment(s)._____

4. Indicate the message(s) the Z segment applies to and the placement of the Z segment in the message(s). _____

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Section 2 - Data Section
Segment Name_____

SQ	FIELD NAME	TYP	LEN	OPT	RPT	TBL ID	APPLICATION FIELD NAME	COMP #	TYP	LEN	OPT	RPT	TBL ID

Notes

Item	Note

DATA DEFINITIONS ATTACHED: YES NO - WILL BE FORWARDED SEPARATELY

Dictionary

The following are descriptions of the information on the segment template.

COLUMN NAME	DESCRIPTION
SQ	SEQUENCE - the number assigned to the data element for identifying the location of the data element on the segment.
FIELD NAME	The entity name that may or may not be the same as the application name for the data element. For example, the LDM name would appear in this column and the application name would appear in the FIELD NAME column.
TYP	TYPE -- the data type of the generic data element. Allowable values - ST (string), TX (text), FT (formatted text data), NM (numeric), DT (date), TM (time), TS (time stamp), PN (person name), TN (telephone number), AD (address), ID (coded value), SI (sequence), CM (composite), CK (composite check digit), CN (composite number and name), CQ (composite quantity with units), CE (coded element), CF (coded element with formatted values), RP (reference pointer), TQ (timing quantity), MO (money),
LEN	LENGTH - the number of positions of the generic data element.
OPT	OPTIONALITY – indicates if the generic data element is required, optional, or conditional in a segment. Allowable values (R - required, O - optional, C - conditional)
BPT	REPETITION - indicates if the generic data type may repeat. Allowable values (N - no repetition, Y - the field may repeat an indefinite number of times, integer (the field may repeat up to the number of times specified in the integer)
TBL ID	TABLE ID - the identification number for the table of allowable values for the generic data element. A table is not necessarily created for each data element.
APP CD	APPLICATION CODE - a code that identifies the application that owns the data element name in the APPLICATION FIELD NAME column.
APPLICATION ELEMENT NAME	The physical name of the application data element. A physical name is defined as the data element name used in programs.
COMP #	The OAS component or the application number used to identify the data element.
TYP	TYPE - indicates the data type of the application data element. Allowable values - ST (string), TX (text), FT (formatted text data), NM (numeric), DT (date), TM (time), TS (time stamp), PN (person name), TN (telephone number), AD (address), ID (coded value), SI (sequence), CM (composite), CK (composite check digit), CN (composite number and name), CQ (composite quantity with units), CE (coded element), CF (coded element with formatted values), RP (reference pointer), TQ (timing quantity), MO (money),
LEN	LENGTH - indicates the number of positions for the application data element.
OPT	OPTIONALITY - indicates if the application data element is required, optional, or conditional in a segment. Allowable values (R - required, O - optional, C - conditional)
RPT	REPETITION - indicates if the application data type may repeat. Allowable values (N - no repetition, Y - the field may repeat an indefinite number of times, integer (the field may repeat up to the number of times specified in the integer)
TBL ID	TABLE ID - indicates the identification number for the table of allowable values for the application data element. A table is not necessarily created for each data element.
PROPOSED SEGMENT NAME	Indicates both the spelled out name and abbreviation for the name of the segment which you are requesting.
NOTES	Indicates any comments that may be helpful in the understanding of a specific field or the segment.

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Appendix B
HL7 Segment and Event Checklists

B.1 SEGMENT CHECKLIST

The segment checklist provides detailed information about the fields contained in each segment. This checklist can be used to identify optional fields that will be used in each message, the characteristics of each field used, and the name of the variable assigned to the corresponding data in each application. A copy of each segment checklist should be completed for each segment identified in the message checklist section.
The segment checklist includes the following definitions:

- Segment Name
- Item Number
- Name
- Required/Optional Indicator. For your convenience, HL7 required fields are marked with an 'R.' A blank line is provided to indicate optional fields which will be included in the segment. Use the following to indicate optionality::
  R – Required
  C – Conditional
  O – Optional
  Z – Supported with Custom Code
  N – Not Supported
- Data Type
- Field Length
  - Maximum Length Used
  - Maximum Length Specified by Standard
- Repetitions. If repetitions are allowed, a line is provided to indicate the number of repetitions used in the interface.
- Sender System's Variable Name
- Receiver System's Variable Name
- Notes. If the field uses a table, the table number is provided in parentheses.

A blank field line is included at the bottom of each segment to define any site-specific 'Z' fields being used.

B.1.1 Accident Information

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00527	Accident Date/Time		TS	(26)				
2	00528	Accident Code		ID	(2)				(0050)
3	00529	Accident Location		ST	(25)				
4	00812	Auto Accident State		CE	(60)				
5	00813	Accident Job Related Indicator		ID	(2)				(0136)
6	00814	Accident Death Indicator		ID	(2)				(0136)

B.1.2 ADD - Addendum

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00066	Addendum Cont. Pointer		ST	(64K)				

B.1.3 AIG - Appointment Information

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00896	Set ID - AIG	R	SI	(4)				
2	00763	Segment Action Code		ID	(3)				(0206)
3	00897	Resource ID	C	CE	(200)				
4	00898	Resource Type	R	CE	(200)				
5	00899	Resource Group		CE	(200)				
6	00900	Resource Quantity		NM	(5)				
7	00901	Resource Quantity Units		CE	(200)	( )			
8	01202	Start Date/Time	C	TS	(26)				
9	00891	Start Date/Time Offset	C	NM	(20)				
10	00892	Start Date/Time Offset Units	C	CE	(200)				
11	00893	Duration		NM	(20)				
12	00894	Duration Units		CE	(200)				
13	00895	Allow Substitution Code	C	IS	(10)				(0279)
14	00889	Filler Status Code	C	CE	(200)				(0278)

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B.1.4 AIL - Appointment Information - Location

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00902	Set ID - AIL	R	SI	(4)				
2	00763	Segment Action Code	C	ID	(1)				(0206)
3	00903	Location Resource ID	C	PL	(80)				
4	00904	Location Type	R	CE	(200)				
5	00905	Location Group		CE	(200)				
6	01202	Start Date/Time	C	TS	(26)				
7	00891	Start Date/Time Offset	C	NM	(20)				
8	00892	Start Date/Time Offset Units	C	CE	(200)				
9	00893	Duration		NM	(20)				
10	00894	Duration Units		CE	(200)				
11	00895	Allow Substitution Code	C	IS	(10)				(0279)
12	00889	Filler Status Code	C	CE	(200)				(0278)

B.1.5 AIP - Appointment Information - Personnel

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00906	Set ID - AIP	R	SI	(4)				
2	00763	Segment Action Code	C	ID	(1)				(0206)
3	00913	Personnel Resource ID	C	XCN	(80)				
4	00907	Resource Role	R	CE	(200)				
5	00899	Resource Group		CE	(200)				
6	01202	Start Date/Time	C	TS	(26)				
7	00893	Start Date/Time Offset	C	NM	(20)				
8	00894	Start Date/Time Offset Units	C	CE	(200)				
9	00895	Duration		NM	(20)				
10	00889	Duration Units		CE	(200)				
11	00895	Allow Substitution Code	C	IS	(10)				(0279)
12	00889	Filler Status Code	C	CE	(200)				(0278)

B.1.6 AIS - Appointment Information - Service

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00890	Set ID - AIS	R	SI	(4)				
2	00763	Segment Action Code	C	ID	(3)				(0206)
3	00238	Universal Service Identifier	R	CE	(200)				
4	01202	Start Date/Time	C	TS	(26)				
5	00893	Start Date/Time Offset	C	NM	(20)				
6	00894	Start Date/Time Offset Units	C	CE	(200)				
7	00895	Duration		NM	(20)				
8	00889	Duration Units		CE	(200)				
9	00895	Allow Substitution Code	C	IS	(10)				(0279)
10	00889	Filler Status Code	C	CE	(200)				(0278)

B.1.7 AL1 - Patient Allergy Information

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00203	Set ID - AL1	R	SI	(4)				
2	00204	Allergy Type		IS	(2)				(0127)
3	00205	Allergy Code/Mnemonic/Desc.	R	CE	(60)				
4	00206	Allergy Severity		IS	(2)				(0128)
5	00207	Allergy Reaction		ST	(15)				
6	00208	Identification Date		DT	(8)				

B.1.8 Appointment Information - Preferences

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00908	Time Selection Criteria		SVC	(80)				
2	00909	Resource Selection Criteria		SVC	(80)				(0206)
3	00910	Location Selection Criteria		SVC	(80)				
4	00911	Slot Spacing Criteria		SVC	(5)				
5	00912	Filler Override Criteria		SVC	(80)				(0278)

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B.1.9 ARQ - Appointment Request

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00860	Placer Appointment ID	R	EI	(75)				
2	00861	Filler Appointment ID	C	EI	(75)				
3	00862	Occurrence Number	C	NM	(5)				
4	00218	Placer Group Number		EI	(75)				
5	00864	Schedule ID		CE	(200)				
6	00865	Request Event Reason		CE	(200)				
7	00866	Appointment Reason		CE	(200)				0276
8	00867	Appointment Type		CE	(200)				0277
9	00868	Appointment Duration		NM	(20)				
10	00869	Appointment Duration Units		CE	(200)				
11	00870	Requested Start Date/Time Range		DR	(53)	( )			00870
12	00871	Priority		ST	(5)				
13	00872	Repeating Interval		RI	(100)				
14	00873	Repeating Interval Duration		ST	(5)				
15	00874	Placer Contact Person	R	XCN	(48)				
16	00875	Placer Contact Phone Number		XTN	(40)	( )			
17	00876	Placer Contact Address		XAD	(106)				
18	00877	Placer Contact Location		PL	(80)				
19	00878	Entered By Person	R	XCN	(48)				
20	00879	Entered By Phone Number		XTN	(40)	( )			
21	00880	Entered By Location		PL	(80)				
22	00881	Parent Placer Appointment ID		EI	(75)				
23	00882	Parent Filler Appointment ID		EI	(75)				

B.1.10 AUT - Authorization Information

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01146	Authorizing Payor, Plan ID		CE	(200)				(0072)
2	01147	Authorizing Payor, Company ID	R	CE	(200)				(0285)
3	01148	Authorizing Payor, Company Name		ST	(45)				
4	01149	Authorization Effective Date		TS	(26)				
5	01150	Authorization Expiration Date		TS	(26)				

6	01151	Authorization Identifier	C	EI	(30)				
7	01152	Reimbursement Limit		CP	(25)				
8	01153	Requested Number of Treatments		NM	(2)				
9	01154	Authorized Number of Treatments		NM	(2)				
10	01145	Process Date		TS	(26)				

B.1.11 BHS - Batch Header

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00081	Batch Field Separator	R	ST	(1)				
2	00082	Batch Encoding Characters	R	ST	(3)				
3	00083	Batch Sending Application		ST	(15)				
4	00084	Batch Sending Facility		ST	(20)				
5	00085	Batch Rcv'ing Application		ST	(15)				
6	00086	Batch Receiving Facility		ST	(20)				
7	00087	Batch Creation Date/Time		TS	(26)				
8	00088	Batch Security		ST	(40)				
9	00089	Batch Name/ID/Type		ST	(20)				
10	00090	Batch Comment		ST	(80)				
11	00091	Batch Control ID		ST	(20)				
12	00092	Reference Batch Control ID		ST	(20)				

B.1.12 BLG- Billing

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00234	When to Charge		CM	(40)				(0100)
2	00235	Charge Type		ID	(50)				(0122)
3	00236	Account ID		CK	(100)				

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B.1.13 BTS - Batch Trailer

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00093	Batch Message Count		ST	(10)				
2	00094	Batch Comment		ST	(80)				
3	00095	Batch Totals		NM	(100)	( )			

B.1.14 CDM - Charge Description Master

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	001306	Primary Key Value - CDM	R	CE	(200)				(0132)
2	00983	Charge Code Alias		CE	(200)	( )			
3	00984	Charge Description Short	R	ST	(20)				
4	00985	Charge Description Long		ST	(250)				
5	00986	Description Override Indicator		IS	(1)				(0268)
6	00987	Exploding Charges		CE	(60)	( )			
7	00988	Procedure Code		CE	(60)				
8	00675	Active/Inactive Indicator		ID	(1)				(0183)
9	00990	Inventory Number		CE	(60)	( )			
10	00991	Resource Load		NM	(12)				
11	00992	Contract Number		CK	(200)	( )			
12	00993	Contract Organization		XON	(200)				
13	00994	Room Fee Indicator		ID	(1)				(0136)

B.1.15 CM0 - Clinical Study Master

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01010	Set ID - CM0		SI	(4)				
2	01011	Sponsor Study ID	R	EI	(60)				
3	01012	Alternate Study Ids		CE	(60)	( ) 3			
4	01013	Title of Study	R	ST	(300)				
5	01014	Chairman of Study		XCN	(60)				
6	01015	Last IRB Approval Date		DT	(8)				
7	01016	Total Accrual to Date		NM	(8)				
8	01017	Last Accrual Date		DT	(8)				

9	01018	Contact for Study		XCN	(60)				
10	01019	Contact's Phone Number		XTN	(40)				
11	01020	Contact's Address		XAD	(100)				

B.1.16 CM1 - Clinical Study Phase Master

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01021	Set ID - CM1	R	SI	(4)				
2	01022	Study Phase Identifier	R	CE	(60)				
3	01023	Description of Study Phase	R	ST	(300)				

B.1.17 CM2 - Clinical Study Schedule Master

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01024	Set ID - CM2		SI	(4)				
2	01025	Scheduled Time Point	R	CE	(60)				
3	01026	Description of Time Point		ST	(300)				
4	01027	Events Scheduled This Time Point	R	CE	(60)	( )			

B.1.18 CSR - Clinical Study Registration

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01035	Sponsor Study ID	R	EI	(60)				
2	01036	Alternate Study ID		EI	(60)				
3	01037	Institution Registration Patient		CE	(60)				
4	01038	Sponsor Patient ID	R	CS	(30)				
5	01039	Alternate Patient ID - CSR		CS	(30)				
6	01040	Date/Time of Patient Study Reg.		TS	(26)				
7	01041	Person Performing Study Reg.		XCN	(60)				
8	01042	Study Authorizing Provider	R	XCN	(60)				
9	01043	Date/Time Patient Study Consent Signed	C	TS	(26)				
10	01044	Patient Study Eligibility Status	C	CE	(60)				
11	01045	Study Randomization Date/Time		TS	(26)	( )			
12	01046	Randomized Study Arm		CE	(200)	( )			

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13	01047	Stratum for Study Randomization		CE	(200)	( )			
14	01048	Patient Evaluability Status	C	CE	(60)				
15	01049	Date/Time Ended Study	C	TS	(26)				
16	01050	Reason Ended Study	C	CE	(60)				

B.1.19 CSS - Clinical Study Data Schedule

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01055	Study Scheduled Time Point	R	CE	(60)				
2	01056	Study Scheduled Patient Time Point		TS	(26)				
3	01057	Study Quality Control Codes	R	CE	(60)	( )			

B.1.20 CSP - Clinical Study Phase

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01051	Study Phase Identifier	R	CE	(60)				
2	01052	Date/Time Study Phase Began	R	TS	(26)				
3	01053	Date/Time Study Phase Ended		TS	(26)				
4	01054	Study Phase Evaluability	C	CE	(60)				

B.1.21 CTI - Clinical Trial Identification

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01058	Sponsor Study Identifier	R	EI	(60)				
2	01051	Study Phase Identifier	C	CE	(60)				
3	01055	Study Scheduled Time Report		CE	(60)				

B.1.22 CTD - Contact Data

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01155	Role	R	CE	(200)	( )			
2	01165	Contact Name		XPN	(106)	( )			
3	01166	Contact Address		XAD	(60)				
4	01167	Contact Location		PL	(60)				
5	01168	Contact Communication Info		XTN	(100)	( )			
6	01170	Preferred Method of Contact		CE	(200)				(0185)

7	01171	Contact Identifiers		CM	(100)	( )			

B.1.23 DB1 - Disability Information

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01283	Set ID - DB1	R	SI	(4)				(0131)
2	01284	Disabled Person Code		IS	(2)				
3	01285	Disabled Identifier		CX	(32)	( )			
4	01286	Disabled Indicator		ID	(1)				(0136)
5	01287	Disability Start Date		DT	(8)				
6	01288	Disability End Date		DT	(8)				
7	01289	Disability Return to Work Date		DT	(8)				
8	01290	Disability Unable to Work Date		DT	(8)				

B.1.24 DG1 - Diagnosis Information

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00375	Set ID - Diagnosis	R	SI	(4)				
2	00376	Diagnosis Coding Method	R	ID	(2)				(0053)
3	00377	Diagnosis Code		CE	(60)				(0051)
4	00378	Diagnosis Description		ST	(40)				
5	00379	Diagnosis Date/Time		TS	(26)				
6	00380	Diagnosis/DRG Type	R	IS	(2)				(0052)
7	00381	Major Diagnostic Category		CE	(60)				(0118)
8	00382	Diagnostic Related Group		CE	(60)				(0055)
9	00383	DRG Approval Indicator		ID	(2)				
10	00384	DRG Grouper Review Code		IS	(2)				(0056)
11	00385	Outlier Type		CE	(60)				(0083)
12	00386	Outlier Days		NM	(3)				
13	00387	Outlier Cost		CP	(12)				
14	00388	Grouper Version and Type		ST	(4)				
15	00389	Diagnosis/DRG Priority		NM	(2)				
16	00390	Diagnosing Clinician		XCN	(60)				
17	00766	Diagnosis Classification		IS	(3)				
18	00767	Confidential Indicator		ID	(1)				(0228)

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19	00768	Attestation Date/Time		TS	(26)				(0136)

B.1.25 DRG - Diagnosis Related Group

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00382	Diagnosis Related Group		CE	(60)				(0055)
2	00769	DRG Assigned Date/Time		TS	(26)				
3	00383	DRG Approval Indicator		ID	(2)				(0136)
4	00384	DRG Grouper Review Code		IS	(2)				(0056)
5	00385	Outlier Type		CE	(60)				(0083)
6	00386	Outlier Days		NM	(3)				
7	00387	Outlier Cost		CP	(12)				
8	00770	DRG Payor		IS	(1)				(0229)
9	00771	Outlier Reimbursement		CP	(9)				
10	00767	Confidential Indicator		ID	(1)				(0136)

B.1.26 DSC - Continuation Pointer

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00014	Continuation Pointer		ST	(180)				

B.1.27 DSP - Display Data

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00061	Set ID - Display Data		SI	(4)				
2	00062	Display Level		SI	(4)				
3	00063	Data Line	R	TX	(300)				
4	00064	Logical Break Point		ST	(2)				
5	00065	Result ID		TX	(20)				

B.1.28 EQL - Embedded Query Language

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00696	Query Tag		ST	(32)				
2	00697	Query/Response Format Code	R	ID	(1)				(0106)
3	00709	EQL Query Name	R	CE	(60)				
4	00710	EQL Query Statement	R	ST	(4096)				

B.1.29 ERQ - Event Query

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00696	Query Tag		ST	(32)				
2	00706	Event Identifier	R	ID	(1)				(0106)
3	00705	Input Parameter List		QIP	(256)	( )			

B.1.30 ERR - Error

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00024	Error Code and Location	R	CM	(80)	( )			

B.1.31 EVN - Event Type

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00099	Event Type Code	R	ID	(3)				(0003)
2	00100	Date/Time of Event	R	TS	(26)				
3	00101	Date/Time Planned Event		TS	(26)				
4	00102	Event Reason Code		ID	(3)				(0062)
5	00103	Operator ID		ID	(5)				(0188)
6	01278	Event Occurred		TS	(26)				

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B.1.32 FAC - Facility

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01262	Facility ID	R	EI	(20)				
2	01263	Facility Type		ID	(1)				(0331)
3	01264	Facility Address	R	XAD	(200)				
4	01265	Facility Telecommunication	R	XTN	(44)				
5	01266	Contact Person		XCN	(60)	( )			
6	01267	Contact Title		ST	(60)				
7	01268	Contact Address		XAD	(200)				
8	01269	Contact Telecommunication		XTN	(44)	( )			
9	01270	Signature Authority	R	XCN	(60)				
10	01271	Signature Authority Title		ST	(60)				
11	01272	Signature Authority Address		XAD	(200)				
12	01273	Signature Authority Telecommunication		XTN	(44)				

B.1.33 FHS - File Header

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00067	File Field Separators	R	ST	(1)				
2	00068	File Encoding Characters	R	ST	(4)				
3	00069	File Sending Application		ST	(15)				
4	00070	File Sending Facility		ST	(20)				
5	00071	File Rcv'ing Application		ST	(15)				
6	00072	File Receiving Facility		ST	(20)				
7	00073	File Creation Date/Time		TS	(26)				
8	00074	File Security		ST	(40)				
9	00075	File Name/ID/Type		ST	(20)				
10	00076	File Header Comment		ST	(80)				
11	00077	File Control ID		ST	(20)				
12	00078	Reference File Control ID		ST	(20)				

B.1.34 FT1 - Financial Transaction

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00355	Set ID - Financial Trans.		SI	(4)				
2	00356	Transaction ID		ST	(12)				
3	00357	Transaction Batch ID		ST	(10)				
4	00358	Transaction Date	R	TS	(26)				
5	00359	Transaction Posting Date		TS	(26)				
6	00360	Transaction Type	R	IS	(8)				(0017)
7	00361	Transaction Code	R	CE	(80)				(0132)
8	00362	Transaction Description	B	ST	(40)				
9	00363	Transaction Desc. - Alt	B	ST	(40)				
10	00364	Transaction Quantity		NM	(6)				
11	00365	Transaction Amount - Ext.		CP	(12)				
12	00366	Transaction Amount - Unit		CP	(12)				
13	00367	Department Code		CE	(60)				(0049)
14	00368	Insurance Plan ID		CE	(60)				(0072)
15	00369	Insurance Amount		CP	(12)				
16	00133	Assigned Patient Location		PL	(80)				
17	00370	Fee Schedule		IS	(1)				(0024)
18	00148	Patient Type		IS	(2)				(0018)
19	00371	Diagnosis Code		CE	(60)	( )			(0051)
20	00372	Performed by Code		XCN	(120)				(0084)
21	00373	Ordered by Code		XCN	(120)				
22	00374	Unit Cost		CP	(12)				
23	00217	Filler Order Number		EI	(22)				
24	00765	Entered By Code		XCN	(120)				
25	00393	Procedure Code		CE	(60)				(0088)

B.1.35 FTS - File Trailer

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00079	File Batch Count		NM	(10)				
2	00080	File Trailer Comment		ST	(80)				

B.1.36 GT1 - Guarantor

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00405	Set ID - GT1	R	SI	(4)				
2	00406	Guarantor Number		CX	(59)	( )			
3	00407	Guarantor Name	R	XPN	(48)	( )			
4	00408	Guarantor Spouse Name		XPN	(48)	( )			
5	00409	Guarantor Address		XAD	(106)	( )			
6	00410	Guarantor Phone - Home		XTN	(40)	( )			
7	00411	Guarantor Phone - Bus.		XTN	(40)	( )			
8	00412	Guarantor Date/Time of Birth		TS	(26)				
9	00413	Guarantor Sex		IS	(1)				(0001)
10	00414	Guarantor Type		IS	(2)				(0068)
11	00415	Guarantor Relationship		IS	(2)				(0063)
12	00416	Guarantor SSN		ST	(11)				
13	00417	Guarantor Date - Begin		DT	(8)				
14	00418	Guarantor Date - End		DT	(8)				
15	00419	Guarantor Priority		NM	(2)				
16	00420	Guarantor Employer Name		XPN	(130)	( )			
17	00421	Guarantor Employer Addr.		XAD	(106)	( )			
18	00422	Guarantor Employer Phone		XTN	(40)	( )			
19	00423	Guarantor Employee ID #		CX	(20)	( )			
20	00424	Guarantor Employment Status		IS	(2)				(0066)
21	00425	Guarantor Organization		XON	(130)	( )			
22	00773	Guarantor Billing Hold Flag		ID	(1)				(0136)
23	00774	Guarantor Credit Rating Code		CE	(80)				
24	00775	Guarantor Death Date/Time		TS	(26)				
25	00776	Guarantor Death Flag		ID	(1)				(0136)

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
26	00777	Guarantor Charge Adjustment Code		CE	(80)				(0218)
27	00778	Guarantor Household Annual Income		CP	(10)				
28	00779	Guarantor Household Size		NM	(3)				
29	00780	Guarantor Employer ID Number		CX	(20)	( )			
30	00781	Guarantor Marital status Code		IS	(1)				(0002)
31	00782	Guarantor Hire Effective Date		DT	(8)				
32	00783	Employment Stop Date		DT	(8)				
33	00755	Living Dependency		IS	(2)				(0223)
34	00145	Ambulatory Status		IS	(2)				(0009)
35	00129	Citizenship		IS	(4)				(0171)
36	00118	Primary Language		CE	(60)				(0296)
37	00742	Living Arrangement		IS	(2)				(0222)
38	00743	Publicity Indicator		CE	(80)				(0215)
39	00744	Protection Indicator		ID	(1)				(0136)
40	00745	Student Indicator		IS	(2)				(0231)
41	00120	Religion		IS	(3)				(0006)
42	00746	Mother's Maiden Name		XPN	(48)				
43	00739	Nationality		CE	(80)				(0212)
44	00125	Ethnic Group		IS	(3)				(0189)
45	00748	Contact Person's Name		XPN	(48)				
46	00749	Contact Person's Phone Number		XTN	(40)				
47	00747	Contact Reason		CE	(80)				(0222)
48	00784	Contact Relationship		IS	(2)				(0063)
49	00785	Contact Job Title		ST	(20)				
50	00786	Job Code/Class		JCC	(20)				(327/328)
51	01299	Guarantor Employer's Organization		XON	(130)				
52	00753	Handicap		IS	(2)				(0310)
53	00752	Job Status		IS	(2)				(0311)
54	01231	Guarantor Financial Class		FC	(50)				(0064)
55	01291	Guarantor Race		IS	(1)				(0005)

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B.1.37 IN1 - Insurance

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00426	Set ID - IN1	R	SI	(4)				
2	00368	Insurance Plan ID	R	CE	(8)				(0072)
3	00428	Insurance Company ID	R	CX	(59)				
4	00429	Insurance Company Name		XON	(130)				
5	00430	Insurance Company Address		XAD	(106)				
6	00431	Insurance Co. Contact Person		XPN	(48)				
7	00432	Insurance Co. Phone Number		XTN	(40)				
8	00433	Group Number		ST	(12)				
9	00434	Group Name		XON	(130)				
10	00435	Insured's Group Emp. ID		CX	(12)				
11	00436	Insured's Group Emp. Name		XON	(130)				
12	00437	Plan Effective Date		DT	(8)				
13	00438	Plan Expiration Date		DT	(8)				
14	00439	Authorization Information		CM	(55)				
15	00440	Plan Type		IS	(3)				(0086)
16	00441	Name of Insured		XPN	(48)				
17	00442	Insured's Relation to Pat		IS	(2)				(0063)
18	00443	Insured's Date of Birth		TS	(26)				
19	00444	Insured's Address		XAD	(106)				
20	00445	Assignment of Benefits		IS	(2)				(0135)
21	00446	Coordination of Benefits		IS	(2)				(0173)
22	00447	Coord. of Ben. Priority		ST	(2)				
23	00448	Notice of Admission Flag		ID	(2)				(0136)
24	00449	Notice of Admission Date		DT	(8)				
25	00450	Rpt. of Eligibility Flag		ID	(2)				
26	00451	Rpt. of Eligibility Date		DT	(8)				
27	00452	Release Information Code		IS	(2)				(0093)
28	00453	Pre-Admit Cert. (PAC)		ST	(15)				
29	00454	Verification Date/Time		TS	(26)				
30	00455	Verification By		XCN	(60)				
31	00456	Type of Agreement Code		IS	(2)				(0098)
32	00457	Billing Status		IS	(2)				(0022)

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
33	00458	Lifetime Reserve Days		NM	(4)				
34	00459	Delay Before L. R. Day		NM	(4)				
35	00460	Company Plan Code		IS	(8)				(0042)
36	00461	Policy Number		ST	(15)				
37	00462	Policy Deductible		CP	(12)				
38	00463	Policy Limit - Amount	B	CP	(12)				
39	00464	Policy Limit - Days		NM	(4)				
40	00465	Room Rate - Semi-Private	B	CP	(12)				
41	00466	Room Rate - Private	B	CP	(12)				
42	00467	Insured's Employ Status		CE	(60)				(0066)
43	00468	Insured's Sex		IS	(1)				(0001)
44	00469	Insured's Employer Addr.		XAD	(106)				
45	0470	Verification Status		ST	(2)				
46	0471	Prior Insurance Plan ID		IS	(8)				(0072)
47	01227	Coverage Type		IS	(3)				(0309)
48	00753	Handicap		IS	(2)				(0310)
49	01230	Insured’s ID Number		CX	(12)				

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B.1.38 IN2 - Insurance Additional Information

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00472	Insured's Employee ID		CX	(59)				
2	00473	Insured's Social Security #		ST	(11)				
3	00474	Insured's Employer Name		XCN	(130)	( )			
4	00475	Employer Information Data		IS	(1)				(0139)
5	00476	Mail Claim Party		IS	(1)	( )			(0137)
6	00477	Medicare Health Ins Card Number		ST	(15)				
7	00478	Medicaid Case Name		XPN	(48)	( )			
8	00479	Medicaid Case Number		ST	(15)				
9	00480	Champus Sponsor Name		XPN	(48)	( )			
10	00481	Champus ID Number		ST	(20)				
11	00482	Dependent of Champus Rcp'nt.		CE	(30)				
12	00483	Champus Organization		ST	(25)				
13	00484	Champus Station		ST	(25)				
14	00485	Champus Service		IS	(14)				(0140)
15	00486	Champus Rank/Grade		IS	(2)				(0141)
16	00487	Champus Status		IS	(3)				(0142)
17	00488	Champus Retire Date		DT	(8)				
18	00489	Champus NA Cert. on File		ID	(1)				(0136)
19	00490	Baby Coverage		ID	(1)				(0136)
20	00491	Combine Baby Bill		ID	(1)				(0136)
21	00492	Blood Deductible		ST	(1)				
22	00493	Special Coverage Apprv. Name		XPN	(48)	( )			
23	00494	Special Coverage Apprv. Title		ST	(30)				
24	00495	Non-Covered Ins. Code		IS	(8)	( )			(0143)
25	00496	Payor ID		CX	(59)	( )			
26	00497	Payor Subscriber ID		CX	(59)	( )			
27	00498	Eligibility Source		IS	(1)				(0144)
28	00499	Room Coverage Type/Amount		CM	(25)	( )			(0145/0146)
29	00500	Policy Type/Amount		CM	(25)	( )			
30	00501	Daily Deductible		CM	(25)				
31	00755	Living Dependency		IS	(2)				(0223)

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
32	00145	Ambulatory Status		IS	(2)				(0009)
33	00129	Citizenship		IS	(4)				(0171)
34	00118	Primary Language		CE	(60)				(0296)
35	00742	Living Arrangement		IS	(2)				(0220)
36	00743	Publicity Indicator		CE	(80)				(0215)
37	00744	Protection Indicator		ID	(2)				(0213)
38	00745	Student Indicator		IS	(2)				(0231)
39	00120	Religion		IS	(3)				(0006)
40	00746	Mother's Maiden Name		XPN	(48)				
41	00739	Nationality		CE	(80)				(0212)
42	00125	Ethnic Group		IS	(1)				(0189)
43	00119	Marital Status		IS	(1)				(0002)
44	00787	Insured's Employment Start Date		DT	(8)				
45	00783	Insured's Employment Stop Date		DT	(8)				
46	00785	Job Title		ST	(20)				
47	00786	Job Code/Class		JCC	(20)				(0327/0328)
48	00752	Job Status		IS	(2)				(0311)
49	00789	Employer Contact Person Name		XPN	(48)	( )			
50	00790	Employer Contact Person Phone		XTN	(40)	( )			
51	00791	Employer Contact Reason		IS	(2)				
52	00792	Insured's Contact Person Name		XPN	(48)	( )			
53	00793	Insured's Contact Person Phone		XTN	(40)	( )			
54	00794	Insured's Contact Person Reason		IS	(2)				(0222)
55	00795	Relationship to Patient Start Date		DT	(8)				
56	00796	Relationship to Patient Stop Date		DT	(8)	( )			
57	00797	Insurance Co Contact Reason		IS	(2)				(0232)
58	00798	Insurance Co Contact Phone		XTN	(40)				
59	00799	Policy Scope		IS	(2)				(0312)
60	00800	Policy Source		IS	(2)				(0313)
61	00801	Patient Member Number		CX	(60)				
62	00802	Guarantor's Rel. to Insured		IS	(2)				(0063)
63	00803	Insured's Phone Number - Home		XTN	(40)	( )			
64	00804	Insured's Employer Phone		XTN	(40)	( )			

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
65	00805	Military Handicapped Program		CE	(60)				
66	00806	Suspend Flag		ID	(2)				(0136)
67	00807	Copay Limit Flag		ID	(2)				(0136)
68	00808	Stoploss Limit Flag		ID	(2)				(0136)
69	00810	Insured Employer Org Name & ID		XON	(130)	( )			
70	00810	Insured Employer Org Name & ID		XON	(130)	( )			
71	00113	Race		IS	(1)				(0005)
72	00811	HCFA Patient Rel. to Insured		CE	(60)				

B.1.39 IN3 - Insurance Certification Info

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00502	Set ID - IN3	R	SI	(4)				
2	00503	Certification Number		CX	(59)				
3	00504	Certified By		XCN	(60)	( )			
4	00505	Certification Required		ID	(1)				(0136)
5	00506	Penalty		CM	(10)				(0148)
6	00507	Certification Date/Time		TS	(26)				
7	00508	Certification Modify D/T		TS	(26)				
8	00509	Operator		XCN	(60)	( )			
9	00510	Certification Begin Date		DT	(8)				
10	00511	Certification End Date		DT	(8)				
11	00512	Days		CM	(3)				(0149)
12	00513	Non-Concur Code/Desc.		CE	(60)				(0233)
13	00514	Non-Concur Effective D/T		TS	(26)				
14	00515	Physician Reviewer		XCN	(60)	( )			
15	00516	Certification Contact		ST	(48)				
16	00517	Certification Contact Phone #		XTN	(40)	( )			
17	00518	Appeal Reason		CE	(60)				
18	00519	Certification Agency		CE	(60)				
19	00520	Certification Agency Phone #		XTN	(40)	( )			
20	00521	Pre-Certification Req./Window		CM	(40)	( )			(150)
21	00522	Case Manager		ST	48)				

22	00523	Second Opinion Date		DT	(8)				
23	00524	Second Opinion Status		ID	(1)				(0151)
24	00525	Second Opinion Doc Rcv'd.		ID	(1)	( )			(0152)
25	00526	Second Opinion Practitioner		XCN	(60)	( )			

B.1.40 LCC - Location Charge Code

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00979	Primary Key Value - LCC	R	PL	(200)				
2	00964	Location Department	R	IS	(10)				(0264)
3	00980	Accommodation Type		CE	(60)	( )			
4	00981	Charge Code	R	CE	(60)	( )			(0132)

B.1.41 LCH - Location Characteristic

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01305	Primary Key Value - LCH	R	PL	(200)				
2	00763	Segment Action Code	R	ID	(1)				(0206)
3	00764	Segment Unique Key		EI	(80)	( )			
4	01295	Location Characteristic ID	R	CE	(80)	( )			(0324)
5	01237	Location Characteristic Value	R	CE	(80)				

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B.1.42 DP - Location Department

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00963	Primary Key Value - LDP	R	PL	(200)				
2	00964	Location Department	R	IS	(10)				
3	00965	Location Service		IS	(3)	( )			
4	00966	Specialty Type	R	CE	(60)	( )			
5	01237	Location Characteristic Value	R	CE	(80)				
6	00675	Active/Inactive Flag		ID	(1)				
7	00969	Activation Date		TS	(26)				
8	00970	Inactivation Date - LDP		TS	(26)				
9	00971	Inactivated Reason		ST	(80)				
10	00976	Visiting Hours		VH	(80)	( )			
11	00978	Contact Phone		XTN	(40)				

B.1.43 LOC - Location Identification

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01307	Primary Key Value - LOC	R	PL	(200)				
2	00944	Location Description		ST	(48)				
3	00945	Location Type	R	IS	(2)	( )			(0260)
4	00947	Organization Name		XON	(90)				
5	00948	Location Address		XAD	(106)				
6	00949	Location Phone		XTN	(40)	( )			
7	00951	License Number		CE	(60)	( )			
8	00953	Location Equipment		IS	(3)	( )			

B.1.44 LRL - Location Relationship

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00943	Primary Key Value - LRL	R	PL	(200)				
2	00763	Segment Action Code		ID	(3)				(0206)
3	00764	Segment Unique Key		EI	(80)				
4	01230	Location Relationship ID	R	CE	(80)				(0325)
5	01301	Organizational Location Rel.	C	XON	(80)				
6	01292	Patient Location Relationship Value	C	PL	(80)				

B.1.45 MFA - Master File Acknowledgment

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00664	Record-Level Event Code	R	ID	(3)				(0180)
2	00665	MFN Control ID	C	ST	(20)				
3	00668	Event Completion Date/Time		TS	(26)				
4	00669	Error Return Code and/or Text	R	CE	(60)				(0181)
5	00670	Primary Key Value - MFA	R	CE	(60)				

B.1.46 MFE - Master File Entry

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00664	Record-Level Event Code	R	ID	(3)				(0180)
2	00665	MFN Control ID		ST	(20)				
3	00662	Effective Date/Time		TS	(26)				
4	00667	Primary Key Value - MFE	R	varies	(200)				

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B.1.47 MFI - Master File Identification

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00658	Master File Identifier	R	CE	(60)				(0175)
2	00659	Master File Application ID		JD	(180)				
3	00660	File-Level Event Code	R	ID	(3)				(0178)
4	00661	Entered Date/Time		TS	(26)				
5	00662	Effective Date/Time		TS	(26)				
6	00663	Response Level Code	R	ID	(2)				(0179)

B.1.48 MRG - Merge Patient Information

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00211	Prior Patient ID - Internal	R	CX	(20)	( )			
2	00212	Prior Alternate Patient ID		CX	(20)	( )			
3	00213	Prior Patient Account Number		CX	(20)				
4	00214	Prior Patient ID - External		CX	(20)				
5	01279	Prior Visit Number		CX	(20)				
6	01280	Prior Alternate Visit ID		CX	(20)				
7	01281	Prior Patient Name		XPN	(48)				

B.1.49 MSA - Message Acknowledgment

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00018	Acknowledgment Code	R	ID	(2)				(0008)
2	00010	Message Control ID	R	ST	(20)				
3	00020	Text Message		ST	(80)				
4	00021	Expected Sequence Number		NM	(15)				
5	00022	Delayed ACK Type	B	ID	(1)				(0102)
6	00023	Error Condition		CE	(100)				

B.1.50 MSH - Message Header (Required segment)

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00001	Field Separator	R	ST	(1)				
2	00002	Encoding Characters	R	ST	(4)				
3	00003	Sending Application		HD	(180)				
4	00004	Sending Facility		HD	(180)				
5	00005	Receiving Application		HD	(180)				
6	00006	Receiving Facility		HD	(180)				
7	00007	Date/Time of Message		TS	(26)				
8	00008	Security		ST	(40)				
9	00009	Message Type	R	CM	(7)				
10	00010	Message Control ID	R	ST	(20)				
11	00011	Processing ID	R	PT	(3)				
12	00012	Version ID	R	ID	(8)				(0104)
13	00013	Sequence Number		NM	(15)				
14	00014	Continuation Pointer		ST	(180)				
15	00015	Accept Acknowledgment Type		ID	(2)				(0155)
16	00016	Application Acknowledge Type		ID	(2)				(0155)
17	00017	Country Code		ID	(2)				
18	00692	Character Set		ID	(6)	( )			(0211)
19	00693	Principal Language of Message		CE	(60)				

B.1.51 NK1 - Next of Kin / Associated Parties

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00190	Set ID - NK1	R	SI	(4)				
2	00191	Name		XPN	(48)	( )			
3	00192	Relationship		CE	(60)				(0063)
4	00193	Address		XAD	(106)	( )			
5	00194	Phone Number		XTN	(40)	( )			
6	00195	Business Phone Number		XTN	(40)				
7	00196	Contact Role		CE	(60)				(0131)
8	00197	Start Date		DT	(8)				

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Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
9	00198	End Date		DT	(8)				
10	00199	Next of Kin/AP Job Title		ST	(60)				
11	00200	Next of Kin Job/AP Code/Class		JCC	(20)				
12	00201	Next of Kin/AP Employee Number		CX	(20)				
13	00202	Organization Name		XON	(60)	( )			
14	00119	Marital Status		IS	(2)				(0002)
15	00111	Sex		IS	(1)				(0001)
16	00110	Date/Time of Birth		TS	(26)				
17	00755	Living Dependency		IS	(2)	( )			(0223)
18	00145	Ambulatory Status		IS	(2)	( )			(0009)
19	00129	Citizenship		IS	(4)	( )			(0171)
20	00118	Primary Language		CE	(60)				(0296)
21	00742	Living Arrangement		IS	(2)				(0220)
22	00743	Publicity Indicator		CE	(1)				(0215)
23	00744	Protection Indicator		ID	(1)				(0136)
24	00745	Student Indicator		IS	(2)				(0231)
25	00120	Religion		IS	(3)				(0006)
26	00746	Mother's Maiden Name		XPN	(48)				
27	00739	Nationality		CE	(80)				(0212)
28	00125	Ethnic Group		IS	(3)				(0189)
29	00747	Contact Reason		CE	(80)	( )			(0222)
30	00748	Contact Person Name		XPN	(48)	( )			
31	00749	Contact Person Phone Number		XTN	(40)	( )			
32	00750	Contact Person Address		XAD	(106)	( )			
33	00751	NOK/AP's Identifiers		CX	(32)	( )			
34	00752	Job Status		IS	(2)				(0311)
35	00113	Race		IS	(1)				(0005)
36	00753	Handicap		IS	(2)				(0295)
37	00754	Contact Person Social Sec. Number		ST	(16)				

B.1.52 NPU - Bed Status Update

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00209	Bed Location	R	PL	(80)				
2	00170	Bed Status		IS	(1)				(0116)

B.1.53 NTE - Notes and Comments

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00573	Set ID - NTE		SI	(4)				
2	00574	Source of Comment		ID	(8)				(0105)
3	00575	Comment		FT	(64k)	( )			

B.1.54 OBR - Observation Request

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00237	Set ID - Observation Request	C	SI	(4)				
2	00216	Placer Order Number	C	EI	(75)				
3	00217	Filler Order Number	C	EI	(75)				
4	00238	Universal Service ID	R	CE	(200)				
5	00239	Priority	B	ID	(2)				
6	00240	Requested Date/Time	B	TS	(26)				
7	00241	Observation Date/Time	C	TS	(26)				
8	00242	Observation End Date/Time		TS	(26)				
9	00243	Collection Volume		CQ	(20)				
10	00244	Collector Identifier		XCN	(60)	( )			
11	00245	Specimen Action Code		ID	(1)				(0065)
12	00246	Danger Code		CE	(60)				
13	00247	Relevant Clinical Info.		ST	(300)				
14	00248	Specimen Rcv'd. Date/Time	C	TS	(26)				
15	00249	Specimen Source		CM	(300)				(0070)
16	00226	Ordering Provider		XCN	(80)	( )			
17	00250	Order Callback Phone Number		XTN	(40)	( )			
18	00251	Placers Field 1		ST	(60)				
19	00252	Placers Field 2		ST	(60)				

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Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
20	00253	Filler Field 1		ST	(60)				
21	00254	Filler Field 2		ST	(60)				
22	00255	Results Rpt./Status Change	C	TS	(26)				
23	00256	Charge to Practice		CM	(40)				
24	00257	Diagnostic Service Sect ID		ID	(10)				(0074)
25	00258	Result Status	C	ID	(1)				(0123)
26	00259	Parent Result		CM	(400)				
27	00221	Quantity/Timing		TQ	(200)	( )			
28	00260	Result Copies to		CN	(150)	( )			
29	00261	Parent Number		CM	(150)				
30	00262	Transportation Mode		ID	(20)				(0124)
31	00263	Reason for Study		CE	(300)	( )			
32	00264	Principal Result Interpreter		CM	(200)				
33	00265	Assistant Result Interpreter		CM	(200)	( )			
34	00266	Technician		CM	(200)	( )			
35	00267	Transcriptionist		CM	(200)	( )			
36	00268	Scheduled Date/Time		TS	(26)				
37	01028	Number of Sample Containers		NM	(4)				
38	01029	Transport Logistics of Collected Sample		CE	(60)	( )			
39	01030	Collector's Comment		CE	(200)	( )			
40	01031	Transport Arrangement Responsibility		CE	(60)				
41	01032	Transport Arranged		ID	(30)				(0224)
42	01033	Escort Required		ID	(1)				(0225)
43	01034	Planned Patient Transport Comment		CE	(200)	( )			

B.1.55 OBX - Observation/Result

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00559	Set ID - OBX		SI	(10)				
2	00676	Value Type	C	ID	(2)				(0125)
3	00560	Observation Identifier	R	CE	(590)				
4	00769	Observation Sub-Id	C	ST	(20)				
5	00561	Observation Results	C	ST	(65536)	( )			
6	00562	Units		ST	(60)				
7	00563	Reference Range		ST	(10)				
8	00564	Abnormal Flags		ST	(5)	( )			(0078)
9	00639	Probability		NM	(5)				
10	00565	Nature of Abnormal Test		ID	(2)	( )			(0080)
11	00566	Observ. Result Status	R	ID	(1)				(0085)
12	00567	Date Last Normal Value		TS	(26)				
13	00581	User Defined Access Checks		ST	(20)				
14	00582	Date/Time of Observation		TS	(26)				
15	00583	Producer's ID		CE	(60)				
16	00584	Responsible Observer		XCN	(80)				
17	00936	Observation Method		CE	(60)	( )			

B.1.56 ODS - Dietary Orders

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00269	Type	R	ID	(1)				(0159)
2	00270	Service Period		CE	(60)	( )			
3	00271	Diet, Supplement or Pref. Code	R	CE	(60)	( )			
4	00272	Text Instruction		ST	(80)	( )			

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B.1.57 ODT- Diet Tray Instructions

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00273	Tray Type	R	ID	(60)				(0160)
2	00270	Service Period		CE	(30)	( )			
3	00272	Text Instruction		ST	(80)				

B.1.58 OM1 - General Observation

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00586	Sequence Number	R	NM	(4)				
2	00587	Producer's Test/Observation ID	R	CE	(200)				
3	00588	Permitted Data Types		ID	(12)	( )			(0125)
4	00589	Specimen Required	R	ID	(1)				(0136)
5	00590	Producer ID	R	CE	(200)				
6	00591	Observation Description		TX	(200)				
7	00592	Other Test/Observation Ids		CE	(200)				
8	00593	Other Names	R	ST	(200)	( )			
9	00594	Preferred Report Name for the Obs.		ST	(30)				
10	00595	Preferred Short Name & Mnemonic		ST	(8)				
11	00596	Preferred Long Name for the Obs.		ST	(200)				
12	00597	Orderability		ID	(1)				(0136)
13	00598	Identity of Instrument Used to Perform Study		CE	(60)	( )			
14	00599	Coded Representation of Method		CE	(200)	( )			
15	00600	Portable		ID	(1)				(0136)
16	00601	Observation Producing Dept/Section		CE	(1)	( )			
17	00602	Telephone Number of Section		XTN	(40)				
18	00603	Nature of Test/Observation	R	IS	(1)				(0174)
19	00604	Report Subheader		CE	(200)				
20	00605	Report Display Order		ST	(20)				
21	00606	Date/Time Stamp for Any Change in Def Attri for Observation		TS	(26)				
22	00607	Effective Date/Time of Change		TS	(26)				

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
23	00608	Typical Turn-Around Time		NM	(20)				
24	00609	Processing Time		NM	(20)				
25	00610	Processing Priority		ID	(40)				(0168)
26	00611	Reporting Priority		ID	(5)				(0169)
27	00612	Outside Site(s) Where Obs may be performed		CE	(200)	( )			
28	0063	Address of Outside Site(s)		XAD	(1000)				
29	00614	Phone Number of Outside Site(s)		XTN	(400)				
30	00615	Confidentiality Code		IS	(1)				(0177)
31	00616	Observation Req'd to Interpret Obs		CE	(200)				
32	00617	Interpretation of Observation		TX	(64k)				
33	00618	Contraindications to Observations		CE	(64k)				
34	00619	Reflex Test/Observations		CE	(200)	( )			
35	00620	Rules that Trigger Reflex Testing		TX	(80)				
36	00621	Fixed Canned Message		CE	(64k)				
37	00622	Patient Preparation		TX	(200)				
38	00623	Procedure Medication		CE	(200)				
39	00624	Factors that may affect the Obs		TX	(200)				
40	00625	Test/Obs Performance Schedule		ST	(60)	( )			
41	00626	Description of Test Methods		TX	(64k)				
42	00937	Kind of Quantity Observed		CE	(60)				(0254)
43	00938	Point Versus Interval		CE	(60)				(0255)
44	00939	Challenge Information		TX	(200)				
45	00940	Relationship Modifier		CE	(200)				(0258)
46	00941	Target Anatomic Site of Test		CE	(200)				
47	00942	Modality of Imaging Measurement		CE	(200)				(0258)

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B.1.59 OM2 - Numeric Observation

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00586	Sequence Number		NM	(4)				
2	00627	Units of Measure		CE	(60)				
3	00628	Range of decimal Precision		NM	(10)	( )			
4	00629	Corresponding SI Units of Measure		CE	(60)				
5	00630	SI Conversion Factor		TX	(60)				
6	00631	Reference (normal) Range - Ordinal & Continuous Observation		CM	(200)				
7	00632	Critical Range for Ordinal & Continuous Observation		CM	(200)				
8	00633	Absolute Range for Ordinal & Continuous Observation		CM	(200)				
9	00634	Delta Check Criteria		CM	(200)	( )			
10	00635	Minimum Meaningful Increments		NM	(20)				

B.1.60 OM3 - Categorical Test/Observation

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00586	Sequence Number		NM	(4)				
2	00636	Preferred Coding System		CE	(60)				
3	00637	Valid Coded “Answers”		CE	(60)				
4	00638	Normal Text/Codes for Categorical Observations		CE	(200)				
5	00639	Abnormal Text/Codes for Categorical Observations		CE	(200)				
6	00640	Critical Text/Codes for Categorical Observations		CM	(200)				
7	00570	Value Type		ID	(3)				(0125)

B.1.61 OM4 - Observations That Require Specimens

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00586	Sequence Number		NM	(4)				
2	00642	Derived Specimen		ID	(1)				(0170)
3	00643	Container Description		TX	(60)				
4	00644	Container Volume		NM	(20)				
5	00645	Container Units		CE	(60)				
6	00646	Specimen		CE	(60)				
7	00647	Additive		CE	(60)				
8	00648	Preparation		TX	(10k)				
9	00649	Special Handling Requirements		TX	(10k)				
10	00650	Normal Collection Volume		CQ	(20)				
11	00651	Minimum Collection Volume		CQ	(20)				
12	00652	Specimen Requirements		TX	(10k)				
13	00653	Specimen Priorities		ID	(1)	( )			(0027)
14	00654	Specimen Retention Time		CQ	(20)				

B.1.62 OM5 - Observation Batteries (sets)

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00586	Sequence Number		NM	(4)				
2	00655	Test/Observation Included with Ordered Test		CE	(200)	( )			
3	00656	Observation ID Suffixes		ST	(200)				

B.1.63 OM6 - Observations That Are Calculated From Others 8-48

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00586	Sequence Number		NM	(4)				
2	00657	Derivation Rule		TX	(10k)				

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B.1.64 ORC - Common Order

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00215	Order Control	R	ID	(2)				
2	00216	Placer Order Number		EI	(22)				
3	00217	Filler Order Number		EI	(22)				
4	00218	Placer Order Number		EI	(22)				
5	00219	Order Status		ID	(2)				(0038)
6	00220	Response Flag		ID	(1)				(0121)
7	00221	Quantity/Timing		TQ	(200)				
8	00222	Parent		CM	(200)				
9	00223	Date/Time of Transaction		TS	(26)				
10	00224	Entered By		XCN	(120)				
11	00225	Verified By		XCN	(120)				
12	00226	Ordering Provider		XCN	(120)				
13	00227	Enterer's Location		PL	(80)				
14	00228	Call Back Phone Number		XTN	(40)	( )			
15	00229	Order Effective Date/Time		TS	(26)				
16	00230	Order Control Code Reason		CE	(200)				
17	00231	Entering Organization		CE	(60)				
18	00232	Entering Device		CE	(60)				
19	00233	Action By		XCN	(120)				

B.1.65 PCR - Possible Casual Relationship

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01098	Implicated Product	R	CE	(60)				
2	01099	Generic Product		IS	(1)				(0239)
3	01100	Product Class		CE	(60)				
4	01101	Total Duration of Therapy		CQ	(8)				
5	01102	Product Manufacture Date		TS	(26)				
6	01103	Product Expiration Date		TS	(26)				
7	01104	Product Implantation Date		TS	(26)				
8	01105	Product Explanation Date		TS	(26)				
9	01106	Single Use Device		IS	(8)				(0239)

10	01107	Indication For Product Use		CE	(60)				
11	01108	Product Problem		IS	(8)				(0239)
12	01109	Product Serial/Lot Number		ST	(30)	( )			
13	01110	Product Available for Inspection		IS	(1)				(0239)
14	01111	Product Evaluation Performed		CE	(60)				
15	01112	Product Evaluation Status		CE	(60)				
16	01113	Product Evaluation Results		CE	(60)				
17	01114	Evaluated Product Source		ID	(8)				(0248)
18	01115	Date Product Returned to Manufacturer		TS	(26)				
19	01116	Device Operator Qualifications		ID	(1)				(0242)
20	01117	Relatedness Assessment		ID	(1)				(0250)
21	01118	Action Taken in Response to the Event		ID	(2)	( )			(0251)
22	01119	Event Casuality Observations		ID	(2)	( )			(0232)
23	01120	Indirect Exposure Mechanism		ID	(1)	( )			(0253)

B.1.66 PD1 - Patient Additional Demographic

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00755	Living Dependency		IS	(2)	( )			(0223)
2	00742	Living Arrangement		IS	(2)				(0220)
3	00756	Patient Primary Facility		XON	(90)	( )			
4	00757	Patient Primary Care Provider Name & ID Number		XCN	(90)	( )			
5	00745	Student Indicator		IS	(2)				(0231)
6	00753	Handicap		IS	(2)				(0295)
7	00759	Living Will		IS	(2)				(0315)
8	00760	Organ Donor		IS	(2)				(0316)
9	00761	Separate Bill		ID	(2)				(0136)
10	00762	Duplicate Patient		CX	(2)	( )			
11	00743	Publicity Indicator		CE	(1)				(0125)
12	01283	Protection Indicator		ID	(1)	( )			(0129)

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B.1.67 PDC - Product Detail Country

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01247	Manufacturer/Distributor	R	XON	(80)				
2	01248	Country	R	CE	(60)				
3	01249	Brand Name	R	ST	(60)				
4	01250	Device Family Name		ST	(60)				
5	01251	Generic Name		CE	(60)				
6	01252	Model Identifier		ST	(60)	( )			
7	01253	Catalogue Identifier		ST	(60)				
8	01254	Other Identifier		ST	(60)				
9	01255	Product Code		CE	(60)				
10	01256	Marketing Basis		ID	(4)				
11	01257	Marketing Approval ID		ST	(60)				
12	01258	Labeled Shelf Life		CQ	(12)				
13	01259	Expected Shelf Life		CQ	(12)				(0239)
14	01260	Date First Marked		TS	(26)				
15	01261	Date Last Marked		TS	(26)				

B.1.68 PEO - Product Experience Observation

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01073	Event Identifiers Used		CE	(60)	( )			
2	01074	Event Symptom/Diagnosis Code		CE	(60)	( )			
3	01075	Event Onset Date/Time	R	TS	(26)				
4	01076	Event Exacerbation Date/Time		TS	(26)				
5	01077	Event Improved Date/Time		TS	(26)				
6	01078	Event Ended Date/Time		TS	(26)				
7	01079	Event Location Occurred Address		XAD	(106)				
8	01080	Event Qualification		ID	(1)	( )			(0237)
9	01081	Event Serious		ID	(1)				(0238)
10	01082	Event Expected		ID	(1)				(0239)
11	01083	Event Outcome		ID	(1)	( )			(0240)
12	01084	Patient Outcome		ID	(1)				(0241)
13	01085	Event Description from Others		FT	(600)	( )			

14	01086	Event From Original Reporter		FT	(600)	( )			
15	01087	Event Description from Patient		FT	(600)	( )			
16	01088	Event Description from Practitioner		FT	(600)	( )			
17	01089	Event Description from Autopsy		FT	(600)	( )			
18	01090	Cause of Death		CE	(60)	( )			
19	01091	Primary Observer Name		XPN	(46)				
20	01092	Primary Observer Address		XAD	(106)	( )			
21	01093	Primary Observer Telephone		XTN	(40)	( )			
22	01094	Primary Observer's Qualification		ID	(1)				(0242)
23	01095	Confirmation Provided By		ID	(1)				(0242)
24	01096	Primary Observer Aware Date/Time		TS	(26)				
25	01097	Primary Observer's Identity May Be Divulged		ID	(1)				(0243)

B.1.69 PES - Product Experience Sender

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01059	Sender Organization Name		XON	(80)				
2	01060	Sender Individual Name		XCN	(60)	( )			
3	01062	Sender Address		XAD	(60)				
4	01063	Sender Telephone		XTN	(44)	( )			
5	01064	Sender Event Identifier		EI	(75)				
6	01065	Sender Sequence Number		NM	(2)				
7	01066	Sender Event Description		FT	(600)	( )			
8	01067	Sender Comment		FT	(600)				
9	01068	Sender Aware Date/Time		TS	(26)				
10	01069	Event Report Date	R	TS	(26)				
11	01070	Event Report Timing/Type		ID	(3)	( )			(0234)
12	01071	Event Report Service		ID	(1)				(0235)
13	01072	Event Reported to		ID	(1)				(0236)

B.1.70 PID - Patient Identification

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00104	Set ID - Patient ID		SI	(4)				

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2	00105	Patient ID (External ID)		CX	(20)				
3	00106	Patient ID (Internal ID)	R	CX	(20)	( )			
4	00107	Alternate Patient ID		CX	(20)	( )			
5	00108	Patient's Name	R	XPN	(48)	( )			
6	00109	Mother's Maiden Name		XPN	(48)				
7	00110	Date of Birth		TS	(26)				
8	00111	Sex		IS	(1)				(0001)
9	00112	Patient Alias		XPN	(48)	( )			
10	00113	Race		IS	(1)				(0005)
11	00114	Patient Address		XAD	(106)	( )			
12	00115	County Code	B	IS	(4)				
13	00116	Phone Number - Home		XTN	(40)	( )			
14	00117	Phone Number - Business		XTN	(40)	( )			
15	00118	Language - Patient		CE	(60)				(0296)
16	00119	Marital Status		IS	(1)				(0002)
17	00120	Religion		IS	(3)				(0006)
18	00121	Patient Account Number		CX	(20)				
19	00122	SSN Number - Patient		ST	(16)				
20	00123	Drivers License - Patient		DLN	(25)				
21	00124	Mother's Identifier		CX	(20)	( )			
22	00125	Ethnic Group		IS	(3)				(0189)
23	00126	Birth Place		ST	(60)				
24	00127	Multiple Birth Indicator		ID	(2)				(0136)
25	00128	Birth Order		NM	(2)				
26	00129	Citizenship		IS	(4)	( )			(0171)
27	00130	Veteran’s Military Status		CE	(60)				(0172)
28	00739	Nationality		CE	(80)				
29	00740	Patient Death Date/Time		TS	(26)				
30	00741	Patient Death Indicator		ID	(1)				(0136)

B.1.71 PR1 - Procedures

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00391	Set ID - PR1	R	SI	(4)				

2	00392	Procedure Coding Method	B	IS	(2)	( )			(0089)
3	00393	Procedure Code	R	CE	(10)	( )			(0088)
4	00394	Procedure Description	B	ST	(40)	( )			
5	00395	Procedure Date/Time	R	TS	(26)				
6	00396	Procedure Type	R	IS	(2)				(0230)
7	00397	Procedure Minutes		NM	(4)				
8	00398	Anesthesiologist	B	XCN	(120)	( )			(0010)
9	00399	Anesthesia Code		IS	(2)				(0019)
10	00400	Anesthesia Minutes		NM	(4)				
11	00401	Surgeon	B	XCN	(120)	( )			(0010)
12	00402	Resident Code	B	XCN	(230)	( )			(0010)
13	00403	Consent Code		CE	(60)				(0059)
14	00404	Procedure Priority		NM	(2)				
15	00772	Associated Diagnosis Code		CE	(80)				

B.1.72 PRA - Practitioner Detail

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00685	PRA - Primary Key Value	R	ST	(20)				
2	00686	Practitioner Group		CE	(60)	( )			
3	00687	Practitioner Category		IS	(3)	( )			(0186)
4	00688	Provider Billing		ID	(1)				(0187)
5	00689	Specialty		CM	(100)	( )			(0337)
6	00690	Practitioner ID Numbers		CM	(100)	( )			(0338)
7	00691	Privileges		CM	(200)	( )			
8	01296	Date Entered Practice		DT	(8)				

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B.1.73 PRC - Pricing

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00982	Primary Key Value - PRC		CE	(200)				(0132)
2	00995	Facility ID		CE	(60)	( )			
3	00996	Department		CE	(30)	( )			
4	00997	Valid Patient Classes		IS	(1)	( )			(0004)
5	00998	Price	C	CP	(12)	( )			
6	00999	Formula		ST	(200)	( )			
7	01000	Minimum Quantity		NM	(4)				
8	01001	Maximum Quantity		NM	(4)				
9	01002	Minimum Price		MO	(12)				
10	01003	Maximum Price		MO	(12)				
11	01004	Effective Start Date		TS	(26)				
12	01005	Effective End Date		TS	(26)				
13	01006	Price Override Flag		IS	(1)				(0268)
14	01007	Billing Category		CE	(60)	( )			(0293)
15	01008	Chargeable Flag		ID	(1)				(0136)
16	00675	Active/Inactive Flag		ID	(1)				(0183)
17	00989	Cost		MO	(12)				
18	01009	Charge On Indicator		IS	(1)				(0269)

B.1.74 PRD - Provider Data

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01155	Role	R	CE	(200)	( )			(0286)
2	01156	Provider Name		XPN	(106)	( )			
3	01157	Provider Address		XAD	(60)				
4	01158	Provider Location		PL	(60)				
5	01159	Provider Communication Info		XTN	(100)				
6	01161	Preferred Method of Contact		CE	(200)				(0185)
7	01162	Provider Identifiers		CM	(100)	( )			
8	01163	Effective Start Date of Role		TS	(26)				
9	01164	Effective End Date of Role		TS	(26)				

B.1.75 PSH - Product Summary Heade

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01233	Report Type	R	ST	(60)				
2	01297	Report Form Identifier		ST	(60)				
3	01235	Report Date	R	TS	(26)				
4	01236	Report Interval Start Date		TS	(26)				
5	01294	Report Interval Start Date		TS	(26)				
6	01238	Quantity Manufactured		CQ	(12)				
7	01239	Quantity Distributed		CQ	(12)				
8	01240	Quantity Distributed Method		ID	(1)				(0329)
9	01241	Quantity Distributed Comment		FT	(600)				
10	01242	Quantity in Use		CQ	(12)				
11	01243	Quantity in Use Method		ID	(1)				(0329)
12	01244	Quantity in Use Comment		FT	(600)				
13	01245	Number of Product Experience Reports Filed by Facility		NM	(2)	( )			
14	01246	Number of Product Experience Reports Filed by Distributors		NM	(2)	( )			

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B.1.76 PV1 - Patient Visit

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00131	Set Id - PV1		SI	(4)				
2	00132	Patient Class	R	IS	(1)				(0004)
3	00133	Assigned Patient Location		PL	(80)				
4	00134	Admission Type		IS	(2)				(0007)
5	00135	Pre-Admit Number		CX	(20)				
6	00136	Prior Patient Location		PL	(80)				
7	00137	Attending Doctor		XCN	(60)	( )			(0010)
8	00138	Referring Doctor		XCN	(60)	( )			(0010)
9	00139	Consulting Doctor		XCN	(60)	( )			(0010)
10	00140	Hospital Service		IS	(3)				(0069)
11	00141	Temporary Location		PL	(80)				
12	00142	Pre-Admit Test Indicator		IS	(2)				(0087)
13	00143	Re-Admission Indicator		IS	(2)				(0092)
14	00144	Admit Source		IS	(3)				(0023)
15	00145	Ambulatory Status		IS	(2)	( )			(0009)
16	00146	VIP Indicators		IS	(2)				(0099)
17	00147	Admitting Doctor		XCN	(60)	( )			(0010)
18	00148	Patient Type		IS	(2)				(0018)
19	00149	Visit Number		CX	(20)				
20	00150	Financial Class		FC	(50)	( )			(0064)
21	00151	Charge Price Indicator		IS	(2)				(0032)
22	00152	Courtesy Code		IS	(2)				(0045)
23	00153	Credit Rating		IS	(2)				(0046)
24	00154	Contract Code		IS	(2)	( )			(0044)
25	00155	Contract Effective Date		DT	(8)	( )			
26	00156	Contract Amount		NM	(12)	( )			
27	00157	Contract Period		NM	(3)	( )			
28	00158	Interest Code		IS	(2)				(0073)
29	00159	Transfer to Bad Debt Code		IS	(1)				(0110)
30	00160	Transfer to Bad Debt Date		DT	(8)				
31	00161	Bad Debt Agency Code		IS	(10)				(0021)

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
32	00162	Bad Debt Transfer Amount		NM	(12)				
33	00163	Bad Debt Recovery Amount		NM	(12)				
34	00164	Delete Account Indicator		IS	(1)				(0111)
35	00165	Delete Account Date		DT	(8)				
36	00166	Discharge Disposition		IS	(3)				(0112)
37	00167	Discharged to Location		CM	(25)				(0113)
38	00168	Diet Type		IS	(2)				(0114)
39	00169	Servicing Facility		IS	(2)				(0115)
40	00170	Bed Status		IS	(1)				(0116)
41	00171	Account Status		IS	(2)				(0117)
42	00172	Pending Location		PL	(80)				
43	00173	Prior Temporary Location		PL	(80)				
44	00174	Admit Date/Time		TS	(26)				
45	00175	Discharge Date/Time		TS	(26)				
46	00176	Current Patient Balance		NM	(12)				
47	00177	Total Charges		NM	(12)				
48	00178	Total Adjustments		NM	(12)				
49	00179	Total Payments		NM	(12)				
50	00180	Alternate Visit ID		CX	(20)				(0192)
51	01226	Visit Indicator		IS	(1)				(0326)
52	01224	Other Health Care Provider		XCN	(60)	( )			(0010)

B.1.76.1 PV2 - Patient Visit - Additional Information

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00181	Prior Pending Location		PL	(80)				
2	00182	Accommodation Code		CE	(60)				(0129)
3	00183	Admit Reason		CE	(60)				
4	00184	Transfer Reason		CE	(60)				
5	00185	Patient Valuables		ST	(25)	( )			
6	00186	Patient Valuables Location		ST	(25)				
7	00187	Visit User Code		IS	(2)				(0130)
8	00188	Expected Admit Date		TS	(26)				

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Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
9	00189	Expected Discharge Date		TS	(26)				
10	00711	Estimated Length of I/P Stay		NM	(3)				
11	00712	Actual Length of I/P Stay		NM	(3)				
12	00713	Visit Description		ST	(50)				
13	00714	Referral Source Code		XCN	(90)				
14	00715	Previous Service Date		DT	(8)				
15	00716	Employment Illness Related Indicator		ID	(1)				(0136)
16	00717	Purge Status Code		IS	(1)				(0213)
17	00718	Purge Status Date		DT	(8)				
18	00719	Special Program Code		IS	(2)				(0214)
19	00720	Retention Indicator		ID	(1)				(0136)
20	00721	Expected Number of Insurance Plans		NM	(1)				
21	00722	Visit Publicity Code		IS	(1)				(0215)
22	00723	Visit Protection Indicator		ID	(1)				(0136)
23	00724	Clinic Organization Name		XON	(90)	( )			
24	00725	Patient Status Code		IS	(2)				(0216)
25	00726	Visit Priority Code		IS	(1)				(0217)
26	00727	Previous Treatment Date		DT	(8)				
27	00728	Expected Discharge Disposition		IS	(2)				(0112)
28	00729	Signature on File Date		DT	(8)				
29	00730	First Similar Illness Date		DT	(8)				
30	00731	Patient Charge Adjustment Code		IS	(3)				(0218)
31	00732	Recurring Service Code		IS	(2)				(0219)
32	00733	Billing Media Code		ID	(1)				(0136)
33	00734	Expected Surgery Date/Time		TS	(26)				
34	00735	Military Partnership Code		ID	(2)				(0136)
35	00736	Military Non-Availability Code		ID	(2)				(0136)
36	00737	Newborn Baby Indicator		ID	(2)				(0136)
37	00738	Baby Detained Indicator		ID	(1)				(0136)

B.1.77 QAK - Query Acknowledgment

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes

1	00696	Query Tag	C	ST	(32)				
2	00708	Query Response Status		ID	(2)				(0208)

B.1.78 QRD - Query Definition

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00025	Query Date/Time	R	TS	(26)				
2	00026	Query Format Code	R	ID	(1)				(0106)
3	00027	Query Priority	R	ID	(1)				(0091)
4	00028	Query ID	R	ST	(10)				
5	00029	Deferred Response Type		ID	(1)				(0107)
6	00030	Def. Resp. Date/Time		TS	(26)				
7	00031	Quantity Limited Request	R	CQ	(10)				(0126)
8	00032	Who Subject Filter	R	XCN	(60)	( )			
9	00033	What Subject Filter	R	CE	(60)	( )			(0048)
10	00034	What Dept. Data Code	R	CE	(60)	( )			
11	00035	What Data Cd. Value Qua.		ST	(20)	( )			
12	00036	Query Results Level		ID	(1)				(0108)

B.1.79 QRF - Query Filter

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00037	Where Subject Filter	R	ST	(20)	( )			
2	00038	When Data Start Date/Time		TS	(26)				
3	00039	When Data End Date/Time		TS	(26)				
4	00040	What User Qualifier		ST	(60)	( )			
5	00041	Other Query Subject Filter		ST	(60)	( )			
6	00042	Which Date/Time Qualifier		ID	(12)	( )			(0156)
7	00043	Which Date/Time Status Qualifier		ID	(12)	( )			(0157)
8	00044	Date/Time Selection Qualifier		ID	(12)	( )			(0158)
9	00694	When Quantity/Timing Qualifier		TQ	(60)				

B.1.80 RDF - Table Row Definition

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00701	Number of Columns Per Row	R	NM	(3)				
2	00702	Column Description	R	RCD	(40)	( )			

B.1.81 RDT - Table Row Data

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00703	Column Value	R	Var	Variable				

B.1.82 RF1 - Referral Information

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	01137	Referral Status		CE	(200)				(0283)
2	01138	Referral Priority		CE	(200)				(0280)
3	01139	Referral Type		CE	(200)				(0281)
4	01140	Referral Disposition		CE	(200)	( )			(0282)
5	01141	Referral Category		CE	(200)				
6	01142	Originating Referral Identifier	R	EI	(30)				
7	01143	Effective Date		TS	(26)				
8	01144	Expiration Date		TS	(26)				
9	01145	Process Date		TS	(26)				
10	01228	Referral Reason		CE	(200)	( )			(0336)
11	01300	External Referral Identifier		EI	(30)	( )			

B.1.83 RQ1- Requisition Detail 1

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00285	Anticipated Price		ST	(10)				
2	00286	Manufactured ID	C	CE	(60)				
3	00287	Manufacturer's Catalog	C	ST	(16)				
4	00288	Vendor ID	C	CE	(60)				
5	00289	Vendor Catalog	C	ST	(16)				
6	00290	Taxable		ID	(1)				(0136)
7	00291	Substitute Allowed		ID	(1)				(0136)

B.1.84 RQD - Requisition Detail

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00275	Requisition Line Number		SI	(4)				
2	00276	Item Code - Internal	C	CE	(60)				
3	00277	Item Code - External		CE	(60)				
4	00278	Hospital Item Code		CE	(60)				
5	00279	Requisition Quantity		NM	(6)				
6	00280	Requisition Unit of Measure		CE	(60)				
7	00281	Dept. Cost Center		IS	(30)				(0319)
8	00282	Item Natural Account Number		IS	(30)				(0320)
9	00283	Deliver to ID		CE	(60)				
10	00284	Date Needed		DT	(8)				

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B.1.85 RXA - Pharmacy Administration

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00342	Give Sub-ID Counter	R	NM	(4)				
2	00344	Sub-ID Counter	R	NM	(4)				
3	00345	Date/Time Admin. Start	R	TS	(26)				
4	00346	Date/Time Admin. End	R	TS	(26)				
5	00347	Administered Code	R	CE	(100)				(0292)
6	00348	Administered Amount	R	NM	(20)				
7	00349	Administered Units	C	CE	(60)				
8	00350	Administered Dosage Form		CE	(60)				
9	00351	Administration Notes		CE	(200)	( )			
10	00352	Administering Provider		XCN	(200)				
11	00353	Administered-At Location	C	CM	(200)				
12	00354	Administered Per (Time Unit)	C	ST	(20)				
13	01134	Administered Strength		NM	(20)				
14	01135	Administered Strength Use		CE	(60)				
15	01129	Substance Lot Number		ST	(20)	( )			
16	01130	Substance Expiration Date		TS	(26)	( )			
17	01131	Substance Manufacturer Name		CE	(60)	( )			(0227)
18	01136	Substance Refusal Reason		CE	(200)	( )			
19	01123	Indication		CE	(200)	( )			
20	01223	Completion Status		ID	(2)				(0322)
21	01224	Action Code		ID	(2)				(0323)
22	01225	System Entry Date/Time		TS	(26)				

B.1.86 RXC - Pharmacy Component

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00313	RX Component Type	R	ID	(1)				(0166)
2	00314	Component Code	R	CE	(100)				
3	00315	Component Amount	R	NM	(20)				
4	00316	Component Units	R	CE	(20)				
5	01124	Component Strength		NM	(20)				
6	01125	Component Strength Units		CE	(60)				

B.1.87 RXD- Pharmacy Dispense

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00334	Dispense Sub-ID Counter	R	NM	(4)				
2	00335	Dispense/Give Code	R	CE	(100)				(0292)
3	00336	Date/Time Dispensed	R	TS	(26)				
4	00337	Actual Dispense Amount	R	NM	(20)				
5	00338	Actual Dispense Units	C	CE	(60)				
6	00339	Actual Dosage Form		CE	(60)				
7	00325	Prescription Number		ST	(20)				
8	00326	Number of Refills Remaining		NM	(20)				
9	00340	Dispense Notes		ST	(200)	( )			
10	00341	Dispensing Provider		CN	(200)				
11	00322	Substitution Status		ID	(1)				(0167)
12	00329	Total Daily Dose		NM	(10)				
13	01303	Dispense-to Location	C	CM	(200)				
14	00307	Needs Human Review		ID	(1)				(0136)
15	00330	Special Dispensing Instructions		CE	(200)	( )			
16	01132	Actual Strength		NM	(20)				
17	01133	Actual strength Unit		CE	(60)				
18	01129	Substance Lot Number		ST	(20)	( )			
19	01130	Substance Expiration Date		TS	(26)	( )			
20	01131	Substance Manufacturer Name		CE	(60)	( )			
21	01123	Indication		CE	(200)	( )			

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22	01220	Dispense Package Size		NM	(20)				
23	01221	Dispense Package Size Unit		CE	(60)				
24	01222	Dispense Package Method		ID	(2)				(0321)

B.1.88 RXE- Pharmacy Encoded

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00221	Quantity/Timing	R	TQ	(200)				
2	00317	Give Code	R	CE	(100)				
3	00318	Give Amount - Minimum	R	NM	(20)				
4	00319	Give Amount - Maximum		NM	(20)				
5	00320	Give Units	R	CE	(60)				
6	00321	Give Dosage Form		CE	(60)				
7	00298	Administration Instructions		CE	(200)	( )			
8	00299	Deliver-to Location	C	CM	(12)				
9	00322	Substitution Status		ID	(1)				
10	00323	Dispense Amount	C	NM	(20)				
11	00324	Dispense Units	C	CE	(60)				
12	00304	Number of Refills		NM	(3)				
13	00305	Ordering Provider's DEA #	C	XCN	(60)				
14	00306	Pharmacist Verifier ID		XCN	(60)				
15	00325	Prescription Number	C	ST	(20)				
16	00326	Number of Refills Remaining	C	NM	(20)				
17	00327	Number of Doses Dispensed	C	NM	(20)				
18	00328	Date/Time of Dose Dispensed	C	TS	(26)				
19	00329	Total Daily Dose	C	CQ	(10)				
20	00307	Needs Human Review		ID	(1)				
21	00330	Pharmacy Special Instructions		CE	(200)	( )			
22	00331	Give Per (Time Unit)	C	ST	(20)				
23	00332	Give Rate Amount		ST	(6)				
24	00333	Give Rate Units		CE	(20)				
25	01126	Give Strength		NM	(20)				
26	01127	Give Strength Units		CE	(60)				
27	01128	Give Indication		CE	(200)				

28	01220	Dispense Package Size		NM	(20)				
29	01221	Dispense Package Size Unit		CE	(60)				
30	01222	Dispense Package Method		ID	(2)				(0321)

B.1.89 RXG - Pharmacy Give

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00342	Give Sub-ID Counter	R	NM	(4)				
2	00334	Dispense Sub-ID Counter		NM	(4)				
3	00221	Quantity/Timing	R	TQ	(200)				
4	00317	Give Code	R	CE	(100)				(0292)
5	00318	Give Amount - Minimum	R	NM	(20)				
6	00319	Give Amount - Maximum		NM	(20)				
7	00320	Give Units	R	CE	(60)				
8	00321	Give Dosage Form		CE	(60)				
9	00351	Administration Notes		CE	(200)	( )			
10	00322	Substitution Status		ID	(1)				(0167)
11	01303	Dispense-To Location		CM	(200)				
12	00307	Needs Human Review		ID	(1)				(0136)
13	00343	Special Admin.. Instructions		CE	(200)	( )			
14	00331	Give Per (Time Unit)	C	ST	(20)				
15	00332	Give Rate Amount		ST	(6)				
16	00333	Give Rate Units		CE	(60)				
17	01126	Give Strength		NM	(20)				
18	01127	Give Strength Units		CE	(60)				
19	01129	Substance Lot Number		ST	(20)	( )			
20	01130	Substance Expiration Date		TS	(26)	( )			
21	01131	Substance Manufacturer Name		CE	(60)	( )			
22	01123	Indication		CE	(200)	( )			

B.1.90 RXO - Pharmacy Prescription Order

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00292	Requested Give Code	R	CE	(100)				

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2	00293	Requested Amount - Minimum	R	NM	(20)				
3	00293	Requested Amount - Maximum		NM	(20)				
4	00295	Requested Give Units	R	CE	(60)				
5	00296	Requested Dosage Form		CE	(60)				
6	00297	Pharmacy Instructions		CE	(200)	( )			
7	00298	Administration Instructions		CE	(200)	( )			
8	00299	Deliver-to Location		CM	(200)				
9	00300	Allow Substitutions		ID	(1)				(0161)
10	00301	Requested Dispense Code		CE	(100)				
11	00302	Requested Dispense Amount		NM	(20)				
12	00303	Requested Dispense Units		CE	(60)				
13	00304	Number of Refills		NM	(3)				
14	00305	Ordering Provider's DEA #	C	XCN	(60)				
15	00306	Pharmacist Verifier ID	C	XCN	(60)				
16	00307	Needs Human Review		ID	(1)	( )			
17	00308	Requested Give Per Time	C	ST	(20)				
18	01121	Requested Give Strength		NM	(20)				
19	01122	Requested Give Strength Units		CE	(60)				
20	01123	Indication		CE	(200)	( )			
21	01218	Requested Give Rate Amount		ST	(6)				
22	01219	Requested Give Rate Units		CE	(60)				

B.1.91 RXR - Pharmacy Route

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00309	Route	R	CE	(60)				(0162)
2	00310	Site		CE	(60)				(0163)
3	00311	Administration Device		CE	(60)				(0164)
4	00312	Administration Method		CE	(60)				(0165)

B.1.92 SCH - Schedule Activity Information

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes

1	00860	Placer Appointment ID	R	EI	(75)				
2	00861	Filler Appointment ID	C	EI	(75)				
3	00862	Occurrence Number	C	NM	(5)				
4	00863	Placer Group Number		EI	(75)				
5	00864	Schedule ID		CE	(200)				
6	00883	Event Reason	R	CE	(200)				
7	00866	Appointment Reason		CE	(200)				(0276)
8	00867	Appointment Type		CE	(200)				(0277)
9	00868	Appointment Duration		NM	(20)				
10	01304	Appointment Duration Units		CE	(200)				
11	00884	Appointment Timing Quantity	R	TQ	(200)	( )			
12	00874	Placer Contact Person		XCN	(48)				
13	00875	Placer Contact Phone Number		XTN	(40)				
14	00876	Placer Contact Address		XAD	(106)				
15	00877	Placer Contact Location		PL	(80)				
16	00885	Filler Contact Person	R	XCN	(38)				
17	00886	Filler Contact Phone Number		XTN	(40)				
18	00887	Filler Contact Address		XAD	(106)				
19	00888	Filler Contact Location		PL	(80)				
20	00878	Entered By Person	R	XCN	(48)				
21	00879	Entered By Phone Number		XTN	(40)	( )			
22	00880	Entered By Location		PL	(80)				
23	00881	Parent Placer Appointment ID		EI	(75)				
24	00882	Parent Filler Appointment ID		EI	(75)				
25	00889	Filler Status Code		CE	(200)				(0278)

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B.1.93 SPR - Stored Procedure Request Definition

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00696	Query Tag		ST	(32)				
2	00697	Query/Response Format Code	R	ID	(1)	( )			(0106)
3	00704	Stored Procedure Name	R	CE	(60)				
4	00705	Input Parameter List		QIP	(256)	( )			

B.1.94 STF - Staff Identification

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00671	STF - Primary Key Value	R	CE	(60)				
2	00672	Staff ID Code		CX	(60)	( )			
3	00673	Staff Name		XPN	(48)				
4	00674	Staff Type		IS	(2)	( )			(0182)
5	00111	Sex		IS	(1)				(0001)
6	00110	Date of Birth		TS	(8)				
7	00675	Active/Inactive		ID	(1)				(0183)
8	00676	Department		CE	(200)	( )			(0184)
9	00677	Service		CE	(200)	( )			
10	00678	Phone		XTN	(40)	( )			
11	00679	Office/Home Address		XAD	(106)	( )			
12	00680	Activation Date		CM	(26)	( )			
13	00681	Inactivation Date		CM	(26)	( )			
14	00682	Backup Person ID		CE	(60)	( )			
15	00683	E-Mail Address		ST	(40)	( )			
16	00684	Preferred Contact Method		ID	(1)				(0185)
17	00119	Marital Status		IS	(1)				(0002)
18	00785	Job Title		ST	(20)				
19	00786	Job Code/Class		JCC	(20)				
20	01276	Employment Status		IS	(2)				(0066)
21	01275	Additional Insured on Auto		ID	(1)				(0136)
22	01302	Drivers License Number -Staff		DLN	(25)				
23	01229	Copy Auto Insurance		ID	(1)				(0136)

24	01232	Auto Insurance Expires		DT	(8)				
25	01298	Date Last DMV Review		DT	(8)				
26	01234	Date Next DMV Review		DT	(8)				

B.1.95 TXA - Transcription Document Header

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00914	Set ID - TXA	R	SI	(4)				
2	00915	Document Type	R	IS	(30)	( )			(0270)
3	00916	Document Content Presentation	C	ID	(2)				(0191)
4	00917	Activity Date/Time		TS	(26)				
5	00918	Primary Activity Provider Code/Name	C	XCN	(60)				
6	00919	Origination Date/Time		TS	(26)				
7	00920	Transcription Date/Time	C	TS	(26)				
8	00921	Edit Date/Time		TS	(26)	( )			
9	00922	Originator Code/Name		XCN	(60)				
10	00923	Assigned Document Authenticator		XCN	(60)	( )			
11	00924	Transcriptionist Code/Name	C	XCN	(48)				
12	00925	Unique Document Number	R	EI	(30)				
13	00926	Parent Document Number	C	EI	(30)				
14	00216	Placer Order Number		EI	(22)	( )			
15	00217	Filler Order Number		EI	(22)				
16	00927	Unique Document File Name		ST	(30)				
17	00928	Document Completion Status	R	ID	(2)				(0271)
18	00929	Document Confidentiality Status		ID	(2)				(0272)
19	00930	Document Availability Status		ID	(2)				(0273)
20	00932	Document Storage Status		ID	(2)				(0275)
21	00933	Document Change Reason	C	ST	(30)				
22	00934	Authentication Person/Time Stamp	C	PTS	(60)	( )			
23	00935	Distributed Copies		XCN	(60)	( )			

B.1.96 UB1 - UB82 Data

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes

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1	00530	Set ID - UB82		SI	(4)				
2	00531	Blood Deductible (43)		NM	(1)				
3	00532	Blood Furn.-Pints of (40)		NM	(2)				
4	00533	Blood Replaced-Pints (41)		NM	(2)				
5	00534	Blood Not Replaced-Pints(42)		NM	(2)				
6	00535	Co-Insurance Days (25)		NM	(2)				
7	00536	Condition Code (35-39)		IS	(14)	( )			(0043)
8	00537	Covered Days (23)		NM	(3)				
9	00538	Non-Covered Days (24)		NM	(3)				
10	00539	Value Amount, Code (46-49)		CM	(12)	( )			(0153)
11	00540	Number of Grace Days (90)		NM	(2)				
12	00541	Spec. Prog. Indicator(44)		CE	(60)				
13	00542	PSRO/UR Approval Ind. (87)		CE	(60)				
14	00543	PSRO/UR Apprvd Stay-Fm (88)		DT	(8)				
15	00544	PSRO/UR Apprvd Stay-To (89)		DT	(8)				
16	00545	Occurrence (28-32)		CM	(20)	( )			
17	00546	Occurrence Span (33)		CE	(60)				
18	00547	Occur Span Start Date(33)		DT	(8)				
19	00548	Occur Span End Date (33)		DT	(8)				
20	00549	UB-82 Locator 2		ST	(30)				
21	00550	UB-82 Locator 9		ST	(7)				
22	00551	UB-82 Locator 27		ST	(8)				
23	00552	UB-82 Locator 45		ST	(17)				

B.1.97 UB2 - UB92 Data

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00553	Set ID - UB2		SI	(4)				
2	00554	Co-Insurance Days (9)		ST	(3)				
3	00555	Condition Code (24-30)		ID	(2)	( )			(0043)
4	00556	Covered Days (7)		IS	(3)				
5	00557	Non-Covered Days (8)		ST	(4)				
6	00558	Value Amount, Code (39-41)		CM	(11)	( )			
7	00559	Occurrence Code, Date (32-35)		CM	(11)	( )			
8	00560	Occur Span Code/Dates (36)		CM	(28)	( )			
9	00561	UB92 Locator 2 (State)		ST	(29)	( )			
10	00562	UB92 Locator 11 (State)		ST	(12)	( )			
11	00563	UB92 Locator 31 (State)		ST	(5)				
12	00564	Document Control Number (37)		ST	(23)	( )			
13	00565	UB92 Locator 49 (National)		ST	(4)	( )			
14	00566	UB92 Locator 56 (State)		ST	(14)	( )			
15	00567	UB92 Locator 57 (National)		ST	(27)				
16	00568	UB92 Locator 78 (State)		ST	(2)	( )			
17	00815	Special Visit Count		NM	(3)				

B.1.98 URD - Results/Update Definitions

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00045	R/U Date/Time		TS	(26)				
2	00046	Report Priority		ID	(1)				(0109)
3	00047	R/U Who Subject Definition	R	XCN	(60)	( )			
4	00048	R/U What Subject Definition		CE	(60)	( )			(0048)
5	00049	R/U What Department Code		CE	(60)	( )			
6	00050	R/U Display/Print Locs		ST	(20)	( )			
7	00051	R/U Results Level		ID	(1)				(0108)

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B.1.99 URS - Unsolicited Selection

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00608	R/U Where Subject Def.	R	ST	(20)	( )			
2	00609	R/U When Start Date/Time		TS	(19)				
3	00610	R/U When End Date/Time		TS	(19)				
4	00611	R/U What User Qualifier		ST	(20)	( )			
5	00612	R/U Other Results Def.		ST	(20)	( )			

B.1.100 VTQ Virtual Table Query Request

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1	00696	Query Tag		ST	(32)				
2	00697	Query/Response Format Code	R	ID	(1)				(0106)
3	00698	VT Query Name	R	CE	(60)				
4	00699	Virtual Table Name	R	CE	(60)				
5	00700	Selection Criteria		QSC	(256)	( )			

B.1.101 Z - Z segment (Hospital specific)

Seq#	Item#	Name	OPT	DT	Len (Max)	Reps	Sender Variable	Receiver Variable	Notes
1		Data Element Name				( )			

B.2 APPLICATION INTEGRATION MATRIX

The following matrix is provided as a quick look for what systems support what Trigger Events. The columns in the following table are defined as follows:

- Value – the HL7 Event Type as defined in HL7 Table 0003.
- Description – the HL7 description of the event as defined in HL7 Table 0003.
- Enterprise Event – put the description of your enterprise's event that corresponds. You may have more than one enterprise event for each HL7 Event.
- Application A/B – indicate the supportability of the trigger event by each application.
    - F – trigger event is sent from this application.
    - T – trigger event is received by this application.
    - X – trigger event is not supported.

Value	Description	Enterprise Event	Application A	Application B
A01	ADT/ACK - Admit / visit notification			
A02	ADT/ACK - Transfer a patient			
A03	ADT/ACK - Discharge/end visit			
A04	ADT/ACK - Register a patient			
A05	ADT/ACK - Pre-admit a patient			
A06	ADT/ACK - Change an outpatient to an inpatient			
A07	ADT/ACK - Change an inpatient to an outpatient			
A08	ADT/ACK - Update patient information			
A09	ADT/ACK - Patient departing - tracking			
A10	ADT/ACK - Patient arriving - tracking			
A11	ADT/ACK - Cancel admit/visit notification			
A12	ADT/ACK - Cancel transfer			
A13	ADT/ACK - Cancel discharge/end visit			
A14	ADT/ACK - Pending admit			
A15	ADT/ACK - Pending transfer			

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Value	Description	Enterprise Event	Application A	Application B
A16	ADT/ACK - Pending discharge			
A17	ADT/ACK - Swap patients			
A18	ADT/ACK - Merge patient information			
A19	QRY/ADR - Patient query			
A20	ADT/ACK - Bed status update			
A21	ADT/ACK - Patient goes on a “leave of absence”			
A22	ADT/ACK - Patient returns from a “leave of absence”			
A23	ADT/ACK - Delete a patient record			
A24	ADT/ACK - Link patient information			
A25	ADT/ACK - Cancel pending discharge			
A26	ADT/ACK - Cancel pending transfer			
A27	ADT/ACK - Cancel pending admit			
A28	ADT/ACK - Add person information			
A29	ADT/ACK - Delete person information			
A30	ADT/ACK - Merge person information			
A31	ADT/ACK - Update person information			
A32	ADT/ACK - Cancel patient arriving - tracking			
A33	ADT/ACK - Cancel patient departing - tracking			
A34	ADT/ACK - Merge patient information - patient ID only			
A35	ADT/ACK - Merge patient information - account number only			
A36	ADT/ACK - Merge patient information - patient ID and account number			
A37	ADT/ACK - Unlink patient information			
A38	ADT/ACK - Cancel pre-admit			

Value	Description	Enterprise Event	Application A	Application B
A39	ADT/ACK - Merge person - external ID			
A40	ADT/ACK - Merge patient - internal ID			
A41	ADT/ACK - Merge account - patient account number			
A42	ADT/ACK - Merge visit - visit number			
A43	ADT/ACK - Move patient information - internal ID			
A44	ADT/ACK - Move account information - patient account number			
A45	ADT/ACK - Move visit information - visit number			
A46	ADT/ACK - Change external ID			
A47	ADT/ACK - Change internal ID			
A48	ADT/ACK - Change alternate patient ID			
A49	ADT/ACK - Change patient account number			
A50	ADT/ACK - Change visit number			
A51	ADT/ACK - Change alternate visit ID			
C01	CRM - Register a patient on a clinical trial			
C02	CRM - Cancel a patient registration on clinical trial (for clerical mistakes only)			
C03	CRM - Correct/update registration information			
C04	CRM - Patient has gone off a clinical trial			
C05	CRM - Patient enters phase of clinical trial			
C06	CRM - Cancel patient entering a phase (clerical mistake)			
C07	CRM - Correct/update phase information			
C08	CRM - Patient has gone off phase of clinical trial			
C09	CSU - Automated time intervals for reporting, like monthly			

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Value	Description	Enterprise Event	Application A	Application B
C10	CSU - Patient completes the clinical trial			
C11	CSU - Patient completes a phase of the clinical trial			
C12	CSU - Update/correction of patient order/result information			
CNQ	QRY/EQQ/SPQ/VQQ/RQQ - Cancel query			
I01	RQI/RPI - Request for insurance information			
I02	RQI/RPL - Request/receipt of patient selection display list			
I03	RQI/RPR - Request/receipt of patient selection list			
I04	RQD/RPI - Request for patient demographic data			
I05	RQC/RCI - Request for patient clinical information			
I06	RQC/RCL - Request/receipt of clinical data listing			
I07	PIN/ACK - Unsolicited insurance information			
I08	RQA/RPA - Request for treatment authorization information			
I09	RQA/RPA - Request for modification to an authorization			
I10	RQA/RPA - Request for resubmission of an authorization			
I11	RQA/RPA - Request for cancellation of an authorization			
I12	REF/RRI - Patient referral			
I13	REF/RRI - Modify patient referral			
I14	REF/RRI - Cancel patient referral			
I15	REF/RRI - Request patient referral status			

Value	Description	Enterprise Event	Application A	Application B
M01	MFN/MFK - Master file not otherwise specified (**for backward compatibility only**)			
M02	MFN/MFK - Master file - Staff Practitioner			
M03	MFN/MFK - Master file - Test/Observation (**for backward compatibility only**)			
Varies	MFQ/MFR - Master files query (use event same as asking for e.g., M05 - location)			
M04	MFN/MFK - Master files charge description			
M05	MFN/MFK - Patient location master file			
M06	MFN/MFK - Clinical study with phases and schedules master file			
M07	MFN/MFK - Clinical study without phases but with schedules master file			
M08	MFN/MFK - Test/observation (Numeric) master file			
M09	MFN/MFK - Test/Observation (Categorical) master file			
M10	MFN/MFK - Test /observation batteries master file			
M11	MFN/MFK - Test/calculated observations master file			
O01	ORM - Order message (also RDE, RDS, RGV, RAS)			
O02	ORR - Order response (also RRE, RRD, RRG, RRA)			
P01	BAR/ACK - Add patient accounts			
P02	BAR/ACK - Purge patient accounts			
P03	DFT/ACK - Post detail financial transaction			
P04	QRY/DSP - Generate bill and A/R statements			
P05	BAR/ACK - Update account			
P06	BAR/ACK - End account			

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Value	Description	Enterprise Event	Application A	Application B
P07	PEX - Unsolicited initial individual product experience report			
P08	PEX - Unsolicited update individual product experience report			
P09	SUR - Summary product experience report			
PC1	PPR - PC/ Problem Add			
PC2	PPR - PC/ Problem Update			
PC3	PPR - PC/ Problem Delete			
PC4	PRQ - PC/ Problem Query			
PC5	PRR - PC/ Problem Response			
PC6	PGL - PC/ Goal Add			
PC7	PGL - PC/ Goal Update			
PC8	PGL - PC/ Goal Delete			
PC9	PGQ - PC/ Goal Query			
PCA	PGR - PC/ Goal Response			
PCB	PPP - PC/ Pathway (Problem-Oriented) Add			
PCC	PPP - PC/ Pathway (Problem-Oriented) Update			
PCD	PPP - PC/ Pathway (Problem-Oriented) Delete			
PCE	PTQ - PC/ Pathway (Problem-Oriented) Query			
PCF	PTR - PC/ Pathway (Problem-Oriented) Query Response			
PCG	PPG - PC/ Pathway (Goal-Oriented) Add			
PCH	PPG - PC/ Pathway (Goal-Oriented) Update			
PCJ	PPG - PC/ Pathway (Goal-Oriented) Delete			
PCK	PTU - PC/ Pathway (Goal-Oriented) Query			
PCL	PTV - PC/ Pathway (Goal-Oriented) Query Response			

Value	Description	Enterprise Event	Application A	Application B
Q01	QRY/DSR - Query sent for immediate response			
Q02	QRY/QCK - Query sent for deferred response			
Q03	DSR/ACK - Deferred response to a query			
Q05	UDM/ACK - Unsolicited display update message			
Q06	OSQ/OSR - Query for order status			
R01	ORU/ACK - Unsolicited transmission of an observation message			
R02	QRY - Query for results of observation			
R03	QRY/DSR Display-oriented results, query/unsol. update **(for backward compatibility only)**			
R04	ORF - Response to query; transmission of requested observation			
R05	QRY/DSR - query for display results			
R06	UDM - unsolicited update/display results			
RAR	RAR - Pharmacy administration information query response			
RDR	RDR - Pharmacy dispense information query response			
RER	RER - Pharmacy encoded order information query response			
RGR	RGR - Pharmacy dose information query response			
R0R	R0R - Pharmacy prescription order query response			
S01	SRM/SRR - Request new appointment booking			
S02	SRM/SRR - Request appointment rescheduling			
S03	SRM/SRR - Request appointment modification			
S04	SRM/SRR - Request appointment cancellation			

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Value	Description	Enterprise Event	Application A	Application B
S05	SRM/SRR - Request appointment discontinuation			
S06	SRM/SRR - Request appointment deletion			
S07	SRM/SRR - Request addition of service/resource on appointment			
S08	SRM/SRR - Request modification of service/resource on appointment			
S09	SRM/SRR - Request cancellation of service/resource on appointment			
S10	SRM/SRR - Request discontinuation of service/resource on appointment			
S11	SRM/SRR - Request deletion of service/resource on appointment			
S12	SIU/ACK - Notification of new appointment booking			
S13	SIU/ACK - Notification of appointment rescheduling			
S14	SIU/ACK - Notification of appointment modification			
S15	SIU/ACK - Notification of appointment cancellation			
S16	SIU/ACK - Notification of appointment discontinuation			
S17	SIU/ACK - Notification of appointment deletion			
S18	SIU/ACK - Notification of addition of service/resource on appointment			
S19	SIU/ACK - Notification of modification of service/resource on appointment			
S20	SIU/ACK - Notification of cancellation of service/resource on appointment			
S21	SIU/ACK - Notification of discontinuation of service/resource on appointment			

Value	Description	Enterprise Event	Application A	Application B
S22	SIU/ACK - Notification of deletion of service/resource on appointment			
S23	SIU/ACK - Notification of blocked schedule time slot(s)			
S24	SIU/ACK - Notification of opened (“unblocked”) schedule time slot(s)			
S25	SQM/SQR - Schedule query message and response			
S26	Notification that patient did not show up for schedule appointment			
T01	MDM/ACK - Original document notification			
T02	MDM/ACK - Original document notification and content			
T03	MDM/ACK - Document status change notification			
T04	MDM/ACK - Document status change notification and content			
T05	MDM/ACK - Document addendum notification			
T06	MDM/ACK - Document addendum notification and content			
T07	MDM/ACK - Document edit notification			
T08	MDM/ACK - Document edit notification and content			
T09	MDM/ACK - Document replacement notification			
T10	MDM/ACK - Document replacement notification and content			
T11	MDM/ACK - Document cancel notification			
T12	QRY/DOC - Document query			
V01	VXQ - Query for vaccination record			
V02	VXX - Response to vaccination query returning multiple PID matches			

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Value	Description	Enterprise Event	Application A	Application B
V03	VXR - Vaccination record response			
V04	VXU - Unsolicited vaccination record update			
W01	ORU - Waveform result, unsolicited transmission of requested information			
W02	QRF - Waveform result, response to query			

Appendix C
Lower Layer Protocols

C.1 INTRODUCTION

The HL7 protocol will be used primarily in network environments. Most of the details of error detection and correction are handled by the lower levels of any reasonable network protocol and are not appropriate for the HL7 Standard. Many mini and mainframe computer systems, however, operate in communication environments that do not provide sufficient lower layer functionality. In these cases HL7 offers several alternate lower layer protocols to suit different environments. It is not a requirement of a vendor to implement any of these protocols to be considered HL7 compliant at the encoding rule level.

a) Many environments consist of simple RS-232 circuits where flow control and error recovery issues dominate the communication design. For these environments a protocol based on the American National Standards Institute Standard X3.28 is provided. It is described in section C.3 of this appendix.

b) Some LAN-based networking environments provide a reliable byte stream but insufficient session control to support HL7. Environments based on the TCP protocol of the Internet Suite are in this category. For these a very simple protocol is provided that simply delimits messages. It is described in section C.4.

c) Some environments are hybrids where communications occur primarily over LANs but host connections to the LAN may be made over RS-232 ports on terminal servers. Environments such as this have some of the same problems as those operating entirely with RS-232 circuits, but the bit error rates are generally lower and flow control is available from the network. The lower layer protocol described in section C.2 of this appendix is significantly more efficient than the X3.28-based protocol for these environments.

C.2 HYBRID LOWER LAYER PROTOCOL

C.2.1 Introduction

C.2.1.1 Goals and Assumptions

The goal of this lower level protocol (LLP) is to provide an interface between HL7 and the network that accommodates these real-world restrictions. Since the source or destination of a message may be a terminal server, all HL7 interfaces to the network must pass through the LLP. For the sake of efficiency the protocol does not add a large amount of overhead which duplicates functions of the lower levels of the network.

It is assumed that:

1. The RS-232 interface distance between the computer and communication server is short (10'). And so will not experience a significant number of errors.
2. The computer may place line length restrictions on data coming in over the serial port.

3. The computer may not deliver serial data to the application until it has received a carriage return.
4. The computer and the communication server have adopted some common flow control protocol over the RS-232 line, such as XON-XOFF or modem control signals.
5. The application may require transient use of the LAN virtual circuit capability. In this mode a circuit will be created for each pair of messages that is exchanged and then released. This mode of operation is an option that will not always be used.

C.2.1.2 Notation Conventions

1. Single ASCII characters are enclosed in single quotes.
2. Special characters or non-printing ASCII characters are enclosed in angle brackets, <>. Special characters are the LLP Start Block and End Block characters. Non-printing ASCII characters may be written as their abbreviation, e.g., ESC for the Escape character. They also may be written as their hex value in the form 0xXX where X is a hexadecimal digit. For example in Standard ASCII, <ESC> is <0x1B>.

C.2.2 Blocks

There are two types of blocks, data blocks and NAK blocks. HL7 messages are transmitted in single data blocks. NAK blocks are used to signal transmission errors.

Both block types have the same format:

<SB>tvv<CR>ddddccccxxx<EB><CR>

Blocks consist of the following fields. Note that these are LLP fields and are not the same as HL7 message fields.

<SB> = Start Block character (1 byte)
Configurable on a site specific basis. Unless there is a conflict, the value should be ASCII <VT>, i.e., <0x0B>. This should not be confused with the ASCII characters SOH or STX.

t = Block Type (1 byte)
'D' = data block
'N' = NAK block

vv = Protocol ID (2 bytes)
The characters '2' '3' for this version

<CR> = Carriage Return (1 byte)
The ASCII carriage return character, i.e., <0x0D>.

dddd = Data (variable number of bytes)
In a data block, this is the data content of the block. The data can contain any displayable ASCII characters and the carriage return character, <CR>. Carriage returns that are not part of the HL7 message may be inserted as described in "Carriage Return Stuffing."

In a NAK block, this field contains a 1-byte reason code as follows:

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'C' - character count wrong in previous data block received

'X' - checksum wrong in previous data block received

'B' - data too long for input buffer in previous block received

'G' - Error not covered elsewhere.

ccccc = Block Size (5 bytes)
Character count of all characters so far in the data block up to and including the last data character. For this version of the protocol this is 5 + the size of the dddd field. **Note:** HL7 message ends with a <CR> character. This character is considered as part of the data.

xxx = Checksum (3 bytes)
Exclusive-OR checksum of all characters in the block up to and including the last data character. The checksum is expressed as a decimal number in three ASCII digits.

If the value of this field is 999, the checksum should not be computed. Processing will proceed as if it were correct. This feature is used for applications where the messages will be translated from one character set to another during transmission.

<EB> = End Block character (1 byte)

Configurable on a site specific basis. Unless there is a conflict, the value should be ASCII <FS>, i.e., <0x1C>. This should not be confused with the ASCII characters ETX or EOT.

<CR> = Carriage Return (1 byte)

The ASCII carriage return character, i.e., <0x0D>.

C.2.3 Processing Rules

C.2.3.1 Optional Connection and Disconnection

When two entities communicate in a LAN environment, they must establish a virtual circuit. The virtual circuit provides reliable, sequenced, error-free, two-directional, full-duplex data transmission over the network. The circuit is established by one of the entities performing a "call" operation and the other performing a "listen" operation. The two entities use Network Names to identify one another. The call operation is often called an "active connection" or simply a "connection" operation. Occasionally, the listen operation may be called a "passive connection." Once the calling entity has connected to the listening entity, the circuit is established and they may exchange data. The preferred method of establishing a circuit is for the initiating system to perform the call operation and for the responding system to perform the listen operation.

When the data exchange is through, either side may perform a disconnect operation to break the circuit. Data may or may not be lost between the two systems depending on the type of disconnect performed. Some network protocols require both sides to perform a disconnect operation for the circuit to disappear completely. It is highly recommended that the system which performs the call operation be the first to perform the disconnect operation.

As stated above, some applications require that the virtual circuits be created on a transient basis. For those applications, processing rules below show steps for creating or releasing the virtual circuits. Where transient virtual circuits are used, the Network Name and certain other communications parameters are determined as discussed under Network Parameter Table (NPT) on page C-7.. These steps should be omitted for environments not requiring them.

C.2.3.2 Initiating and Responding

By definition, the initiating system sends the initiate message and the responding system sends back a response message. Each of these messages is formatted into a single LLP data block. In the usual case, where there are no errors, the initiating system will send a message and receive the response. The responding system will receive the initiate message and send the response.

Initiating System Processing. The following steps are performed on the initiating system, which first sends a message and then receives a response.

1. Accept initial message from encoding rule module and form into block.
2. (Optional.) Perform connection-specific initialization based on the contents of the message header and the NPT (see page C-7).
3. (Optional.) Connect as required by the implementation. This may require several attempts before a circuit is made if so specified in the NPT entry.
4. Send the data block that contains the message.
5. Receive the response from the responding system. To receive the block that contains the response:
   a) If a completely delimited block is not received before the receive timeout as specified in the NPT, resend the original block. If the number of timeout retries specified in the NPT has been exceeded, then return to the encoding rules module with a timeout error.
   b) Ignore all incoming characters until a Start Block character is received. Any time another Start Block character is received before the end of a block, ignore all previous characters. Receive characters until <EB> <CR> is recognized. This is the end of the block.
   c) If a block is received that does not have the proper:
      1) Block Format,
      2) Checksum (xxx),
      3) Block Size (ccccc) or
      4) Has too many characters to be received in a single block resend the original block or return an indication of the error to the encoding rule module depending on the number of send retries and the type of error.
   d) If the block is acceptable and has block type 'N', it is a negative acknowledgment. Resend the original block as many times as is specified in the NPT or return to the application with an indication of the error.
   e) If the block is acceptable and has block type 'D' it is the response. Go to the next step.
   f) If the initiating system detects an error in the data block from the responding system, it has the option of retransmitting the original data block. The decision of whether to

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retransmit the original block is application-specific. It depends on the type of message and the ability of the receiving system to detect duplicate messages.

6. (Optional) Disconnect.
7. Return to the encoding rule module with the response message.

Responding System Processing. The responding system follows these steps:

1. (Optional) Perform a listen function if required by the environment.
2. Receive the block that contains the initial message.

   To receive a block:

   a) Ignore all incoming characters until a Start Block character is received. Any time another Start Block character is received before the end of a block, ignore all previous characters. Receive characters until <EB> <CR> is recognized. This is the end of the block.

   b) If a block is received that does not have the proper:
      1) Block Format,
      2) Checksum (xxx),
      3) Block Size (ccccc) or
      4) Has too many characters to be received in a single block, construct and send a NAK block (type t = 'N') that includes the appropriate reason code in the data field.

   c) If the receive block is valid, go to the next step.
3. Give the initiation message to the application.
4. Application creates a response and makes a block.
5. Send the response message.
6. Disconnect if required.

C.2.4 Carriage Return Stuffing

The HL7 encoding rules do not place any limits on the length of a segment. Many languages or operating systems have terminal oriented input disciplines that place a limit on the number of characters that can be received before they must receive a carriage return character. To overcome this problem, Carriage Return Stuffing may be used.

If a certain number of characters has been transmitted without a carriage return, the sending system inserts a carriage return character into the output stream. The receiving system is also counting characters from the last carriage return seen. If the limit is reached, the receiving system knows that the next character is a stuffed carriage return and must be removed from the data. Stuffed carriage returns are not used in calculations of block length or checksum.

The line length for carriage return stuffing is configurable on a site specific basis.

As an example, consider an imaginary HL7 message with a 150 character segment and a 1000 character segment. Suppose that the maximum numbers of characters that can be received without a carriage return is 200. Then the original message will look like this:

Header<CR>
MSH segment<CR>

150 char segment<CR>
1000 char segment<CR>
Trailer<CR>

The transmitted data will look like this (stuffed <CR>'s are underlined):

Header<CR>
MSH segment<CR>
150 char segment<CR>
200 chars<CR>
200 chars<CR>
200 chars<CR>
200 chars<CR>
200 chars<CR>
<CR>
Trailer<CR>

The carriage returns at the end of most HL7 segments mean that most of the time, no carriage returns will need to be stuffed. Notice that at one place there are two carriage returns in a row. The first is the stuffed carriage return; the second is the carriage return that is part of the HL7 message. Even if a carriage return is stuffed where there already is a carriage return in the message, the carriage return that is part of the original message must still be transmitted.

The receiving system will receive the data and note where 200 charsacters in a row appear without a carriage return. It then knows that the next character is a stuffed carriage return and should be thrown out. This recreates the original block.

C.2.5 Flow-Through Processing

The HL7 Standard may be applied in situations where queries will be made on behalf of a user who is waiting to view the response at a terminal. In such cases, the communicating applications and implementations of the higher levels may agree to overlap transmitting the early portion of the response with the retrieving and formatting of later portions so that the user can view the initial part of the message before the entire message has been sent. This section describes an option that supports this mode of processing.

C.2.5.1 Initiating System Processing

After sending the initial message, the initiating system awaits the response (step 5, page C-4). The program must receive characters and form them into <CR>-terminated lines. When a complete block header (the portion from the Start Block character to the first <CR>) has been received and it is determined that the reply is not a negative acknowledge, the data lines that follow can be sent directly to the encoding rules as they are received. Before the line is sent to the encoding rules, however, the character before the <CR> must be checked to see if it is an End Block character. If it is, this line is the block trailer and should not be passed to the higher level. The block should be verified at this time. If an error is detected, notification should be passed through the encoding rules to the application.

C.2.5.2 Responding System Processing

When the encoding rules have provided the first segment of the reply, a block header (the portion from the Start Block character to the first <CR>) and the partial reply can be sent. The remaining characters of the message are sent as the encoding rules module provides them. Once the entire message has been created and sent, a block trailer can be constructed and sent. This may require the application to keep a running character count and checksum.

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C.2.6 Implementation, System and Site-Specific Issues

This section deals with issues that do not affect the data flowing among HL7 systems. As such they are considered local matters and not subject to standardization. Nonetheless, they are important considerations in the implementation of this Lower Layer Protocol.

C.2.6.1 Connect Retries (for Optional Transient Virtual Circuits)

Although the entire problem of connecting and disconnecting to form a virtual circuit on the network is beyond the scope of this document, it should be pointed out that it may require more than one call operation to complete a circuit. If the destination system is already processing a request, the called address may not be immediately available. Waiting a short time and retrying to connect may then be successful. The number of times to retry connecting will be dependent on a number of factors and should be configurable. This is covered more fully in the section Communication Parameters and the NPT.

C.2.6.2 Receive Timeout Errors

A timeout error is often a signal of a hardware problem for which retrying will not help. It may take a few seconds to tens of seconds for these errors to be returned to the program, so blindly retrying on timeout error may make an interactive system appear to lock up. Some implementations may wish to no retry an operation after a timeout error.

C.2.6.3 The Network Parameter Table (NPT)

Communication over the network requires establishing some parameters. The parameters for any given circuit depend on the organization of the network at the site, the type of computers running and the type of message being sent. Some common parameters are:

Network Name - the network name to call based on the destination information in the MSH segment.

Connect Retry Count - the number of times to try to connect to a destination.

Connect Pause - the amount of time to wait between connect attempts.

Receive Timeout - the amount of time to wait for a response data block.

Send Retry Count - the number of times to resend a data block after receive errors.

The values of these parameters need to be specific to a site and to message type. They should be easily configurable to allow tuning once the network has started functioning. One easy way to do this is by using a Network Parameter Table or NPT.

The NPT is a simple text table that is read in by the application. The table contains values for each of these parameters indexed by message type, receiving facility, receiving application and processing ID. In the communication step which calls for connection-specific initialization, these values are looked up in the NPT and then control the rest of the communication attempt.

The use of an NPT is recommended, but it is not a requirement for HL7.

C.2.6.4 Error Reporting and Logging

An important feature of any software package that does data interchange is its ability to log and report errors to the operator and other system administrators. These are, however, local matters since they do not affect the data formats or processing rule. They are not specified by this Standard.

C.3 X3.28 BASED DATA LINK PROTOCOL

C.3.1 Overview

C.3.1.1 Introduction

The communications protocol described in this section may be used to transfer HL7 messages between systems. Much of the language contained in this protocol specification is based on or reproduced from the ANSI X3.28-1976 Standards document. These portions are reproduced with permission from American National Standard X3.28, copyright 1976 by the American National Standards Institute. Copies of the complete X3.28 Standard may be purchased from:

American National Standards Institute
11 West 42nd Street
New York, NY 10036
(212) 642-4900

X3.28 has a collection of options to support various communications requirements. This section is mainly comprised of a selection of these options appropriate for HL7 use. Specific local implementations may require functionality that is not provided by the protocol described in this document. It is strongly recommended that any additional functionality be implemented using options from the ANSI X3.28 Standard.

Decisions to use specific X3.28 options came from the items listed in section 1.2 "Requirements and Assumptions."

The following X3.28 options are used. (Parenthesized paragraph numbers are citations to the ANSI document.)

1. - Establishment and Termination Subcategory 2.3: Two Way Alternating, Nonswitched Point-to-Point.
2. - Message Transfer Subcategory B2: Message-Associated Blocking with Alternating Acknowledgments. (ACKN is used with link block numbers as a substitution for alternating ACK0, ACK1.)

    - Link Block Numbers (3.7)
    - Prefixes. (3.3)
    - Block abort. (3.4.1)
    - Sending station abort. (3.4.2)
    - Termination Interrupt. (3.4.3)
    - Reverse interrupt. (3.4.4)

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- Optional transparent heading and text. (Transparent block sequences are always used, but escaping of DLEs in data is left to local implementation agreement.)

Other features not covered in the X3.28 Standard, but used in this protocol:

- The BCC is converted to an ASCII hexadecimal representation.
- A single termination character follows each block and control sequence.
- A message length has been added to the block trailer to help verify block integrity.
- A line check (timer E) provides early warning of communications link problems.

This protocol does not prescribe the means for establishing a channel (signaling path) between two or more stations nor does it provide a session interface. It does prescribe control procedures used to send and receive data once a channel has been established.

C.3.1.2 Requirements and Assumptions

1. The protocol must support point-to-point connection with guaranteed delivery. (It does not require that the message be processed before it is acknowledged.)
2. Simplicity of implementation has priority over throughput.
3. The protocol software need not accept another transmission request from a higher level while it is completing a previous transmission request.
4. Only one physical line is required to accommodate the request and (application level) reply for a given remote operation.
5. The data link protocol must allow different types of remote operations to be sent over a single physical line. (Data link acknowledgment of a message must not wait for the application level reply. This would hang the link and prevent all types of messages from being delivered.) ACKs must be sent independent of application replies.
6. Data transmission may be initiated by either side (although not simultaneously).
7. One side may use a driver that recognizes only a single termination character.
8. A system may lack flow control (XON, XOFF) capabilities.
9. Blocking must be done to accommodate limitations of some systems.
10. Block transmissions must be synchronous and duplicates recognized.
11. The receiver must be able to interrupt the sender to reverse the direction of data flow when needed.
12. Error recovery should be simple. (few states)
13. The checksum algorithm must not produce arbitrary byte values. Displayable ASCII characters must be sent.
14. Support of data transparency should be an optional, but fairly trivial addition to the protocol.
15. Either side can detect when the communication link becomes inoperative (within 5-10 minutes).
16. Block size (and perhaps other parameters) can be negotiated or predetermined.

C.3.1.3 Environment Model

The following model and guidelines are used with this protocol to support the stated requirements and assumptions.

The job of the communication modules that implement this protocol is to take a message from a single source and deliver it intact to a single destination. (See Figure C-1.) The message source and destination may vary with implementation, but will frequently be a queue or spooler.

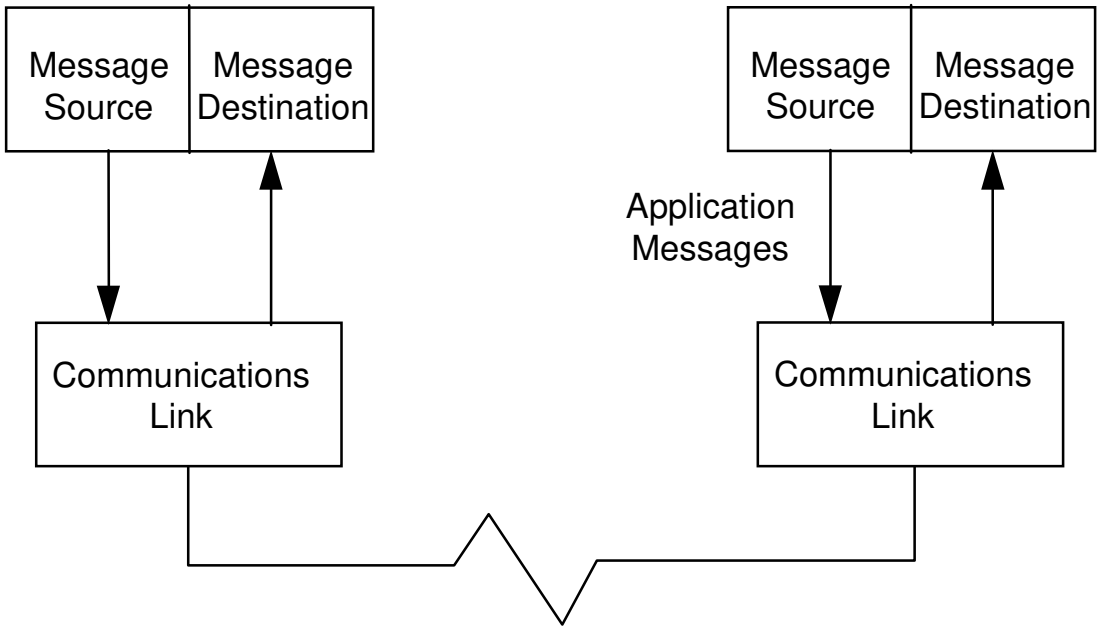

Figure C-1 – Single Message, 1 Way Transfer

The communications protocol is a delivery mechanism only. To the communications module, an HL7 reply is just another message text. It does not know the data content of the messages it transfers. The following functions are performed at a higher level and should not be confused with the communications protocol described here:

- Queuing and prioritization of messages to be sent.
- Distributing messages received to the correct server application.
- Asynchronous storage and processing of messages.
- Relating application replies to requests.
- Guaranteed completion of remote operations.

A single communications module and physical line may support multiple applications. (Although throughput, message priorities, or fault tolerance may dictate a multi-line design.)

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C.3.1.4 Communication Control Characters

The following table defines the communication control sequences. A brief description of each sequence follows the table. References to these control sequences is used in describing the protocol throughout this document.

Note that the Termination Character must be appended to the transmission sequences: EOT, ENQ, NAK, and ACKN. A Termination Character is also appended to transmission blocks after the checksum.

Control Sequences

Abbreviation	Characters	Actual Bytes (hex)
TERM	CR	0D
SOH	SOH	01
STX	STX	02
ETB	ETB	17
ETX	ETX	03
EOT	EOT	04
ENQ	ENQ	05
RINT	DLE	10 3C
NAK	NAK	15
ACK0	DLE 0	10 30
ACK1	DLE 1	10 31
ACK2	DLE 2	10 32
ACK3	DLE 3	10 33
ACK4	DLE 4	10 34
ACK5	DLE 5	10 35
ACK6	DLE 6	10 36
ACK7	DLE 7	10 37

SOH (Start of Heading)
SOH delimits the start of a message heading. If the heading is subdivided into multiple transmission blocks, SOH delimits the start of each block that continues transmission of the heading.

STX (Start of Text)
STX precedes a sequence of characters that is to be treated as an entity and entirely transmitted through to the ultimate destination. Such a sequence is referred to as "text." If a heading precedes the text, STX delimits the end of the message heading. If the text is subdivided into transmission blocks, STX delimits the start of each block that continues transmission of the text.

ETX (End of Text)
ETX delimits the end of a message text. In multi-block messages, ETX indicates the last block of the message.

ETB (End of Block)

ETB delimits the end of a block that is not the last block of a message.

EOT (End of Transmission)
EOT indicates the conclusion of a transmission that contained one or more

message texts and any associated headings.

- EOT cancels any previous master/slave assignment.
- EOT must never have a prefix.
- EOT is sent by a master station after the completion of the message transfer phase in order to effect a normal termination of the transmission. (End current master/slave transmission relationship.)
- EOT is sent by a master station prior to the completion of the message transfer phase in order to effect a sending station abort function. (Sent between blocks of a multi-block message.)
- EOT is sent by a slave station in place of ACK/NAK in order to effect a termination interrupt function. It serves to NAK the current block and causes the current master/slave relationship to be ended.

ENQ (Enquiry)
ENQ is used to request master status.

- ENQ is used to solicit a response from a remote station.
- ENQ may be used to obtain identification of the remote station.
- ENQ is the last character of a polling or selection supervisory sequence.
- ENQ is used by the master station in block abort procedures.

NAK (Negative Acknowledgment)
NAK is transmitted as a negative response to the sender.

- NAK is used during the establishment phase to indicate that the station is not ready to receive.
- During message transfer, NAK indicates that the last message or transmission block wasnot accepted, but the station is ready to receive.

ACKN (Acknowledgment N)

ACK0 is transmitted during the establishment phase as a response indicating a readiness to receive (become slave).

ACKN is transmitted by a slave station as a numbered affirmative reply to a transmission block.

ACK1 is sent as a reply to the first block after the establishment phase. ACK2 is replied to the next block. Sequencing continues through ACK7 and then wraps to ACK0.

C.3.1.5 Block Number

A block number (BLK) is used to sequence message blocks. It immediately follows the first start-of-block delimiter (SOH or STX). The BLK character is a single ASCII numeric character that varies from zero through seven. The first transmission block, after establishment of master/slave is

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assigned the numeric character one (hex 31). Subsequent transmission blocks will use sequential numbers (2, 3, 4, 5, 6, 7, 0, 1, 2, etc.).

The BLK character is added by the transmitting station and is functionally deleted by the receiving station. It is not considered as part of the end-to-end heading or text. The BCC must be correct before BLK is used to determine proper block sequencing.

BLK is reset to "one" upon a timer-D timeout or upon transmission or reception of EOT.

C.3.1.6 Text Length

The Text Length (TL) is the number of bytes of message text that are present in the block. It immediately follows BLK and is a decimal number in ASCII characters. It is always 5 characters long, right justified, zero filled. (See the example message below.)

C.3.1.7 Block Checking Characters

Two block check characters (BCC) are added at the end of each transmission block to facilitate error detection. The BCC is generated as follows:

1. Take the Exclusive-Or of all of the characters in the block, starting with the character following the first SOH or STX in the message, and ending with the character just prior to the BCC characters. (If SOH is present, start with the character following SOH and include the STX.)
2. Convert the resulting binary value to a two character hexadecimal ASCII representation.

For example, to send the message text "HL7 is great!" as the first block after establishment of master/slave, the general message format of:

STX BLK TL Text of Message ETX BCC TERM

would be encoded as the hexadecimal byte values:

STX	01	
BLK 1 31	("1")	(BCC starts with this byte)
0	30	
0	30	
0	30	
1	31	
3	33	
H	48	
L	4C	
7	37	
	20	
I	49	
s	73	
	20	
g	67	
r	72	
e	65	
a	61	
t	74	
!	21	
ETX 03	(BCC ends, including this byte)	

6	36
D	44
CR	0D

The result of the exclusive-or of the checksummed bytes:

31 30 30 30 31 33 48 4C 37 20 69 73 20 67 72 65 61 74 21 03

= 6D. The ASCII characters "6D" are used as the BCC above.

C.3.2 Establishment of Master/Slave Relationship

(In this section, the numbers in parentheses refer to Figure C-2.)

Prior to the establishment of transmission (1), neither station has master status (is the sender). Either station may request control of the line to become the master (sender) (2).

When a station desires to transmit a message, the station requests to be the master by sending an ENQ supervisory sequence to the remote station (2). It is possible for both stations to bid for master status simultaneously. (Indicated by receipt of an ENQ after sending an ENQ.) In this case, priority is given to the station that is designated by local agreement as the primary for contention purposes.

- The secondary station grants the line to the primary station by sending an ACK0.
- The primary station waits for receipt of ACK0. If ACK0 is received prior to expiration of Timer A, the primary has been granted master status and begins transmitting data. If Timer A expires, the primary station again requests master status by transmitting an ENQ sequence.

A station that has not sent ENQ, but has received ENQ, takes the following action:

1. Inhibits the sending of ENQ to bid for master status.
2. If ready to receive, assumes slave status and sends an optional prefix (See section on "Prefixes") followed by ACK0 (3).
3. If not ready to receive, sends an optional prefix followed by NAK (4).

Upon receipt of an affirmative reply, the bidding station assumes master status and proceeds with message transfer (12).

Upon receipt of NAK, the bidding station reinitiates a bid for master status (2). The station reinitiates its bid M times (5) and then exits to a recovery procedure (6).

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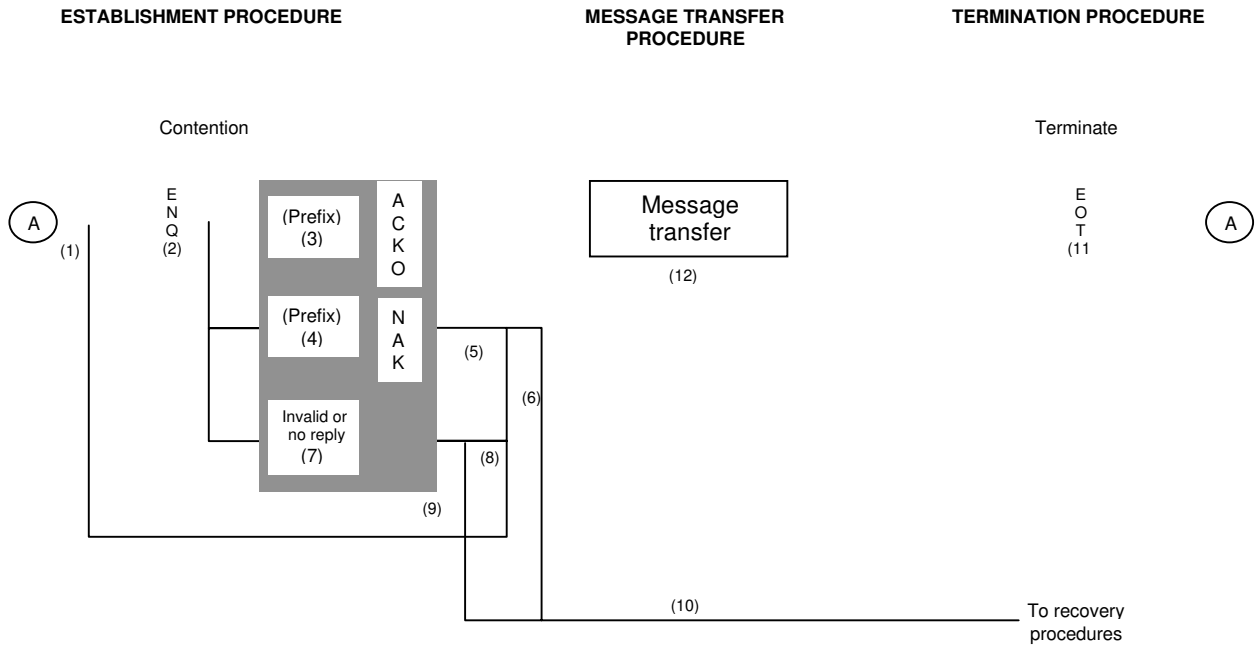

Figure C-2 Establishment of Master/Slave

In the case of an invalid or no reply to ENQ (7), the bidding station reinitiates its bid for master status (2). The station reinitiates its bid N times (8). After N unsuccessful bids, the station exits to a recovery procedure (9).

An exit to the recovery procedure (10) indicates that the remote station is not operational (busy or down). The recovery procedure may consist of a delay after which line bidding is resumed (2). Or, recovery may involve passing an error indication to a higher level to abort a connection. (As in the case of a dial-in link.)

The master station transmits EOT (11) to indicate it has no more data to transmit. EOT negates the master/slave relationship and returns the station to contention mode (1).

C.3.3 Message Transfer

Messages may be subdivided into blocks. A transmission block may be a complete message or a portion of a message. The master station sends each transmission block to the slave station and waits for a reply.

If the reply indicates that the block was accepted, the master station may send another block, or it may terminate. If the reply is negative, the master station immediately retransmits the block that was not accepted.

The numbers in parentheses in the following discussion refer to Figure C-3.

C.3.3.1 Transmission Blocks

The transmission of blocks is initiated by the master after a master-slave relationship has been established. If the message has a heading (See section on "Headings"), the master station begins the transmission with SOH (2). If the message has no heading (3), the master station begins the transmission with STX (4). An intermediate block that continues a heading (7, 2) is started with SOH. An intermediate block that either begins or continues a text (7, 3, 4) is started with STX. If the last information character of a heading ends on a block boundary (ended by ETB), the subsequent block may be started by either SOH or STX. Note that in such a case the receiver must be able to handle both situations.

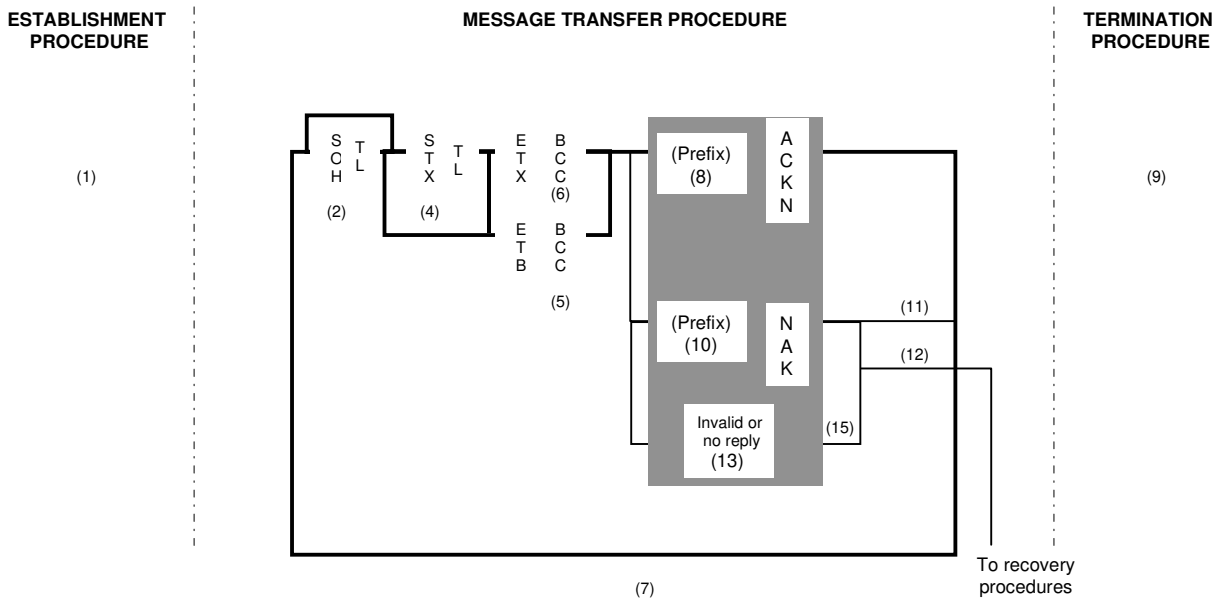

Figure C-3 – Message Transfer for Procedure

A block that ends at an intermediate point within the message is ended with ETB (5). A block that ends at the end of a message is ended with ETX (6). The ETB or ETX character is immediately followed by the two block check characters (BCC). After the ETB or ETX and BCC are sent, the master station waits for a reply.

C.3.3.2 Replies

The slave station, upon detecting the ETB or ETX followed by the BCC, determines whether it will send ACKN or NAK.

The receiver verifies that a block was received correctly by checking that:

1. The message terminated with TERM.
2. The calculated BCC matches the BCC in the message.
3. The number of bytes in the message text matches the Text Length in the message.
4. The message text is followed by either an ETB or ETX.

The receiver checks the block sequence number (BLK) to detect duplicate or missing blocks. BLK of 1 is expected in the first block received after establishment of master/slave. BLK of 2 is expected in the second block received. Subsequent BLK numbers sequence up to and include 7 after which they wrap to 0 and sequence upward as before. This sequencing continues for the remainder of the master/slave relationship.

1. ACKN
   a) If the transmission block was accepted and the slave station is ready to receive another block, it sends the appropriate ACKN (8), where N is the frame number of the block being acknowledged. Upon detecting the appropriate ACKN, the master station may either transmit the next block (7), or initiate termination (9) if the last block ended in ETX BCC (6).
   b) If the received BLK character is lower than expected, a duplicate block has been received.The receiver discards the block and sends the optional prefix followed by ACKN when ready to receive another block.
2. NAK
   a) If the transmission block was not accepted and the slave station is ready to receive another block, it sends a NAK. (10). Upon detecting a NAK, the master station initiates retransmission of the last transmission block (11, 7). L retransmissions may be made, after which the master station exits (12) to a recovery procedure.
   b) If the received BLK character is higher than expected, the receiving station discards the received transmission block and sends an optional prefix followed by NAK when ready to receive another block.

The use of NAK does not alter the sequence of acknowledgments. The same affirmative reply (ACK0 through ACK7) is used for a successful retransmission as would have been used if the previous transmission of the unaccepted block had been successful.

If the numbered reply indicates that the slave station missed the outstanding block (receipt of ACKn-1 instead of ACKn), the master station initiates retransmission of that block as if the slave station had returned a NAK.

A message frame is acknowledged as soon as the receiving buffer is available to receive the next frame. Flow control (XON, XOFF) is not needed since a synchronous block acknowledgment scheme is used and a receiver's buffer is guaranteed to hold a block of maximum block size. (Buffer overruns do not cause loss of data.)

C.3.4 Aborts and Interrupts

At times during data interchange, the sending station may need to end a transmission block in an unusual manner such that the receiving station disregards that portion of the block or transmission that has been received. This procedure is called an abort.

At other times during data interchange, a receiving station may wish to cause the sending station to stop sending, either temporarily (to permit the receiving station to send) or permanently. This procedure is called an interrupt.

C.3.4.1 Block Abort

Description — The sending station in the process of sending a block, but before the end of the block, decides to end the block in an unusual manner such that the receiving station will

discard the block. Such a procedure is called a block abort.

Application

Block abort may be used by a sending station when, in the process of sending data, there occurs an indication that the data being sent may not be valid.

Block abort may be used in the message transfer state to cause a temporary text delay after receipt of the previous acknowledgment if the sending station is not capable of transmitting the text of the next transmission block before the predetermined time-out period. The reasons for such a delay might be the unavailability of buffer space or that the speed of the input device is considerably slower than the transmission speed and a full block has not yet been read from the media.

Procedures

Block abort is accomplished by the sending station's ending the block (at any time) with the ENQ. The sending station then halts transmission and waits for a reply. The receiving station detects that the block was ended with ENQ rather than with a normal ending character (ETB or ETX), discards that portion of the block that had been received and sends a NAK response to the sending station and remains in the receive condition.

Following receipt of the NAK response, the sending station will normally reinitiate the transmission with the same or a new block.

In the case of a NAK response that is not received, the sending station will time out (expiration of Timer A - see section on Timers). The sending station reinitiates transmission with the same block or it may choose to initiate an appropriate termination or recovery procedure. The specific choice of operation will generally be a function of the system discipline being employed.

C.3.4.2 Sending Station Abort

Description

The sending station, in the process of sending several blocks per message text, decides to terminate transmission prematurely at the end of a block and after receipt of the proper acknowledgment reply. Such a procedure is called a sending station abort.

Application

Sending station abort procedures may be used by a sending station when, in the process of sending multiple blocks per message text, it determines that it should prematurely terminate transmission to the particular receiving station. Such a determination might be made if the sending process did not receive the remaining blocks in time from the higher level, needed to send a higher priority message, or was temporarily unable to continue transmission, etc.

Sending station abort procedures may be used following block abort procedures to accomplish a transmission abort condition; that is, the sending station prematurely terminates the transmission within a transmission block.

Procedures

Sending station abort procedures are accomplished by the sending station completing the transmission of a block, for example, ETB, ENQ. Then upon receipt of the proper acknowledgment reply (ACK, NAK, etc.) or a Timer-A time-out, the sending station transmits EOT to terminate the transmission to the receiving station. The receiving station detects this sending station abort procedure by recognizing receipt of EOT following ETB, or ENQ instead of ETX

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C.3.4.3 Termination Interrupt

Description

The receiving station, after receipt of a message or transmission block, causes the sending station to cease transmission. Such a procedure is called a termination interrupt.

Application

Termination interrupt may be used by the receiving station to cause the transmission to be interrupted because it is not in a condition to receive. Cause for such inability to receive could include a hardware malfunction, loss of an additional network connection, etc.

Procedures

Termination interrupt procedures are accomplished by the receiving station's transmitting EOT in lieu of one of its normal responses. This response indicates a negative acknowledgment of the last transmission and the conclusion of a transmission.

C.3.4.4 Reverse Interrupt

Description

A receiving station may request the sending station to terminate the transmission in progress prematurely in order to facilitate a reversal in the direction of data transfer. Such a procedure is called reverse interrupt.

Application

Reverse interrupt procedures may be used by a receiving station to interrupt its receiving of a message stream so that it may transmit a priority message or messages to the original sending station.

Procedures

Reverse interrupt procedures may be used by a receiving station only after reception of a block with a valid BCC. Reverse interrupt procedures are accomplished by the receiving station's transmitting a RINT sequence in lieu of the normal affirmative acknowledgment. This reply is interpreted as an affirmative reply to the last transmission, and it signals a request by the receiving station that the sending station terminate the transmission sequence in progress as soon as the sending station is in such status that it can receive a message without destroying or losing information that may have previously been stored in buffers.

The RINT sequence may not be repeated by the receiving station to successive transmission blocks without transmitting intervening affirmative acknowledgments (ACKN).

Upon receipt of RINT, the sending station should terminate the transmission by transmitting EOT after it has completed transmitting all data that would prevent it from receiving a message. The number of transmission blocks to be transmitted prior to termination is variable and dependent upon station design.

The receipt of RINT as a response to a sending station's ENQ should be treated as a repeated (duplicate) response if the last valid response received was ACKN. The sending station should continue by transmitting the next block, or EOT. If the last valid response was RINT, the sending station must assume that the last transmitted block was garbled. The sending station should retransmit the previous block.

C.3.5 Block Headings and Acknowledgment Prefixes

C.3.5.1 Headings

An optional heading may be sent as part of a transmission block. It is a sequence of (non-communication control) characters that constitutes a machine-sensible address or routing information. A STX terminates a heading.

C.3.5.2 Prefixes

An optional prefix may precede acknowledgments. It may consist of up to 15 characters, other than communication control characters, in order to convey additional information (for example, identity or status). Note that EOT must never have a prefix. Stations must accept prefix characters without confusion. Interpretation of the prefix, however, must be by prior agreement between the implementers. A prefix must not change the meaning of the associated control character.

C.3.6 Timers and Recovery Procedures

C.3.6.1 Timers

Timers are primarily used to indicate when recognition of specific control characters does not occur within specified periods. It is to be noted that the timers specified in this section are functional only and do not necessarily imply a specific implementation. The action taken following a timeout is specified, but may vary for specific implementation requirements.

Logging and/or operator notification of timeouts should be done to aid in the maintenance and troubleshooting of interfaces.

Timer A (Response Timer)

Timer A is used by a sending station to protect against an invalid response or no response. Timer A is started after the transmission of the last character of a block or after sending ENQ. Timer A is stopped upon receipt of a valid reply (ACKN, NAK, or EOT).

The value for Timer A includes the response time of the receiver plus the time to transmit the acknowledgment sequence. It should be slightly longer than Timer B.

When timeout occurs while sending a block, the sending station either:

1. retransmits the block (up to N times) or
2. follows the Sending Station Abort procedures by transmitting EOT.

When timeout occurs while bidding for master status, ENQ will again be sent to request the line.

Timer B (Receive Timer)

Timer B is used by a slave station to protect against failure to recognize the end of a block (ETB or ETX). Timer B is started upon receipt of start-of-block or start-of-text (SOH or STX). Timer B is stopped upon receipt of a valid terminating character or sequence, for example, ETB, or ETX.

Since Timer B is the time to transmit a complete block, its value is a function of the baud rate, maximum message size, and any intrablock delays by the sender (if a message block is sent in pieces).

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When timeout occurs:

1. Prepare to receive another transmission.
2. Discard incomplete block.

Timer D (Inter-block Timer)

Timer D serves to prevent a station from hanging in slave mode. Timer D is started when entering slave mode and restarted after replying to each block. Timer D is stopped upon receipt or transmission of EOT.

When timeout occurs:

1. Return to control mode.

Timer E (Line Check Timer)

Timer E triggers a check of the communications link when neither station has requested to be master for some time. Timer E is reset whenever a transmission is sent or received.

When timeout occurs:

1. The station triggers a bid for the line. (The line may be released as soon as master/slave is established.)

If no response is received when bidding for the line, the normal mechanism using Timer A will report problems with the communications link.

C.3.6.2 Recovery Procedures

Recovery procedures are system guidelines that should be used by all stations, as applicable. However, it is recognized that the detailed method of station mechanization, absolute value of timers, etc., may vary with applications and communication facilities. Recovery procedures should be implemented that eliminate operator intervention wherever possible.

When a timeout, invalid, or NAK response to a transmitted block is received, the master transmits the block again. This may occur up to L times. The recovery procedure after L unsuccessful retransmissions:

1. Notify the operator or the processor program, or both.
2. Transmit EOT to end the master/slave relationship.

When a timeout, invalid, or NAK response to a line bid (ENQ) is received, the sender transmits ENQ again. This may occur up to L times. The recovery procedure after M unsuccessful retransmissions:

1. Notify the operator or the processor program, or both.
2. The sender may continue to request the line by sending ENQ with an appropriate delay between requests.

C.3.6.3 Parameters and Defaults

The following parameters should be defined when implementing this protocol. Many are subject to local agreement. Some defaults are given in parenthesis, but are not mandatory.

Buffer Sizes

- Maximum Message Size
- Maximum Block Size

Timer Values

- Timer A 6 seconds
- Timer B 3 seconds
- Timer D 30 seconds
- Timer E 3 minutes

Contention

- Station designated as Primary
- Contention Retry Delay--Primary Station, 1 second
- Contention Retry Delay--Secondary Station, 3 seconds

Retry Counts

- L (block transmission) 5 times
- M (line bid) 10 times
- Delay between requests after M retries 30 seconds

Physical Layer Parameters for RS-232

- Baud rate Easily switched between 1200, 2400, 4800, 9600 bps.
- Start Bits (1)
- Stop Bits (1)
- Data Bits (8) Standard Extended ASCII. (ANSI X3.41 1974 code extension techniques)
- Parity (Odd)

C.4 MINIMAL LOWER LAYER PROTOCOL

C.4.1 Introduction

This section describes a minimal HL7 lower level protocol to be used in a pure network environment. It is an adaptation of the hybrid lower layer protocol.

C.4.1.1 Background

It is assumed that this HL7 protocol will be used only in a network environment. Most of the details of error detection and correction are handled by the lower levels of any reasonable network protocol and do not require any supplementation.

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C.4.1.2 Goals and Assumptions

The goal of this lower level protocol (LLP) is to provide an interface between HL7 and the network that uses minimal overhead while remaining compatible with other lower level protocols. By remaining compatible with other LLP's, vendors will need to make minimal changes to existing code to use this LLP.

It is assumed that there are only direct connections to the network. Any other types of links, such as RS-232 to a communication server, will require another protocol to guarantee their integrity.

C.4.1.3 Differences

This version of the LLP differs significantly from other LLPs in that it has only a single byte to signal the start of a message and two bytes to signal the end of a message. There is no other lower level header or trailer information. There are no other characters added to the HL7 message.

C.4.1.4 Notation Conventions

1. Single ASCII characters are enclosed in single quotes.
2. Special characters or non-printing ASCII characters are enclosed in angle brackets, <>. Special characters are the LLP Start Block and End Block characters. Non-printing ASCII characters may be written as their abbreviation, e.g., ESC for the Escape character. They also may be written as their hex value in the form 0xXX where X is a hexadecimal digit. For example in Standard ASCII, <ESC> is <0x1B>.

C.4.2 Block Format

HL7 messages are enclosed by special characters to form a block. The format is as follows:

<SB>dddd<EB><CR>

<SB> = Start Block character (1 byte)
ASCII <VT>, i.e., <0x0B>. This should not be confused with the ASCII characters SOH or STX.

dddd = Data (variable number of bytes)

This is the HL7 data content of the block. The data can contain any displayable ASCII characters and the carriage return character, <CR>.

<EB> = End Block character (1 byte)
ASCII <FS>, i.e., <0x1C>. This should not be confused with the ASCII characters ETX or EOT.

<CR> = Carriage Return (1 byte)
The ASCII carriage return character, i.e., <0x0D>.

C.4.3 Processing Rules

The rules governing circuit control and processing of messages for these blocks are the same as for Hybrid HL7 LLP blocks with the following exceptions.

1. Since there are no NAK blocks, there is no way to signal transmission errors except with higher level messages.
2. Carriage Return stuffing is not used.

Flow through processing is an allowable option.

C.5 HL7 SEQUENCE NUMBER PROTOCOL IMPLEMENTATION

In this discussion of HL7 Sequence Number protocol, there is an initiating application (sending system), and an accepting application (receiving system). It should be noted that not all messages require sequence numbers, i.e., queries, network messages, etc. When a message does require sequence numbers, the following implementation notes will apply.

C.5.1 Sequence Number Usage

Both parties will follow the HL7 Specification with the following clarifications. These clarifications will apply to each of the links over which the HL7 sequence number will be used.

Note: If the Sequence Number protocol is not used on the above links, the proper receipt of the messages transmitted over these links cannot be guaranteed.

Sequence numbering will not be used on display queries or network management messages.

C.5.2 Sequence Number Description

A sequence number is one of the following: a positive integer (from 1 to two billion), 0, or -1. No other numbers are valid.

- 1 is the smallest sequence number which can be used for normal message transactions.
- The value 0 (zero) is reserved for querying for an Expected Sequence Number.
- The value -1 is reserved for synchronizing the sequence numbers on a link.

C.5.3 State of the Receiving System

The receiving system will be in one of two states, depending on its Expected Sequence Number. Either the receiving system has an Expected Sequence Number or it does not. In the middle of a synchronization sequence , the receiving system does not have an Expected Sequence Number. At startup, the receiving system may or may not have an Expected Sequence Number.

C.5.3.1 Sequence Number Processing by the Receiving System

The receiving system is expected to keep track of both its Expected Sequence Number and Expected Sequence Number state in a secure manner. This is so that in the event of either side of a link going down, a link may be restarted without loss or duplication of transactions.

By saving a -1 when the Expected Sequence Number state is NONE, the receiving system can track both pieces of information with a single operation.

Saved ESN	Expected Sequence Number State
> = 1	> = 1 (valid sequence number)
- 1	NONE

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C.5.4 Normal Operations

In normal operation of a link, the sending system sends a message with a sequence number. The receiving system checks the sequence number of the message against its Expected Sequence Number. The two possible conditions are listed as follows.

C.5.4.1 The Message Sequence Number Sent Equals the Expected Sequence Number

The receiving system sends, to the sending system, an ACK with an AA or AE acknowledgment code and the current Expected Sequence Number (MSA:4). It then increments its internal Expected Sequence Number by one and continues to process the message.

C.5.4.2 The Message Sequence Number Sent does not Equal the Expected Sequence Number

The receiving system returns an ACK with AR (Application Reject) acknowledgment code, an error message, the Expected Sequence Number (MSA:4), and message sequence number (MSH:13).

The sending system receives the reply message and checks the acknowledgment code. In the event of an Application Reject (AR), the sending system checks the Expected Sequence Number field.

C.5.4.2.1 The Message Sequence Number Sent Plus One is Equal to the Expected Sequence Number

It is assumed the previous acknowledgment was lost and the initial message was a duplicate. The sending system sends the next message.

C.5.4.2.2 The Message Sequence Number Sent is Greater than the Expected Sequence Number

The sending system can try to recover by starting again at the lower sequence number or it can freeze the link for operator intervention.

C.5.4.2.3 Other Errors

The sending system freezes the link for operator intervention.

C.5.5 Sequence Numbering Chart

SEQUENCE NUMBER PROCESSING BY RECEIVING SYSTEM

SQ# Sequence Number
ESN/Expected Sequence Number
ESN State/Expected Sequence Number State

Is this a type of message that requires SQ#s?

NO	YES
Process according to that type and ignore sequence numbers. Do not change either the ESN State or the ESN. Example: If this message is a network management message from receiving system, ignore sequence numbers altogether.	**Incoming is an integer SQ# > = -1?**

NO	YES
Send an MSA with an AR. Example: The right message, but the wrong sequence number format.	Continue ▼

What is the ESN State (Expected Sequence Number State)?

ESN State >= 1 An Expected Sequence Number exists or is defined.	ESN State = NONE An Expected Sequence Number does not exist or is not defined.

Incoming SQ# = -1?			**Incoming SQ# = -1?**		
YES	NO		NO		YES
Set the following: • ESN = -1 • ESN State = NONE	**Incoming SQ# = 0?**		**Incoming SQ# = 0?**		Set the following: • ESN = -1 • ESN State = NONE
Send MSA with AA	YES	NO	NO	YES	Send MSA with AA
Set the following: • ESN = Existing ESN • ESN State = "ESN >= 1"		SQ# must be >= 1 Set the following: ESN = Existing ESN ESN State = "ESN >= 1"	**Incoming SQ# >= 1?**		Set the following: • ESN = -1 • ESN State = NONE
Send MSA with AA		Refer to the Message with Sequence Number Chart.	NO	YES	Send MSA with AA
			error	Set the following: • ESN = Incoming SQ# • ESN State >= 1 This must be a full message and the assumption is that its been preceded by a SQ# control message of 0 or -1. Thus, this is a "start of sequencing, actual message, and the receiving system is synchronized to this incoming SQ# as its ESN (and ESN State is "ESN >= 1"). No further SQ# checking, but do regular application processing on this message.	
				Send MSA with AA or AE accordingly	

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<table>
<tr><td colspan="4">This chart is a continuation from the Sequence Number Processing Chart on the previous page. It details the Sequence Number Process when there is an ESN and the ESN state = "ESN >= 1."MESSAGE WITH SEQUENCE NUMBER</td></tr>
<tr><td colspan="4">Sending system</td></tr>
<tr><td colspan="4">sends a message with a sequence number (SQ#) ⇒</td></tr>
<tr><td colspan="4">Receiving System
tracks Expected Sequence Number (ESN) and ESN state</td></tr>
<tr><td colspan="4">compares SQ# with ESN ⇒</td></tr>
<tr><td>SQ# = ESN</td><td colspan="3">SQ# ≠ ESN</td></tr>
<tr><td>Sends MSA with AA or AE acknowledgment code, and contains the SQ# = ESN.</td><td colspan="3">Sends MSA with AR acknowledgment code, an error message, the Expected Sequence Number (ESN), and the message sequence number (SQ#) received.</td></tr>
<tr><td colspan="4">Sending system
⇒</td></tr>
<tr><td>SQ# = ESN</td><td>SQ# +1 = ESN</td><td>SQ# > ESN</td><td>Other Errors</td></tr>
<tr><td>Increments SQ# by 1.</td><td>Assumes the previous acknowledgment is lost. The message sent is a duplication. Increments SQ# by 1.</td><td>1) ADT tries to recover by starting at the ESN in the MSA.
--or--
2) Freezes the link.</td><td>Freezes the link.</td></tr>
<tr><td>Processes the next message.</td><td>Processes the next message.</td><td>1) Sends messages from log beginning with ESN in MSA.
--or--
2) Waits for operator intervention.</td><td>Waits for operator intervention.</td></tr>
</table>

C.5.6 To Query for the ESN

The reserved sequence number 0 is used to query the receiving system for its Expected Sequence Number (ESN). The sending system starts a query transaction by sending a message with a 0 (zero) in the Sequence Number field of the MSH segment (MSH: 13).

The receiving system replies with a message which has its Expected Sequence Number (an integer greater than zero) in the Expected Sequence Number field of the MSA segment (MSA: 4). If the receiving system does not have an Expected Sequence Number, it should return a -1 in the Expected Sequence Number field of the MSA segment (MSA: 4).

In the event the receiving system returns a -1 in the Expected Sequence Number field of the MSA segment (MSA: 4), the sending system determines the Expected Sequence Number for the link.

C.5.7 To Synchronize the ESN

The reserved sequence number -1 is used to synchronize the Expected Sequence Number of the receiving system.

The sending system starts a synchronization transaction by sending a message with a -1 in the sequence number field of the MSH segment (MSH: 13).

The receiving system replies with a message which has -1 in the Expected Sequence Number field of the MSA segment (MSA: 4). At this point, the receiving system does not have an Expected Sequence Number. The next message received which has a positive (non-zero) sequence number determines the Expected Sequence Number of the receiving system. The receiving system sets its Expected Sequence Number to the sequence number of the incoming message.

Note: If the receiving system is queried (message sequence number equals zero) after the synchronization message, but before receiving a positive non-zero sequence number, it should reply with a -1 in the Expected Sequence Number field of the MSA segment.

C.5.8 Overview of the Sequence Number Protocol

The following two tables provide an overview of the sequence number protocol. The first shows the state of the receiving system without an existing Expected Sequence Number, such as can occur during startup or synchronization. The second shows the state of the receiving system when an Expected Sequence Number exists.

Current State of Receiving System: Expected Sequence Number = NONE		
Incoming Message Seq. Num	**Expected Seq. Num Field of MSA**	**Next State of Receiving System**
-1	-1	None
0	-1	None
>= 1	Same as incoming	Same as Incoming +1

Current State of Receiving System: Expected Sequence Number >= 1		
Incoming Message Seq. Num	**Expected Seq. Num Field of MSA**	**Next State of Receiving System**
-1	-1	None
0	Expected Seq. Num	Expected Seq. Num
>= 1	Same as incoming	Same as incoming +1

C.5.9 Link Management Messages

The messages used to query and synchronize the link do not need to be complete messages of any particular type. The message can consist of just a valid MSH segment (with appropriate headers and trailers). Similarly, the reply message can be an acknowledgment message consisting of just the MSH and MSA segments (with appropriate headers and trailers).

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C.5.10 Responsibility for Initiating Synchronization

The receiving system never initiates the synchronization of a link.

Note: Sequence numbers will range from 1 to 2 billion.

C.5.11 Acknowledgment Codes

The following are the acknowledgment codes for Initiating Application - Accepting Application messages using sequence number protocol.

AA	As described in the HL7 Specification.
AR	In addition to the uses described in the HL7 Specification, this code is used to signify sequence number errors.
AE	As described in the HL7 Specification, this code is used to signify that the message passed all checks which would cause an AR code, but could not be processed for some other reason.

Note: In the case of an AE or an AR, the sending system will determine the appropriate action..

C.6 PSEUDO CODE FOR HL7 TCP

The following is pseudo-code for circuit control and message passing by initiating and accepting software modules. Two types of virtual circuits are used to exchange data: transient and permanent. In the case of a transient virtual circuit, an initiating module calls an accepting module, the modules then perform one or more message transactions and the modules disconnect. In the case of a permanent virtual circuit, the initiating module has the responsibility of always maintaining a virtual circuit with another location, whether or not it currently has messages to send. This record-oriented results links between the initiating and accepting modules will be permanent virtual circuits.

C.6.1 Initiating Module

The initiating module needs at least the following information to manage a series of message transactions:

- network address
- number of connection retries
- pause time between connect attempts
- receive timeout
- send timeout send retries (if NAK is received)

For best performance, these parameters may vary according to message type and receiving application. The information can be kept in text form in a Network Parameter Table (NPT) which is read by an application at run time. The NPT is keyed by the message type and receiving application. By reading this information at run time, the system can be tuned or reconfigured without coding changes.

The following pseudo-code shows the procedure that the initiating task uses to perform message transactions over a transient virtual circuit. The task calls a destination until successful or until a maximum number of attempts is reached. If the call is successful, it performs the message transactions and disconnects. If there is a send or receive error, it disconnects. Connect errors and

send or receive errors must be passed back to the application in a suitable form. In particular, receive time-outs should be detected and reported.

```
do                          /* call until successful or too many retries */
        { status = call(network address);
        if ( status == OK )         /* break out of loop if successful */
                break;
        retries = retries - 1;
        sleep for configurable # of seconds (1 sec?) ;
        } while ( retries >= 0 );
if ( status != OK )                 /* return if calls failed */
        return(status);

while messages to send to this destination
        { status = send(next message);      /* send the message */
        if ( status != OK )
                goto disconnect;
        status = receive(reply);                    /* get the reply */
        if ( status != OK )
                goto disconnect;
        application code to process reply
        }
disconnect:
 disconnect();                      /* disconnect if error or done */
 return(status);
```

C.6.2 Accepting Modules

The following pseudo-code shows the procedure that the accepting task uses. The task first puts up a listen. When the listen completes successfully, it receives the initiating message. The message is passed to the application which generates a reply message. The reply message is then sent back. The accepting task receives messages until it is disconnected.

```
for ( ; ; )         /* do forever */
        { do                /* wait for listen to complete successfully */
                {       status = listen(port);      }
        while ( status != OK );

        for ( ; ; )                 /* loop until disconnected */
                { status = receive(message);
                if ( status == OK )
                        { application_code(message,reply);
                        send(reply);
                        }
                else if ( status == DISCONNECTED )
                        break;  /* break out of inner loop */
                else ERROR      /* some other error */
                }
        disconnect();               /* disconnect if error or done */
        }
```

C.6.3 Permanent Virtual Circuits

A permanent virtual circuit is a virtual circuit which remains established even when there are no pending message transactions. It is the responsibility of the module which performs the network

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call operation to maintain the circuit. This module must be prepared to re-establish the circuit in the event it is disconnected, either accidentally or because of errors. The use of permanent virtual circuits must be agreed upon in order to avoid situations in which one module permanently ties up another module which is meant to be used on a transient basis.

C.6.4 Assumptions and Guidelines

The following assumptions and guidelines should be noted.

1. It is assumed that the initiating module performs the call operation. This implies that it is the initiating module's responsibility to maintain a permanent virtual circuit.
2. Network address may mean a combination of IP address and TCP port address or just a TCP port address as appropriate.
3. Error handling varies from application to application. The only requirement from a network standpoint is that circuits not be left dangling.
4. Care should be taken that a single initiating module does not monopolize an accept module over a transient virtual circuit. This may cause problems for other parts of the system trying to use the services of the accept module. This problem may occur if the initiate module has a number of messages which take the accept module a long time to process or the initiate module takes a long time to process reply messages and the initiate module does not disconnect between messages.
5. It is assumed that an initiating module may connect and perform more than one message transaction before disconnecting, but it may not have more than one outstanding message waiting for a response. In other words, the initiating task must wait for the response to a given message before sending another message.
6. The pseudo-code here is given in a C-like language. Further clarification of the pseudo-code can be given if requested.

Appendix D
Helpful Hints

D.1. INTRODUCTION

The purpose of this appendix is to provide a forum for health care organizations who have implemented HL7 interfaces to share their "lessons learned" in the form of helpful hints.

D.2. VENDOR NEGOTIATIONS FOR HL7 INTERFACES

Contributed By: **Patricia Burtchaell**
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As our involvement with interfacing multiple computer platforms within DBCHS grows, we have recognized the need to document suggestions to be considered when negotiating with vendors for future interfaces. The following suggestions are based on past experience and may or may not apply when implementing future HL7 interface(s) or any other proprietary interface(s).

If the interface or interfaces are to be HL7, during contract negotiations HL7 message definitions should be reviewed and agreed upon. The version of HL7 should be agreed upon as well as provisions to migrate to any new versions in the future with the intent to stay as current as possible. In addition to stating compliance to HL7, an agreement should be made that the final interface will be in accordance to customer specifications as HL7 is prone to variation. It is also important to discuss the content of the data elements with the vendor so they cannot come back at a later date and refuse to accept a certain field due to database incompatibility.

Lower layer data transmission protocols such as TCP/IP need to be decided on at time of contract negotiation.

An agreement needs to be reached as to who supports the interface(s) once they are implemented and live.

Functional requirements of the interface(s) and a testing plan should be drawn up and agreed upon prior to beginning implementation. Again these should be in accordance with the specifications of the customer.

Test data must be provided from the sending side and it must be signed off on prior to live testing. The intent of this is to minimize any surprises at the last minute as our experiences with vendors in the past have been that they do not review the test data provided to them.

Any master files that need to be built to facilitate interface(s) have to be agreed upon as well as provisions for their creation and maintenance.

Naming conventions for the interface objects may need to be developed and documented for the purpose of future maintenance.

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Appendix E
Sample Case Studies

E.1. INTRODUCTION

The intent of this appendix is to provide health care organizations who are considering or are in the process of implementing HL7 interfaces, with case studies from other healthcare organizations who utilize the HL7 Standard. Case studies have been voluntarily submitted to HL7 for inclusion in this appendix.

E.2. CASE STUDY: ADT and Charge Interfaces using HL7 and TCP/IP

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E.2.1 Beginning of Project

In January of 1994 Deaconess Billings Clinic Health Center (DBCHS) contracted with a vendor to implement a clinical based system for the hospital which would provide an Order Communications system as well as several clinical modules including Pharmacy, Radiology and Nursing. One of the challenges for the hospital was that the clinical based system resides on a Tandem Himalaya K1002 and our financial based system resides on an IBM AS/400 9406 D80. In the past the hospital had made a commitment to standardize on HL7 for the application protocol and also to use TCP/IP as the communication protocol on any future interfaces. Prior to this, HL7 messages had been communicated in batch interfaces between platforms using an emulation file transfer process.

E.2.2 The Project Management Process

In order to more effectively understand the needs of the clinical departments, a Project Coordinator for the entire project was recruited from the nursing staff of the hospital. To assist her with the project management and technical issues, a Clinical Systems Analyst was also recruited. The Project Coordinator developed a project plan using an Excel spreadsheet as a tool to break up the main project into smaller projects and the smaller projects into individual activities and tasks. The spreadsheets contained data such as responsible teams, team members, activity start dates, end dates, calculated duration days, and man days. A project manual was also developed to assist user departments through the process of implementing the clinical system. An extra step is also being taken to use this as an opportunity to avoid automating the processes currently in place but to first work on improving them and making them more efficient.

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E.2.3 The ADT and Charge Interface Projects

As previously stated the hospital had not yet had the opportunity to send HL7 messages in a real time interface utilizing the TCP/IP protocol. It had been determined that this project required a real time ADT interface to the Tandem to support the clinical systems with the charges returning in a batch format to the AS/400 using the TCP/IP FTP subcommands.

E.2.4 HL7 and TCP/IP Implementation

It was decided that we would implement using version 2.1 of HL7 with the intent to migrate to new versions as they became available. Our vendor for the clinical system requested that we conform to the Berkeley Socket for the TCP/IP portion of the interface, however, that feature of TCP/IP is not expected to be available on the AS/400 until Version 3 release 1 of the operating system. Until then we are able to execute the real time TCP/IP functions on the AS/400 with Pascal code and the FTP subcommands with IBM Control Language programs. Our physical connection between the AS/400 and the Tandem is a direct Ethernet connection.

E.2.5 Functional Requirements

Our intent when designing the interface was to make it as much like a utility as possible therefore making future implementations of any TPC/IP interface easier whether it be ADT, Orders, or Results. The HL7 ADT interface program is an RPG program that responds to ADT trigger events in our financial system. It will reside active in a subsystem on the AS/400 and will not end until it is forced to by a request from operations or by detecting an error from the receiving system. A second RPG program also resides active in the same subsystem and, when called, is passed parameters containing the names of the data queues containing the messages, the addresses and ports necessary to establish the communication connection, and a text description of the interface.

As each message is developed the HL7 program writes the data and its length out to a sending data queue. The second RPG program reads the sending data queue and executes segments of a Pascal program which in turn performs the TCP/IP functions and sends the data to the Tandem. After each send the TCP/IP interface program receives an acknowledgment back from the line that the data hit the line successfully and then an acknowledgment back from the application system identifying whether or not they received the data intact. The second RPG program, which is again executing segments of the Pascal program, picks up the ACK or NACK and writes it out to a receiving data queue. If the acknowledgment is not positive that RPG program notifies operations of the problem by sending an informational message. The HL7 ADT program then receives the data queue and checks for an positive ACK. If it does not receive back a positive acknowledgment, it alerts the other programs that it is terminating and they in turn end. It is up to operations to act upon the error message and resolve the problem. Once that is done the interface programs can be restarted. If the acknowledgments are positive the ADT interface program continues to read and process the trigger records as they arrive.

The charge batch, is retrieved from the Tandem once a day. The FTP subcommand 'GET' is executed by an IBM CL program and the file is placed in a library on the AS/400 ready to be processed by the HL7 charge interface program. That program interprets the messages and creates records that are processed by our daily financial posting run. This interface did not need to be real time as we only post once a day in our financial system and the clinical system also generates charges in a similar manner.

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E.2.6 Implementation Issues

The main stumbling block was the need for the data to be EBCDIC on the AS/400 and ASCII on the Tandem. The second RPG program referred to above in the ADT interface has the ability to do EBECDIC to ASCII translations as well as ASCII to EBCDIC on the return using an IBM program where you pass in one record at a time in a parameter and receive it back translated. Therefore this issue of translating one record at a time was minimal. Unfortunately the problem was not as easily handled with the charge batch. Something inherent with the Tandem hardware required us to perform a 'BINARY' translation when executing the 'GET'. Because the translation options of 'BINARY', 'EBCDIC', and 'ASCII' are mutually exclusive we were forced to either receive the file in ASCII or ask our vendor on the Tandem to send it in EBCDIC. When working with IBM on how to perform a ASCII to EBCDIC translation on an entire file we found that the only way was to use IBM PC Support functions which we determined to be too cumbersome. Our decision was to request the batch to be sent in EBCDIC.

E.2.7 The Future

Initially we only needed the two interfaces as the first module we are bringing up on the Tandem is the Pharmacy module. When we bring up our Order Communications module we will need to implement real time orders and results interfaces as our Lab system resides on our AS/400. It is our current plan to have those interfaces function similarly to the ADT interface and hopefully utilizing some of the same code.

Appendix F
Sample Templates

F.1 SAMPLE RFP FOR AN APPLICATION INTERFACE ENGINE

This appendix contains a Request for Proposal (RFP) for the selection of an Application Interface Engine (AIE) for the fictitious *St. Anybodys Medical Center*. The RFP is meant to serve as a model for developing your own RFP. Successful selection of an AIE is dependent upon how well the requirements in your RFP reflect the needs of your environment and on the evaluation of the product's ability to meet these requirements.

Several paragraphs of the model RFP have been left blank. These sections are purely site specific and it is left up to members of the organization to determine what information should be included. Most of these paragraphs are in sections II through V. These sections contain a description of the organization, its systems, its strategic direction, how the selection process will be conducted and how the AIE will be implemented. Italicized words in the RFP are meant to be substituted with words appropriate to the organization and the selection process.

St. Anybodys Medical Center

Request for Proposal for an Application Interface Engine

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F.2 SAMPLE INTEGRATION PROJECT PLAN FOR A CLINICAL LAB PROJECT 59

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F.1.1 Introduction

This is a Request for Proposal (RFP) for an Application Interface Engine (AIE) for *St. Anybodys Medical Center* (*SAMC*). The remainder of this RFP is divided into the following sections:

F.1.2 Background and Strategic Direction

This section includes information regarding *St. Anybodys Medical Center*, the current systems environment, and the project approach.

F.1.3 Instructions, Scope and Methodology

This section includes instructions for responding to the RFP, an overview of the selection timetable, the scope of the RFP, and a description of the evaluation methodology.

F.1.4 Current Operational and Technical Environment

This section describes the current operational environment and the strategic IS direction that *St. Anybodys Medical Center* intends to pursue.

F.1.5 Proposed Environment and Development Plan

This section describes the proposed interface environment and the plan for implementing interfaces on the selected AIE.

F.1.6 Vendor Information

This section includes questions regarding the vendor's organization, contractual and warranty specifications, system support and maintenance, installation support and system documentation and training.

F.1.7 Application Interface Engine Features and Functionality

This section defines specific functional requirements for the AIE.

F.1.8 Hardware/Operating System Technical Specifications

This section addresses the system architecture, performance and security requirements for the AIE.

F.1.9 Hardware and Software Cost Schedules

This section includes schedules which are designed to provide *St. Anybodys Medical Center* with complete and detailed cost information including the cost of hardware, software, ongoing maintenance, modifications, documentation, installation assistance, cabling, shipping, and taxes.

F.1.2 Background and Strategic Direction

F.1.2.1 Current Environment

- *Inpatient Care*
- *Ambulatory Care*
- SAMC *In the Community*
- *Emergency Care*
- *Volunteers*

F.1.2.2 Strategic Direction

F.1.3 Instructions, Scope and Methodology

F.1.3.1 Project Objectives and Scope of the Request for Proposal

The primary objective of this project is for the Information Services Department to select an application integrator that will allow the hospital to effectively and quickly interface multiple, disparate information systems.

The primary scope of this proposal is to define, evaluate, and select an Application Interface Engine that performs the following objectives:

- Supports long term IS strategies laid out in the information technology plan.
- Provides system-to-system interfaces ("back-end" integration).
- Allows for adding and removing of applications and/or platforms.
- Builds in redundancy of both hardware and software.
- Provides interface monitoring and management capabilities.
- Provides easy to use development tools.
- Provides a common user interface ("front-end" integration), if possible.

F.1.3.2 Vendor Requirements/Instructions

1. RFP Response
2. Please respond completely to Sections VI, VII, VIII and IX. The majority of the questions in these sections require a narrative response. Section IX contains the cost schedules. Each section introduction specifies the required response format. These instructions must be followed exactly. Failure to respond in the format requested may be cause for elimination.
3. Use of Vendor Proposal and Accompanying Material
4. All material submitted by the vendor becomes the property of *St. Anybodys Medical*

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Center and may be evaluated by any employee or agent of *St. Anybodys Medical Center*. *St. Anybodys Medical Center* reserves the right to proceed or not to proceed with plans to acquire an AIE. All proprietary information provided by vendors will be treated as confidential.

5. On-Site Walk-Throughs and Demonstrations

   Vendors will be scheduled for a *number*-hour on-site walk-through and system demonstration during *month*_____. The purpose of this step is to:

   - Allow vendors the opportunity to ask questions and clarify any issues related to the RFP.
   - Provide an overview of the physical layout of the site.
   - Allow *St. Anybodys Medical Center* to more fully understand the products being proposed.

   Each vendor will be required to have the appropriate staff on-site to:

   - Provide background on the company.
   - Provide a conceptual overview of how the proposed product will meet *St. Anybodys Medical Center* needs.
   - Conduct a detailed demonstration of the product and the interface development tools being proposed for *St. Anybodys Medical Center.*

   The goal of this session is to provide as much product and site information to both the vendor and the hospital to ensure a more thorough and complete RFP response and evaluation.

F.1.3.3 Number of Proposals

Please submit four copies each of all materials to the following address by *date*_____. We request that one copy of the responses be delivered in electronic format (Microsoft Word 6.0 or 7.0 is preferred).

1. Name of Individual
2. Tide of Individual
3. Address
4. Phone number

To assist in the response process, *St. Anybodys Medical Center* has provided a diskette containing the body of this RFP. This RFP has been created in Microsoft Word *6.0 or 7.0.*

The award of the contract, if any, will be based upon evaluation criteria developed by *St. Anybodys Medical Center* and the manner in which each proposal meets the evaluation criteria will be determined by *St. Anybodys Medical Center*, at its discretion.

All inquiries regarding the RFP and selection process should be directed to___*name*__ at the

address provided above.

F.1.3.4 Project Timetable

All RFP responses will be evaluated by a team whose members represent the Information Systems Department of *St. Anybodys Medical Center* and ___*name, if applicable*, *Consultant to St. Anybodys Medical Center* for this selection process. Each vendor will be notified of the outcome of the review of its response. The anticipated timetable for the evaluation process and subsequent project activity is summarized below:

1.	Begin Date - End Date	Conduct reference checks
2.	Date	Distribute request for proposal
3.	Begin Date - End Date	Vendor response period
4.	Begin Date - End Date	Schedule on-site walk-throughs and demos
5.	Date	Receive vendor responses
6.	Begin Date - End Date	Complete vendor evaluations and select systems for further review
7.	Begin Date - End Date	Conduct vendor demos
8.	Begin Date - End Date	Conduct site visits
9.	Date	Select vendor of choice

F.1.4 Current Operational and Technical Environment

F.1.4.1 Current Information Systems Environment

The current systems environment is...

The primary development language is...

F.1.4.2 Strategic Technological Direction

St. Anybodys Medical Center is pursing a strategy of selecting "best of breed" solutions, especially those with good interoperability characteristics. This strategy anticipates solutions built on standards and protocols, or systems with the ability to intemperate with system built on standards and protocols. The strategy favors robust platforms with good to excellent fault tolerance, scaleable architectures, and broad networking options.

Included in this direction is implementing:

- An Application Interface Engine (AIE)
- A Common User Interface (CUI)
- Connectivity to community physician systems

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F.1.4.3 Application Systems Environment

Applications currently supported include:

APPLICATION	*VENDOR*	*PRODUCT NAME*	*RELEASE/ VERSION*	*HARDWARE PLATFORM*	*FACILITY(S) USING THIS SYSTEM*	COMMENTS
ADT/OP Registration						
Medical Records						
Patient Billing/Credit and Collection						
General Accounting						
PayrolI/Personnel						
Charge Entry						
Order Communication						
Outpatient Scheduling						
Nursing Acuity						
Laboratory						
Radiology						
Pharmacy - Retail						
Pharmacy - Inpatient						
Operating Room						
Nurse Scheduling						

F.1.4.4 Application Interface Environment

Current Application Interfaces

The following point-to-point interfaces are currently installed):

	SENDING SYSTEM	*RECEIVING SYSTEM*	*TYPE*	*COMM. PROTOCOL*	*RECORD SIZE*	*RECORD VOLUME*
1•						
2•						
3•						
4•						
5•						
6•						
7•						
8•						
9•						
10•						
11•						
12•						
13•						
14•						

The following downloads are used to interface with foreign applications through magnetic media:

	SENDING SYSTEM	*RECEIVING SYSTEM*	*MEDIA*	*FREQUENCY*	*RECORD SIZE*	*RECORD VOLUME*
1•						
2•						
3•						
4•						
5•						

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Future Application Interfaces

Point-to-point interfaces that will be installed in the future include, but are not limited to:

	SENDING SYSTEM	*RECEIVING SYSTEM*	*TYPE*	*COMM. PROTOCOL*	*RECORD SIZE*	*RECORD VOLUME*
1•						
2•						
3•						
4•						
5•						
6•						
7•						
8•						
9•						
10•						
11•						
12•						
13•						
14•						

F.1.4.5 Network Environment

1. Local Area Network

a. a. Current Network

b. b. Plans/Strategy

2. Wide/Metropolitan Area Network

c. a. Current Network

d. b. Plans/Strategy

F.1.5 Proposed Environment and Development Plan

F.1.5.1 Proposed Environment

The proposed AIE environment at *St. Anybodys Medical Center* will ultimately include all of the interactions represented in the three Data Interaction Matrices that follow, as well as the future interfaces described in Section IV.C. The future interfaces will certainly not be limited to those identified in this document. Rather, we estimate that the number of interfaces could increase by 100-200 percent over the useful life of the AIE, with an attendant but unknown increase in interface traffic. All interfaces will be routed through the AIE. While the initial focus will be to migrate existing point-to-point interfaces to the AIE, new interfaces will

probably be implemented concurrently.

The matrices included in this section divide existing interfaces into three development categories. These categories are described and itemized in Section V.B. The last category includes specifics on anticipated near-term interfaces. Please note that inclusion in a particular category does not imply any temporal relationship, with the possible exception of Category I.

While *St. Anybodys Medical Center* is open to most hardware/operating systems platforms, it does have preferences. For specifics regarding existing interfaces to be transferred to the AIE, please refer to Section IV.C.

F.1.5.2 Development Plan

Applications will be phased into the AIE, not necessarily in order by their categories. However, Category I interfaces have been targeted for installation early in the life of the AIE. Phases of installation after Categories I through III will be determined by the business needs of *St. Anybodys Medical Center*. Sizing should focus on the first three categories, but information regarding future growth implications should be included. Guidelines for cost information are included in Section VIII.

F.1.5.2.1 Interface Categories

Future interfaces have been categorized by the impact their implementation will have on *St. Anybodys Medical Center* processes. Categories I through III represent a phased implementation of the AIE. Category IV lists interfaces that *St. Anybodys Medical Center* recognizes a need for but has not yet addressed.

a. Category I Interfaces

b. Interfaces included in the first category should be completed in the first 90-120 days of implementation. They include the following:

c. Category II Interfaces

d. Interfaces included in this category are expected to be completed in phase 2 (within 120-150 days of implementation). They include the following:

e. Category III Interfaces

f. Interfaces included in this category are expected to be completed in phase 3 (within 150-180 days of implementation). They include the following:

   - Downloads to Magnetic Media

g. Category IV Interfaces

h. These are interfaces that are known to be necessary in the near term, but have not been analyzed and designed. The time-frames for implementation are also yet to be determined. They include the following:

F.1.5.2.2 Data Interaction Matrices

The following Matrices summarize the types of information to be transferred across the interfaces in each category. The following codes have been used:

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A = A/D/T M = Clinical/Abstract Data F = Financial Management

C = Charges H = HR/Payroll S = Statistical

Category I Interactions

TO: *FROM:*				

Category II Interactions

TO: *FROM:*				

Category III Interactions

TO: *FROM:*				

F.1.6 Vendor Information

This section of the RFP presents questions related to the basic vendor information required by *St. Anybodys Medical Center*. Please answer each question completely, concisely, and accurately. Incomplete answers will be considered as "blank answers" and will be disregarded. Failure to provide appropriate data may delay or eliminate the evaluation of this proposal. The following pages may be photocopied or new ones prepared in order to help you respond to these questions, or you may respond on the enclosed diskette. In any event, the questions must be printed along with the answer.

Questions are presented in the following sequence:

1. General Vendor Information
2. Contractual/Warranty Specifications
3. System Support and Maintenance
4. Installation Support
5. Documentation and Training

F.1.6.1 General Vendor Information

1. Corporate Overview

   A. Names of Representatives

      Respondent to REP

      Name:

      Title:

      Office/Location:

      Phone Number:

   B. Authorized Contract Signer

      Name:

      Title:

      Office/Location:

      Phone Number:

2. Locality

   A. Where are your company headquarters located?

   B. Where is your sales office nearest to *St. Anybodys Medical Center* located?

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3. Corporate Management

Please indicate the date of the last change in the following items:

Last Change in:	*Date of Change*	*Comments*
Ownership Composition		
President		
Chief Financial Officer		
Technical Support Director		
Customer Support Director		
Auditors		
Bankers		

4. Financial Background

A. For each of the last three fiscal years, please indicate:

	FY 19__	*FY 19__*	*FY 19__*
Annual Sales			
Net Profit			
Total Assets			
Total Debt			

B. How many consecutive quarters of profit has your firm posted in the past two years?

C. List any outstanding financial or legal liens on the company.

D. Please provide a copy of your most recent financial statement.

5. Product Development Profile

A. How long has your company been in the business of data processing?

B. How long has your company been in the business of Application Interface Engines?

C. What percent (%) of revenue and how many dollars did your company allocate for research development on your AIE for 1994?

- Percent of Revenue:

- Dollars:

D. Have any of your customers canceled a contract before, during, or after an installation? If yes, why? Specify hospital and location.

E. What is the name and version of your operating system? Is the operating system standard or tailored for the vendor?

F. Is any part of your system written by a third party? If so, what applications? Who wrote it? Who supports it? What is your companies relationship with the third party?

6. AIE Customer Base

Identify, by hospital size, the number of hospitals currently using the AIE you propose.

- 0-300 Beds:
- 301-500 Beds:
- 501-700 Beds:
- Over 700 Beds:

7. References

Identify the following items for at least three hospitals that are currently using your AIE for the system you are proposing for *St. Anybodys Medical Center*. The hospitals listed should be using the same HIS vendor or have environments similar to ours.

	FACILITY 1	*FACILITY 2*	*FACILITY 3*
NAME OF FACILITY			
FACILITY ADDRESS			
NUMBER OF BEDS			
INPATIENT DAYS			
OUTPATIENT VISITS			
IS DIRECTOR NAME			
IS DIRECTOR PHONE			
AVAILABLE FOR A SITE VISIT?			

A. Describe each of the facilities referenced.

Facility 1:

- The hospital environment and system configuration:

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- Similarities to *St. Anybodys Medical Center*:

Facility 2:

- The hospital environment and system configuration:
- Similarities to *St. Anybodys Medical Center*:

Facility 3:

- The hospital environment and system configuration:
- Similarities to *St. Anybodys Medical Center*:

B. Describe the interfaces installed at the reference facilities

Facility 1:

APPLICATIONS INSTALLED	*CURRENTLY INTERFACED THROUGH THE AIE?*	*REAL TIME INTERFACE?*	*COMMUNICATION PROTOCOL*

Facility 2:

APPLICATIONS INSTALLED	*CURRENTLY INTERFACED THROUGH THE AIE?*	*REAL TIME INTERFACE?*	*COMMUNICATION PROTOCOL*

Facility 3:

APPLICATIONS INSTALLED	*CURRENTLY INTERFACED THROUGH THE AIE?*	*REAL TIME INTERFACE?*	*COMMUNICATION PROTOCOL*

F.1.6.2 Contractual/Warranty Specifications

1. Purchase Contract

St. Anybodys Medical Center is interested in including the following items in the final contract. Describe your company's position on including each item in the final contract.

a. Scheduled installation dates for all hardware and software.

b. Positive incentives for meeting implementation dates.

c. Availability dates of software under development.

d. Provisions for cancellation by either party and penalties for cancellation and/or failure to perform.

e. Set of acceptance criteria to be used in determining that the system is installed satisfactorily.

f. A guarantee for the availability (for example, minimum downtime).

g. Throughput (transactions per second).

1. A guarantee of throughput.

2. Are your throughput objectives with or without mapping? Your throughput definition should include the length of the message and some amount of mapping (described).

3. Provide examples of expected throughput specific to *St. Anybodys Medical Center*.

4. Provide benchmarks and substantiate performance.

5. Indicate recourse if throughput does not meet the guaranteed performance.

h. Identification of modifications necessary to customize your system to meet the requirements of *St. Anybodys Medical Center*.

i. Timeframes in which modifications will become available.

j. Names and resumes of personnel to be assigned to the installation.

k. Training schedule.

l. Right for *St. Anybodys Medical Center* to demand component replacement (lemon clause).

m. Absolute fixed price or "not to exceed" contracts for hardware, software and services.

n. Guarantee that software prices and installation fees quoted in this REP will be honored during the duration of the selection process. Hardware prices will be valid for a minimum of twelve (12) months.

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o. Definition of response time.

p. Maximum acceptable software and hardware support response time.

q. Definition of escalation procedures.

r. Incorporation of specification in the RFP as part of the contract.

s. Assignment clauses.

t. Source code escrow options and invocation criteria.

u. Verification that the software has no key locks or software disabling capabilities.

v. Disclosure of all third party relationships

w. Warranty of ownership and/or right to sub-license.

- Describe the contracting options that you offer to your clients.
- Will you stipulate that your contract will be entered into under and governed by the laws of the State of ___*state*__ ?
- How and when (before or after the contract is signed) are the detailed specifications for each system developed? Can installation costs be changed based on these specifications? Do both parties sign off on specifications? When is this done?
- Is your company willing to post a performance bond to "insure" successful installation and operation?
- Will you contract fixed prices for software systems which are currently under development and not yet installed?
- Will you support the re-incorporation of custom modifications (done for *St. Anybodys Medical Center*) into all new software releases?
- What is your company's position regarding the inclusion of a 30-day cancellation clause in your contracts?

2. Warranty

a. Please provide a copy of your standard hardware and software warranty.

b. If you do not sell the hardware on which the proposed software will execute, describe the process by which you will warrant the operation and performance of your software on the proposed hardware platform.

c. Will your company warrant your software if the hardware is purchased directly from the hardware vendor?

F.1.6.3 System Support and Maintenance

1. Contract

a. Please provide a copy of your standard hardware and software maintenance/support contract.

b. Describe how you contract for ongoing software maintenance and support.

c. How soon after the release of a new operating system will you guarantee delivery and installation?

d. If you modify your operating system, how long will it take you to incorporate these modifications into previous releases?

e. If *St. Anybodys Medical Center* delays or declines to install a new release, how will this affect our support agreement?

f. Do the proposed costs of your system include future enhancements and developments? If not, describe the conditions and terms under which enhancements and new releases are available to current users of your system

g. Do you act as a single point of contact for all hardware and software?

h. What is the average response time to call for software support that your company is prepared to guarantee?

i. What is your company's policy regarding maintenance contracts that do not automatically renew (e.g., is positive action required to renew the maintenance contract)?

2. Capabilities

a. Does your system have the capability for dial-up diagnosis of system trouble?

b. Under your software maintenance agreement can *St. Anybodys Medical Center* develop its own separate systems that could access, but not modify, data contained in your system?

3. Field Support

a. Where is the field office nearest to *St. Anybodys Medical Center* for software support?

b. With how many and what types of employees is it staffed?

c. What office is responsible for the maintenance of the following hardware, what is the location of that office, and what is the average response time to calls for hardware support that your company is prepared to guarantee?

	RESPONSIBLE PARTY	*OFFICE LOCATION*	*TIME*
FILE SERVERS			
TERMINALS AND WORKSTATIONS			

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PRINTERS			
COMMUNICATIONS EQUIPMENT			

d. Is emergency hardware and software support available 24 hours a day, seven days a week, on-site or by telephone? Define types of response, timeframes. and additional cost if there is one.

e. What is the availability of spare parts and standby equipment, should it be required by *St. Anybodys Medical Center*? What timeframe should be expected for parts and equipment to be delivered to *St. Anybodys Medical Center*?

f. Describe in detail the support you provide based on the system you have proposed. Include the following areas of support:

- Training
- Education
- Hot Lines
- Software releases and Enhancements
- Documentation

g. Describe any regularly held seminars or user group meetings available to users of your system. Have any enhancements been developed based on input from these user group meetings?

F.1.6.4 Installation Support

1. Staffing

Describe in detail the installation process including the number of vendor personnel you will commit to having on-site during the installation. Provide an installation work plan indicating the tasks required (including hardware and communications equipment installation and interface development), the party responsible or each task (hospital, vendor. other), the approximate time required to complete each task, and the relative sequence of tasks. Also, specify client resources needed to successfully install your system (e.g., data processing and department man-hours, required skill levels, etc.).

a. Provide brief resumes of your personnel who would manage the project as well as those who would be assigned to the day-to-day work.

b. Provide brief resumes of your support and development staff.

c. Describe the anticipated *St. Anybodys Medical Center* personnel required and the skill level required to support your system on an ongoing basis.

d. Define one individual on your staff who will have overall responsibility for the total implementation and conversion.

e. How many installations are you currently supporting?

f. How many installations do you anticipate installing throughout the next 12 months?

2. Method

a. Describe your methodology for installation and frequency of product releases. Provide a history of product release for the last 18 months.

b. Describe your method of identifying, documenting, and providing software modifications.

F.1.6.5 Documentation and Training

1. Documentation

a. Describe the documentation provided as part of your standard installation approach including:

b. Manager and user reference manuals

c. User operator manuals

d. Will copies of user and system documentation manuals be provided for review during the system evaluation process?

e. Can on-line documentation manuals be printed on demand?

f. How often is application documentation updated? How often are updates made available to the user? How is documentation updated (memo, revised manuals, etc.)?

g. Do you customize end user documentation to reflect *St. Anybodys Medical Center* modifications?

h. In what media is the documentation provided (e.g. CD ROM, Help Files, Paper Manuals, etc.)?

i. Is necessary hardware, operating system and other third party documentation provided?

2. Training

a. Describe the training approach and schedule you would recommend for *St. Anybodys Medical Center*. Indicate incremental training costs, specify training materials, user materials, and the number and skill levels of the employees required for training

b. Describe your methodology for incorporating a testing region and a training region.

c. Describe any computer-assisted instruction modules that you have available.

d. Do you provide training in the use of routines to build system files/dictionaries/tables?

e. Describe the operations training available to data processing personnel. Does it include:

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- Training on hardware maintenance and repair
- Recovery from hardware and software failures
- Running hardware diagnostics
- Interpretation of hardware diagnostics

f. Do you provide the final end user training manuals?

g. Is on-site training available?

h. Is training available for every release? Is it included in the price of the release?

i. What are the qualifications of your trainers?

F.1.7 Application Interface Engine Features and Functionality

This section defines the functions and development tools both necessary and desired for implementation of an AIE at *St. Anybodys Medical Center*. Each subsection of questions is prefaced with the *St. Anybodys Medical Center* definition of the feature/function. The AIE vendor must address each subsection's questions in their proposed solution. If specific features or functionality are unavailable, the AIE vendor must identify these as unavailable and propose alternative solutions that meet *St. Anybodys Medical Center*'s integration requirements. If a feature is available in a future release, please note the anticipated release date. Again, the questions must be printed along with the answer and identify in what module your system provides each of the features.

Questions are presented in the following sequence of subsections:

A. System Overview

B. Transaction Data Translation, Splitting and Combining

C. Transaction Routing

D. Application Interface Engine Development and Maintenance Tools

E. Product Architecture

F. Customer User Interface Front End

G. Standard Interfaces

H. Data repository

I. Administration

F.1.7.1 System Overview

Based on your knowledge of the *St. Anybodys Medical Center* environment, please provide an overview description of the system interface solution you are proposing. Include a schematic and/or a conceptual overview diagram of the system.

1. System Description

2. System Diagram

F.1.7.2 Transaction Data Translation, Splitting and Combining

This function converts a transaction received from one computer platform and repackages that transaction into a format the receiving application system platform can interpret and use. It involves reformatting and changing record lengths along with communication protocol conversion, if needed.

All transactions routed through the AIE must be validated for format and content. An initial validation screening must ensure that all parts of a transaction arrived from a sending system. Any security/authorization checking should be performed at this time. An acknowledgment should be sent to the sending system indicating that a legitimate transaction has arrived for AIE processing.

Communications protocol translation must be performed between disparate computer platforms. Protocol conversion should occur prior to data reformatting and transmission of the transaction to the receiving system. The AIE will look like a dedicated network resource to each major computer platform to which it is attached.

Each message or transaction sent to the AIE, once received, must be formatted to the specifications of the receiving systems.

Describe in detail how, and in what module, your system provides each of the following capabilities and facilities:

Transaction Data Handling

1. Ensuring that all parts of a transaction arrive from a sending system.

2. Sending an acknowledgment to the sending system indicating that a legitimate transaction has arrived for processing.

3. Rejecting/accepting transactions based on data that is part of the transaction.

4. Modifying field values in a transaction based on conditions that can be defined within the AIE application.

5. Modifying field values in a transaction based upon values within transaction fields.

6. Routing transactions based upon values within transaction fields.

7. Updating/validating database code tables based upon values within transaction fields.

8. Lengthening/shortening a transaction by adding/removing data based on pre-defined code tables or conditions that may require mathematical computation.

9. Translating a batch file into a series of real-time transactions.

10. Translating a series of real-time transactions into a batch file.

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11. Compressing the data packet and/or individual data elements prior to sending to the receiving system.

12. Translating transactions from ASCII to EBCDIC (and vice versa) prior to sending to the receiving system.

13. Providing error recovery and validation.

14. Combining data elements of multiple transactions into a single transaction.

15. Splitting a single received transaction into multiple sending transactions.

16. Processing binary data (e.g., GIF to JPEG).

17. Parsing by extracting and transmitting all or selected transaction fields as required by the receiving system.

18. Reordering and enhancing data elements as necessary for processing by the receiving system.

19. Communication Protocol Translation

20. List the protocols translations that are provided with your AIE.

21. Describe your communication protocol facilities and your method for conversion. Are any third party or additional hardware or software components required? Does configuration involve any type of programming? What implementation tools are provided?

F.1.7.3 Transaction Routing

The primary function of the transaction routing feature is to send transactions from one application system to a receiving application system. The router has the network transport protocol necessary to make the connection to the receiving system and can dynamically change paths to a receiving system.

Describe in detail how, and in what module, your system provides each of the following capabilities and facilities:

1. Source and Destination Routing

   The router should be able to pass transactions on to a single destination and multiple destinations depending on transaction type. Alternate routing functions should be available in the event of system or network failure.

   a. Explain the router function.

   b. Explain recovery methods when AIE failures occur.

   c. Describe features available to monitor such failures.

2. Routing Variables

   Identity whether transactions can be routed to destinations based on each of the following variables, and explain how routing is performed for each possibility:

a. Transaction type

b. User location

c. User sign-on

d. Application processor type

e. Date/time transaction has been generated

f. Value of a data element contained in the transaction (e.g., critical value indicator on lab result)

g. Value of related information not contained in the transaction but contained in a separate database (e.g., routing of lab results based on Referring Physician). Describe this database and how it is accessed as part of transaction routing.

h. Values of two or more data elements contained in the transaction (e.g., patient age and patient diagnosis)

i. Explain which variable(s) take precedence.

3. Route Transaction Tuning

   Transactions can be routed to destination systems at a scheduled time during the day or on scheduled dates.

   a. Explain how this function is performed.

   b. Explain what happens if a receiving system is unavailable.

4. Transaction Store and Forward

Identify whether the AIE can receive transactions and store these transactions until one of the following events occur:

a. A time threshold is reached

b. A set number of transactions has been queued for the target system application

c. An application system indicates it has recovered from a failure

d. A predefined application function occurs

e. A *St. Anybodys Medical Center*-defined application processing event occurs

f. Describe in detail what transpires when each event occurs.

g. What other trigger events will send a transaction?

h. Describe transaction history/archival capabilities.

i. Describe transaction re-transmission capabilities.

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5. Transaction Size and Volume

    a. Identity size limitations.

    b. Identity volume limitations.

    c. (Describe image, audio, and video transaction capability.

6. Batch File Transfer

    Which of the following do you support? How are they configured (e.g. table-driven, programmed, etc.)? Describe the programming effort and/or tables required.

    a. TCP/IP

    b. DECnet

    c. OSI

    d. Kermit

    e. X-, Y-, or Z-Modem

    f. Novell

    g. Pathworks

    h. LAN Manager

    i. Appletalk

    j. SMTP

    k. Magnetic Media

    l. Any others your product supports

F.1.7.4 Application Interface Engine Development and Maintenance Tools

The Application Interface Engine (AIE) development environment must fit within the framework of *St. Anybodys Medical Center*'s existing design, program and testing philosophy. Review and QA will be used throughout the development phase and in the overall implementation of the AIE. Development tools specified by the vendor must include aids for debugging and testing.

In addition, computer based training and help facilities are desirable in the proposed solution. The underlying programming language should correspond to a common development language in general use today (e.g., C or C++). The intent of the development tools is to give interface developers easy to use methods and tools for designing, programming, editing and testing interface programs.

Maintenance of the AIE (including starting and stopping interfaces, monitoring sessions and connection status, etc.) should be uncomplicated yet secure. In *St. Anybodys Medical Center*'s environment remote maintenance capability is desirable.

Describe in detail **how, and in what module**, your system provides the following capabilities, facilities and tools:

1. Programming Aids

    a. Tables and menus to configure messages that the AIE will receive and forward to other systems.

    b. Sections for help and programmer training

    c. Templates for pre-existing standards (e.g., HL7, ANSI X.12, etc.)

    d. A GUI for system interface developers to access AIE resources as well as execute real-time tests

2. Testing and Debugging Aids

    Debugging aids that incorporate facilities for:

    a. Sending dummy transactions (with and without requiring applications)

    b. Conducting stress tests

    c. Monitoring step-by-step processing flow

    d. Real-time reviewing of results

    e. Monitoring statistics

3. Documentation

    Utilities that create, as a by-product of interface application coding, documentation of:

    a. Record layouts

    b. Processing flows

    c. Special reports

4. Prototyping

    While interface coding is being developed, utilities that provide for:

    a. Unit testing

    b. Overall system (integration, stress, parallel) testing

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5. Object Oriented Programming

   Facilities that allow system developers to:

   a. Manipulate data objects and formats without writing the underlying programming language.

   b. Establish relationships between data elements and systems that result in a test or prototype interface environment being created.

   c. Save and reuse previously designed and tested relationships for function testing and debugging.

6. Database/Data Definition

   Facilities that provide for:

   a. Defining/maintaining a data dictionary of commonly interfaced items and data conversion tables.

   b. Any database management functionality inherent in the AIE.

7. Language

   Identify availability of:

   a. Intrinsic language(s)

   b. Third-party language(s)

   c. Debugger(s)

   d. Code Library tool(s)

   e. Editor(s)

8. Programmer "Exits/hooks"

   Facilities that provide for:

   a. Conditionally passing control to customized external routine(s) based on field values, transaction types, etc.

   b. Resuming processing when control returns.

9. Security

   Facilities that provide for:

   a. Isolating development from production areas.

   b. Protecting data dictionaries and tables.

   c. Migrating developed interfaces into production.

d. Starting up/shutting down individual interfaces.

e. Authenticity. What method do you recommend for verifying the sender of the message? Do you support a digital signature?

f. Do you encrypt/decrypt messages?

g. All other intrinsic security functionality.

10. Maintenance

    Facilities that provide for:

    a. GUI-based monitoring/system maintenance.

    b. 'Snapshot' screens for quick system status checking/reporting

    c. Starting up/shutting down individual interfaces

    d. Querying status of individual links.

    e. Remote access

    f. All other intrinsic maintenance functionality

11. Communication Client Level Development

    a. What already developed assets are available? How much do they cost?

    b. How do you inform clients of their availability

F.1.7.5 Product Architecture

The architecture of the AIE can have significant impact on performance, fault tolerance, and robustness of the individual interfaces as well as on overall system performance and development cycles. *St. Anybodys Medical Center* requires that the architecture of the proposed system promote these objectives and facilitate the AIE's growth over time.

Describe in detail the AIE's architecture **and why/how it fits the *St. Anybodys Medical Center* environment**. The description should include details on the scalability, mirroring, use of multiple processors and/or multiple processes, and how a distributed AIE may be implemented

1. AIE Architecture
2. Scalability
3. Mirroring
4. Processors
5. Distributed AIE

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F.1.7.6 Customer User Interface Front End Integration

St. Anybodys Medical Center desires a Common User Interface (CUI) for presentation to end users, preferably in a graphical object oriented format.

If your product supports this concept by either providing the capability or by facilitating its development please complete this section.

Describe in detail **how, and in what** module, your system provides the following capabilities and facilities:

1. Supporting specific types of end user devices (e.g., workstations, terminals, PCs, printers, etc.).

2. Supporting common log-in services (e.g., the ability to use a single log-in ID to access multiple application systems).

3. Supporting menu services (e.g., the ability to execute an application without requiring the user to interface with the system software).

4. Supporting 'mapping' services (e.g., providing common screen layout and function key services for all users regardless of the application or system).

5. Supporting hot key services (e.g., the ability to maintain multiple sessions and switch back and forth between applications).

6. Supporting windowing services (e.g. , the ability to display multiple sessions on the screen at once with "cut and paste" features).

7. Supporting object oriented graphical user interface (e.g., a client-server application where data from multiple application processors is retrieved and processed at the user workstation for display based on a user sign on.

8. Ability to monitor the AIE remotely (e.g., availability of multiple or remote console). If the environment is distributed can all the processors be seen in one window?

F.1.7.7 Standard Interfaces

Health Level 7 (HL7) is a standard for interfacing health care environments. The focus of HL7 is the seventh layer, the application level, of the System Interconnection (OSI) model of the International Standards Organization (ISO). As such, HL7 has focused on communication issues related to the definition and format of data to be exchanged and to the timing of the data exchange.

St. Anybodys Medical Center is committed to using HL7 for standardization of all interfaces. However some of its current systems require proprietary system interfaces. *St. Anybodys Medical Center* is interested in compressing the development cycle by utilizing other standardized interface message templates that may be a part of the AIE.

Describe in detail how, **and in what module,** your system provides the following capabilities and facilities:

Support for HL7.

1. Support for HL7 version 2.1.
    a. Recognizing and supporting all HL7 trigger events, v2. 1.
    b. Recognizing and supporting all HL7 message types, v2.1.
    c. Recognizing and supporting all HL7 segments, v2.1.
2. Support for HL7 version 2.2.
    a. Recognizing and supporting all HL7 trigger events, v2. 2.
    b. Recognizing and supporting all HL7 message types, v2.2.
    c. Recognizing and supporting all HL7 segments, v2.2.
3. When will support for HL7, v2.3, trigger events, message types and segments be available?
4. Support for user-defined elements.
    a. Recognizing and supporting user defined trigger events.
    b. Recognizing and supporting user defined message types.
    c. Recognizing and supporting user defined segments.
5. Supporting HL7 encoding and decoding rules.
6. Supporting multiple versions of HL7.
7. Supporting HL7, if the AIE does not specifically recognize HL7 standards.
8. Does it support the sequence protocol?

Support for non-HL7 Interfaces

1. Does your AIE support multiple message formats that consist of HL7 and non-HL7 formats?
2. What other standardized interface templates are provided within the AIE. For each interface standard, include a list of versions supported.
    a. ANSI X.12
    b. DICOM
    c. Other Interface Standards
3. What database capabilities are resident in the engine (e.g. loader, acknowledgment database, etc.)?
4. What tools are available?

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F.1.7.8 Data Repository (Clinical Database)

The AIE might be a vehicle for populating a clinical data repository. This repository will collect information from existing *St. Anybodys Medical Center* systems and disseminate the information in a format defined by an end user. The database will reside on another processor or system on the enterprise network with Systems feeding information to it in a common data formal

If your product supports this concept by either providing the capability or by facilitating its development, please complete this section.

The database will consist of communications hardware, system and database software to gather patient demographic information and clinical data or *St. Anybodys Medical Center* users.

Describe in detail any features and/or functionality that could be used to populate a data repository (e.g., a clinical data repository), and identify in what modules they reside.

F.1.7.9 Administration

Administration includes those functions that are necessary to ensure the day-to-day operation of the AIE. Administrative functions differ from interface implementation functions in that they do not address the interface configuration or mapping. Administrative functions concentrate on the performance of the system, the successful completion of transactions, access to the system and maintenance functions.

1. Describe in detail the administration capabilities of the AIE.
    a. Security
    b. Error Logging
    c. Transaction Logging
    d. Activity Logging
    e. Error Escalation
    f. System/Link Escalation
    g. User Access
    h. Distributed Administration (i.e. ability to allow different administrators to perform different administrative functions, without providing access to all administrative functions.)
    i. System-Wide Parameters
2. Describe any administrator training included with the system.
3. How much time should the *St. Anybodys Medical Center* AIE Administrator spend administering the system? Describe daily, weekly, and monthly that should be performed.

F.1.8 Hardware/Operating System Technical Specifications

This section defines the technical specifications for the product platform both necessary and desirable for implementation of an AIE at *St. Anybodys Medical Center*. Each question is prefaced with the *St. Anybodys Medical Center* definition of the specification. The AIE vendor must address each subsection's questions in their proposed solution. if specific features or functionality are unavailable, the AIE vendor must identify these as unavailable and propose alternative solutions that meet *St. Anybodys Medical Center*'s integration requirements. If a feature is available in a future release, please note the anticipated release date. **Again, the questions must be printed along with the answer and identify in what module your system provides each of the features.**

Questions are presented in the following sequence of subsections:

A. Processor

B. Input/Output

C. Network and Communication Protocols

D. Operating System

E. Performance/Integrity

F. Fault Tolerance

G. Backup/Restore/Journaling/System Recovery

H. Disaster Recovery

I. Environment

J. Cable Plant

F.1.8.1 Processor

In order for the AIE product to perform the integration processing at *St. Anybodys Medical Center* it must be coupled with a processor that is capable of delivering the required services in a time efficient manner with a high degree of integrity.

1. Describe the attributes you deem important for a processor when implementing the AIE product.

2. Is the processor designed to accommodate a high volume transaction processing environment? If so, what are the specifications on the recommended processor?

3. Is the processor RISC or CISC?

4. What architecture/family is the processor?

5. What is the design and performance of the internal BUS?

6. What are the performance ratings for this processor?

7. Does the processor allow an upgrade path? If so, what is it?

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8. Describe processor data integrity and error recovery features.

9. Can the platform be incorporated into a cluster (Open VMS or Unix)?

F.1.8.2 Input/Output

Because of the high transaction loads expected to be performed on the AIE the system must be designed with high speed buses and I/0 devices. The majority of the I/0 devices will be to the network adapter and the disk, and for this reason *St. Anybody's Medical Center* feels the system must be architected such that the network bus and I/0 bus be capable of sustained handling of large bandwidths at high speeds. While performance is a key attribute, so is integrity; therefore, the system and its components must also maintain data integrity throughout all operations.

1. Describe the attributes you deem important as '10 features when implementing the AIE product.

2. What type of disk subsystem is used by the recommended processor?

3. What are the benchmarks (bandwidth, bus, etc.) associated with the recommended disk subsystem?

4. What are optional disk subsystems available with the recommended processor?

5. Does the system provide disk caching features? If so, what are they?

6. Describe high performance features of recommended disk subsystem.

7. Describe availability, data integrity, and error detection/correction features of recommended disk subsystem.

8. Describe system RAID capabilities.

9. Describe system disk grouping/clustering capabilities.

F.1.8.3 Network and Communication Protocols

The AIE product at *St. Anybodys Medical Center* will be providing critical services to the entire information systems arena. What this means to *St. Anybodys Medical Center* is the AIE must have the ability to successfully integrate and communicate with all of *St. Anybodys Medical Center*'s existing and planned information systems. *St. Anybodys Medical Center* operates on a number of disparate platforms that are integrated through network services. This type of environment is expected to continue growing as we implement more systems to assist the institution achieve its mission.

1. Describe the attributes you deem important as network features when implementing the AIE product

2. What types of communications adapters are available for the recommended platform? Please list all available.

3. Can the platform accommodate multiple communications adapters? If so, can they be of varying types?

4. Does the system allow for multiple adapters to be active simultaneously? Are there any limitations to the number allowed?

5. What type of internal bus accommodates the communications adapters? What are the performance

6. What type of communications adapters are you recommending for *St. Anybodys Medical Center*? What are the performance ratings for these adapters?

7. What types of terminal servers/controllers are available?

8. What types of communications software is available for connecting this platform to the *St. Anybodys Medical Center* proposed enterprise network?

9. Describe what happens to the AIE or its interfaces if one of the interface processor nodes fails.

10. Describe what happens to the AIE or its interfaces if communications is broken with one of its processor partners.

11. Can the product communicate using:

    a. DECnet Phase IV

    b. TCP/IP

    c. RS232

    d. 051

    e. Novell

    f. Appletalk

    g. Pathworks

    h. Any others?

Describe all central network management capabilities.

F.1.8.4 Operating System

The operating system utilized by the AIE processor is responsible for providing services to the applications and system components. The operating system is also responsible for maintaining and coordinating all tasks and processes on the system.

1. Describe the attributes you deem important for the operating system when implementing the AIE product.

2. What type of operating system are you recommending for the recommended platform?

3. Is this a multi-processing/multi-tasking operating system?

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4. What other operating systems does the AIE operate under?

5. Describe data integrity and error detection/correction features of the recommended operating system.

6. Does the AIE application have any hooks into the operating system? If so, please list the hooks and the OS process they interact with.

7. What are the performance benchmarks for the recommended OS?

8. Describe the fault tolerant features of the recommended operating system.

9. Describe the security maintenance features of the recommended operating system.

10. Describe operating system management GUI, if available.

F.1.8.5 Performance/Integrity

Performance and integrity are critical elements in providing service to the user. Because the AIE will be providing services that are critical to the institution, it must have high performance while maintaining the utmost integrity at the transaction, data and security levels.

1. Describe what attributes you deem important for performance and integrity when implementing the AIE product?

2. What are the overall performance benchmarks for the recommended system?

3. What type of growth factor was built into the recommended systems?

4. How is data integrity maintained?

5. What happens if data integrity is not maintained?

6. What optional performance features are available?

7. Describe real-time performance monitoring utilities.

8. Can performance tuning be performed dynamically (e.g., can I/O paths be altered, can CPU resources be redirected, etc.)?

9. How is network performance monitored?

10. Describe real-time network performance monitoring utilities.

11. How is disk performance monitored?

12. What is the processor and performance overhead associated with the various data modalities (e.g. text, voice, imaging, video)?

13. How does a GUI interface impact performance, and what considerations/options must be implemented to support this?

14. How does a CUI interface impact performance, and what considerations/options must be

implemented to support this?

15. Identify inbound/outbound transaction volume limitations.

16. Identify transaction turnaround rate that is provided by the recommended processor, operating system, I/O subsystem, and network configuration.

17. Describe performance management GUI, if available.

F.1.8.6 Fault Tolerance

Because the AIE will be providing critical services to all areas within the hospital, and due to the dependence other systems have on the AIE for Interface information, it is necessary to provide a fault tolerant environment in order to eliminate or minimize the potential of downtime.

1. Describe what attributes you deem important for fault tolerance when implementing the AIE product.

2. What levels of fault tolerance are available for the recommended platform?

3. Can fault tolerance be incorporated incrementally (e.g., disk mirroring, disk duplexing, etc.)?

4. What auditing features are available for tracking faults?

5. How are staff members alerted to faults?

6. How is the hardware vendor alerted to faults?

7. Does the system automatically detect faults and reroute to backup systems?

8. Can faults be corrected dynamically or is down time and/or operator intervention required for servicing?

9. Describe how the system provides 'continuous up-time.'

10. Does/can the system utilize swappable Components as its redundancy mechanism? What components can utilize this form of redundancy? Is this ‘hot swappable’?

11. Does the system utilize shadowed disks?

12. Does the system contain a redundant power supply?

13. Describe how the fault tolerant features of the system can be phased in.

F.1.8.7 Backup/Restore/Journaling/System Recovery

In the event of disk damage/downtime, or corruption to data files, or disaster recovery circumstances the system must be capable of performing backups and restores. In a traditional environment this requires the system to be dormant for a period of time in order to backup or restore given files; however, because of the nature and dependence of other systems on the AIE this must either be eliminated or be made very short.

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1. Describe the attributes you deem important for backup/restore features when implementing the AIE product.

2. How are backup/restore functions incorporated into your system?

3. Does backup require system downtime?

4. How are backups tracked?

5. Can the recommended platform perform unattended backup with the product active and still maintain data integrity? If so, how?

6. What medium is recommended for backup?

7. What media options exist for backup?

8. Describe in detail the process for recovery of production from backup media.

9. Describe in detail transaction journaling.

10. Describe in detail recovery procedures using backup and journal files.

F.1.8.8 Disaster Recovery

St. Anybody's Medical Center requires a disaster recovery plan to be incorporated at all levels within the institution. This is even more critical at *St. Anybody's Medical Center* than at most corporations due to the business *St. Anybody's Medical Center* is in. Our health care staff and patients rely on *St. Anybody's Medical Center*'s information systems to provide timely and accurate information for patient care. In the event of a disaster the AIE must be recovered because of its relationship to the other systems.

1. Describe the features/plans/facilities available for disaster recovery.

2. Describe disaster recovery plans you have incorporated at other institutions, and identify the institution and contact person.

3. What types of disaster recovery functions are available with the recommended platform?

4. What, if any, disaster recovery function are you recommending?

5. How are you, the vendor, involved in disaster recovery?

6. Describe any real-time disaster-tolerant features of the product (e.g., an Open VMS, or FDDI cluster).

F.1.8.9 Environment

St. Anybodys Medical Center provides a data center that is engineered to provide facilities to meet the requirements of the equipment. This includes but is not limited to proper power, air conditioning, space, and security.

1. Describe the environmental requirements/consumption (e.g., electrical power, A/C, etc.) of

the AIE processor and its components.

2. What are the proposed platform's space requirements?

3. Please provide copies of templates for planning the computer room layout.

F.1.8.10 Cable Plant

St. Anybodys Medical Center has typically installed cabling on an as needed basis to support network and system applications.

It is anticipated that the hardware platform will be configured with the appropriate cables.

1. Describe any cabling that will be required to support the AIE.

2. Provide a schematic representing the physical layer of the network to describe how *St. Anybodys Medical Center* systems will be connected to the AIE.

F.1.8.11 Security Specifications

This section/subsection defines the specifications for security functions both necessary and desirable for implementation of an AIE at *St. Anybody's Medical Center*. If specific features or functionality are unavailable, the AIE vendor must identify these as unavailable and propose alternative solutions that meet *St. Anybody's Medical Center*'s integration requirements. If a function is available in a future release, please note the anticipated release date. **Again, the questions must be printed along with the answer and identify in what module your system provides each of the features.**

The current information systems at *St. Anybody's Medical Center* security environment consists of individual security systems based on processor/OS platform. The platform/security package correlation is as follows:

DEC VAX/VMS Standard VMS Security/Application-Level Security
Ultrix BSD level Security/Application-Level Security

St. Anybody's Medical Center currently performs security checks at the dataset level, user ID level, transaction level, volume level, task level, and system level. All current systems generate security logs for auditing by appropriate personnel.

It is *St. Anybody's Medical Center*'s intent to maintain a secure environment while not constricting the flow of information to areas/users requiring it. The future of security from a central system/central database is still unknown; however, *St. Anybody's Medical Center* will continue to keep abreast of technologies available.

1. Describe in detail how, and in what module, your system provides the following capabilities and facilities:

   a. Transaction authentication

   b. Data integrity

   c. Auditing/logging security violations

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d. Automatically revoking privileges upon exceeding security parameters

e. Security at all levels (e.g. dataset, volume, task, transaction, etc.)

f. Security interfaces to all platforms interacting with the AIE

2. For the recommended system what security package is being implemented?

3. Are other packages outside of the recommended package available? If so, what are they and who manufactures them?

4. For the recommended security package what features does it incorporate?

5. How is security maintained when integrating and communicating with foreign systems?

6. Is security pass-through available? Do you recommend using it? If not, why not?

7. Does the recommended security system allow for multiple security administrators? If so, can these administrators be assigned different levels of authorization based on their function? What are the levels?

8. Will the security system allow for dynamic reconfiguration? If so, can the new configuration be activated based on administrator requirements (e.g. immediately or deferred)?

9. Describe security administration GUI, if available.

10. How is security maintained in conjunction with single terminal access or CUI?

F.1.9 Implementation Cost Schedules

This section of the RFP includes schedules for cost information for the proposed system. Please fill out each section completely and accurately.

We have provided transaction information for the proposed interfaces. **Failure to provide cost information in the required format or for a different implementation approach may be cause for elimination.**

The schedules for the following are included:

A. Software

B. Hardware

C. Documentation

D. Modifications

E. Support and Implementation Staff

F. Training

G. Installation Assistance

H. Ongoing Support, Maintenance, and Enhancements

I. Shipping and Taxes

J. Total Life Cycle Cost

K. Vendor Recommended Categories/Approach

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F.1.9.1 Software

Provide the software packages and modules (with version/release number) that are proposed to meet the requirements in the preceding sections as you responded to them. Indicate whether modules/packages are included with the basic offering and the cost of adding the module/package if it is not included. Pricing must include a description of how the product is licensed (i.e., by site, seat, workstation, interface, application, etc.) and the number of licenses proposed. If a volume discount has been factored into the price, provide the incremental cost for additional licenses. Describe any assumptions and/or additional information that will help to clarify the proposed pricing/licensing.

The list of software must be complete. It must include all modules that run on the AIE, the user workstations, and the application hosts; including standard interface templates, emulators, translators, etc.

Interface Category I

Include all software modules/packages required to implement Category I interfaces.

PACKAGE/MODULE	*VENDOR (THIRD PARTY)*	*REL/ VER*	*DESCRIPTION*	*LICENSING*	*LICENSES REQUIRED*	*PRICE*	*ADD'L LICENSE COST*	*NOTE NO.*

TOTAL PROPOSED COST OF SOFTWARE FOR CATEGORY I INTERFACES: $_____

Notes:

Interface Category II

Include all software modules/packages that are required in addition to those proposed for Category I interfaces in order to implement Category II interfaces. Software that has been listed as required for Category I interfaces but will require additional licenses for Category II interfaces should be included with the number and purchase price of **additional** licenses required.

PACKAGE/MODULE	*VENDOR (THIRD PARTY)*	*REL/ VER*	*DESCRIPTION*	*LICENSING*	*LICENSES REQUIRED*	*PRICE*	*ADD'L LICENSE COST*	*NOTE NO.*

TOTAL PROPOSED COST OF ADDITIONAL SOFTWARE FOR CATEGORY II INTERFACES: $_____

Notes:

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Interface Category III

Include all software modules/packages that are required in addition to those proposed for Category I an II interfaces in order to implement Category III interfaces. Software that has been listed as required for Categories I and II but will require additional licenses for Category III should be included with the number and purchase price of **additional** licenses required.

PACKAGE/MODULE	*VENDOR (THIRD PARTY)*	*REL/ VER*	*DESCRIPTION*	*LICENSING*	*LICENSES REQUIRED*	*PRICE*	*ADD'L LICENSE COST*	*NOTE NO.*

TOTAL PROPOSED COST OF ADDITIONAL SOFTWARE FOR CATEGORY II INTERFACES: $_____

Notes:

F.1.9.2 Hardware

Provide a complete list of hardware, including cabling, that will be needed to meet the requirements in the preceding sections as you responded to them. Indicate whether you will provide the hardware in conjunction with the purchase or if the hardware may be purchased from another source. Include a full configuration description for each computing platform. Describe any assumptions and/or additional information that will help to clarify the proposed pricing/configuration.

The list of hardware must be complete. All necessary gateways, translators, network components, etc., must be included.

Interface Category I

Include all hardware required to implement Category I interfaces.

COMPONENT (VENDOR AND MODEL)	*QUANTITY*	*CONFIGURATION*	*COST*	*NOTES*

TOTAL PROPOSED COST OF HARDWARE FOR CATEGORY I INTERFACES: $_____

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Interface Category II

Include all hardware and cabling that is required to implement Category II interfaces and is in addition to what is proposed for Category I interfaces. Hardware that has been listed as required for Category I interfaces but will require additional components for Category II interfaces should be included.

COMPONENT (VENDOR AND MODEL)	*QUANTITY*	*CONFIGURATION*	*COST*	*NOTES*

TOTAL PROPOSED COST OF HARDWARE FOR CATEGORY II INTERFACES: $_____

Interface Category III

Include all hardware and cabling that is required to implement Category III interfaces and is in addition to what is proposed for Category I and II interfaces. Hardware that has been listed as required for Categories I and II but will require additional components for Category III interfaces should be included.

COMPONENT (VENDOR AND MODEL)	*QUANTITY*	*CONFIGURATION*	*COST*	*NOTES*

TOTAL PROPOSED COST OF HARDWARE FOR CATEGORY III INTERFACES: $_____

F.1.9.3 Documentation

List of all of the documentation you provide in support of the proposed solution. Indicate whether the documentation is included in the purchase price of the product or if it must be purchased at additional cost. If the documentation is included, indicate how many copies are included and the cost of additional copies. Describe any assumptions and/or additional information that will help to clarify the proposed pricing.

Interface Category I

Include all document to implement and support Category I interfaces.

DOCUMENT NAME	*PART NO.*	*SOURCE*	*COPIES INCLUDED*	*MEDIA*	*PRICE /COPY*	*NOTES*

TOTAL PROPOSED COST OF DOCUMENTATION FOR CATEGORY I INTERFACES: $_____

Interface Category II

Include all additional document to implement and support Category II interfaces.

DOCUMENT NAME	*PART NO.*	*SOURCE*	*COPIES INCLUDED*	*MEDIA*	*PRICE /COPY*	*NOTES*

TOTAL PROPOSED COST OF DOCUMENTATION FOR CATEGORY II INTERFACES: $_____

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Interface Category III

Include all document to implement and support Category III interfaces.

DOCUMENT NAME	*PART NO.*	*SOURCE*	*COPIES INCLUDED*	*MEDIA*	*PRICE /COPY*	*NOTES*

TOTAL PROPOSED COST OF DOCUMENTATION FOR CATEGORY III INTERFACES: $_____

F.1.9.4 Modifications

Provide a description of all custom modifications that will be required to meet the requirements of the proposed solutions. Include who will make the modifications, the number of man-hours estimated to make them, and the time frame for completion. Describe any assumptions and/or additional information that will help to clarify the proposed pricing.

Interface Category I

Include all modifications required to implement Category I interfaces.

DESCRIPTION OF MODIFICATION	*ESTIMATED MAN-HOURS*	*COMPLETION TIMEFRAME*	*PERFORMED BY*	*COST*	*NOTES*

TOTAL PROPOSED COST OF MODIFICATIONS FOR CATEGORY I INTERFACES: $_____

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Interface Category II

Include all modifications required to implement Category II interfaces.

DESCRIPTION OF MODIFICATION	*ESTIMATED MAN-HOURS*	*COMPLETION TIMEFRAME*	*PERFORMED BY*	*COST*	*NOTES*

TOTAL PROPOSED COST OF MODIFICATIONS FOR CATEGORY II INTERFACES: $_____

Interface Category III

Include all modifications required to implement Category III interfaces.

DESCRIPTION OF MODIFICATION	*ESTIMATED MAN-HOURS*	*COMPLETION TIMEFRAME*	*PERFORMED BY*	*COST*	*NOTES*

TOTAL PROPOSED COST OF MODIFICATIONS FOR CATEGORY III INTERFACES: $_____

F.1.9.5 Support and Implementation Staff

Roles and Responsibilities

Describe the roles and responsibilities of the individuals from *St. Anybodys Medical Center* who will be required to participate in the implementation and support of the AIE. A few positions have been provided as a strawman.

POSITION	*DESCRIPTION*	*COMMENTS*
Interface Analysts	Implement the interface using the AIE	
Operators	Monitor the operation of the AIE. Take first level corrective action. Identify the cause of the problem and escalate to the proper analyst.	
AIE Administrator	Performs daily administrative functions on the AIE.	

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Recommended Staff Background

What training/experience should the implementation and support personnel described above have prior to implementing your product?

POSITION	*TRAINING/EXPERIENCE*	*COMMENTS*
Interface Analysts		
Operators		
AIE Administrator		

Estimated Man-hours

Provide an estimate of the man-hours required of St. Anybody's Medical Center staff to support and implement the proposed solution. Justify the estimate by including any assumptions or experience on which the estimate is based.

Implementation

Category I Interfaces

POSITION	*MAN-HOURS*	*JUSTIFICATION*

Category II Interfaces

POSITION	*MAN-HOURS*	*JUSTIFICATION*

Category III Interfaces

POSITION	*MAN-HOURS*	*JUSTIFICATION*

Ongoing Support and Maintenance

Category I Interfaces

POSITION	*MAN-HOURS*	*JUSTIFICATION*

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Category II Interfaces

POSITION	*MAN-HOURS*	*JUSTIFICATION*

Category I Interfaces

	MAN-HOURS	*JUSTIFICATION*

F.1.9.6 Training

Recommended Training

List the training classes recommended for each type of AIE support person.

POSITION	*RECOMMENDED TRAINING CLASSES*

Cost of Training

Describe the training available, both on- and off-site. Indicate whether the training is included in the purchase of the proposed solution. If it is included, indicate any limits on the number of staff members for whom training will be provided and the cost of adding additional staff. Provide the cost for obtaining that training again in the future and for training that is not included with the purchase. Describe any assumptions and/or additional information that will help to clarify the proposed pricing.

TRAINING CLASS	*INCLUDED*			*NOT INCLUDED / FUTURE*		*NOTES*
	LOCATION	*LIMIT*	*COST/ ADD'L*	*LOCATION*	*COST PER STUDENT*	

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F.1.9.7 Installation Assistance

1. Describe any assistance you will provide with the installation and implementation of the proposed solution.

2. Describe any assistance you will provide at an cost in addition to the price of the proposed solution.

F.1.9.8 Ongoing Support, Maintenance, and Enhancements

1. Warranty

   a. How long is the system (Category I interfaces) under warranty? Include warranties for all major hardware and software components.

   b. Will there be additional warranties associated with the implementation of Category II and III interfaces?

2. Maintenance and Support

   a. *St. Anybody's Medical Center* requires support and maintenance 24-hours a day, seven days a week. Provide the annual cost of 24x7 maintenance and support for both software and hardware. If support is not included in the maintenance plan, indicate the additional cost for support. Note any increases in maintenance and support cost due to the addition of software modules and hardware components for the Category II and III interfaces. Describe any assumptions and/or additional information that will help to clarify the proposed pricing.

COMPONENT	*MAINTENANCE*			*SUPPORT*			*NOTE NO.*
	CATEGORY I	*CATEGORY II*	*CATEGORY III*	*CATEGORY I*	*CATEGORY II*	*CATEGORY III*	

   b. What is the maximum that cost of the support and maintenance contract(s) can increase each year?

3. Upgrades and System Enhancements

a. Are system patches included in maintenance? If not, are they considered an upgrade or system enhancement?

b. What is your definition of a system upgrade? How often are they available? Is there a guideline for estimating the cost for system upgrades? What is it?

c. What is your definition of a system enhancement? How often are they available? Is there a guideline for estimating the cost for system enhancement? What is it?

F.1.9.9 Shipping and Taxes

Provide an itemized list of shipping and handling costs associated with the purchase of the proposed solution, including support, maintenance, upgrades and system enhancements.

Provide an itemized list of taxes associated with the purchase of the proposed solution, including support, maintenance, upgrades and system enhancements

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F.1.9.10 Total Life Cycle Cost

Use the information provided in the preceding sections to complete the following table.

	IMPLEMENTATION COST			*SUPPORT AND MAINTENANCE*			*UPGRADES AND ENHANCEMENTS*		
	CATEGORY I	*CATEGORY II*	*CATEGORY III*	*CATEGORY I*	*CATEGORY II*	*CATEGORY III*	*CATEGORY I*	*CATEGORY II*	*CATEGORY III*
SOFTWARE									
HARDWARE AND CABLING									
DOCUMENTATION									
MODIFICATIONS									
TRAINING									
IMPLEMENTATION ASSISTANCE									
FIRST YEAR									
SECOND YEAR									
THIRD YEAR									
FOURTH YEAR									
FIFTH YEAR									
SHIPPING AND TAXES									
TOTAL									

Notes:

F.1.9.11 Vendor Recommended Categories/Approach

Completion of this section is optional. However, if you have any suggestions for improving the implementation of the AIE and described interfaces, *St. Anybody's Medical Center* is interested in knowing them. Please describe any changes you would propose to our interface category definitions or our approach to the implementation. If your recommendations affect your proposed solution and/or the cost of implementing of implementing it, please note the changes.

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F.2 SAMPLE INTEGRATION PROJECT PLAN FOR A CLINICAL LAB PROJECT

1 PLANNING AND ADMINISTRATION

1.1 Plan and Cost Estimate

1.1.1 Lab Vendor Contract or Contract Addendum

1.1.1.1 Review Contract

1.1.1.2 Signoff Contract

1.2 Prepare Project Plan

1.2.1 Define Project Scope

1.2.2 Prepare Preliminary Project Plan

1.2.3 Prepare Project Management Guide

1.2.3.1 Distribute Outline

1.2.3.2 First Draft

1.2.3.3 Final Release

1.2.4 Prepare Detail Enterprise Project Plan

1.2.4.1 First Draft

1.2.4.2 Final Release

1.2.5 Lab to Deliver Project Plan

1.2.6 Integrate Enterprise and Vendor Project Plans

1.2.6.1 First Draft

1.2.6.2 Final Release

1.2.7 Obtain Approvals & Signoffs-Project Plan

1.3 Determine Project Organization

1.3.1 Establish Committees/Teams

1.3.1.1 Project Oversight Committee

1.3.1.2 Interface Engine Selection Committee

1.3.1.3 Lab Advisory Committee

1.3.1.4 Implementation Team

1.3.2 Define Roles/Responsibilities

1.3.3 Establish Meeting Schedules

1.3.4 Obtain Approvals & Signoffs-Project Organization

1.4 Prepare Project Orientation

1.4.1 Review Issue Track/Problem Reporting

1.4.2 Review Change Control Mechanism

1.4.3 Project Administration

2 INTERFACE ENGINE SELECTION

2.1 Requirements Analysis - Interface Engine

2.1.1 Define Communication Manager/Client Requirements

2.1.1.1 ADT LU 6.2 Accept

2.1.1.2 Patient Registration Accept

2.1.1.3 Patient Demographics Accept

2.1.1.4 Clinician Master File Update Accept

2.1.1.5 Remote Solicit - Query to Patient Demographics

2.1.1.6 Clinical Data Repository - Query for Information

2.1.1.7 Benefits Eligibility - Query for Eligibility

2.1.1.8 Clinical Data Repository - Initialize from Queues

2.1.1.9 Ordering System - Accept

2.1.1.10 Lab HL7 Results - Accept

2.1.1.11 Lab HL7 Orders - Accept

2.1.1.12 Requirements Draft Documentation Development - Communication Manager

2.1.1.13 Requirements Final Documentation - Communication Manager

2.1.1.14 Obtain Communication Manager Requirement Signoff

2.1.2 Define Queues Requirements

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2.1.2.1 STAT Order Queue

2.1.2.2 STAT Result Queue

2.1.2.3 Other Queues

2.1.2.4 Requirements Draft Documentation Development - Queues

2.1.2.5 Requirements Final Documentation - Queues

2.1.2.6 Obtain Queues Requirements Signoff

2.1.3 Define DB Requirements

2.1.3.1 Patient Demographics

2.1.3.2 Translation Tables

2.1.3.3 Clinician Holdover Table

2.1.3.4 Others?

2.1.3.5 Requirements Draft Documentation Development - DB

2.1.3.6 Requirements Final Documentation Development - DB

2.1.3.7 Obtain DB Requirements Signoff

2.2 Develop Interactive RFP

2.3 Develop I/E Test Criteria

2.4 Meet with I/E Vendors

2.5 Bring Evaluation Copy of I/E In-house

2.6 Run Pre-established Tests

2.7 Create Evaluation Matrix and Findings Document

2.8 Present Findings/Recommendations to Interface Engine Selection Committee

2.9 Select Interface Engine Vendor

2.10 Return Evaluation Software to Non-selected Vendors

3 SITE AND NETWORK PREPARATION

3.1 Determine Environment Configuration

3.2 Order Hardware and Software

3.2.1 Order Hardware

3.2.1.1 Order Interface Engine Development/Testing HW

3.2.1.2 Receive Interface Engine Development/Testing HW

3.2.1.3 Order Interface Engine Production HW

3.2.1.4 Receive Interface Engine Production HW

3.2.2 Order Software

3.2.2.1 Order Software

3.2.2.2 Receive Software

3.2.2.3 Order Software-Development/Test

3.2.2.4 Receive Software - Development/Test

3.2.3 Order Support Equipment

3.2.4 Receive Support Equipment

4 HARDWARE/SOFTWARE INSTALLATION

4.1 Create Test Environments

4.1.1 Configure Interface Engine Test Environment

4.1.2 Install & Configure Lab Test Environment

4.1.3 Setup test beds (data)

4.2 Site Preparation - Pilot (repeat this set for all test and production environments)

4.2.1 Location of Server

4.2.2 UPS

4.2.3 Phone line for modem

4.2.4 Network Connectivity

4.2.5 Order Unix hardware/Software

4.2.6 Receive Unix Hardware/Software

4.2.7 Install UNIX System

4.2.7.1 Unpack and Setup system

4.2.7.2 Install any/all SBUS expansion cards

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4.2.7.3	Install peripherals (Tape drives, CDROM...)
4.2.7.4	Load Solaris OS
4.2.7.5	Partition all Disk Sub-systems
4.2.7.6	Add User Login Accounts
4.2.7.7	Install Paging Software for Operations Personnel
4.2.7.8	Connect Unix to Network
4.2.8	UNIX Software Configuration
4.2.8.1	NIS
4.2.8.2	Automounter
4.2.8.3	Dial-up/out maintenance modem
4.2.8.4	FTP
4.2.8.5	PCNFS daemon
4.2.8.6	C/C++ Compiler
4.2.8.7	Version Control Software
4.2.8.8	Application software
4.2.8.9	Utilities
4.2.9	Licensing of Relational Database Product
4.2.10	UNIX Environment Setup
4.2.10.1	Add User Logon IDs
4.2.10.2	Setup operations
4.2.10.3	Load Relational Database Product
4.2.10.3.1	Raw Disk Requirements
4.2.10.3.2	Log/data/master device locations
4.2.10.3.3	Install SQL Server Software
4.2.10.3.4	Create databases
4.2.10.3.5	Create dump devices
4.2.10.3.6	Create logins

4.2.10.3.7 Setup Replication srvr components

4.2.10.3.8 Develop Automatic Dump Log Scripts

4.2.11 Install Lab Vendor Software

4.3 Workstations and Software (All Sites)

4.3.1 Order Workstations & software

4.3.2 Receive Workstations

4.3.3 Workstation Setup (each)

4.3.3.1 Load Software

4.3.3.2 Configure Workstation.

4.3.3.3 Connect to Network

4.3.3.4 Test Access to Mainframe (if necessary)

4.3.3.5 Test Access to Minis (if necessary)

4.3.3.6 Test Access to UNIX box (if necessary)

4.3.3.7 Test Access to Novell Server (or other Network product)

5 STANDARDS DEVELOPMENT

5.1 Create Standards Document (subjects - see below)

5.1.1 First Draft

5.1.2 Final Release

5.2 Documentation Standards

5.3 Project Plan Standards

5.4 Development Environment

5.4.1 Directory Structure

5.4.1.1 Test Environment Directory Structure

5.4.1.2 Interface Engine Development Directory Structure

5.4.2 Quality Assurance Standards

5.4.3 Version Control Standards

5.5 Hardware Standards

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5.6 Program File Naming Standards

5.6.1 Files

5.6.2 Rules

5.6.3 Tables

5.7 Login Usernames

6 TOOLS ACTIVITIES

6.1 Evaluate Development/Production Software

6.2 Development Tools

6.2.1 Version Control System

6.2.1.1 Evaluate Version Control Tools [Unix, IBM, DEC, or other]

6.2.1.2 Order Version Control Tools

6.2.1.3 Receive Version Control Tools

6.2.1.4 Install Version Control Tools

6.2.1.5 Setup Version Control Environments

6.2.1.6 Implement Version Control Tools

6.3 Testing - QA Tools

6.3.1 Test Data Source/Content

6.3.1.1 Evaluate Testing Tools [Unix, IBM, DEC, or other]

6.3.1.2 Order Testing Tools

6.3.1.3 Receive Testing Tools

6.3.1.4 Install Testing Tools

6.3.1.5 Setup Test Tool Environments

6.3.1.6 Integrate Testing Tools

6.4 Implementation Tools

6.4.1 Distribution

6.4.1.1 Evaluate Distribution Tools [Unix, IBM, DEC, or other]

6.4.1.2 Order Distribution Tools

6.4.1.3 Receive Distribution Tools

6.4.1.4 Install Distribution Tools

6.4.1.5 Configure Distribution Tools

6.4.1.6 Implement Distribution Tools

6.4.2 Synchronization

6.4.2.1 Evaluate Synchronization Tools [Unix, IBM, DEC, or other]

6.4.2.2 Order Synchronization Tools

6.4.2.3 Receive Synchronization Tools

6.4.2.4 Install Synchronization Tools

6.4.2.5 Configure Synchronization Tools

6.4.2.6 Implement Synchronization Tools

7 REQUIREMENTS ANALYSIS

7.1 Vendor Education

7.1.1 Develop Education Schedules

7.1.2 Attend Initial Team Training

7.1.2.1 Analysis Training

7.1.2.2 Interface Engine Training

7.1.2.3 Clinical Database Configuration Training (if necessary)

7.1.2.4 Lab System Functionality

7.1.3 Attend Intermediate Team Training

7.1.4 Attend Advanced Team Training

7.2 Requirements Analysis - Communications

7.2.1 Develop Communications Requirements Document

7.2.1.1 Development Environment

7.2.1.2 QA Environment

7.2.1.3 Production Environment

7.2.2 Obtain Communication Requirements Signoff

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7.3 Request IP Addresses

7.3.1 Dev. IDs - Unix, Alphas, & Workstations

7.3.2 QA IDs - Unix and Alphas

7.3.3 User Env. IDs - Unix and Alphas

7.3.4 Acceptance Env. IDs - Unix and Alphas

7.3.5 Regional Production Evn. IDs - Unix and Alphas

7.3.6 Vallejo Production Env. IDs - Unix and Alphas

7.4 Requirements Analysis - Hardware

7.4.1 Sizing

7.4.1.1 Development

7.4.1.2 Test

7.4.1.3 Production

7.4.2 Obtain Hardware Requirements Signoff

7.5 Requirements Analysis - Production Benchmark

7.6 Requirements Analysis - Development Environment

7.6.1 Requirements Documentation Development - Development Environment Draft

7.6.1.1 Network Requirements

7.6.1.2 Disk Requirements

7.6.1.3 Memory Requirements

7.6.1.4 Additional peripherals

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7.11.4 Requirements Documentation Development - Patient Demographics Requirements Mtgs

7.11.5 Conduct Patient Demographics Requirements Meetings

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7.11.7 Prepare Patient Demographic Requirements Document - Final

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Appendix G

HL7 FAQ

This section contains a list of "frequently asked questions" about HL7. Please feel free to distribute it. Commercial rights are reserved by HL7. This is an unofficial document and as such is included in this version of the HL7 Implementation Guide. The opinions are those of the author and (the author hopes) of the cited contributors.

This FAQ is also available on the internet at <http//:dumccss.mc.duke.edu/ftp/standards.html>.

G.1 WHAT'S NEW, AUTHORS, CONTRIBUTORS

G.2 WHO ARE THE AUTHORS AND CONTRIBUTORS TO THIS FAQ?

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Frequently, a FAQ article is an amalgam of many individual postings to a thread. Not all contributors may be cited.

In every case the author of the FAQ has edited the original list server thread and may have added or changed ideas.

G.3 HOW CAN I CONTRIBUTE TO THE FAQ?

Send a question and answer directly to wes@rishel.com. Include links to relevant information that is available on the Web. We would prefer to get the contribution as a nonencoded Microsoft Word document,

but we will also accept the text directly in the mail message or in a WordPerfect document. Keep the format simple. You are answering a question, not writing a book or creating a brochure.

Submit diagrams in any format available to Windows users. When you send a diagram in WMF format you will give us good flexibility to adjust its size for most effective display. The author uses Visio to prepare his diagrams. Try to keep the width of the diagram down to less than 5.5 inches. If you are sending the diagram as a bitmap, remember that for many users the usable portion of the screen is about 600 pixels wide by 400 pixels high. Any larger will not be easily visible for these users. For reference, the SIGOBT diagram at the web site listed above is 395 pixels wide by 430 high.

Please use a GIF file format when you are submitting a diagram as a bitmap. For diagrams that contain solid colors, GIF files are far more compact and more accurately rendered than JPEG files. For esthetic reasons, consider using the "transparent background" option for your GIF files. For PC users, two fantastic shareware programs for working with images are Lview Pro and Paint Shop Pro. The help files alone are worth the bother of a download!

Use color in diagrams where it is important to clarify the thought. But please do not use color just to "pretty up" a diagram. The time a browser takes to download a black and white diagram will be 1/8th of the time for color. For users who access the Web with a high speed modem, the time can be 6 seconds for black and white vs. 48 seconds for color. Multiply this by the number of diagrams that we would like to include. When you use color it is helpful if you confine its use to a few solid colors. (There is a bandwidth saving if there are fewer than 16 colors including black and white.) Remember, Smoky the Internet Bear says, "Only you can prevent data avalanches." Diagrams are omitted from this version of the Frequently Asked Questions.

G.4 DESIGN AND DISCLAIMERS

G.4.1 What is the Purpose of this FAQ, and What Disclaimers Does it Carry?

The primary goal is to give people a way to find answers to frequently asked questions before posting them on the List Server. Its first priority is to support "newbies," by answering common questions or pointing them to information resources.

At this stage in its publication there are still many frequently asked questions that are not answered here. A secondary purpose of the FAQ is to serve as a stimulus for people other than the editors to contribute answers.

This FAQ will includes answers to questions on the interpretation of the HL7 standard. It is important to recognize that the FAQ itself is not a sanctioned document of the HL7 group, has not been balloted, and carries no normative weight in deciding whether an implementation of HL7 is conformant.

Much of this material is an excerpt from the HL7 List Server. For this reason some "contributors" to this may not be aware they have been cited. The editors of the FAQ presume that by publishing on the List Server the authors will assent to an edited version being included in the FAQ. We will, of course, remove or correct any such "contribution" at the request of the author.

G.4.2 What are the Design Goals of this FAQ?

The contents of the FAQ should be attributed and the FAQ should provide information on how to reach the contributors.

We would expect this FAQ document to be available as World Wide Web document and as a text

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file, or at most a small number of text files.

In the Web version it should provide the benefits associated with the Web including links within the document and to other Internet resources that are cited within the document. The text version should have the same material as the Web version, but for the occasional diagram. The user should be able to navigate it using hierarchically numbered question/topic headings. Where the Web document has a link to a URL, the text of the URL will be available in the text version.

G.5 GENERAL HL7 MESSAGE FORMAT

G.5.1 What is the Current Version of HL7?

Version 2.3 was published in April 1997.

G.5.2 Does the HL7 Standard Specify a Maximum Segment Length and/or a Maximum Message Length?

Not really, although the maximum field length suggested in Version 2.3 is 64k and the use of very large fields probably requires site- specific negotiations, since actual implementations of lower-layer protocols usually have some length maximums defined.

Mark Shafarman

G.5.3 How Do I Get Around the 512-Byte Maximum Read in Digital Standard Mumps TCP?

Sunquest uses a `C' based layer of communications that initiates, manages, and reads the TCP/IP socket. The MUMPS component of the interface talks to the `C' layer, receiving digestible chunks of data and storing them in a MUMPS global until the entire message has been received. There is no external blocking protocol requirement. The `C' layer dynamically allocates enough buffer space to receive the entire message no matter how large.

John May

G.5.4 How Do I Find the End of an HL7 Message?

HL7 relies on the lower layer protocol to signal when it has received the last byte of a message. There is no specific content in the message that serves as an "end" statement. Most lower layer protocol implementations use special characters to indicate the start and end of a message. Start of message and end of message characters come as a pair in the HL7 Minimal Lower Layer Protocol. Strictly speaking this is not a part of the HL7 standard but was a "recommendation" to be used in the absence of the full functional support from the lower layers in real-word environments. It was thought to be necessary for TCP which is a stream-oriented protocol but not for LU6.2 which inherently provides message blocking.

One function of these characters was to provide the receiving routines with a way to signal when the message was complete, without waiting for another message to start. For some environments, another function was to deal with the possibility that partial messages had slipped through. This latter problem was more prevalent when HL7 messages were being sent over Local Area Networks and then from a communications server into a serial port of the receiving system. Because the Minimal LLP is not part of the Standard there is nothing that requires a system to use it. Traffic on the net server and the author's own contacts with some sites has shown that the

Minimal LLP is used quite frequently in TCP environments. Whether it is best or not, there is considerable advantage to doing what most other people do. For vendors, it reduces the likelihood that you will be compelled to do something different than your normal product. For institutions it is usually faster, cheaper, and more reliable to have the vendors install code that has been developed and field-tested at others' expense.

Wes Rishel

G.5.5 How Can I Send Binary Data in HL7 Messages?

The 2.3 draft allows for a mime-encoded base-64 data type (encapsulated data) which could be used, for example, in the OBX value field. There would have to be a bilateral agreement on the interpretation of such fields. See files H7C2FINB.DOC and H7C2FINB.TXT in <ftp//:dumccss.mc.duke.edu/standards/HL7/pubs/version2.3/control- query>.

Mark Shafarman, Al Stone

G.5.6 Are there Provisions in HL7 for European and Asian Character Sets?

The HL7 2.3 control/query ballot includes support for other character sets. Some of the language came from Japanese HL7 users and Technical Committee 251 in the European Community. The proposal is to use ISO-standard escape sequences to switch between ASCII and 8-bit or multibyte character sets within text fields.

Mark Shafarman

G.5.7 How Should Midnight Be Represented in HL7?

HL7 explicitly states that midnight should be represented as 00:00. See the definition of the TM data type in HL7 Version 2.3 Chapter 2.

Wes Rishel

G.5.8 Why Isn't HL7 Plug and Play?

When two parties agree to implement HL7 they must write an auxiliary specification that describes how they will apply it to their specific interface. The requisite time for analysis, programming, and testing significantly delays and adds costs to interfaces. Why is this?

- There are differences in the information needs of different institutions depending on locale, size, and practices. These dictate the need for optionality in the interface. Some examples of the kinds of differences that exist include the requirement to capture specific demographic data elements based on local regulations or special populations. We could not imagining telling health care system A that they can't send Patient's County or Primary Nurse or health care system B that they must collect Patient's County or use the primary nursing system because "HL7 requires it."

A similar concern relates to reference labs. We cannot imagine telling a reference lab that it must maintain a database of all patients that it has seen, each uniquely identified, so it can accept updates to demographics separate from what is contained in an order, or apply a demographic update to patients that do not have current orders pending. There are many such individual concerns. Rather than enumerate them all and treat each as a separate set of messages, the approach of the technical committees has been to create a "flexible standard" that can be applied in

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these situations through bilateral negotiations.

- The HL7 group has, as a policy, attempted to avoid dictating changes in the design of user systems in order to implement HL7 interfaces. For example, very few systems can deal with variation in order content between a physician's pharmacy order and that of a pharmacist. Options exist that can be adapted to systems that can and those that cannot.

Another example of this system variability has to do with the assignment of order numbers. Some systems assume that they are the only source of order numbers where others recognize that numbers may be assigned by other systems. Options exist to accommodate both approaches.

In extremes, this policy has meant accommodating systems that have conceptual anomalies such as identifying the patient only by a visit number or systems that can accept orders but cannot assign an order number.

- There are optional features of the HL7 protocol including the assignment of serial numbers to transactions, sending transactions individually or in batches, and several approaches to representing textual reports. Not all systems have needed to implement all of these options.

- There are ambiguities in the specification. This is a major concern in the areas of Query transactions.

- Optionality of fields is defined by segment, rather than by how the segment is used for a specific trigger event. Since the fields may be required for some trigger events and not for others, almost every field ends up being shown as optional.

- As the health care business changes, and as HL7 gets applied in widening frames of reference, needs are discovered that have not been addressed. When these are brought to the attention of the appropriate Technical Committee they are usually addressed. However the implementation where the discovery proceeds will have to use the HL7 provisions for site-specific variations to address the need before a revised standard is available.

- Because the lower level protocols are not HL7 standards the enterprise or its vendors may opt to use a different approach.

- HL7 has maintained a policy of "backward compatibility" in subsequent releases of the Standard. When ambiguities or errors are found in the Standard this makes it difficult to fix the problems.

- Some prominent vendors have simply declined to implement some specific features of HL7 within an interface that is primarily based on HL7. Their customers have accepted these compromises. These are frequently vendors with legacy systems based on older technologies.

- There is no model for conformance claims in HL7. In HL7 Version 3 several things are planned that will greatly reduce the need for site-specific negotiations. Transactions are developed based on a reference data model, and optionality will be defined by trigger event rather than by segment. These approaches will reduce the potential for ambiguity and errors. Many known problems can be corrected because version 3 will not be 100% compatible. Version 3 will probably use profiles to specify exactly how to implement it in TCP/IP and some other communications environments. Version 3 will have a conformance model to describe conformance on a specific interface basis, rather than a black or white "is conformant" or "is not conformant."

The recognition and use of HL7 has grown since we began working on the 2.X series. We expect that our members (users and vendors) will support more rigorous specifications with fewer options in version 3.

Wes Rishel

G.6 PATIENT ADMINISTRATION MESSAGES

G.6.1 Error in Trigger Event A18 (Merge Patient Information)?

There is a typographical error in version 2.2 describing the A18 message format. The MRG segment is listed as optional, but it will always be used. The PV1 segment is not listed as optional, when in fact it was in version 2.1. Note that A18 should normally not be used; it was retained for backwards compatibility purposes only. You probably should be using A34 - A36 (where the MRG segment is required).

Norman Daoust

G.7 CLINICAL DATA CONTENT

G.7.1 I Cannot Locate the HL7 Field Where I Put Glucose (or Height and Weight or Outcome or Whatever)?

There are tens of thousands of kinds of clinical observations. Rather than define a separate field for each such membership the HL7 committee chose to use a technique where the same segment, OBX-Observations/Results, serves for all of them. Some of the important fields in this segment are

- Value Type--will the value be a string, a number, a code, a block of text or what?
- Observation Identifier--a code that identifies the observation (e.g., serum glucose fasting)
- Observation Value--the actual reported value
- Units--for numerical values the units
- Reference Range--the normal range for this test and patient
- Abnormal Flags--a flag if it was read as abnormal

This same segment has been used to send chemistries, microbiology reports, radiology reports, physical observations like height, weight, and coma scale and many other results and findings. It is discussed at length in Chapter 7 of the specification. Instead of looking for a field whose name describes the data you want to send, you should look for a code to go in the Observation Identifier field that describes that data.

G.7.2 How Do I Send Narrative Reports such as History and Physical or Discharge Summary?

In HL7 Standard Version 2.3, Sections 7.1.2 and 7.1.3, you will find a very precise description of how to send messages containing narrative reports.

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Narrative reports from services such as Radiology usually consist of a number of subcomponents (e.g., a chest x-ray report may consist of a description, an impression, and a recommendation). Other studies, such as echocardiograms, contain analogous components, as well as numeric observations (e.g., left ventricular and diastolic diameter).

The current standard treats each component of a narrative report as a separate "test" or observation. A CHEM12 panel may be transmitted as an order segment (OBR) plus 12 OBX segments. A chest x-ray may be transmitted as an order (OBR) segment plus three OBX segments, one for the description, one for the impression, and one for the recommendations. Similarly, an EKG report would be transmitted as an order segment (OBR), two OBX segments for the impression and recommendation, and additional OBX segments for each EKG measurement, e.g. the PR interval, QR interval, QRS axis, and so on.

We have defined code suffixes for constructing observation IDs for the common components of narrative reports (see HL7 Standard Version 2.3 Figure 7-1). The observation identifier for each such component is obtained by concatenating the observation battery ID (the ID in OBR-4-universal service ID of the preceding OBR from any coding system) with the appropriate suffix.

The author presumes that when a report message contains a mixture of text and numeric observations, that the numeric observations would be repeated in the text. With this usage it is possible to display or print a report by simply copying the contents of the values of the text-type values. The standard is silent on this point.

In addition to breaking the report into sections the standard further requires (in HL7 Standard Version 2.3 Section 7.3.2.5 KAREN VERIFY SECTION) that "logically independent" observations be broken into separate OBXs. So, for example, an impression section with multiple findings would itself be subdivided into multiple OBXs. This approach has a number of benefits. By breaking out numeric observations in separately-identified OBXs, the information is accessible in a record-oriented form. Breaking the text into smaller, separately identified clumps makes it easier to retrieve only the impressions, etc. Similarly, separating the logical observation permits easier retrieval and also allows the use of related data fields such as abnormal flags.

With this approach the contents of the observation value field may be very long. It may contain many paragraphs of text.

We are aware of two deviations from this specification that have been frequently implemented. Both were legal in version 2.1.

- Some sites agree to have the textual material sent as one line of text per OBX. This minimizes the size of a single segment. In this case the universal service ID repeats in each successive OBX. Changes in the suffix of a universal service ID is one way to separate segments under this scheme.

- Some sites send the report without distinguishing the sections. This is frequently done where the reports are transcribed from dictation with no systematic enforcement of section names. Both variations may occur together.

Version 2.3 offers additional support for tracking the transcription through its stages from initial dictation to final approved report. This includes the ability to send the voice embedded in an HL7 message. Refer to HL7 Version 2.3 Chapter 7 for details.

Wes Rishel and Clem McDonald

G.7.3 Where Does the Accession Number Go in a Lab Order?

There is no explicit place for it, although it is frequently used as part of the filler's order number. In this case it is combined with some additional characters to ensure that the order number won't repeat when the accession numbers recycle. Although the accession number is primarily a creature of the lab, there are times when it needs to be communicated. It is often sent along with a charge transaction to be printed on the bill as a reference number. It is useful when a physician calls to discuss a result. These uses are discussed below.

Before the development of HL7 most lab people thought of the accession number as being the order number. In reality they still do. For the very occasional test that requires more than one specimen they decide on some arbitrary and not necessarily consistent basis which accession number to store the results under and leave it at that. Many or most lab systems recycled their accession numbers so, on the rare case where they had to look up an old test, they would say "give me the report on test #123 that occurred in November of last year." Typically, these were not stored on-line anyway, except possibly on an archive tape. In some places the accession numbers recycled as frequently as once per week. I have seen one lab system implemented where the accession number was X9999 where X was a one-letter code to represent the day of the week. At one time, disk was expensive, and this was one justification for recycling accession numbers. However, there are also human factors justifications. Fewer digits can be typed faster with fewer errors. Accession numbers are used as a reference in external communications, so being able to send them out somehow is valuable.

When the HL7 committee met on the topic of clinical order numbers, it imposed the new requirement on HL7 participants that the order numbers sent and received over the protocol be unique through all time. As more data is stored on-line longer (in repositories for example) this has been an important requirement. Lab systems have taken several approaches.

Some may have decided not to recycle their accession numbers and used them as order numbers. Where this is not seen as practical or desirable they typically have done something like prepending another field to the accession number to create a filler's order number for external communications. The Julian date of the order is one such possible qualifier. It is somewhat wasteful of space, since not every combination of the four-digit date and the appended accession number will be used, but disk is cheap, processors are fast, and the disruption on a system and an organization of changing the accession number scheme does not seem to be justified by the `waste' of a few digits. I believe that in situations where the physician is talking to a lab person and looking at the Sender Order Number on the report, lab personnel are frequently saying "what are the last six digits of the order number" or something similar to get an accession number to put into their computer screen to look up the test. Similarly if the accession number or filler's order number is needed as a reference on a bill, there is a place in the financial transactions to send this.

G.7.4 How Do I Send Pharmacy Orders like "BID Every M, W & F?"

It seems that version 2.2 does not provide a means for sending orders that have two patterns of repetition for an indefinite duration, except to create a stream of serial orders and extend them from time to time.

Some sites have reported using the following approach to this on the List Server. The are adding a third subcomponent to the Interval component of the Quantity/Timing field in the RXE segment. This subcomponent might be called "Schedule Interval." It is drawn from the same set of values as the Repeat Pattern subcomponent of the Interval component. Some examples of reasonable value are:

- QD-for daily type orders (probably 99% of orders meet this type).

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- QOD-for every other day.
- QJ135-for every Monday, Wednesday, & Friday.

So currently an order for BID at 8:00 AM and 8:00 PM every Tuesday, Thursday, & Saturday, would contain the following interval component**: BID&0800,2000&QJ246**

Note that the placing the value QD in this new Schedule Interval subcomponent is redundant. Receiving systems should treat "BID" (with the other subcomponents null) as the same as "BID&&QD" for compatibility with the standard.

Tim Tracy

G.7.5 How Would I Send Immunization Information with HL7?

The CDC data management division, in support of the Immunization information system initiative is working with HL7's committees to add segments to handle the transmission of the immunization events and reaction information. HL7 will be the standard for immunization information exchange at the state level (e.g. from state to state) and in some cases intrastate. It is also used for lab information reporting as well as inter-facility reporting.

The IMMNET-L list server can be a source of more information on this topic. Please contact me if I can be of any further help.

John Barthle (75522.3032@compuserve.com)

There is a draft version of part of the HL7 specification related to the needs of the CDC and state departments of public health available on the Duke ftp site in the section on version 2.3 draft ballots.

Norman Daoust

G.7.6 How Would I Send Public Health Communicable Disease Data with HL7?

There has been some discussion on the List Server that implies that the CDC effort that led to a proposal for transmitting immunization information also supports the public health reporting associated with communicable disease cases. This does not seem to be the case.

The formats in Chapter 7 are very general and could probably be used for this application given the establishment of a suitable set of codes for Observation ID. The author is not aware of any specific effort to establish those codes or verify that the formats in chapter 7 are complete. I addition there are probably issues of patient identification and patient privacy that would have to be addressed.

G.8 OTHER AREAS OF INTEREST

G.8.1 SIGOBT

G.8.1.1 What is the Special Interest Group on Object Brokering Technologies?

"Object" and "object oriented" are two of the most overloaded terms since "user friendly." Object

Brokering generally refers to a model of communication among cooperating programs that is (a) based on some of the concepts of Object-Oriented Programming and (b) includes a "broker" to help the cooperating applications find one-another using symbolic names rather than physical locations.

Two important object brokers that are being actively used today are Microsoft OLE and the Common Object Request Broker Architecture (CORBA.) OLE is the method of choice for developing cooperating applications within a workstation running any of the Windows operating systems. Through OLE users have the ability to access data and control applications using a wide and expanding set of productivity tools. It is a basis for "componentized software." Users are able to access data and control other applications from any package that can be en OLE controller.

CORBA is being used today to communicate among applications running on heterogeneous operating systems. The tool sets that are available for accessing CORBA are all third-generation languages, like C++ or C. The applications that are using CORBA today are primarily using it for inter-application messaging in a manner quite similar to the messaging done through HL7. The Object Management Group, which is the consortium that developed and is promoting CORBA has a Web page at <http//:ruby.omg.org/corbmed.htm>.

In the author's opinion their Web page is somewhat frustrating because all the cool information is restricted to members. However, there is a good bibliography of books on CORBA.

OpenDoc is a third proposal for object brokering services that is being developed.

The two approaches have a lot in common, even though they are used today in somewhat different modes. It is likely that in the future the domain of each will expand to where there is considerable overlap.

The SIGOBT group has been exploring how to share HL7 data in the environments of these two object brokering environments. It did a demonstration project in which seven vendors interoperated using OLE and the HL7 model at last year's HIMSS. Another effort is underway for this years' HIMSS. At the same time it is working to find the common abstractions so that object-based communications using HL7 data will be the same in the two environments.

G.8.1.2 What Approach is SIGOBT Using?

Rob Seliger's initial concept paper, the current versions of the OLE demo spec and the sample code are all available on the Duke server:

<ftp//:dumccss.mc.duke.edu/standards/HL7/sigs/SIGOBT>

The HL7 Version 2.X Object Mapping Specification (OMS) prescribes the process of translating a given version of the HL7 protocol to a set of objects and methods that can be used to implement HL7 in an object brokering technology. Rob Seliger has developed an initial concept paper that will be the basis for the OMS. In this abstract model, the objects are things like Producer, Consumer, Message, Segment, Name, Date, and so forth. The Message and Segment objects are exact analogues of the corresponding data structures in HL7 Version 2.X. From this abstract specification we can prepare specific specifications for LE, CORBA, OpenDoc, or other object brokering technologies. HL7 does not endorse any of these object technologies but is serving as a focus for any group of five or more HL7 members that wants to include a technology in this process.

During a series of interim meetings specifications have been prepared for the OLE version on a prototyping basis and this experience has been fed back into the preparation of the OMS. This second prototype will be shown in a demo at HIMSS. ADT and Results data will be made

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available by Producer systems and used by Consumer systems. After the demo is complete we will fold the experience in producing a ballotable version of the OMS and production quality specifications for the HL7 OLE Objects. Microsoft has indicated that it will again develop freely available code to accelerate implementations of the final objects.

The purpose of the abstract OMS is to ensure that similar developments in the other technologies are as common as possible, while still developing a pragmatic approach that can be efficiently implemented in the technologies. Groups of interested parties has begun reviewing the OMS from the points of view of CORBA and OpenDoc. The CORBA group is committed to writing IDL and other code and is considering the formation of a prototyping project similar to that being implemented for OLE.

Because this approach is modeled so closely on existing HL7 we believe that we can complete the prototypes, develop and ballot the OMS and develop recommendations for the specific technologies within a year. This is an aggressive schedule, but the SIGOBT has been meeting eight or more times a year to facilitate progress.

G.8.1.3 How Does the SIGOBT Work Relate to the HL7 Data Modeling and Version 3

The following chart summarizes various activities that are going on through SIGOBT and how they relate to the activities of the QA/Data Modeling Group and the plans for Version 3.

(Image here in Web version.)

The diagram also shows the effort of the HL7 QA/Data Modeling group to work with all HL7 working committees to produce an object oriented model of health care data. In this model the objects are things like Person, Patient, Encounter, Result, etc., as well as objects to deal with messages and trigger events.

This group is making great progress. Its ultimate realization will be HL7 Version 3. Joint discussions between SIGOBT and QA/Data Modeling are helping to ensure that the current SIGOBT efforts will help guide the QA/Data Modeling approach to achieve pragmatic results. We also feel that the OMS will provide one important basis for developing some or all of the technical approaches for Version 3.

G.8.2 Implementing HL7

G.8.2.1 As an Institution, How Do I Implement HL7?

There is considerable room for discussion on the approaches, but the steps will include these.

- Get your vendors to agree to HL7. Establish your provisions for maintaining the interface as part of the initial contract.

- Establish an auxiliary specification that specifies what trigger events, messages, and optional fields you will use, what special options from the control chapter will be used (sequence numbers, transaction batching, etc., and how and when the systems will interconnect (for example, "they will use TCP/IP and the ADT system will create the circuit every time it reinitializes the interface.").

- Specify what you will require from the implementing systems in terms of operational support of an interface (for example, can you tell whether it's up, whether errors have occurred recently, what the errors were, and what the volumes were; can you restart the interface without restarting the system).

- Develop and follow a test plan that includes validation of each data field for each trigger event and deals with error conditions.

The important thing to recognize is that interfaces are not plug and play, nor will they be trouble-free. Considerable analyst time will be involved in selecting which options to use, negotiating them with the vendors, and developing and following a test plan. As you change your information processing needs in house you will need to maintain your interfaces. The most straightforward example of this is adding additional fields to messages as they become necessary.

The HL7 Implementation Guide is a source of more detailed information on implementation methodology.

G.8.2.2 As an Information Systems Developer, How Do I Develop HL7 Interfaces?

The two very important things to remember:

- Interfaces run without the involvement of a human being.

- Interfaces will change.

Because they run without a human being they are very sensitive to errors. It is an unacceptable situation when the lab calls at 9:00 Monday morning because it isn't getting admissions and you find that since midnight the ADT system has been in a loop trying to resend the same faulty admission. Careful attention to detecting and dealing with errors intelligently is critical to a successful interface.

Frequently the analysts will decide they need to add fields to an existing message or add new messages. If you are developing an in-house interface how much recoding and testing will be required? The ideal is to drive the contents of messages from tables and give the analysts the tools to change these tables without any reprogramming.

If you are receiving HL7 transactions remember that the sending system is allowed under HL7 to add new information to messages and your program must accept the messages with no programming changes whatsoever. (Your program may not store the information in the database if the field was added after the message was implemented. But it must not fail or reject the message.} A standard method for testing for amateur-hour interfaces is to add a field on the end of a segment and see if the receiver complains or crashes.

G.8.2.3 Is There Software Available to Help Build HL7 Interfaces?

There are several HL7 toolkits available for those developing HL7 interfaces in C or C++.

1. Gunter Schadow of the Universitaetsklinikum Steglitz, Berlin, has developed a C++ class generator called ProtoGenHL7. His home page is

<http//:fub46.zedat.fu-berlin.de:8080/~gusw/>.

2. The author has not tried it, but it seems an order of magnitude more comprehensive than the other toolkits.

3. Imex, the first C-language toolkit to be made publicly available was written at Columbia Presbyterian Medical Center. It can be downloaded from

<ftp//:cucis.cis.columbia.edu/pub/hl7/hl7imex/>.

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4. Alan Rueter, of the Mallinckrodt Institute of Radiology at Washington University has updated Imex and made it available as Imexa. It can be downloaded from

<ftp//:wuerlim.wustl.edu/pub/hl7imexa>.

G.8.3 Future Versions of HL7

G.8.3.1 What Will be in Version 2.3?

Version 2.3 was published in April, 1997 and included the following updated information:

Patient Administration (Chapter 3)

Order Entry (Chapter 4)

Query (Chapter 5)

Financial Management (Chapter 6)

Observation Reporting (Chapter 7)

Master Files (Chapter 8)

Medical Records/Information Management (Chapter 9)

Scheduling (Chapter 10)

Patient Referral (Chapter 11)

Patient Care (Chapter 12)

G.9 GENERAL INFORMATION

G.9.1 The Goals and Scope of HL7

G.9.1.1 What is HL7?

HL7 is a standard for electronic data exchange in health care environments. It endeavors to standardize the format and protocol for the exchange of certain key sets of data among health care computer application systems. HL7 is accredited by the American National Standards Institute (ANSI) to write these standards.

As with almost all United States standards, HL7 standards are voluntary, consensus standards. There is no governmental mandate to use HL7, except in very limited circumstances. HL7 follows procedures that have been approved by ANSI for review and ballot of its standards to ensure that the standard represents a consensus view of a balance of users and producers of health care information systems.

HL7 is also the name of the group that publishes these standards.

HL7-sanctioned national groups also exist in many other countries outside of the United States including Australia, Germany, Japan, the Netherlands, and New Zealand.

G.9.1.2 What is the Functional Scope of the HL7 Standard?

The Standard currently addresses the interfaces among various systems that send or receive patient admissions/registration, discharge or transfer (ADT) data, queries, orders, results, clinical observations, billing, and master file update information.

The next version of the standard (2.3) will expand on the current coverage of these areas and will include new coverage for patient care, medical records, and automated instruments. Work is also underway to produce HL7 standards for recording immunizations and drug reactions.

(Adapted from the introduction to the HL7 Specifications.)

G.9.1.3 What Application Architecture is HL7 Based on?

It tries not to assume a particular architecture with respect to the placement of data within applications. In particular it is designed to support a central patient care system as well as more distributed environment where data resides in departmental systems. There is support for environments where there is no order entry system, a central order entry system, or multiple systems that can originate orders. There is support for environments where results data and observations reside on a single system or where they are distributed among several systems.

(Adapted from the introduction to the HL7 Specifications.)

G.9.1.4 What is Implied by the Phrase "Level Seven?"

The term "Level 7" refers to the highest level of the Open System Interconnection (OSI) model of the International Standards Organization (ISO). In the OSI conceptual model, the communications functions are separated into seven levels. Those developing the HL7 Standard are primarily focused on the issues that occur within the seventh, or application, level. These are the definitions of the application data to be exchanged, the timing of the exchanges, and the communication of certain application specific errors between the applications. Specifications at this level are referred to in the HL7 argot as "abstract message specifications."

However, as a matter of pragmatic necessity the HL7 specifications also define the presentation of the information, that is to say the strings of text that represent it. HL7 refers to these as the "encoding rules." This represents Level 6 of the OSI conceptual framework. Most HL7 implementations use the HL7 encoding rules. However, there is an "out" in the current HL7 specifications. An implementation the follows the abstract message specifications but uses different encoding rules can claim to be HL7 conformant. There have been implementations using ASN.1 and LU6.2 to encode the data fields.

HL7 does not specify standards for communicating the character strings from one system to another. Several recommended lower layer protocols were published as appendices to HL7 version 2.1. These can be used for implementing HL7 over serial lines and using TCP/IP. These will be republished, essentially unchanged, in the Implementation Guide for version 2.2. However, implementations using other lower layer protocols may claim HL7 compliance.

G.9.1.5 What are the Goals of the HL7 Effort?

HL7's purpose is to facilitate communication in health care settings. The primary goal is to provide standards for the exchange of data among health care computer applications that eliminate or substantially reduce the custom interface programming and program maintenance that may otherwise be required. This primary goal can be delineated as a set of objectives.

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- The Standard should support exchanges among systems implemented in the widest variety of technical environments. Its implementation should be practical in a wide variety of programming languages and operating systems. It should also support communications in a wide variety of communications environments, ranging from a TCP/IP network "stack" to point-to-point RS-232C interconnections, as well as the transfer of data by batch media such as floppy disk and tape.

- Immediate transfer of single transactions should be supported along with bulk transfers of multiple transactions.

- The greatest possible degree of standardization should be achieved, consistent with site variations in the usage and format of certain data elements. The Standard should accommodate necessary site-specific variations. This will include, at least, site specific tables, code definitions and possibly site specific message segments.

- The Standard must support evolutionary growth as new requirements are recognized. This includes support of the process of introducing extensions and new releases into existing operational environments.

- The Standard should be built upon the experience of existing production protocols and accepted industry-wide standard protocols. It should not, however, favor the proprietary interests of specific companies to the detriment of other users of the Standard.

- Initial versions of the standard focused on information systems within hospitals, versions 2.2 and 2.3 substantially expand coverage to define formats and protocols for computer applications in all health care environments.

- The very nature of the diverse business processes that exist within the health care delivery system prevents the development of either a universally agreed-on process or data model to support a definition of HL7's target environments. In addition, HL7 does not make a priori assumptions about the architecture of health care information systems nor does it attempt to resolve architectural differences between health care information systems. For these reasons, HL7 cannot be a true "plug and play" interface standard. These differences at HL7 sites will require site-negotiated agreements. (See Why isn't HL7 Plug and Play? for further comments on this issue.).

- The initial interest of the HL7 Working Group was to employ the Standard as soon as possible. Having achieved this, HL7 has been approved by the American National Standards Institute (ANSI) to be recognized as an Accredited Standards Organization (ASO).

- Cooperation with other related health care standards efforts (e.g., ACR/NEMA DICOM, ASC X12, ASTM, IEEE, NCPDP, etc.) has become a priority activity of HL7.

(Adapted from the introduction to the HL7 Specifications.)

G.9.2 The Governance of HL7

G.9.2.1 What is the HL7 Working Group?

The HL7 Working Group is composed of volunteers who give their time on a personal basis or under sponsorship of their employers. Membership in the HL7 Working Group has been, and continues to be, open to anyone wishing to contribute to the development and refinement of Level 7 Interface Standard for network technology in health care.

G.9.2.2 What is a Technical Committee of the Working Group?

A Technical Committee, often called a "chapter committee" is the basic specification-writing entity in HL7. Its members are charged with developing and balloting proposed chapters in the HL7 specification. For example, the ADT/Finance committee writes chapters 3 (ADT) and 6 (Finance).

One special Technical Committee which does not write a chapter is the "QA/Data Modeling Committee." This Committee has been primarily involved with developing a data model to represent the data used in HL7 transactions.

The current technical committees are

- ADT/Finance/Inter-Enterprise
- Control/Query
- Implementation
- Information Management (Medical Records)
- Order Entry/Clinical Results
- Patient Care
- Quality Assurance and Data Modeling

G.9.2.3 What is a Special Interest Group of the Working Group?

A Special Interest Group is a sanctioned group that meets under the auspices of HL7 but is not authorized to write and ballot draft chapters. The home health care SIG, for example, is a group that meets to discuss the application of HL7 to home health care and to provide coordinated input into the work of the various chapters. Occasionally a special interest group meets and makes the case for a new chapter and is reconstituted as a Technical Committee.

G.9.2.4 What is the HL7 Executive Committee?

The Executive Committee consists of the elected officers of the group and certain members that are appointed by the Executive Committee, including the Technical Chair and the Membership Chair. The Executive Committee provides policy-level guidance including setting budgets and approving the expenditure of funds. The Executive Committee approves the formation of new Technical Committees or Special Interest Groups upon recommendation of the Technical Steering Committee.

G.9.2.5 What is the HL7 Technical Steering Committee?

The Technical Steering Committee consists of the chairs of all the HL7 Technical Committees and Special Interest Groups. Its primary function is to coordinate the work of the Technical Committees.

G.9.2.6 What is the Role of the HL7 Executive Director and Administrative Staff?

HL7 contracts with The Association Management Group of Ann Arbor, Michigan, for various membership services. These include publishing the standard and Implementation Guide, arranging and providing administrative management of meetings, publishing minutes, and providing information about HL7. Mark McDougall of this firm is the Executive Director of HL7. In this role he reports to the Executive Committee.

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The Executive Director and his staff have no role whatsoever in determining the content of the HL7 standard.

G.9.2.7 How are HL7 Standards Written, Balloted and Published?

Technical committees write draft chapters. During this process the chapter chair will normally use votes of those present in a meeting to decide upon draft contents and provide good order. These are approved by a mail ballot by the HL7 Balloting process defined below. The ballot group is not limited to members of the committee. Any HL7 member can register an interest in the work of any committee and will be offered the opportunity to vote by mail, without any need to attend any meetings.

In a response to a ballot a member may vote affirmatively, affirmatively with minor suggestions, negatively with minor suggestions, or negatively. The Technical Committee is required to respond to all negative votes. Frequently they contact the person who provided the negative ballot in order to discuss the issue. The committee's response to the negative ballot may be any of these:

- In response to the negative vote we have decided to amend the chapter and resubmit it to ballot.
- We have discussed the negative ballot and clarified the meaning of the spec, and the voter has agreed to withdraw the negative.
- We have agreed to a minor clarification of the document that is not a substantial change and the voter has agreed to withdraw the negative.
- Or the Technical Committee has voted that it does not find the negative ballot persuasive for reasons stated in the response.

Technically, a ballot may be declared passed if thirty days have elapsed from the mailing of the ballot and a quorum of 60% of the ballot group responded and 67% of the respondents voted affirmatively. In practice technical committees work with the voters to reach an understanding so they will withdraw almost every negative ballot. Since the ballot group is different than the group that wrote the chapter this normally involves at least one revision and reballot of the chapter. In some cases chapters have been substantially rewritten as a result of the comments from the ballot group.

When the chapters have been approved they are assembled into a draft standard. The editor will strive to achieve a common look and organization at this time. The draft standard balloted by the same process. Any HL7 member can register an interest in balloting the draft document and will be offered the opportunity to vote by mail, without any need to attend any meetings. The procedure for dealing with negative ballots at this level is essentially the same as at the chapter level, but the acceptance criterion is more strict. At least 60% of the registered voters must vote and 90% must vote to affirm. In practice the Technical Committees work with the voters to achieve clarification and compromises in order to get almost all negative votes withdrawn.

After the draft standard has been successfully balloted it is subjected to a final editing process and then published. Version 2.2 was published primarily as a series of WordPerfect files on floppy disk. Members have the option to request printed copies. Due to difficulties using this version it is likely that Version 2.3 will be published electronically using a different file format.

G.9.2.8 Who May Use the HL7 Standard? Do I Have to be a Member?

There are no licensing requirements for using the HL7 standard, so technically anyone can use it. There is a big Catch-22 here, however. The primary source of funds for HL7 is its membership

fees. The documents are free to members.

It is possible to purchase a copy of the document without being a member, but the cost is the same as joining.

G.9.2.9 How Do I Get a Copy of the Standard?

Contact the HL7 Administrative Headquarters.

G.9.2.10 What are the Sources of HL7 Funding and How is the Money Used?

HL7 is wholly funded from two sources: membership fees and meeting fees.

Meeting fees are used to cover the costs of running meetings including conference rooms, lunches, on-site administrative staff and a substantial copying bill. Historically meeting fees and costs have just about balanced out.

Membership fees are used to cover the cost of editing and distributing the documents, conducting mail ballots, producing the annual member directory, and various informative activities including the HL7 Newsletter and information booths at trade shows. HL7 also pays for software used by the Technical Committees to develop a data model.

HL7 sometimes provides meeting space to other standards groups at no charge so that their meetings can be co-located with those of HL7. This has demonstrably improved the harmonization among the various standards efforts.

G.9.3 The HL7 Working Group

G.9.3.1 How Do I Join the HL7 Working Group?

Contact the HL7 Administrative Headquarters.

G.9.3.2 Why Should I Join the HL7 Working Group?

The main reason you should join the Working Group is to support the effort. Membership fees are the primary source of funds that support the work of writing, publishing, and providing information about the Standard.

Joining as an individual members is the cheapest way to get a copy of the spec and the only way to get the implementation guide. It is possible to buy the spec at the same price without becoming a member.

Some companies choose to join HL7 as a company in order to be able to provide more substantial support or to make a statement to their customers and prospects about their support for HL7. Some institutions choose to join HL7 as a corporate member in order to provide more substantial support or to make a statement to vendors about their interest in seeing HL7 compliance.

Corporate membership also simplifies administration for companies that have multiple working group members.

G.9.3.3 How Big is the HL7 Working Group?

There are approximately 1700 people who are currently eligible to vote in HL7 ballots.

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The average working group meeting includes about 250 members.

G.9.3.4 Who are the Principle Contacts for Questions and Comments about HL7?

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G.9.3.5 When and Where are the Next Working Group Meetings?

- January 12-16, 1998, New Orleans, LA
- April 27- May 1, 1998, Baltimore, MD
- September 14-18, 1998, San Diego, CA

G.9.3.6 How Can I Get More Information about the Next Working Group Meeting?

Contact HL7 Headquarters.

G.9.4 HL7 Information Resources

G.9.4.1 How Can I Learn More about HL7?

Contact HL7 Administrative Headquarters for information about membership or to be placed on the HL7 mailing list. You will receive meeting announcements and a quarterly newsletter which contains authoritative summaries of the work of the Technical Committees.

The HL7 Implementation Guide, only available to members, provides significant information about how to implement HL7.

The best tutorial information can be seen by attending HL7 meetings. Each meeting includes two days of tutorial and case studies.

G.9.4.2 How Can I Contact the HL7 Administrative Headquarters?

Health Level Seven
3300 Washtenaw Avenue, Suite 227
Ann Arbor, MI 48104-4250
Fax: (313) 677-6622
hq@hl7.win.net

G.9.4.3 What HL7 Information Resources are Available on the Internet?

To join the List Server send E-mail to: majordomo@virginia.edu; the subject can be anything you want. The first line must say exactly "subscribe HL7" (without the quotation marks).

Duke University maintains a World Wide Web server at <http//:dumccss.mc.duke.edu:/ftp/standards.html>. This Web Server contains pointers to many other Web resources applicable to HL7 and health care information systems standards.

G.10 RELATIONSHIP TO OTHER STANDARDS

G.10.1 DICOM

G.10.1.1 HL7 Does not Support DICOM, yet. How Can We Handle Images with HL7 Standard?

I think it is fair to say that today there is no HL7 specification for image management that is ready for implementation. There has been discussion of this within HL7, and there is a DICOM/HL7 special interest group on image management.

Some of the discussion is archived in <ftp//:dumccss.mc.duke.edu/standards/HL7/archive/current/CONTROL.TXT>.

Dean Bidgood, bidgood@acpub.duke.edu, is a contact for the Image Management SIG.

In addition, the draft of the Control chapter of the next version of HL7 provides for image and audio data types - see files H7C2FINB.DOC and H7C2FINB.TXT in <ftp//:dumccss.mc.duke.edu/standards/HL7/pubs/version2.3>.

Al Stone

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Logical Observation Identifier Names and Codes (LOINC®) Users' Guide

Updated 5/01/1998

Please send questions and comments to:

LOINC
c/o Regenstrief Institute
1001 West 10th Street, RHC-5
Indianapolis, IN 46202

or via Internet:
loinc@regenstrief.iupui.edu

This and other relevant documents are available via

FTP/Gopher:www.mcis.duke.edu/standards/termcode/loinclab/
World Wide Web: http://www.mcis.duke.edu/standards/termcode/loinc.htm

List of Files:

Description	Format	File Name
LOINC database	ASCII	LOINDBT1.TXT
LOINC database	ASCII ZIP	LOINDBT1.ZIP
LOINC database	MDB ZIP	LOINCMDB.ZIP
LOINC database printout	RTF	LOINDBW1.RTF
LOINC database printout	RTF ZIP	LOINDBW1.ZIP
LOINC Users' Guide	WP 6/7/8	LOINMAN1.WPD
LOINC Users' Guide	Word 6/95	LOINMAN1.DOC
LOINC Introduction	ASCII	LOININTR.TXT
LOINC Read Me	ASCII	LOINRDME.TXT
LOINC Release Notes	ASCII	RELNOTES.TXT
RELMA (Regenstrief LOINC Mapping Assistant)	EXE ZIP	RELMA.EXE
RELMA Documentation	Word ZIP	MANUAL.ZIP

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Users of the LOINC codes agree to the following conditions:

1) They will not change the meanings of any of the LOINC codes.

2) They will not change any contents in the defined LOINC Fields. (Users may add their own new fields to the database if they want to attach additional information to the existing LOINC record.)

3) They will include this notice of copyright and terms of use in any copies of the LOINC database that they distribute.

4) If new records are added to the LOINC database as distributed to deal with local requirements, these records must be assigned a LOINC code containing a leading alphabetic "X" so that the new term cannot be confused with new LOINC codes as they are assigned by the LOINC committee.

5) Those who incorporate any part of the LOINC database into another laboratory test definition database for distribution outside of their corporation must include the LOINC code (field #1) all six name fields (#2-7), the related terms (field #8), and the answer list (field #19), and include this copyright notice on the electronic document that incorporates the LOINC database.

Regenstrief Institute and the members of the LOINC Consortium do not accept liability for any omissions or errors in the LOINC database, and all **EXPRESS AND IMPLIED WARRANTIES, INCLUDING THOSE RELATING TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE DISCLAIMED**.

LOINC is a trademark of the Regenstrief Institute. This legend should be displayed on every copy of the database (both on the diskette itself and in a text file loaded onto the diskette or onto the Internet), and on all user manuals and other materials used in connection with the LOINC database.

Preface and Introduction

The LOINC databases provide sets of universal names and ID codes for identifying laboratory and clinical test results.[1] The purpose is to facilitate the exchange and pooling of results, such as blood hemoglobin, serum potassium, or vital signs, for clinical care, outcomes management, and research. Currently, many laboratories are using ASTM 1238 or its sister standard, HL7, to send laboratory results electronically from producer laboratories to clinical care systems in hospitals. Most laboratories identify tests in these messages by means of their internal (and idiosyncratic) code values. So the receiving medical informatics systems cannot fully "understand" the results they receive unless they either adopt the producer's laboratory codes (which is impossible if they receive results from multiple source laboratories, e.g.; the hospital lab, the local commercial lab, and a nursing home lab), or invest in work to map each laboratory's code system to their internal code system.[2]

If medical information producers who wish to communicate with each other used the LOINC codes to identify their results in data transmissions, this problem would disappear. The receiving system with LOINC codes in its master vocabulary file would be able to understand and properly file HL7 results messages that identify clinical observations via LOINC codes. Similarly, government agencies would be able to pool results (within limits) for tests from many sites if they were reported electronically using the LOINC codes. The LOINC codes (and names) for test observations should be of interest to hospitals, clinical laboratories, doctors' offices, state health departments, governmental health care providers, third-party payers, and organizations responsible for quality assurance and utilization review.

The LOINC codes are not intended to transmit all possible information about a test or observation. They are only intended to *identify* the test result or clinical observation. Other fields in the message can transmit the identity of the source laboratory and very detailed information about the sample. (For instance, the result code may identify a *blood* culture, but the message source code can be more specific and identify the sample as pump blood.) The level of detail in the LOINC definitions was intended to distinguish tests that are usually distinguished as separate test results within the master file of existing laboratory systems. Indeed, we used the master files from seven U.S. laboratories to shape this effort.

Each LOINC record corresponds to a single test result. (A current project is to invent names and codes for batteries of tests such as electrolytes.) The record includes fields for specifying:

1) Component (analyte) — e.g., potassium, hemoglobin, hepatitis C antigen.
2) Property measured — e.g., a mass concentration, enzyme activity (catalytic rate).
3) Timing - i.e., whether the measurement is an observation at a moment of time, or an observation integrated over an extended duration of time — e.g., 24-hour urine.
4) The type of sample — e.g., urine, blood.
5) The type of scale — e.g., whether the measurement is quantitative (a true measurement) ordinal (a ranked set of options) or nominal (E Coli; Staph Aureus).
6) Where relevant, the method used to produce the result or other observation.

It also contains information about the amount, route, and timing of physiologic or pharmacologic challenges (e.g., oral glucose tolerance test, which would be expressed in LOINC as GLUCOSE^1H POST 100 DL GLUCOSE PO[i]) The LOINC identifiers do not usually include the method in the name for chemistry tests, where tests are more often standardized to normalized methods, but do include it for most serological tests and coagulation studies. This same principle is usually reflected in the master files of existing laboratories. Of course, the method can always be reported as a separate item of information in a result message regardless of whether it is part of the test name.

We used many sources for constructing the database, including the Silver Book from the International Union of Pure and Applied Chemistry (IUPAC) and the International Federation of Clinical Chemistry (IFCC),[3] textbooks of clinical pathology (e.g. Henry[4] and Tietz[5]), the expertise and work of the LOINC members, and EUCLIDES. We have also reviewed the master test files of seven sources (Indiana University/Regenstrief, University of Utah, Association of Regional and University Pathologists (ARUP), Mayo Medical Laboratories, LDS Hospital in Salt Lake City, the Department of Veterans Affairs, Quest Diagnostics, and University of Washington). This has been an empirical effort. Our goal is to provide codes to which laboratories (and clinical departments) could map to their master files.

[i] In the United States, PO (an abbreviation for *per ora*) is used to identify medications taken by mouth.

The database includes fields for each of the six parts of the name. In addition, it may also contain EUCLIDES codes (for the component/analytic part of the name), IUPAC/IFCC codes, and ASTM codes, as well as related words, synonyms, and comments. Related words ("synonyms") are included to facilitate searches for individual laboratory test and clinical observation results.

Laboratories and managers of medical records systems should record the LOINC codes as attributes of their existing test/observation master files and use the LOINC codes and names in the OBSERVATION ID field (OBX-3) of the ASTM and HL7 OBX segment and the corresponding CEN TC251 and DICOM messages to identify laboratory results.

The print version of the LOINC database is presented to you as an electronic document grouped by "sensible" categories to make it easier to find general areas of interest. It is divided into two main categories, “lab” and “clinical.” (This split is recorded in Field #38, CLASSTYPE.) The laboratory portion of the LOINC database contains the usual categories of chemistry, hematology, serology, microbiology (which includes parasitology and virology), and toxicology; we also have categories for drugs and the cell counts you would find reported on a complete blood count or a cerebrospinal fluid cell count. We have separated antibiotic susceptibilities into their own category. The clinical portion of the LOINC database contains entries for vital signs, hemodynamics, intake/output, EKG, obstetric ultrasound, and other clinical observations. Table 18 (in Appendix A) lists all of these classes in detail. There is nothing sacred about these categories. You will be able to sort the database by whatever class is convenient for your application when you get the electronic version.

We have defined fields in the database for a number of data elements, e.g., typical units, sample normal ranges, but most of those fields are not yet filled in. In a few cases, we have suggested standard answer lists for tests whose results are usually reported as codes. The database is an ongoing project. We have established guidelines for users who wish to request additions and changes to LOINC, which are detailed in Appendix C.

For some kind of tests and observations, the database provides several ways to report values. For example, blood cell antigens might be presented as a "panel" with separate "tests" which report each possible antigen as present or absent if the test is to establish paternity; for cross matching, the result would be reported as a list of antigens found. We try to provide for both methods of reporting in the LOINC databases by including codes for both types of test identifiers.

The Regenstrief Institute and the LOINC committee will maintain the database while grant support is available (at least until January 1, 2001). We expect to find longer-term support or another home for the database before then. The LOINC database (which identifies over 13,000 different lab tests and clinical observations) and supporting documentation is available through the Duke standards Internet site. Anonymous FTP and Gopher access is available at **www.mcis.duke.edu**. The LOINC database and accompanying files are in the directory **standards/termcode/loinclab**.

The World Wide Web URL **http://www.mcis.duke.edu/standards/termcode/loinc.htm** provides links to all the LOINC files.

The LOINC databases are stored in a number of file formats. In each of them, the first part of the file contains the copyright notice with permission to use the database for any purpose without charge or written permission. We have copyrighted the databases and this document to assure that multiple variants of the codes do not emerge. Having many variants would defeat the purpose of a universal identifiers for test results.

✓ **Tab Delimited ASCII:**

Each record of the database is on a separate line. Each record is terminated by CR/LF, and each field is delimited by a tab character. Non-null text fields are enclosed in double quotes ("). Spreadsheet and database programs can import such files easily. This is the format you will use if you want to inport into your own data base. It contains all of the content of the data base. The tab delimited ASCII file is the "database of record" -- unlike the word processing versions, it will always contain all implemented fields. This file is available in a zipped and unzipped version.

✓ **RTF file:**

This file is formatted to print landscape in a Courier 6 point font and is intended to provide an easy to read print version. The LOINC records are sorted in alphabetic order by class and then by full LOINC name within class. The print version does not include all of the LOINC fields. Some of the longer fields float vertically. The size of the printed page make it

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impossible to display all database fields in this file.

The following files are available either zipped and unzipped. (PKUNZIP v. 2.04 or compatible required)

✓ **ACCESS data base:**

The LOINC database is also available as a ACCESS (MDB) file. This database, which is indexed, is available as LNC1MDB.ZIP. The database was created using Microsoft Access™ 2.0.

✓ **The LOINC Users' Guide** is also available both as a WordPerfect 6.0 or Word 95 file. The Users' Guide (this document) explains the structure of the database, its rationale, and the rules we used for naming test results. It is not compressed.

✓ **Brief Users' Guide**

The introduction to the Users' Guide is available as a separate ASCII text file.

✓ **RELMA**

In addition to the basic LOINC files, we also produce a Windows-based mapping utility called the Regenstrief LOINC Mapping Assistant (RELMA™). This program is also available for free use and may be downloaded from

http://www.mcis.duke.edu/standards/termcode/relma.zip

The RELMA package includes the LOINC table in the database plus several large index tables. Zipped, the program and database files exceed 12M, not including the manual. Note that you must unzip the LOINC database after running the SETUP.EXE program. All of the RELMA files will need almost 80 meg of disk space.

✓ **RELMA Users' Guide**

There is a separate Users' Guide documenting the RELMA program, which is included in this ZIP file.

We welcome corrections or extensions to the database. We are not interested in adding terms that *might* be needed in some future situation but we are interested in adding test observations that are actively being reported today. Appendix C provides instructions about submitting new terms.

Clem McDonald, MD
Chairman, LOINC committee

Stan Huff
Co-chairman, LOINC committee

Acknowledgments

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1 Goals

The goal of this project is to create universal identifiers (names and codes) to be used in the context of existing ASTM E1238, HL7, CEN TC251, and DICOM observation report messages employed in the various subdomains of healthcare informatics such as Clinical Laboratory Information Management Systems and Computer-Based Patient Record Systems.[6,7] Specifically, we want to create identifiers that can be used as the coded value of the "Observation Identifier" field (# 3) of the OBX segment of an ORU HL7 (HL7 Vs 2.2 and 2.3[8] or ASTM 1238-94[9]) message, or in a similar context in future versions of these HL7/ASTM standards. The LOINC codes will be identified in HL7 as code system "LN". The ultimate goal is that these "universal" identifiers, when used in the context of the messaging standards, will allow the exchange of clinical laboratory data between heterogeneous computing environments.

To facilitate this process, each identifier needs a fully specified name that is created in a standard way so that users can create long names for their tests that can be linked to the universal test identifier using semi-automated methods. We have either begun, or plan, to link other code systems for tests observations such as the IUPAC/IFCC2, ASTM E1238-94, SNOMED[10], and Euclides[11] codes to the LOINC codes. You will see a field in the LOINC database labeled for each of these related codes.

We decided to focus on creating names for results of reportable tests or clinical measurements rather than requestable batteries as our first effort, because the issues involved in naming results of tests are less complex than those involved in naming the batteries. Furthermore, defining the individual results is a prerequisite for defining the batteries that contain these individual tests. In addition, we can begin the process of transferring (and pooling) results once we have created unique identifiers for results. We do have a proposed approach to some orderable test batteries.

Our goal is to create a "universal" master file of elected "test" names that will cover most of the entries in master files of operational laboratory systems, so that the terms in these operational master files could be mapped directly into universal codes and names. The names we create correspond most closely to the "long test descriptions" seen in test master files. We want to create "fully specified" names. That is, if a person wanted to map her local test dictionary to the LOINC codes, all information needed to map a local test name to one of the fully specified names should be present in the LOINC name. This means that the names created will usually be longer than those used in lab reports today. The fully specified LOINC name is not meant to be used on clinical reports. It is assumed that shorter, more convenient abbreviated names and synonyms will be created and maintained by the local computer system. We have had many requests to create standardized "short" names (that could serve as reportable names) and will consider defining such names as a future project.

We want to achieve a level of detail in the definition of a test that will map one-to-one to the separately reported observations on a clinical laboratory report. If a test has its own column on a clinical report, or has a reference range that is different from other tests, or has clinical significance distinct from other closely related tests, it will usually be assigned a separate name. We deliver these fully specified names, their codes, and their related names as a database in which each line corresponds to a unique type of test.

1.1 Successes

The LOINC codes have been greeted enthusiastically since they were released to the Internet in April of 1996. Since then we have released ten revisions of the LOINC data base and it now includes nearly 14,000 observation concepts. The LOINC codes have been endorsed by the American Clinical Laboratory Association (ACLA) and recommended for adoption by its members, and by the informatics committee of the College of American Pathologists. The ACLA is the association of large referral laboratories, and its members are responsible for more than 60% of US outpatient laboratory volume. Quest Diagnostics (formerly Corning MetPath) and LabCorp, two of the largest commercial laboratories have adopted LOINC as their code system for reportable test results, as has LifeChem and ARUP (Associated Regional and University Pathologists). In addition, University of Colorado, Intermountain Health Care, Promedica, Kaiser Permanante, Clarian Partners (Indiana University, Methodist Hospital, and Riley Hospital), Partners Healthcare System of Boston (Brigham and Women's and Mass General Hospital), Care Group of Boston, and the United States Navy are adopting the LOINC codes for laboratory reporting. Insurance carriers such as Empire Blue Cross are also adopting LOINC for internal purposes. Internationally, LOINC has also met success. Geneva, Switzerland, is adopting LOINC in a trial preliminary to country-wide adoption. The province of Ontario, Canada, is adopting LOINC codes for a pilot study of a province-wide laboratory data base, and both Newfoundland and British Columbia are considering following in its footsteps.

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The LOINC codes have are being incorporated into the National Library of Medicine's ULMS. They are the basis for HCFA's ICD10-PCS laboratory codes. They have been incorporated in HCFA's quality assurance testing pilot programs, and they have been adopted by the Center for Disease Control and Preventions/State and Territorial Epidemiologist's project for reporting/transmitting communicable diseases electronically.

SNOMED collaboration

LOINC and SNOMED are supporting a collaboration that will ensure a consistent, unambiguous clinical reference terminology that builds upon the strengths of each. The SNOMED Editorial Board and the LOINC Committee have agreed on the following method for linking the SNOMED and LOINC terminologies in a synergistic way and preventing overlap:

- The detailed names of laboratory tests provided by LOINC will all be incorporated into the P3 SNOMED axis. These codes will retain the full LOINC code (number and check digit) but will include a prefix to identify the SNOMED axis. The LOINC committee will continue to have editorial control over these terms and will continue to distribute them on the Internet for public use.

- SNOMED will not define laboratory test names that overlap in meaning with fully specified LOINC names. The SNOMED Editorial Board can create hierarchical concepts in the SNOMED P3 (Laboratory Procedures) axis that combine any one or two LOINC relationships. However, if one of the relationships is the LOINC component relationship, SNOMED can NOT combine it with the LOINC system relationship. When the SNOMED Editorial Board has the need to use more than two LOINC relationships, the Editorial Board will work with the LOINC Committee to create a mutually acceptable solution. Any concept in the SNOMED P3 axis that currently does not meet these criteria will be retired and/or given to the LOINC Committee for consideration. LOINC will not define codes for entities that would be stored as values for its observations, including those that are listed as text in the answer field of the LOINC database.

- The components of LOINC names will be mapped to their corresponding atomic SNOMED elements. The entire mapping (along with the LOINC copyright requirement) will be published in a future release of SNOMED. Contact the CAP if you are interested in examining a pre-release version of this mapping. SNOMED version 3.4 contains numerous additions to the SNOMED chemicals, functions, living organisms, and other (atomic) axes that are referred to by the LOINC mapping.

1.2 What is not part of the name

Certain parameters and descriptions pertaining to test performance are specifically excluded from the fully specified test name. These parameters will typically be reported in separate fields (attributes) of a test/observation report message, not as part of the observation name. Attributes that we explicitly exclude from the fully specified name are:

- the instrument used in testing
- fine details about the sample or the site of collection such as "right antecubital fossa"
- the priority of the testing, e.g., whether stat or routine
- who verified the result
- the size of the sample collected
- the place of testing (e.g. home, bedside, clinical lab)

In the case of laboratory tests, the name does include information that identifies the type of sample (or specimen). However, the "sample" part of the name is not meant to carry all possible information about the sample, but only enough to indicate significant differences in the result *and* to reflect current usage in test names. For example, laboratories usually define urine sodium, sweat sodium, and serum sodium as different tests because each of these has a different normal range. But laboratories do not define different tests to distinguish the concentration of arterial serum sodium from venous serum sodium, though the lab may report that the sample was venous or arterial in another part of the report. We are guided by the pragmatics of conventional usage. If laboratories define separate tests for the same measurements done on different specimens (this usually implies a well defined normal range difference), we will define different "resultable" tests in our dictionary. If they do not, we will not.

The extent to which we include methods as part of the name is also guided by pragmatics. We distinguish tests/observations by the method used to produce the results only if the method has a significant effect on the interpretation

of the result. This is a complex subject and it is difficult to fully describe our rationale in this report. Where laboratories do not tend to include the method in the name -- e.g., most of chemistry -- we do not include the method in the name. Where they tend to -- e.g., in immunochemistry -- we do. For some tests, this can be justified by the standardization of methods to produce "equivalent" results, and sometimes by the many variables (method, reagent) that one could never hope to represent fully in a single name. However, even when we do distinguish these cases, we distinguish by method *class*, not the most detailed possible method distinction. (See section 2.7 for more details.)

The College of American Pathologists produces statistical summaries of the results for measurements of standard samples broken down by laboratory and by instrument or procedure. (These are called CAP surveys.) We explored the feasibility of using this CAP survey data to decide empirically when test names should be distinguished by method. This was not feasible because many of the apparent differences in method obtained with the standard samples were artifacts of the sample matrix and did not apply to serum specimens. In addition, the variation among laboratories was often of the same magnitude as the variation among methods within laboratories for the same method.

We do not mean to underrate the importance of method differences. The result message will still include information about the normal range for that particular test, the source laboratory and, if the laboratory wishes, specific information about the method (e.g., OBX 17 can carry very specific method information). However, such information is reported in separate fields in the HL7 message. It is not embedded in the names of the test.

We have a cooperative agreement with CAP and SNOMED to provide copies of the LOINC codes and names for distribution with the SNOMED codes in the P3 AXIS. The LOINC committee will continue to have editorial control and to distribute the LOINC database via the WG SNOMED and add hierarchies to the LOINC data base.

1.3 Scope of this document

The current scope of the existing laboratory portion of the LOINC database includes all observations reported by clinical laboratories, including the specialty areas: chemistry, including therapeutic drug monitoring and toxicology; hematology; serology; blood bank; microbiology; cytology; surgical pathology; and fertility.In the most current release, a modest number of terms used in veterinary medicine have been included, and more are planned for the near future. In addition, the scope includes those non-test measurements that are commonly required to interpret test results and are usually included as part of the report with the laboratory observations. Examples include:

- for cervical pap smears, the phase of menstrual cycle use of estrogens
- for arterial blood gases, inspired dioxygen
- for drug concentrations used in pharmacokinetics, the dose
- for a blood bank, the number of units dispensed

The clinical portion of the LOINC database covers the areas of blood pressure, heart and respiratory rates, critical care measures, cardiac output, body dimensions, body temperature, intake and output, electrocardiography, obstetric ultrasound, urologic ultrasound, and the major headings of history and physical, discharge summary, and operative note reports. Work on gastroenterology, mechanical ventilator management, and obstetrics is underway.

To each name, we have assigned a unique permanent code that we call the LOINC code. This is the code that systems should use to identify test results in electronic reports. The LOINC code has no intrinsic structure except that the last character in the code is a mod 10 check digit. The algorithm to calculate this check digit is given in Appendix B. All of the structure associated with a single LOINC entity is stored in other fields in the LOINC database.

2 Major "Parts" of a Test/Observation Name

The fully specified name of a test result or clinical observation has five or six main parts including: the name of the component or analyte measured (e.g. glucose, propranolol), the property observed (e.g. substance concentration, mass, volume), the timing of the measurement (e.g. is it over time or momentary), the type of sample (e.g. urine, serum), the scale of measurement (e.g., qualitative vs. quantitative), and where relevant, the method of the measurement (e.g., radioimmune assay, immune blot). These can be described formally with the following syntax.

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<Analyte/component>:<kind of property of observation or measurement>:<time aspect>:<system (sample)>:<scale>:<method>

The colon character, ":", is part of the name and is used to separate the main parts of the name.

The first part of the name can be further divided up into three subparts, separated by carats (^). The first subpart can contain up to three levels of increasing taxonomic specification, separated by dots (.). The hierarchical structure is outlined in Table 1, with references to the section numbers where each item is explained in detail.

We used Tietz[4], Henry[3], IUPAC[2], EUCLIDES[10], diagnostic microbiology textbooks such as Mahon and Manuselis[12] the American Association of Blood Banking[14], and other sources as well as the expertise of the individuals or the committee to choose preferred names.

Examples of fully specified LOINC names:

SODIUM:SCNC:PT:SER:QN
SODIUM:SCNC:PT:UR:QN
SODIUM:SRAT:24H:UR:QN
CREATININE.RENAL CLEARANCE:VRAT:24H:UR:QN
GLUCOSE^2H POST 100 G GLUCOSE PO:MCNC:PT:PLAS:QN
GENTAMICIN^TROUGH:MCNC:PT:SER/PLAS:QN
CALCIUM.FREE:SCNC:PT:SER/PLAS:QN
ALBUMIN:MCNC:PT:SNV:QN

2.1 General naming conventions

2.1.1 Abbreviations in names of component/analyte

Except for enumerated exceptions (Table 2), abbreviations should not be used in the component (analyte) of the name. We require the use of "total" not "tot," "Fraction" not "frac," "alpha" not "A-," "Beta not B-" (and so on for any Greek letter), oxygen, not O_2, and so on.

2.1.2 General naming rules for the component (analyte) part of the fully specified name

2.1.2.1 Place the identifier of the substance being measured first. This means "Hepatitis A antibodies (AB)" not "Antibodies, Hepatitis A."

2.1.2.2 Use the generic name of a drug, not the brand name, when referring to drug concentrations and minimum inhibitory concentrations (MICs), e.g., Propranolol, not Inderal. For concentrations of drugs and to antibiotic susceptibility, we will usually include the brand or trade names in the field "related name".

Table 1: Hierarchical Structure of Fully Specified Analyte Names	
Subpart Name	**Section**
Component/analyte	2.2
Name and modifier	2.2.1
Component/analyte name	2.2.1.1
Component/analyte subname	2.2.1.2
Component/analyte sub-sub-name	2.2.1.3
Information about the challenge (e.g., 1H post 100 gm PO challenge)	2.2.2
Adjustments/corrections	2.2.3
Kind of Property (mass concentration, mass)	2.3
Time Aspect (point or moment in time vs. time interval)	2.4
System/Sample type (urine, serum)	2.5
"Super System" (patient, donor, blood product unit)	
Type of Scale (nominal, ordinal, quantitative)	2.6
Method Type	2.7

2.1.2.3 Use full taxonomic name of an organism or virus name (not the disease) when describing a test that diagnoses that disease. Say "rickettsia rickettsii AB" not "Rocky mountain spotted fever AB". Say "herpes simplex virus AB" not "HSV AB." The disease name should be included as a synonym in the Related Term field.

2.1.2.4 Species and groups of species: SP identifies a single species whose identity is not known. SPP identifies the set of species beneath a genus. We have a third case, however. In some tests, antibodies apply to different strains of species. In rickettsial diseases, the antibodies are then against groups of species, e.g. the spotted fever group or the typhus group. The convention remains the same: we name the immunochemical (serologic) test by the organism, so it becomes Rickettsia SPP.Spotted fever group, or Rickettsia SPP.Typhus group.

When the test measures an antigen to a specific species of organism but cross-reactivity is such that other organisms are identified, the name should be the principal organism which is targeted by the test.

2.1.2.5 Avoid "direct" and "indirect" except as parts of synonym names. Avoid conjugated and unconjugated when a more precise term is available. For instance, use bilirubin glucuronide instead of bilirubin conjugated. Bilirubin conjugated becomes the synonym.

2.1.2.6 Use "platelets," not "thrombocytes."

2.1.2.7 Name vitamins by their chemical name. E.g., use thiamin not Vitamin B1, The name containing "Vitamin" will be included as a synonym. This is the only reasonable approach because all vitamins have a chemical name but not all vitamins have a "numbered" vitamin name.

2.1.2.8 Always specify whether serology tests measure the antigen or antibody, using the abbreviation "AB" for antibody and "AG" for antigen. Remove the "anti" from "ANTI X AB." It is redundant and obscures the most significant word in the name. Thus, "anti-smooth muscle AB" becomes "Smooth muscle AB."

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Table 2: Allowable Abbreviations in Component (analyte) Names	
Abbreviation	**Full Name**
AB	antibody
AG	Antigen
AGGL	Agglutination
CFU	colony forming unit
DNA	deoxyribonucleic acid
HIV	human immunodeficiency virus
HLA	human histocompatibility complex derived antigens
HTLV-1	human t-cell lymphotropic virus-1
Igx	immunoglobulins (e.g., IGG for immune globulin G, IGM for immune globulin M)
RNA	ribonucleic acid
RRNA	ribosomal nucleic acid

2.1.2.9 VDRL will be named Reagin AB because that is what it is. We will have to depend upon synonyms and aliases to equate our "standardized" names with the old names.

2.1.2.10 Use the noun form of the target of the antibody, e.g., Myocardium AB, not Myocardial AB.

2.1.2.11 Anion vs acid: Always use the anionic name for chemicals, not the acid name, e.g., lactate, citrate, and urate, not lactic acid, citric acid, and uric acid. The acid form of the name will be included in the synonym field of the database.

2.1.2.12 Alcohols: Always use the single-word names for alcohols: methanol, not methyl alcohol; ethanol, not ethyl alcohol, and so on.

2.1.2.13 Always spell out OH as Hydroxy, or as - ol, with no space or hyphen between Hydroxy and the next word.

2.1.2.14 Greek letters, alpha, beta, gamma, etc., are always spelled out (e.g., alpha tocopherol, not A-tocopherol), with a space between the spelled out Greek letter and the rest of the chemical name.

2.1.2.15 Use pH, not log(H+).

2.1.2.16 When naming allergenic materials of plant or animal origin, order the common name to reflect the Linnaean taxonomy of "genus species," e.g., for specific species of the maple, genus *Acer*, the LOINC analyte names would be MAPLE RED (*Acer rubrum*); MAPLE SILVER (*Acer saccharinum*); MAPLE SUGAR (*Acer saccharum*). Whenever available, the Latin name will be stored in the RELATED NAMES field.

2.1.2.17 Avoid use of the word "total" in laboratory test names, except when denoting the denominator of a fraction. Thus it is ALKALINE PHOSPHATASE, NOT ALKALINE PHOSPHATASE.TOTAL, but ALKALINE PHOSPHATASE.BONE/ALKALINE PHOSPHATASE.TOTAL.

2.1.3 Punctuation in analyte names

A number of analyte names include punctuation characters such as commas, for example, to identify the position of multiple alkyl groups in a carbon chain. We will avoid special characters, e.g., commas, dashes, and parentheses, except where they are included in the name specified by IUPAC, the Chemical Abstract Service (CAS) convention, or another international convention. So commas *will* appear in multiple substitutions of alkyl chains per the CAS standard, dashes will appear in HLA antigen names, and parentheses (i.e. round brackets) will appear in the names of red blood cell antigens.

2.1.4 Case insensitivity

All names are case insensitive. We use upper case in our example, but senders and receivers could use upper, lower or mixed case. However, the meanings should not be sensitive to case conversions to avoid any possibility of confusion when

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the information is sent over networks that may apply case conversion. To identify parts of the few names that by international convention *are* case sensitive, such as red blood cell antigens, we use the word 'LITTLE' in front of the letter that is lower case. We use a similar convention to indicate superscripts with the word SUPER. See examples in Table 3.

Since some systems are capable of distinguishing upper and lower case, we provide mixed case names in the EXT_CP_SY (Exact Component Synonym) field (Field #33). However, the available character set does not permit direct representation of superscripts; these are recorded in the EXT_CP_SY field as a carat ("^"), e.g., Lu^a.

Table 3: Case Specifying Conventions

Our conventions	Standard mixed case
A LITTLE U (LITTLE A) AB	Au(a) AB
L LITTLE U LITTLE SUPER A	Lu^{a}
LITTLE I -1 AB	I-1 AB

2.1.5 Roman numerals vs. arabic numerals

Whenever possible, numerals shall be represented in their arabic form. However, when the conventional name uses Roman numerals as is the case for clotting factors such as factor VIII, the LOINC primary name will use Roman numerals and we define a synonym containing Arabic numerals.

2.2 Component/analyte (1st part)

The first main part consists of three subparts: (1) the principal name (e.g. the name of the analyte or the measurement); (2) the challenge or provocation, if relevant, including the time delay, substance of challenge, amount administered, and route of administration; and (3) any standardization or adjustment.

The three subparts of the first part follow this syntax:

<[analyte].[subclass].[sub-subclass]> ^
<[time delay] post [amount] [substance] [route])> ^
<adjustment>

In the above syntax, the carat (^) is a required delimiter and the "dot" (.) separates the analyte name from its subspecies.

This convention also implies that dots (.) and carats (^) cannot be a formal part of any of the words that are connected by these delimiters.

These subparts are described in greater detail below, Sections 2.2.1 through 2.2.3.

2.2.1 Analyte Name (1st subpart)

The first subpart names the analyte, including any relevant sub-classifications, separated from the main analyte name by dots.

2.2.1.1 Class/Subclass/Sub-subclass

The principal name (the first subpart) can be divided further by subclass (e.g. calcium (II) is one component, calcium.ionized is another test that measures a subclass of calcium.) Subclasses are separated by dots. Bound and free, and bioavailable, components, ionized and unionized components, and antibody subtypes are all subclasses. Note that bio-available is distinguished from free by including both free and partially bound moieties. Use total as a modifier sparingly, in in denominators of mass and substance fractions, e.g. the fraction of Prealbumin over Protein.total.

.

If the antibody is from a particular subclass of antibodies specify the subclass (IGM, IGG, IGA, or IGD) e.g., Hepatitis A

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AB.IGG, Hepatitis A AB.IGM

If more than one species is included in the measurement, all are listed in the subclass, e.g. "Hepatitis A AB.IGM+IGG" with a plus sign (+) to separate the subspecies. There should be no spaces between the plus sign and the words it connects. If two constituents are measured as one quantity, both should be named and the component separated by a plus sign (+), e.g., Alprozolam + Metabolytes.

2.2.2 Challenge test (2nd subpart)

The second subpart contains information necessary to interpret "challenge" (or loading or tolerance) tests. Variables that report the result of a measurement taken a certain amount of time post challenge (e.g. glucose after an oral glucose tolerance test) must be distinguished according to the challenge and the time post challenge. Thus, the second subpart has a substructure that identifies the time interval or time difference and the challenge, using the following syntax, where the word "post" (or base line) is required.

<time delay> "post" <challenge>

where the challenge can be further characterized as

<amount given> <substance/treatment given> <route given>

The time difference follows the syntax: n<S|M|H|D|W> where n is a number (possibly a decimal); S denotes seconds; M denotes minutes; H denotes hours; D denotes days; and W denotes weeks. The time delay can be preceded by a 'greater than' (>) sign, e.g. >4H.

Table 4 lists some possible values for time difference, but any time specification that follows the above syntax would be legal.

The second subpart can also be used to specify the ordering of specimens, e.g., ^1ST SPECIMEN 1, ^2ND SPECIMEN. Use this syntax to indicate pre- and post-immunization specimens, acute and convalescent specimens, or a series of specimens for which no more detailed information is available.

More general terms, of the form <analyte>^POST CHALLENGE, are available to transmit information about challenges for which pre-coordinated terms do not exist in the LOINC database.

The second subpart is also used to describe measurements taken at a specified point after the beginning of an ongoing treatment, such as peritoneal dialysis, e.g., CREATININE^12H POST PERITONEAL DIALYSIS

Table 4: Time Delay Post Challenge			
BS	Baseline (time just before the challenge)		
PEAK	The time post drug dose at which the highest drug level is reached (differs by drug)		
TROUGH	The time post drug dose at which the lowest drug level is reached (varies with drug)		
RANDOM	Time from the challenge, or dose not specified. (random)		
n minutes/hours/days/weeks/months/etc. after challenge begun:			
1M	1 minute post challenge	6H	6 hours post challenge
2M	2 minutes post challenge	7H	7 hours post challenge
3M	3 minutes post challenge	8H	8 hours post challenge
4M	4 minutes post challenge	8H SHIFT	8 hours alligned on nursing shifts
5M	5 minutes post challenge	12H	12 hours post challenge
6M	6 minutes post challenge	24H	24 hours post challenge
7M	7 minutes post challenge	2D	2 days
8M	8 minutes post challenge	3D	3 days
9M	9 minutes post challenge	4D	4 days
10M	10 minutes post challenge	5D	5 days
15M	15 minutes post challenge	6D	6 days
20M	20 minutes post challenge	7D	7 days
25M	25 minutes post challenge	1W	1 week
20M	30 minutes post challenge	10D	10 days
1H	1 hour post challenge	2W	2 weeks
2H	2 hours post challenge	3W	3 weeks
2.5H	2 1/2 hours post challenge	4W	4 weeks
3H	3 hours post challenge	1MO	1 month (30 days) post challenge
4H	4 hours post challenge	2MO	2 months (60 days) post challenge
5H	5 hours post challenge	3MO	3 months (90 days) post challenge

2.2.2.1 Reporting the baseline measure as part of a challenge test

We define one baseline term for different challenge batteries when the challenge is given by the same dose and route. So we define one baseline test for the 100 gm oral glucose tolerance test regardless of the number of separate measurements defined in the battery. For example, the baseline serum glucose for 100 g oral glucose by mouth would be:

GLUCOSE^BS 100 G GLUCOSE PO

A laboratory could use this same test identifier to identify the baseline result of a 2 h glucose tolerance and a 3 h glucose tolerance, for example.

We would define different baseline measurements for challenges with different substances. The baseline serum glucose before a challenge with 50 U insulin challenge would be defined as a different test from the baseline glucose for an oral glucose tolerance test. These different baseline tests are defined to accommodate laboratories that conventionally do the same. However, a baseline glucose for any challenge is not affected by the challenge and could in principle be reported as a glucose without specifying the relation to a coming challenge.

We denote the route of the challenge by HL7 Version 2.2 "abbreviations for medication routes" (Table 5). An oral route of administration would be denoted by "PO," an intravenous route by "IV."

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Table 5: Route Abbreviations for Challenge Part (from HL7 vs. 2.3, chapter 4)			
AP	Apply Externally	MM	Mucous Membrane
B	Buccal	NS	Nasal
DT	Dental	NG	Nasogastric
EP	Epidural	NP	Nasal Prongs
ET	Endotrachial Tube	NT	Nasotrachial Tube
GTT	Gastronomy Tube	OP	Ophthalmic
GU	GU Irrigant	OT	Otic
IMR	Immerse (Soak) Body Part	OTH	Other/Miscellaneous
IA	Intra-arterial	PF	Perfusion
IB	Intrabursal	PO	Oral
IC	Intracardiac	PR	Rectal
ICV	Intracervical (uterus)	RM	Rebreather Mask
ID	Intradermal	SD	Soaked Dressing
IH	Inhalation	SC	Subcutaneous
IHA	Intrahepatic Artery	SL	Sublingual
IM	Intramuscular	TP	Topical
IN	Intranasal	TRA	Tracheostomy
IO	Intraocular	TD	Transdermal
IP	Intraperitoneal	TL	Translingual
IS	Intrasynovial	UR	Urethral
IT	Intrathecal	VG	Vaginal
IU	Intrauterine	VM	Ventimask
IV	Intravenous	WND	Wound
MTH	Mouth/Throat		

Examples

GLUCOSE^BS 100 G GLUCOSE PO:MCNC:PT:SER:QN
GLUCOSE^30M POST 100 GM GLUCOSE PO:MCNC:PT:SER:QN
GLUCOSE^2H POST 100 GM GLUCOSE PO:MCNC:PT:UR:QN
GENTAMICIN^TROUGH:MCNC:PT:SER:QN

For drug peak (obtained at a time presumed to reflect the highest concentration) and trough (obtained at a time presumed to reflect the lowest concentration) measures the nature of the substance loaded is the same as the analyte name, and need not be included.

2.2.2.2 Physiologic challenges

Some challenges are defined in terms of a physiologic stress, not a dose of a chemical substance. The LOINC names currently cover calorie fasts (no calorie intake), exercise, and fluid restrictions. These challenges are denoted by codes given in Table 6.

In the case of such challenges, the syntax also includes the duration of the challenge.

E.g., <duration> POST <duration><physiologic challenge>
E.g., CHOLESTEROL^POST 12H CFST

Table 6: Nature of Challenge	
CFST	Calorie fast. No caloric intake (food) for the period specified in the time part of the term, e.g., POST 12H CFST
EXCZ	Exercise undertaken as challenge (can be quantified)
FFST	Fluid "fast." No fluid intake for the period specified

The naming structure is an exact analogous structure to that of chemical challenges. A test for glucose after 12 hours of an energy fast would be represented as:

GLUCOSE^BS POST 12H CFST:MCNC:PT:SER:QN

In all physiologic challenges (fasting, fluid deprivation), the duration of the physiologic challenge must be stated.

A test for osmolality after fluid restriction would be

OSMOLALITY^POST 12H FFST:OSMOL:PT:UR:QN

A test for triglyceride after an 18 h for energy fast would be:

TRIGLYCERIDES.TOTAL^POST 12H CFST:MCNC:PT:SER:QN

Two durations can appear in one specification, e.g.:

CORTISOL^1.5H POST 0.05-0.15 U INSULIN/KG IV POST 12H CFST:MCNC:PT:SER:QN

Our rules for naming challenge tests work well only when there is a single intervention followed by a test for one or more components over time. Complex challenge tests involving more than one intervention or complicated sampling techniques need a unique name, but the name may not be a complete description of all of the test parameters.

2.2.2.3 Reporting characteristics of challenge as separate observations

Because we cannot anticipate every type of challenge and route of administration, and because some challenge tests have no usual dose, some challenge tests will not contain a dose. Challenge observations that do not include a specific dose in the name have the word "DOSE" where a numeric dose would otherwise appear. The general form is:

<analyte>^<time> post dose <route>

Examples:

GLUCOSE^1H POST DOSE PO:MCNC:PT:SER:QN

The actual dose might then be sent as a comment or as a separate "test" that carries the dose as its value. To accommodate laboratories that wish to transmit the relevant challenge dose as a separate observation, we also define separate test names (and codes) for reporting such doses. This dose could then be sent by the reporting service as a separate result in a separate OBX segment.

The name of the observation that identifies the value of the dose would have the form:

<drug or challenge substance>: <time> post dose <challenge substance>

Examples:

GLUCOSE^PO:MASS:PT:DOSE:QN
GENTAMICIN^IV:MASS:PT:DOSE:QN

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Thus we distinguish a drug concentration from the drug dose by means of the system (sample), 4th part, of the test name (see Section 2.5). You can find the observations that carry the dose of drugs or challenges grouped in the class DRUG within the LOINC database. This approach has the advantages of parsimony and practicality. It also provides an observation ID for the piece of information that must be transmitted along with the request for the observation.

Another example would be:

OXYGEN:PRES:PT:BLDA:QN
OXYGEN INHALED:VRAT:PT:IHG:QN (liters/minute or milliliters/second)
OXYGEN INHALED MECHANISM:TYPE:PT:DOSE:NOM (to report kind of delivery mechanism, e.g., nasal cannula)

An analogous approach is used for reporting many kinds of associated variables when the variables are not conventionally embedded in the name, in part because there are too many levels of the variables and it is not feasible.

2.2.2.4 Generic challenge specifications

We allow for very specific challenges, and less specific challenge designs:

a) 30M post challenge
b) 1st specimen post challenge

Some challenges will be specified fully as described above, e.g. 30M post 100 gm glucose pc. We will also include challenges without the amount specified, e.g. 30M xxx glucose and those that do not specify the exact time, e.g., 1st specimen post xxx glucose pc, or even more generic, 1st specimen post challenge. These latter varients are needed to accommodate the submissions to reference laboratories that do not fit any common protocol (and do not report the details of the study protocol to the referenc laboratory).

2.2.2.5 Acute and convalescent, pre & post immunization specimens.

To assess the efficacy of immunizations by measuring antibody titres before and after the immunization, we obtain evidence for acute infection by assessing acute and convalescent screens. Both of these cases are assessed by the 1st specimen, 2nd specimen option, e.g.:

STREPTOCOCCUS AB^1ST SPECIMEN:ACNC:PT:SR:QN

2.2.3 Adjustments/corrections (3rd subpart)

The third subpart of the data element contains calculations that adjust or correct some measured value. We use this subpart to distinguish corrected or adjusted values from the uncorrected measurement, e.g., corrected cell counts from the raw cell counts. Since these attributes are unique to each measurement, they will be short phrases of text rather than a controlled vocabulary to define the content of the third subpart. However when defined, such a test will have a unique LOINC code and the meaning will be fixed by the text in the third part.

Examples:

CALCIUM.FREE^^PH ADJUSTED TO 7.4:SCNC:PT:SER/PLAS:QN

CREATININE.RENAL CLEARANCE^^NORMALIZED TO 1.72 BODY SURFACE AREA:VRAT:24H:UR:QN

LEUKOCYTES^^CORRECTED FOR NUCLEATED ERYTHROCYTES:NCNC:PT: BLD:QN

Note that the actual pH of the sample would be sent as a separate OBX segment in the test result message analogous to the approach described in Section 2.2.2.1.

2.3 Kind of Property (also called kind of quantity) (2nd part)

The second part of the fully specified name distinguishes between different kinds of quantities relating to the same substance, e.g., the mass versus the concentration of sodium in a urine sample, a molar concentration versus a mass concentration, or the absolute eosinophil count versus the percent of the total white count that are eosinophils. The type of property (kind of quantity) is an IUPAC concept described in the Silver Book.[6] We include most of the relevant IUPAC types of property in Table 7. (See Appendix E for detailed examples.)

Analytes reported with masses (mgs, gms, etc.) in the numerator of the units of measure are associated with one of the properties that begin with the word mass, e.g., mass content, mass concentration, etc. Analytes reported as moles or millequivalents in the numerator of units of measure are associated with properties that begin with the word substance, e.g., substance amount, substance concentration. Counts are associated with properties that begin with "number," e.g., a white blood cell count reported as number of WBCs divided by volume of blood, would have a property of Number Concentration. Measures of enzymatic activity are all associated with properties beginning with "catalytic."

Each of these four major property categories has five derivatives: content, concentration, concentration ratio, fraction, and rate. Measures of an amount (of mass, substance amount, catalytic activity, or number) divided by volume are concentrations. Measures of the total amount measured per mass of sample are reported as contents (mass content, substance content, etc.). These have units such as kg/gm sample. "Mass fraction" is used when grams of a component measured as a subcomponent of another component, e.g., CKMB/TOTAL CK. These are almost always reported as percents (%).

A mass ratio is the ratio of the mass of two chemical components in one system (or sample). If the ratio refers to components in a single system, the ratio of the mass concentrations is also a mass ratio because the denominators cancel out. So, a mass of serum creatinine to mass of serum urea nitrogen within the same specimen (system) would be a mass ratio. Amount of substance (molar amount) would give a different ratio: SRTO. If the measures come from different specimens, e.g., PT patient/PT control, it is a relative ratio.

IUPAC describes an entitic quantity. This refers to measure per entity by number of entities (e.g. cells, receptors, molecules).

Entetic quantities usually have units that include the name of some entity, e.g. red blood cells ("per 10^6 RBCs). One must be careful about measures of constituants of red blood cells because they can be expressed as an amount "per mass of hemoglobin" or "per red blodd cell". The former is a mass content, the latter is a mass per entity.

All clearances have the property of volume rate, but "Clearance" will be included in analyte name to clarify meaning:

SODIUM RENAL CLEARANCE:VRAT:24H:UR:QN
CREATININE RENAL CLEARANCE:VRAT:12H:UR:QN

Use "PRID" (presence or identity) as the type of property field when a specimen is sent for culture, and the result can be the presence of any organism (especially as an initial result) and later the organism is identified. The same rule applies to toxicology screens or other observations that report the identity of one or more classes of entities as the result. For example:

MICROORGANISM IDENTIFIED:PRID:PT:ISLT:NOM:BACTERIAL SUBTYPING
MICROORGANISM IDENTIFIED:PRID:PT:ISLT:NOM:VIRAL SUBTYPING

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Table 7: Kind of Property

Enzymatic Activity	
CACT	*Catalytic Activity
CCNC	*Catalytic Concentration
CCRTO	Catalytic Concentration Ratio
CCNT	*Catalytic Content
CFR	*Catalytic Fraction
CRAT	*Catalytic Rate
CRTO	*Catalytic Ratio
Entitic	
ENT	*Entitic
AENT	*Arbitrary Entitic
ENTSUB	*Entitic Substance of Amount
ENTCAT	*Entitic Catalytic Activity
ENTLEN	Entitic Length
ENTMASS	Entitic Mass
ENTNUM	*Entitic Number
ENTVOL	*Entitic Volume
Mass	
MASS	Mass
MCNC	*Mass Concentration
MCRTO	Mass Concentration Ratio
MCNT	Mass Content
MFR	*Mass Fraction
MINC	*Mass Increment
MRAT	Mass Rate
MRTO	Mass Ratio
RLMCNC	*Relative Mass Concentration
THRMCNC	*Threshold Mass Concentration
Counts	
ACNT	Arbitrary Count
NUM	*Number
NARIC	Number Areic (number per area)
NCNC	*Number Concentration (count/vol)
NCNT	Number Content = Count/Mass
NFR	*Number Fraction
NRAT	Number Rate = Count/Time
NRTO	Number Ratio
Substance Amount (Moles/Millequivalents)	
RLSCNC	*Relative Substance Concentration
SUB	*Substance Amount
SCNC	*Substance Concentration
SCRTO	*Substance Concentration Ratio
SCNT	*Substance Content
SCNTR	*Substance Content Rate
SFR	*Substance Fraction
SCNCIN	*Substance Concentration Increment
SRAT	*Substance Rate
SRTO	*Substance Ratio
THRSCNC	Threshold Substance Concentration
Volumes	
VOL	*Volume
VCNT	*Volume Content
VFR	*Volume Fraction
VRAT	*Volume Rate
VRTO	*Volume Ratio
ARENRG	Energy/Area
ARRESIS	Resistance/Area
ARVOL	Volume/Area
ARVOLRT	Volume Rate/Ratio
ARVRAT	Volume Rate/Area
Arbitrary Unit Measures	
ACNC	Concentration, Arbitrary Substance
ACNT	Arbitrary Content
AFR	Arbitrary Fraction
THRACNC	Threshold Arbitrary Concentration
ARAT	Arbitrary Rate

Other Properties	
ABS	Absorbance
ACT	*Activity
ANAT	Anatomy
ANGLE	Angle
APER	Appearance
ARB	*Arbitrary
AREA	Area
ASPECT	Aspect
BIB	Bibliographic Citation
CIRC	Circumference
CLAS	*Class
CNST	*Constant
COEF	*Coefficient
COLOR	Color
COMPLX	Complex
CONS	*Consistency
DEN	Density = Mass/Volume
DEV	Device
DIFF	*Difference
ELAS	Elasticity
ELPOT	Electrical Potential (Voltage)
ELPOTRAT	Voltage Rate (=Amperage)
ELRES	Electrical Resistance
ENGRAT	Power = Energy/Time
ENGRTO	Energy Ratio
ENRG	Energy
EQL	*Equilibrium
EQU	Equation
FCN	Function
FIND	Finding
FORCE	Mechanical Force
FREQ	Frequency
IMP	Impression/interpretation of study
ID	Identifier
HX	History
KINV	*Kinematic Viscosity
LEN	Length
LENRTO	Length Ratio
LINC	*Length Increment
LIQ	*Liquifaction
METHOD	Method
MGFLUX	Magnetic flux
MORPH	Morphology
MOTIL	Motility
OD	Optical density
OSMOL	*Osmolality
PCT	Percent
PRCTL	Percentile
PRID	Presence or Identity
PPRES	*Pressure (partial)
PRES	Pressure
PRESRTO	Pressure Ratio
RANGE	Ranges
RATIO	Ratios
RDEN	Relative Density
REL	*Relative
ROUTE	Route of RX
SATFR	*Saturation Fraction
SHAPE	Shape
SMELL	Smell
SUSC	Susceptibility
TASTE	Taste
TEMP	*Temperature
TEMPDF	*Temperature Difference
TEMPIN	*Temperature Increment
TEXT	Text

Table 7: Kind of Property			
Time		THRESHOLD	*Thresdhold
DATE	Date	TITR	Dilution Factor (Titer)
TIME	Time (e.g. seconds)	TYPE	Type
TMSTP	Time Stamp -- Date and Time	VEL	*Velocity
TRTO	Time Ratio	VELRAT	*Velocity Rate
RCRLTM	*Reciprocal Relative Time	VELRTO	*Velocity Ratio
RLTM	*Relative Time	VISC	Viscosity
*Starred items are adopted from the IUPAC Silver Book,[2] non-starred items are extensions.			

Properties tend to be the most foreign to new users of LOINC. Appendix E provides more explanation and many detailed examples.

2.4 Time Aspect (Point or moment in time vs. time interval) (3rd part)

One can measure a property at a moment (point) in time or over a time interval and integrate, in the mathematical sense, over time. In the latter case, we aggregate a "series" of physiologic states into a single scalar value that reflects some "average" property measured over the specified time interval. Intervals also have relevance for rate measurements such as excretion (substance rate or mass rate) or clearances (volume rates). The amount over an interval is often expressed as a mass rate (MRAT) or a substance rate (SRAT, e.g., mol/24h). Interval measurements often apply to urine and stool (e.g., collection over 24 h and calculation of a concentration, total amount, or clearance). They also apply to clinical measurements such as urine outputs where we have shift totals and 24 h totals, and event counts on physiologic monitors such as the number of premature ventricular contractions (PVCs) over 24 h on a Holter monitor.

The allowed values are defined as a syntax exactly like the syntax for the times in challenge tests, e.g., <numeric value><S|M|H|W> The most common one is 24H. Table 8 gives some other examples.

For 24H urine collection is the "standard" integrated measure and these are almost always reported as mass (MRAT), amount of substance (SRAT), or catalytic (CRAT) rates. These would contrast with spot or random urines which are represented as point (PT) measures in our nomenclature and usually reported as concentrations -- MCNC, CCNC, or SCNC for mass, catalytic, and substance concentrations respectively. However, we can also report the average concentration on a 24 hour specimen and a 24 hour average concentration must be distinguished from the point concentration.

The designation of 24 h collection is maintained for tests that traditionally have reference ranges based on amount of substance of a component cleared or excreted in 24 h. However, a given specimen could have a 23 h collection time and would still be called as a 24 h study. Depending upon the policies and procedures of the lab, they might extrapolate the reported value to what it would have been if the collection was the full 24 hours and report it as moles per day.

We allow indirect specifications of a time window. STDY identifies the duration of the Study (without specifying an exact time). ENCTR identifies the Encounter (ER visit, hospital stay, etc).

Drug doses (as required to report the mass or amount of substance of a drug given) would be identified by recording "DOSE" as the system (sample) and "MASS" as the kind of quantity. A point dose would be the dose given at a single point in time (e.g., 250 mg of ampicillin). To represent the total amount of a drug given in 24 h, one would record "24H" in the third subfield, and "MASS RAT" as the property.

Example:

GENTAMICIN:MASS:PT:DOSE:QN
GENTAMICIN:MRAT:24H:DOSE:QN

Sample volumes reported for timed measurements are carried in other fields or as separate "test" results in other OBX segments.

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Table 8: Duration Categories	
PT	To identify measures at a point in time. This is a synonym for "spot" or "random" as applied to urine measurements.
	.
	.
STDY	Duration of the study
ENCTR	Duration of an encounter (hospital stay, visit).
PROCEDURE	Duration of the procedure (surgery, etc.)
XXX	Not specified; time will be reported in another part of the electronic message
* (star)	Life of the "unit." Used for blood products.

1M	1 minute	7H	7 hours		
5M	5 minutes	8H	8 hours	2W	2 weeks
10M	10 minutes	9H	9 hours	3W	3 weeks
15M	15 minutes	10H	10 hours	4W	4 weeks
20M	20 minutes	12H	12 hours	1MO	1 month (30 days)
30M	30 minutes	18H	18 hours	2MO	2 months
45M	45 minutes	24H	24 hours	3MO	3 months
90M	90 minutes	72H	72 hours		
1H	1 hour	1D	1 day		
2H	2 hours	2D	2 days		
2.5H	2½ hours	3D	3 days		
3H	3 hours	4D	4 days		
4H	4 hours	5D	5 days		
5H	5 hours	6D	6 days		
6H	6 hours	1W	1 week		

Table 9 shows the allowable time aspect codes. The second and optional subpart of the time component allows an indication of some sub selection or integration of the measures taken over the defined period of time, so 8H^MAX heart rate would be the highest heart rate observed over 8H (Shift). MIN, MAX, FIRST, LAST, MEAN are the other possible values for this subpart. When nothing is stored in this subpart, we assume a mean value over the time period in questions.

Table 9: Time Aspect Codes	
Time	**Definition**
MIN	Minimum value over interval
MAX	Maximum value over interval
FRST	First value observed during an interval
LAST	Last value observed during an interval
MEAN	Mean of all of the values observed on the interval (This is the default selection)

2.5 System (Sample) Type (4th part)

System (sample) type is the fourth part of the fully specified test name. It consists of two subparts; the first names the system, the optional second (delimited with a "^") indicates the super system source of the sample if it is not the patient, e.g., fetus, blood product unit, donor, etc. Sample type should be represented with the abbreviations in Table 10 (which include most of the sample types defined in ASTM E1238, and HL7).

We define different tests for the combination of component (analyte) and type of system (sample) that are commonly reported. In practice, laboratories include a relatively small range of sample types in the their test names. Chemical tests commonly distinguish between serum, urine, blood, and cerebrospinal fluid. Microbiology cultures tend to distinguish between a greater number of sources. The list in Table 10 was defined for reporting sample type in a field of the HL7/ASTM message that is quite independent of the test/measure name, and we do not imply that all such types will find their way into distinct LOINC names. However, when a distinction by type of system *is* required in the name, it should be represented by one of the codes given in Table 10.

When should we lump a variety of specimen types under the unspecific code FLU and when we should give a body material its own unique name for a given component? The decision depends upon the degree to which laboratories have reported the system-component pair as a separate "result" and the degree to which the normal ranges for a given component-system have been standardized. By this rule, we will always define different tests for serum and for urine, when a component can be measured in both. We define sweat sodium as a distinct test because it is a standardized test used to diagnose cystic fibrosis. We did not define duodenal fluid sodium as a separate LOINC code because this measure has not been standardized. This does not mean that the specifics about the system would be ignored. It just means that this information would be recorded in another field of the message (the specimen field of the HL7 OBR segment), not in the name.

For many chemistry tests we have included in the LOINC database a test name for identifying miscellaneous types of body fluid (FLU), to provide a way to distinguish tests that are performed on fluid types that are not explicitly represented in the database. We use the code XXX to identify a material that is not specified — it could be solid or fluid, for example.

For many types of tests, the distinction between plasma and serum is irrelevant. When testing on serum or plasma is clinically equivalent, the system should be recorded as SER/PLAS. Sometimes the test can only be run on either plasma or serum; the component will then be associated with either SER or PLAS in one observation. If the test can be run on either but the results are different and standardized (a very rare circumstance), two separate tests will be defined in our file, one with a system PLAS and one with a system SER. The current LOINC database includes some SER tests and some PLAS tests that should really be SER/PLAS. As we determine that a SER or PLAS test really should have been designated SER/PLAS, we will change the designation.

If the test is run on a combination of types of system (such as a ratio of substance found in CSF and plasma) the codes are joined with a "+" : CSF+PLAS, CSF+SER, etc.

We will be specific about the type of system to distinguish at least among blood, urine, cerebrospinal fluid, pleural fluid, synovial fluid, and peritoneal fluid.

Details about the exact source and collection method (e.g. blood drawn from the right arm and maintained on ice) are not a proper part of the test name and are reported in other parts of the message, e.g., OBX and OBR of the HL7 definition.

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Table 10: System/Sample Type Codes

Abbrev	Name	Abbrev	Name	Abbrev	Name
ABS	Abcess	FLU	Body fluid, unsp	SKN	Skin
AMN	Amniotic fluid	FOOD	Food sample	SKM	Skeletal muscle
ANAL	Anus	GAS	Gas	SPRM	Spermatozoa
ASP	Aspirate	GAST	Gastric fluid/contents	SPT	Sputum
BPH	Basophils	GEN	Genital	SPTC	Sputum - coughed
BIFL	Bile fluid	GENC	Genital cervix	SPTT	Sputum - tracheal aspirate
BLDA	Blood arterial	GENF	Genital fluid	STON	Stone (use CALC)
BBL	Blood bag	GENL	Genital lochia	STL	Stool = Fecal
BLDC	Blood capillary	GENM	Genital Mucus	SWT	Sweat
BLDCO	Blood - cord	GENV	Genital vaginal	SNV	Synovial fluid (Joint fluid)
BLDMV	Blood- Mixed Venous	HAR	Hair	TEAR	Tears
BPU	Blood product unit	IHG	Inhaled Gas	THRT	Throat
BLDV	Blood venous	IT	Intubation tube	THRB	Thrombocyte (platelet)
BON	Bone	ISLT	Isolate	TISS	Tissue, unspecified
BRAIN	Brain	LAM	Lamella	TISG	Tissue gall bladder
BRTH	Breath (use EXG)	WBC	Leukocytes	TLGI	Tissue large intestine
BRO	Bronchial	LN	Line	TLNG	Tissue lung
BRN	Burn	LNA	Line arterial	TISPL	Tissue placenta
CALC	Calculus (=Stone)	LNV	Line venous	TSMI	Tissue small intestine
CDM	Cardiac muscle	LIQ	Liquid NOS	TISU	Tissue ulcer
CNL	Cannula	LIVER	Liver	TRAC	Trachea
CTP	Catheter tip	LYM	Lymphocytes	TUB	Tube, unspecified
CSF	Cerebral spinal fluid	MAC	Macrophages	ULC	Ulcer
CVM	Cervical mucus	MAR	Marrow (bone)	UMB	Umbilical blood
CVX	Cervix	MEC	Meconium	UMED	Unknown medicine
COL	Colostrum	MBLD	Menstrual blood	URTH	Urethra
CNJT	Conjunctiva	MLK	Milk	UR	Urine
CUR	Curettage	MILK	Breast milk	URC	Urine clean catch
CRN	Cornea	NAIL	Nail	URT	Urine catheter
CYST	Cyst	NOS	Nose (nasal passage)	URNS	Urine sediment
DENTIN	Dentin	ORH	Other	USUB	Unknown substance
DIAFP	Peritoneal Dialysis fluid	PAFL	Pancreatic fluid	VITF	Vitreous Fluid
DIAF	Dialysis fluid	PAT	Patient	VOM	Vomitus
DOSE	Dose med or substance	PEN	Penis	BLD	Whole blood
DRN	Drain	PCAR	Pericardial Fluid	BDY	Whole body
DUFL	Duodenal fluid	PRT	Peritoneal fluid /ascites	WAT	Water
EAR	Ear	PLC	Placenta	WICK	Wick
EARW	Ear wax (cerumen)	PLAS	Plasma	WND	Wound
ELT	Electrode	PLB	Plasma bag	WNDA	Wound abscess
ENDC	Endocardium	PLR	Pleural fluid (thoracentesis fld)	WNDE	Wound exudate
ENDM	Endometrium	PMN	Polymorphonuclear neutrophils	WNDD	Wound drainage
EOS	Eosinophils	PPP	Platelet poor plasma	XXX	To be specified in another part of the message
RBC	Erythrocytes	PRP	Platelet rich plasma		
EYE	Eye	PUS	Pus		
EXG	Exhaled gas (=breath)	SAL	Saliva		
FIB	Fibroblasts	SMN	Seminal fluid		
FLT	Filter	SMPLS	Seminal plasma		
FIST	Fistula	SER	Serum		

These abbreviations are used in the laboratory LOINC codes. Systems in clinical LOINC terms are spelled out in full and should be easily understood.

2.5.1 Super system (2nd subpart)

The second subpart of the system distinguishes observations on the patient (or samples taken from the patient or donor) from observations on non-patient materials that relate to the patient, e.g. a blood product unit (BPU). We refer to this as the super system. When the super system is not included in a name, it can be assumed to be the patient. This subpart can take on the values in Table 11:

Table 11: Super System	
CONTROL	Control
PATIENT	Patient
DONOR	Donor
BPU	Blood Product Unit (Pack)
FETUS	Fetus
POPULATION DISTRIBUTION	Population Distribution
NEWBORN	Newborn

For instance, an example of representing a coagulation study which uses measures on both patient and a control might be:

COAGULATION REPTILASE INDUCED:TIME:PT:PPP^PATIENT:QN:TILT TUBE
COAGULATION REPTILASE INDUCED:TIME:PT:PPP^CONTROL:QN:TILT TUBE

Blood banks often report red blood cell antigens for the patient and for each blood product pack assigned to that patient. So we have:

RHESUS NOS AG:ACNC:PT:SER^PATIENT:ORD:AGGL
RHESUS NOS AG:ACNC:PT:SER^BPU:ORD:AGGL

The super system does not have to be valued (and usually is not). Assume patient when the super system is null.

Note - the inclusion of the super system as part of the system represents a change from an earlier version of LOINC. Earlier versions included this information in the 3 subparts of the component.

2.6 Type of Scale (5th part)

The fifth data part of the test name specifies the scale of the measure, and is a required part. The abbreviation of the type of scale (previously called precision), given in Table 12, should be used in the fully specified name. Note we have changed the codes for these from SQ to ORD and from QL to NOM to more accurately identify the meaning.

We have five kinds of scales. Quantitative (QN) identify scales that can be tied to some physical quantity through a linear equation. This means that if we have two reports for the same quantity one with a value of 5 and the other a value of 10 we know that the two are related in amount through the linear equation Y=aX +b. When the intercept, b, is non zero we have a difference scale. Fahrenheit temperature is a difference scale. When it is zero we have a ratio scale (Kelvin temperature is a ratio scale).[13] A QN value may be reported as a value for a "continuous" scale, as is the case for serum sodium, or it may be reported from a series of discretevalues, as is the case for titers, e.g., 1:16, 1:32.

Some observations have values that are well ordered, e.g., 1+, 2+, 3+, or negative, intermediate, positive, but the values have no linear relationship to one another. We do not know that positive is two or three times as much as intermediate, we just know that positive is more than intermediate. These kinds of observations have an ordinal scale (ORD).

Some observations take on values that have no relative order. Think of the numbers on football jerseys. These simply identify the players, they do not provide quantitative information or rank ordering of the players. We refer to these as nominal (NOM) in scale. Blood culture results provide a good example. The value can be E.coli (or a code for E.coli) or staph aureus. Other examples are admission diagnoses, discharge diagnoses. Any tests or measure that looks broadly at patient or specimen and reports the name of what it finds, is a NOM scale. The values of nominal scaled observations are assumed to be taken from a predefined list of codes or from a restricted vocabulary.

Some observations are reported as free text narrative,. The content is not drawn from a formal vocabulary or code system. A dictated present illness would be an example of a scale of narrative (NAR). Many clinical LOINC codes will come in two versions one for the nominal (coded) version and one for a narrative (free text) version.

We strongly encourage all reporting to be at the most granular level of detail. That is if three numbers are reported they would each be reported under a unique LOINC code and transmitted in a separate HL7 in separate OBX segment. Occasionally reporting systems are not able to comply with this dictum. For example some chromatography instruments

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can identify chemicals from the entire spectrum of known chemicals (CAS identifies more than 10 million distinct chemicals) and we may not have specific LOINC codes for reporting out these details. We have designated the scale of MULTI to identify results that include many separately structured results as one text "glob" with or without imbedded (display formatting). Some laboratories report all of the details of many multiple measure tests under such globs with test names that correspond to their order name. We strongly discourage such reporting. It defeats the very purpose of individual codes to tag content.

Table 12: Type of Scale

Type of Scale	Abbr.	Description
Quantitative	QN	The result of the test is a numeric value that relates to a continuous numeric scale. Reported either as an integer, a ratio, a real number, or a range. The test result value may optionally contain a relational operator from the set {<=, <, >, >=}. Valid values for a quantitative test are of the form "7", "-7", "7.4", "-7.4", "7.8912", "0.125", "<10", "<10.15", ">12000", 1-10, 1:256
Ordinal	ORD	Ordered categorical responses , e.g. 1+, 2+, 3+ ; positive, negative; reactive, indeterminant, nonreactive. (Previously named SQ)
Quantitative or Ordinal	ORDQN	Test can be reported as either ORD or QN, e.g., an antimicrobial susceptibility which can be reported as either resistant, intermediate, susceptible or as the mm diameter of the inhibition zone. (Previously named SQN)
Nominal	NOM	Nominal or categorical responses that do not have a natural ordering. e.g. names of bacteria (reported as answers); categories of appearance that do not have a natural ordering, e.g., yellow, clear, bloody. (Previously named QL)
Narrative	NAR	Text narrative, such as the description of a microscopic part of a surgical papule test.
"Multi"	MULTI	Many separate results structured as one text "glob," with or without imbedded display formatting.

2.7 Type of Method (6th part)

The method by which the test was performed is the sixth part of the test name. Methods need only be expressed as part of the name when they provide a distinction between tests that measure the same component (analyte) but which have different clinical significance or have a different clinical reference ranges. For instance, whole blood glucose tested with a chemstrip might be distinguished in the method field.

The list of methods given in Table 13 is not exhaustive; we have included only those methods which are abbreviated in the database or which otherwise require explanation or clarification. Most methods are fully spelled out in the database and should be self-explanatory.

Laboratories do not include the method as part of the name for most common chemical and hematological tests. They often need the freedom to choose the instrument according to time of day, urgency of the request for service, availability of the instruments and so on, even though the instruments may employ different methods. The laboratories then adjust each of the "interchangeable" instruments to produce equivalent results even though the instruments may use different methods. So, we do not want to distinguish too finely on the basis of methods. Though method is rarely significant for many chemical and hematological tests, it is often important to immunochemical/serology testing, because the sensitivity and specificity of some tests varies greatly with the method. So you will commonly see methods included in microbiology tests and coagulaiton tests within the LOINC database.

This does not mean that information about the method is irrelevant, but that it is not always a meaningful part of the test name. It is an essential element of the internal quality assurance of laboratories. Remember that both reference range and method can be sent in other fields of ASTM, HL7, and CEN TC251 result messages.

Table 13: Methods

Method	Abbr	Comment
AGAR DIFFUSION	AGAR	Bacterial sensitivity (Kirby-Bauer)
AGGLUTINATION	AGGL	
LATEX AGGLUTINATION	LA	
AGGLUTINATION -- RED BLOOD CELL	AGGL RBC	Blood bank typing
COMPLEMENT FIXATION	CF	
COAGULATION ASSAY	COAG	To distinguish coagulation assays based on coagulation
DNA NUCLEIC ACID PROBE	DNA PROBE	Nucleic acid amplification - PCR is one of several methods.
TARGET AMPLIFICATION & PROBE	PROBE.AMP.TAR	
SIGNAL AMPLIFICATION & PROBE	PROBE.AMP.SIG	
ENZYME IMMUNOASSAY	EIA	Subsumes variants such as ELISA
ENZYMATIC ASSAY	ENZY	To distinguish coagulation assays based on enzymatic activity
FLOCCULATION ASSAY	FLOC	
HEMAGGLUTINATION INHIBITION	HAI	
IMMUNE BLOT	IB	
IMMUNE DIFFUSION	ID	
IMMUNE FLUORESCENCE	IF	
IMMUNE STAIN		Cells “stained” with immune enzyme.Also called Cyto immune enzyme.
LEUKOCYTE HISTAMINE RELEASE	LHR	
MINIMUM LETHAL CONCENTRATION	MLC	Also called MB (bactericidal) C
MINIMUM INHIBITORY CONCENTRATION	MIC	Antibiotic susceptabilities
NEUTRALIZATION	NEUT	
RADIOIMMUNOASSAY	RIA	
SERUM BACTERICIDAL TITER	SBT	Antibacterial susceptabilities

Stain methods which are modifications of a basic method are named using a <basic>. <modification> syntax, e.g., METHENAMINE SILVER STAIN.JONES.

2.7.1 DNA/RNA probes/measures

We will distinguish three kinds of DNA probe methods.

- Probe (without amplification)
- Probe with signal amplification (PROBE.AMP.SIG)
  See Table 14A for a list of methods that would be identified as PROBE.AMP.SIG in a LOINC method
- Probe with target amplification (PROBE.AMP.TAR)
  See Table 14B for a list of methods that would be identified as PROBE.AMP.TAR in the method part of the LOINC term.

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Table 14A: Examples of specific methods that would be classed as target amplified DNA/RNA (not an exhaustive list)		
PROBE.TAR.AMP (includes nucleic acid signal amplification and probe)		
PCR	Polymerase Chain Reaction	Applies to: DNA, RNA Roche Molecular Systems (thermal cycler) Requires repeated cycles of heating and cooling - each cycle doubles the target
TMA	Transcription Mediated Amplification	Applies to DNA, RNA Genprobe, Inc. (isothermal)
NASBA	Nucleic Acid Sequence Based Analysis	Applies to RNA, DNA Organon-Tenika Corp (isothermal)
SDA	Strand Displacement Amplification	Applies to DNA Beckon Dickenson (isothermal)
LAT	Ligation-Activated Transcription	
3SR SR	3 Self-Sustaining Sequence Replication	Applies to RNA, DNA Bartel's Diagnostic (isothermal)
LCR	Ligase Chain Reaction	Also probe amplification category method Abbott Laboratories (thermal cycler)
QBR	Q-Beta Replicase or probe amplification category method	Applies to DNA RNA Gene Track Systems. (isothermal)

Table 14B: Examples of specific methods that would be defined in LOINC as signal amplification methods		
PROBE.AMP.SIG		
HPA	Hybridization Protection Assay	Applies to _____
BdnA	Branched Chain DNA	Applies to DNA, RNA Chiron Corp (isothermal)
---------	Hybrid Capture	Applies to _____

2.7.2 Immune fluorescent (IF)

We do not distinguish among many variants of immune fluorescent tests. DFA, ACIF, are all classed as immune fluorescent (IF).

2.7.3 Immune Tissue Stain (Cyto IE)

We classify Peoxidase and all other immune stains of tissue under the method category immune stains

2.7.4 Enzyme Immune Assay

We classify many variants of enzymes under EIA, including ELISA, CEIA, etc.

2.7.5 Coagulation

We distinguish among three kinds of coagulation method. Coagulation, which measures the coagulation activity, immune - which measures the coagulation constituant, and enzymatic -- which measures the coagulaiton factor via enzyme rate methods.

2.7.6 Stains

We provided very detailed distinctions among various tissue stains.

2.7.7 Clinical measures

We distinguish reported from estimated and measured values; so reported body weight would be the stated weight from a patient or surrogate. Estimated would be the body weight estimated by an observer, and measured body weight.

2.7.8 Imaging studies

We distinguish among the major imaging modalities for most measures derived from such imaging studies (e.g., cardiac output from a muga scan, vs angiography).

3 Special Cases

3.1 Findings viewed as variables or as values

For some complex tests there are two ways to organize the results into a report.

3.1.1 Value

Assume a set "X" is made up of five "results" that can have a scale of (absent present) or (0 1). These results could be reported as:

Finding 1 =	Present	or as	1
Finding 2 =	Absent		0
Finding 3 =	Present		1
Finding 4 =	Absent		0
Finding 5 =	Absent		0

Each finding is then considered a binary variable. This is sometimes called a "panel" approach.

3.1.2 Variable (Multiple Choice) Approach

The alternative would be to report this information as a single variable (or multiple-choice question) with many possible values:

Variable X - Finding 1, Finding 3

In this case the findings are the values of a variable called Variable X; only the positive findings are reported as values. Many laboratory tests, e.g., those that test for HLA antigens, red blood cell antigens, or screens for toxic substances, could in theory be presented either way. The microscopic part of the differential count and urinalysis could also be described either way. History and physical findings and (given a real stretch) even culture results could be structured in the panel or multiple choice/multiple answer format.

A single lab may report red blood cell antigens in either way, as a binary panel or a multiple-choice result, depending upon the purpose of the test. The routine cross and type are reported out in the multiple choice pattern format (only positives from a modest fixed set of tested antigens are reported). But if the tests are being used to prove fatherhood, the results are usually reported as a binary panel.

Blood cultures could in theory be regarded as panels:

Test Name	Value
E.Coli	absent
Staph aureus	present
Diptheroids	absent
Pneumococcal pneumonia	absent
Pseudomonas	present

although in practice such tests are almost always reported in the multiple choice/multiple answer format, as follows:

Test Name	Values
Blood culture	*Pseudomonas, Staph aureus*

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We bring up these issues to explain why we use a somewhat different data format for some types of tests, and why we sometimes provide for both reporting methods (e.g., HLA blood cell antigen tests) in the LOINC database. When a binary scale is used, the kind of property will usually be arbitrary concentration (ACNC). When the multiple-choice multiple-answer approach is used, the scale will be nominal and the type of property will be presence or identification (PRID).

3.2 Blood bank

Red cell antigens will be named in accordance with the American Association of Blood Banking (A/AB/B) naming standards.[14] In addition to the antigen or antibody, a modifier would be included in the fourth subfield of the first field, to indicate whether testing was performed on the patient, donor, or blood pack. Unless explicitly stated, testing is assumed to have been on a material collected from a patient. Additional information about the person identified in the fourth subpart, such as the donor's name or relationship to patient, should be placed in other OBX segments, or comment segments of the message, and would *not* be part of the test name.

Examples of blood bank related names:

ANTIBODIES IDENTIFIED:PRID:PT:SER^PATIENT:ORD
B AB:ACNC:PT:SER^DONOR:NOM:AGGL RBC

Each reportable antigen must have its own test, so that each element in a full set of binary tests could be reported as (negative positive) or (0 1).

The fully specified names of A, AB, and O blood types (as observations) would be as follows:

Measure of serum antibody against type A blood of donor:

A AB:ACNC:PT:SER^DONOR:NOM:AGGL RBC

Presence of A antigen on donor's red blood cells:

A AG:ACNC:PT:RBC^DONOR:NOM:AGGL RBC

Presence of A antigen on the blood cells in a pack of blood given to the patient:

A AG:ACNC:PT:RBC^BPU:NOM:AGGL RBC

Blood bank reporting illustrates the need for a method of reporting by panel *and* by multiple-answer mechanism. The LOINC database provides observation names for both kinds of reporting.

B AG:ACNC:PT:RBC^BPU:ORD:AGGL RBC
ANTIGENS ABSENT:PRID:PT:BBL^BPU:ORD

The LOINC database provides other "observations" for reporting: the status of each blood pack (e.g. held, given, discarded), and for reporting that information when HIS and medical records systems want it; how much of each type of blood product was given at a moment in time; the type of each pack; any adverse reaction to that pack; and the pack number to accommodate laboratories that send this information as discrete observations.

BLOOD PRODUCT DISPOSITION:TYPE:PT:BPU:NOM
BLOOD PRODUCT TYPE:TYPE:PT:BBL:NOM

3.3 Immunocompetence studies

The T-cell markers in the LOINC database include all of the single markers and the most commonly reported combinations, e.g. "CD10+CD20+". Most of these are really measuring the number or percent of lymphocytes which bear the specific T-cell marker pattern. So they should be specified as a subtype of a lymphocyte, e.g., Lymphocytes,CD10+CD20

Two kinds of measures are of interest. The "absolute" number of such cells per cubic millemeer. These are represented as number concentrations, e.g.,:

Lymphocytes.CD10+CD20+NCNC:PT:BLD:QN

The other quantity of interest is the percent of these cells per 100 lymphocytes. These are represented as number fractions, e.g.:

Lymphocytes.CD10+CD20+100 lymphocytes:NFR:PT:BLD:QN

The database also includes fully specified names for all of the commonly reported HLA antigens. These are grouped in the class HLA. Experimental methods can define many subtypes of many antigens, so this list is not exhaustive, and is also likely to expand with time.

Example:

HLA-A1:ACNC:PT:BLD^PATIENT:ORD

3.4 Naming results of microbiological culture

The inherent complex structure of results of microbiological culture presents unique challenges for standard names. Result Status (Preliminary, Final) will be indicated in the OBR segment of HL7 segment with the Result Status field (OBR-25), not as part of the name.

Specimen Type (Serum, Blood, Urine, etc.) will be indicated in the HL7 OBR segment with the Specimen Source field (OBR-15), but may also be represented in the name.

Details of specimen collection will usually be noted as OBX segments or comment segments that accompany the culture result message. The observation identifier for the OBX segment will have the fully specified name of "Specimen Collection Description:NOS:NOMS" and the Observation Sub-ID field will be used to order or group sets of observations. That is, if the material was collected by swabbing a wound of the right upper arm, multiple OBX segments would be created, each with the name "Specimen Collection Description:NOS:NOMS," and the Observation Results fields of the OBX segments would contain respectively "Swab," "Right," "Arm," and "Wound." (The granularity of the actual terms used in the specimen description is at the discretion of the user. Thus, "Right Arm Wound" as the value of a single OBX segment could be used in place of the three codes described in the previous sentence.)

Descriptions of measurement and culture growth will be noted as separate OBX segments that accompany the culture result message. The name of the observation identifier will provide the context of the observation. For instance, the name for a quantitative test of bacteria in a specimen would be:

COLONY COUNT:NUM:PT:XXX:QN:VC

Descriptions of Gram stain findings will be noted as OBX segments that accompany the culture result message. The name of the observation identifier will be:

MICROSCOPIC OBSERVATION:PRID:PT:XXX:NOM:GRAM STAIN

The result values that could be reported with this test (which is a multiple-choice, multiple answer type or observation) might include one or more of the following:

Epithelial cells
Gram positive cocci in chains
Many Gram negative diplococci

The organisms identified in a culture will be sent as result values in OBX segments. A separate table of allowable organism names will need to be identified. Bergey's Manual of Determinative Bacteriology[15] or some other authoritative

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source (SNOMED is an appropriate source for these organism names/codes) may be used as the standard. The names for the result identifiers will be created using the same strategy as for other identifiers but with particular emphasis on the method. While "Throat Culture" is the source of the culture inoculum, it is also a label that indicates what kind of media was inoculated and the other techniques used in the laboratory. So, it is a short hand for a kind of method and such will be recorded as the method part of the name. Thus, "Throat Culture," and "Blood Culture," and "*Clostridium difficile* Culture," all represent labels for how a culture was performed. Examples of names of culture results are:

MICROORGANISM IDENTIFIED:PRID:PT:BLD:NOM:BLOOD CULTURE
MICROORGANISM IDENTIFIED:PRID:PT:BRN:NOM:DIRECT BURN CULTURE
MICROORGANISM IDENTIFIED:PRID:PT:STL:NOM:STOOL CULTURE

Names of methods of staining directly on a sample/material (where many descriptive observations are possible):

MICROSCOPIC OBSERVATION:PRID:PT:XXX:NOM:GRAM STAIN
MICROSCOPIC OBSERVATION:PRID:PT:XXX:NOM:ACID FAST STAIN.KINYOUN
MICROSCOPIC OBSERVATION:PRID:PT:XXX:NOM:DRY MOUNT
MICROSCOPIC OBSERVATION:PRID:PT:XXX:NOM:INDIA INK PREPARATION
MICROSCOPIC OBSERVATION:PRID:PT:XXX:NOM:TRICHROME STAIN
MICROSCOPIC OBSERVATION:PRID:PT:XXX:NOM:GIEMSA STAIN

Names for results of staining procedures performed on organisms that are growing in culture will use Isolate (ISLT) as the system/sample type. For example:

MICROORGANISM IDENTIFIED:PRID:PT:ISLT:NOM:FUNGAL SUBTYPING

Names for organism-specific cultures:

BRUCELLA SP:PRID:PT:BLD:NOM:ORGANISM SPECIFIC CULTURE
BORDETELLA PERTUSSIS:ACNC:PT:THRT:ORD:ORGANISM SPECIFIC CULTURE
CHLAMYDIA SP:PRID:PT:GEN:NOM:ORGANISM SPECIFIC CULTURE
LEGIONELLA SP:PRID:PT:SPT:NOM:ORGANISM SPECIFIC CULTURE

Names for method for general class of organism:

FUNGUS IDENTIFIED:PRID:PT:WND:NOM:ROUTINE FUNGAL CULTURE
MICROORGANISM IDENTIFIED:PRID:PT:CSF:NOM:STERILE BODY FLUID CULTURE

Again, the Result Value of these tests would be either organism names or other statements of culture outcome. Table 15 contains valid values of the culture result OBX segment:

Table 15: Example Culture Results
No growth
Gram-positive cocci
Small Gram negative rod
Escherichia coli
Normal flora
Candida albicans

Note if a test applies to a specific species of organism, the component should include the genus AND species (at least). If the measure applies to a series of species in the same family the string "SP" must be included. If it applies to as subgroup of the genus, then that subgroup should be named.

PRID as a property should be used when the value of a test can identify one set of alternative infectious agents. If the culture is for herpes virus and the culture can have results of herpes virus 1, herpes virus 2, etc., then PRID is the right property. If the culture is for herpes virus and the answer is positive/negative or yes/no, then the property should be ACNC and the scale ordinal (ORD).

3.5 Drug susceptibilities

Drug-susceptibility tests will be named according to the generic name of the drug tested and the methodology used in testing, with the property SUSC, with values that are either QN or ORD. Thus, appropriate names would be:

AMPICILLIN:SUSC:PT:ISLT:QN:MIC
AMPICILLIN:SUSC:PT:ISLT:ORD:AGAR DIFFUSION
TICARCILLIN+CLAVULANATE:SUSC:PT:ISLT:QN:MBC

Table 16 lists methods in drug-susceptibility tests.

Table 16: Drug Susceptibility Methods

AGAR	Bacterial sensitivity (Kirby-Bauer) via agar diffusion
MIC	Minimum inhibitory concentration
MLC	Minimum lethal concentration
SBT	Serum bactericidal titre
GRADIENT STRIP	Susceptable by E-Test or gradient strip method

The drug susceptibility tests are all grouped together in the LOINC database under the class ABXBACT.

3.6 Alternate representation of microscopic examinations

Because of the alternative representation of microscopic observations (see discussion in 1.1 of LOINC and item 21) the following convention will be used for the alternate representation of microscopic examinations:

WBC CASTS:ACNC:PT:URNS:ORD:MICROSCOPY.LIGHT
RBC CASTS:ACNC:PT:URNS:ORD:MICROSCOPY.LIGHT
EPITHELIAL CELLS:ACNC:PT:URNS:ORD:MICROSCOPY.LIGHT

3.7 Cell counts

The following convention will be used to represent microscopic examinations:

WBC CASTS:ACNC:PT:URNS:SQ:MICROSCOPY.LIGHT
RBC CASTS:ACNC:PT:URNS:SQ:MICROSCOPY.LIGHT
EPITHELIAL CELLS:ACNC:PT:URNS:SQ:MICROSCOPY.LIGHT

Counts of various entities and cells in urinalysis and CSF and other body fluids may be performed and reported in one of three ways.

They may be reported as absolute counts per unit volume, then they have the property of NCNC, or as percents of a general cell type, e.g., percent eosinophils, then they have the property of NFR. Blood cells are usually reported in such a manner, via a manual or automated count method.

Counts on urine and other body fluids can also be done as direct counts and reported as NCNC or NFR. However, they are more often reported as the number of entities or cells per microscopic high power or low power field, e.g., 5-10 cells per high power field. These are really numbers per area (NARIC). E.g., the number of erythrocytes per low power field would be reported as follows

ERYTHROCYTE CASTS:NARIC:PT:URNS:QN:MICROSCOPY.LIGHT.LPF

Note that even though the values are reported as a range, the scale is still QN, because the values can be related through a ratio. We use HPF or LPF to identify high power and low power fields respectively. Large entities (such as casts) are usually reported per low power fields, smaller entities per high power fields.

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The other way such entities are reported is as a pure ordinal, e.g., none, few, moderate, loaded. These would be specified as ACNC properties with ordinal scale, e.g.

ERYTHROCYTES:ACNC:PT:URNS:ORD:MICROSCOPY.LIGHT

3.8 Skin tests

These follow the pattern of a challenge test. For a TB skin test it would be:

TUBERCULOSIS REACTION WHEAL^3D POST 25 U TU ID:LEN:PT:SKN:QN

Where TU means tuberculin units, ID means intradermal, LEN indicates a measure of length (the diameter of the wheal) and so on.

4 Clinical observations and measures

4.1 Introduction

For most of the measures we include separate observations for summary data, e.g., shift and twenty four hour urine output totals. We also provide varying degrees of pre-coordination for the observation, the body site at which it was obtained, and the method. E.g., a cardiac output based on the Fick method is distinguished from a cardiac output computed from 2D cardiac echo data.

Physiologic measures are often monitored continuously over time, and the instrument reports summary "statistics" over that reporting period. For vital signs these can include minimum, maximum, and mean value over a time period. For intake and output the total is the summary statistic usually reported. When we address measures taken over time, we usually include 1 hour, 8 hour, 10 hour, 12 hour, and 24 hour intervals to cover the varying lengths of work shifts within and across institutions. The LOINC names of these correspond to the form of a 24H urine specimen. The times are recorded in the duration (3rd part) of the name.

The parts of clinical measurement names are the same as for laboratory measures. Parts 2, 3, 5 and 6 (type of property to method) correspond exactly in meaning between laboratory and clinical LOINC codes. Part 4, body system, has the same general meaning for clinical and laboratory measures, but in the case of laboratory tests the system usually identifies a fluid and a body compartment by implication, e.g., serum, cerebral spinal fluid. For clinical terms, the system is usually a body part (e.g., chest), organ (e.g., cardiac ventricle), or part of an organ (cardiac In the case of laboratory tests, the component usually identifies some chemical moiety that is distributed in the system (glucose, or HIV antibodies).

In the case of clinical terms, the component usually identifies a particular projection of a three or four dimension space to a measure of a particular feature (e.g., QRS interval, systolic) of a time changing measure. ventricle.left.outflow tract). In some cases the system may be an instrument or device attached to the system.

The component includes such things as the special kinds of length (whether circumference, or diameter, or radius) when length is the property, and the specific level and axis on which a measure of a body part is taken, e.g. circumference taken at the nipple line. The component should remove all ambiguity as to what projection or axis or specific subtime frame is being measured. So if one is measuring the diameter of the kidney, the system would have to specify the kidney.right (or kidney.left), and the component would identify the axis and level at which the diameter was measured (e.g., crossectional at level of pelvis). For a measure of chest circumference the system = chest, the property = circumference at nipple line, and the property = length. Areas, lengths, and volumes of organs all have to be specified enough in the component to distinguish a particular area or length that is being measured. When a measure changes over some cycle (e.g., inspiration, expiration, diastole, systole), then that should also be specified in the component. (Duration is used to identify the duration of an over all study)

Table 17 Subjects covered to date in clinical LOINC
Blood pressure (systolic, diastolic, and mean)
Heart rate (and character of the pulse wave)
Respiratory rate
Critical care measures
Cardiac output, resistance, stroke work, ejection fraction, etc.
Body weight (and measures used to estimate ideal body weight)
Body height
Body temperature
Circumference of chest, thigh, legs
Intake and output
Major headings of history and physical
Major headings of discharge summary
Major headings in operative note
Electrocardiographic measures
Obstetric ultrasound imaging
Urology ultrasound imaging

In general the component is used to distinguish the various points or ranges, or inflections of a physiologic tracing, and to define precisely which of a number of possible dimensions of length or area are being measured in imaging.

For most clinical measurements, the component is an attribute of a patient or an organ system within a patient. However, attributes of non-patient systems are also often of interest. For example, we might want to know the class of instrument used to obtain the measurement: i.e., the vendor model number or institutional inventory number of an endoscopy. Such identification numbers have a property of ID. Infection control might want the latter reported in order to track nosocomial infections.

When attributes of an instrument or device are being reported, the system is the name of instrument. The same is true when we report characteristics of tubes used to move fluid in and out of body cavities. For example, we might want to report the size and type of a nasogastric tube.

To accommodate the special dimensions of clinical observations we have introduced new options for the kind of property, The new kinds of property are what you might expect from the new kinds of dimensions being measured (e.g., resistance, voltage, work per beat). However we have also introduced three important new properties:

ANAT is a special case of PRID (or taxon) which applies to anatomic sites only.

IMP (impression) is a diagnostic statement, always an interpretation or abstraction of some other observation (a series of test results, an image, a total patient), and almost always generated by a professional. (We could also consider the EKG cart's automated diagnoses as impressions.) Impressions are used in laboratory medicine as well as clinical medicine, so you will see them appearing there as well.

FIND Finding is an atomic clinical observation, not a summary statement as an impression. Physical, historical, review of systems and other such observations have a property of Finding. These may have a scale of NOM (for coded findings) or NAR for findings reported in narrative text.

In clinical measures, super systems (the second subpart of the system component) is widely used. For example, we distinguish a head circumference of the patient versus a fetus as follows:

CIRCUMFERENCE:LEN:PT:HEAD
CIRCUMFERENCE:LEN:PT:HEAD^FETUS:QN

4.2 Atomic versus molecular (pre-coordinated names)

With clinical terms we almost always have two ways of reporting. Using the first, we can report an observation by

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reporting a number of atomic variables which together fully describe the observation. For example, we have the following atomic observations for circumference measures. These variables let us deal with all of the odd ball kinds of circumferences for which we have not yet defined a pre-coordinated term

CIRCUMFERENCE:LEN:PT:BODYPART.XXX:QN	The actual measure of some circumference
CIRCUMFERENCE SITE:ANAT:PT:*:QL	Identifies the body part measured (specifies the system)
CIRCUMFERENCE METHOD:TYPE:PT:BODY PART.XXX:*	Identifies the measuring technique used to obtain the circumference (answers = tape measure, derived, imaging)

We also provide pre-coordinated terms that combine some of the atomic variables into one LOINC code. For example we have

8279-2 CIRCUMFERENCE.AT NIPPLE LINE:LEN:PT:CHEST:QN

and

8290-2 CIRCUMFERENCE^INSPIRATION:LEN:PT:CHEST:QN

which provide more specificity and permit the key components of the measure to be expressed as one variable as is the convention in many clinical systems. We call these pre-coordinated codes "molecular" variables.
Within the LOINC database molecular variables will vary with respect to how many atomic components are aggregated. As is true in some laboratory areas, methods often not included as part of a name, nor are they always reported. The commonest molecular aggregation is between functional measure and a particular site of measurement. (E.g., the many different intravascular sites for blood pressure measurements.) But in some cases the molecular variables represent combinations of specific measures and particular methods (e.g., the cardiac output measures). Please note that most molecular variables could also be accompanied by one or more atomic measures to provide special information about the measure, e.g., special circumstances of the measure, or the vendor model number or institutional inventory number of the measuring instrument.

We have introduced one more convention in this release. When we have a variable that really reports what would have been contained in the name in a fully pre-coordinated term, will have an asterisk placed in the part that will be reported as a value. For example, a variable that is used to report the anatomic site as an atomic variable, would have an asterisk (*) in the system part of the name. The variable used to report the method of a particular measure would have a asterisk (*) in the method part of the name.

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Appendix A -- LOINC Database Structure

#	Field Name	Type	Width	Description
1	LOINC_NUM	Char	7	The unique LOINC Code. This is a numeric code with a mod 10 check digit. (The algorithm for calculating a mod 10 check digit is given in Appendix B.)
2	COMPONENT	Char	150	Fields 2-7 contain the six parts of the name. The fully specified name for a given LOINC code would be constructed by printing out the contents of these fields (2-7), inserting a colon (:) between the contents of each of these fields.
3	PROPERTY	Char	10	
4	TIME_ASPCT	Char	10	
5	SYSTEM	Char	50	
6	SCALE_TYP	Char	30	
7	METHOD_TYP	Char	50	
8	RELAT_NMS	Char	254	One or more synonyms, separated by semicolons (;). This field is intended to make it easier to find a given observation by providing other names by which the observation may be known. For a drug level, for example, we include the trade names of that drug under the related names.
9	CLASS	Char	20	An arbitrary classification of the terms for grouping related observations together. The current classifications are listed in Table 18. We present the database sorted by the class field within class type (see field 10). Users of the database should feel free to re-sort the database in any way they find useful, and/or to add their own classifying fields to the database.
10	SOURCE	Char	8	Field 10 - Source, is for our internal use, and should be ignored by database users.
11	EUCLIDE_CD	Char	10	EUCLIDES analyte code. The Euclides code identifies the analyte (the first subpart of the first part of the name).
12	ASTM_CD	Char	9	The ASTM codes apply to only a few of the tests (e.g., cell counts, antibiotic sensitivities). These are the codes included in the appendices of HL7 and ASTM E1238-94.
13	IUPAC_CD	Char	8	The IUPAC code identifies the component, kind of property, and system. Note: Most of the IUPAC codes for chemistry assume the component is measured in substance concentration, e.g., moles, while most U.S. labs report in mass concentration. We have applied the IUPAC code for substance concentration to mass concentration, because IUPAC has no code for the mass concentration variant.

#	Field Name	Type	Width	Description
14	DT_LAST_CH	Char	8	Date last changed, in the format YYYYMMDD
15	CHNG_REAS	Char	254	Reason term was changed. If a term has been changed, the reason for the change is detailed here.
16	CHNG_TYPE	Char	3	Change Type Code. DEL = Delete; ADD = add, NAM = change to Analyte/Component (field #2); MAJ = change to name field other than #2 (#3 - #7); MIN = change to field other than name.
17	COMMENTS	Char	254	Free-text comments relating to the test result.
18	ANSWERLIST	Char	254	The list of answers for results that are reportable from a multiple choice list (e.g., the answers for the term DISPOSITION OF BLOOD PACK are GIVEN;PARTIALLY GIVEN;DISCARDED). This field provides examples, not required answer lists.
19	STATUS	Char	3	Deprecated or superseded status indicated by DEL in this field (otherwise blank). Used to mark terms as the database evolves. LOINC codes will not ever be re-used nor will they be removed from the database, they will instead be cross-referenced to superseding terms in Field 20.
20	MAP_TO	Char	7	Used when a field has been dropped from the active database (by entering "DEL" in the Status field) because it has been replaced by an updated term. In those cases, Map_To contains the LOINC code of the new term that should be used.
21	SCOPE	Char	254	Not currently used.
22	SNOMED_CD	Char	10	SNOMED Code (future versions). Not currently used.
23	VA_CD	Char	8	VA Code (future versions). Not currently used.
24	METPATH_CD	Char	10	Metpath Code. Not currently used.
25	HCFA_CODE	Char	12	HCFA code (future versions). Not currently used.
26	CDC_CODE	Char	6	Code from CDC Complexity file which maps laboratory tests to the instruments used to perform them. These codes are at the analyte level, not the test instrument level.
27	NORM_RANGE	Char	30	Normal Range - Example answers from real tests
28	EX_US_UNITS	Char	30	Example units used in the US.
29	IPCC_UNITS	Char	30	Example units used by IUPAC/IFCC (future)

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#	Field Name	Type	Width	Description
30	GPI_CD	Char	11	GPI Code. For drugs, this field contains a map to the Medispan GPI codes, a hierarchical system of classifying pharmaceutical products.
31	GPI_CD_TOT	Char	254	GPI Code Total. For a few products, a simple one-to-one mapping with a GPI code was not possible. In these cases, all applicable GPI codes are contained in this field, separated by semicolons.
32	REFERENCE	Char	254	Contains references to medical literature, product announcements, or other written sources of information on the test or measurement described by the LOINC record.
33	EXACT_CMP_SY	Char	254	Exact core component synonym: This field contains an exact synonym for the "core component" of the LOINC component name. We have included the mixed case and "superscript" form of blood bank and HLA antigens (e.g., Lu^{a}) here. As there is no ASCII representation for superscript letters, we use the hat (^) to signify superscripts in this field. (E.g., if the core component is represented as L LITTLE U LITTLE SUPER A in the LOINC component/analyte name field, it is represented in the Exact Core Synonym field as Lu^a.) In a future release we will add more exact synonyms for the core components.
34	MOLAR_MASS	Char	13	Molecular weights: This field contains the molecular weights of chemical moieties when they are provided to us. This release contains values kindly contributed by IUPAC.
35	IUPC_ANLT_CD	Char	13	IUPAC analyte code: This field contains the Chemical Abstract service number or the Enzyme Nomenclature number for the chemical components for chemicals and/or enzymes. These were also contributed by IUPAC.
36	ANSWERLIST2	Char	254	These two fields provide an overflow for ANSWERLIST values that exceed the 254 characters allowable in most 16-bit spreadsheet and database programs (such as Excel 5.0/95 and FoxPro 2.5)
37	ANSWERLIST3	Char	254	
38	CLASSTYPE	Int	2	1=Laboratory class; 2=Clinical class
39	FORMULA	Char	254	Regression equation details for many OB.US calculated terms.
40	MULTUM_CD	Char	6	Maps to Multum Inc.database of codes for drugs.

#	Field Name	Type	Width	Description
41	DEEDS_CD	Char	7	Data Elements for Emergency Department Systems Codes (CDC). This field contains the DEEDS code value which maps to the LOINC code in question.
42	CSCQ_FRNCH_NM	Char	255	French name for LOINC term. Supplied by Centre Suisse de Contr⊥le de Qualit9. This field contains extended characters and will not transfer correctly to 7-bit systems
43	SPECIES	Char	20	Codes detailing which non-human species the term applies to. If blank, “human” is assumed.
44	EXAMPL_ANSWERS	Char	50	For some tests and measurements, we have supplied examples of valid answers, such as “1:64”, “negative @ 1:16”, or “55”. This differs from the ANSWERLIST field, which details possible choices for nominal scale terms.

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Table 18: Classes			
Abbr	**Laboratory Term Classes**	**Abbr**	**Clinical Term Classes**
ABXBACT	Antibiotic susceptibility	BDYCRC	Body circumference
ALLERGY	Response to antigens	BDYHGT	Body height
BC	Cell counts (blood, CSF, pleuritic fluid)	BDYSURF	Body surface area
BLDBK	Blood bank	BDYTMP	Body temperature
CELLMARK	Cell surface models	BDYWGT	Body weight
CHAL	Challenge tests	BP	Blood pressure
CHALSKIN	Skin challenge tests	BP.CENT	Blood pressure – central
CHEM	Chemistry	BP.PSTN	Blood pressure – positional
COAG	Coagulation study	BP.TIMED	Blood pressure – timed
CYTO	Cytology	BP.VENOUS	Blood pressure – venous
DRUG	Drug levels	CLIN	Clinical NEC
DRUGDOSE	Drug dose (for transmitting doses for pharmacokinetics)	ED	Emergency department
FERT	Fertility	EKG	Electrocardiogram
HEM	Hematology (excluding coagulation & differential count)	EKG.IMP	Electrocardiogram impression
HLA	HLA tissue typing antigens	EKG.MEAS	Electrocardiogram measures
MICRO	Microbiology	EYE	Eye
PATH	Pathology	FUNCTION	Functional status (e.g. Glasgow)
SERO	Serology (antibodies and most antigens except blood bank and infectious agents)	H&P	History and physical
SURGPATH	Sugical pathology	HEMODYN	Hemodynamics
TOX	Toxicology	HRTRATE	Heart rate
UA	Urinalysis	IO	Input/Output
VET	Veterinary Medicine	NEONAT	Neonatal measures
		OB.US	Obstetric ultrasound
		OBGYN	Obstetrics/gynecology
		RESP	Respiration
		SKNFLD	Skinfold measurements
		US.URO	Urological ultrasound
		VOLUME	Volume (specimens)

Appendix B -- Calculating Mod 10 Check Digits

The algorithm for calculating a Mod 10 check digit is as follows:

Instructions	Example
	12345
(1) Take the odd digit positions counting from the right	531
(2) Multiply by 2	1062
(3) Take the even digits starting from the right	42
(4) Append these to the front of the results of (2)	421062
(5) Add the digits of (4) together	4+2+1+0+6+2 = 15
(6) Find the next highest multiple of 10	20
(7) Subtract (5) from (6)	20 - 15 = 5. Thus, 5 is the Mod 10 check digit for 12345.

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Appendix C -- Procedure for Submitting Additions/Changes to the Database

Introduction

We receive two kinds of requests for additions:

(1) The first kind of request deals with (a) an entirely new kind of measurement, e.g., DNA sequencing or (b) the use of LOINC codes in manners that have not been agreed upon by the LOINC committee, e.g., the definition of terms to accommodate the organism 1, organism 2, etc., structures that are present in many laboratory databases.

(2) Other requests are variations on observations that are already in the database. E.g., we have a term for a particular test result with serum as the specimen (system) and a user requests an identical term for a specimen of gastric contents. Provided that the requestor followed the rules given below and the number of terms requested at a given time are modest, we will try to respond to these kinds of requests quickly.

We will only be able to respond quickly to such requests if the requestor provides us with clear information about the new terms, as detailed in the first part of Table 19, which defines the content that we need to determine whether a submitted code requires a new LOINC code assignment or not. Before sending a request, make sure that you have, at a minimum, provided information about items 1 through 7 (and 8 if applicable). It is also very important to us to know the units and (when possible) a sample value of the test/observation that is being requested.

We cannot guarantee a response for requests that do not include items 11 and 12. This information enables us to verify the property, precision, and method.

Please note that we tend to avoid the use of methods for chemistry tests. We will not routinely accept requests for method-specific chemistry tests. Only in very special circumstance will we distinguish among analytic methods in chemistry. We do distinguish microbiology, serology, and coagulation tests by method type. Even here, however, we do not distinguish every variation in methods. Look in the body of this guide for information about the kinds of distinctions we make.

When you find a test in the data base that you believe is wrong, please send us a letter or email calling attention to the concept and the reason it is wrong, e.g., we are not using the standard nomenclature, a typographical error has occurred, the name carries some internal contradiction - e.g., we have listed it as being done on serum when it is only valid when performed on plasma - or it is a duplicate of some other concept in the data base.

Note that our policy is to allow both method vague (no method) as well as method specific measures in serology (measures of AB and AG), but not in antibiotic susceptibility testing.

Please pay special attention to requests for submissions that include the system of serum or plasma alone. For most chemical analyses there is no important clinical difference between the values obtained from serum and those obtained from plasma, and we would like to represent them in the database as SER/PLAS to indicate our indifference to the distinction. Unfortunately, many requestors of new terms define their request in terms of the one that they happen to use (e.g., serum or plasma) without telling us that the measure can really be done on either serum or plasma, equally. Most such requests should be for SER/PLAS as the system (sample). If the measurement MUST be done either serum or plasma, please scientifically justify your request; otherwise you will greatly delay our response to your submission.

When you wish to submit tests or measures which are radically different from those we currently carry, please provide a full description of the test, its purpose, and procedure. (A Xerox copy of test kit vendors descriptive material or from a textbook describing the procedure and its purpose would be very helpful.) We often will require a committee discussion to decide how to represent new subject matter, so response times will be slower.

The requestors also need to supply some evidence that they are familiar with the database and that they are sure the term is not already represented in LOINC. The major work these requests generate is the effort to be sure the observation is not already in the database. We can perform this service if the requestors have done most of this work themselves. For this reason, we request that you identify the LOINC term that is closest to your request and to flag the difference between the requested test and the existing test. That is, when a new observation is only a variation on an old one, use an existing LOINC observation as the template;

change the part that is different in the new term and indicate that difference. Later in this appendix, we discuss how to make a submission as either a Microsoft Access database or an ASCII text file. If you use an Access file submission, you may use the S_COMMENT field (see Table 20a) to indicate the difference of the new term. If you are making the submission as an ASCII file, you should append three asterisks ("***") to the different term. Terms should be submitted in an acceptable LOINC database format (Access or dBase), Excel or Lotus spreadsheet, or tab delimited ASCII file. All submissions should include, at a minimum, the 7 or 8 required parts of the term as detailed in Table 19.

Please sort the input file by the your proposed LOINC name. We will maintain the order of the submitted file when we return with our proposed new or existing LOINC codes mapped to your submission. It makes it a lot easier to work with an alphabetically sorted file from the outset.

If you transmit an ASCII tab delimited file (see Section 4, Submission in ASCII File Format) please maintain the field order as outlined in Table 19 below, using whatever delimiter is appropriate to your file format to indicate blank fields. An example submission (which, because of space limitations, includes columns for only the first eight fields) appears below. Real submissions should have columns for all 14 attributes listed in Table 19. Additional details are provided in the section titled Access Database and Excel Submissions presented later in this appendix.

Table 19: Example submission

Row#	*Your test ID*	*Analyte/Component*	*Property*	*Time*	*System*	*Prec*	*Method*	*Class*	*Related*	*Etc*
1	G23	GLUCOSE^90M POST 50G LACTOSE PO	MCNC	T	UR***	ORD	TEST STRIP	CHAL		
2	C47	COPROPORPHYRIN 1 ISOMER***	MRAT	24H	UR	QN		CHEM		
3	I98	INDICAN	MRAT	24H	UR	QN		CHEM		
4	T51	THYROXINE.FREE	MCNC	PT	UR					

When we first get a file we run it through a filter program that looks for identical or close matches. Our first response to you will often be an email asking some clarifying questions. We will refer to your submissions by the row number of the submitted file (first concept is row 1, second is row 2, etc.). We would prefer to clear up the general intent of the file via an email dialogue before proposing LOINC codes for your submissions. Please respond to the email by inserting your answers below the questions in a response email.

We will return the output in a file with all of the fields you submitted plus a number of fields that we will add it as part of our internal review process. We will also add fields that identify the LOINC code and formal LOINC name when we are able to map your term to a LOINC concept. These will include an action code, explaining whether we mapped your term to a pre-existing LOINC code or made up a new one to accommodate it. (We also indicate in both cases whether we had to change your term to make it fit our rules -- please check these closely to be sure that we did not misunderstand your proposal). We also will point out internal contradictions in the naming, and show close matches (these help us decide whether your term is formatted correctly for the subject matter.)

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Table 20a Access Field Names for Submissions

Row #	Field Name	Data Type	Size (Bytes)	Description
1	S_ROW	LONG	4	Row number of this term in submitter's file. This submitted row number will be preserved even when outputs are sorted differently.
2	S_LOCAL_CD	TEXT	50	The submitter's local code used to identify the test/observation in the submitter's master file. This can be any string of up to 50 characters.
3	S_COMPO	TEXT	150	Submitter's Analytes/Component. Mandatory. (User Guide 2.2)
4	S_PROP	TEXT	10	Submitter's Kind of Property. Mandatory – but we can help if you provide enough details. (User Guide 23)
5	S_TIME	TEXT	10	Submitter's Time Aspect. Mandatory. (User Guide 2.4)
6	S_SYS	TEXT	35	Submitter's System/Sample Type. Mandatory. (User Guide 2.5)
7	S_SCALE	TEXT	30	Submitter's Type of Scale. Mandatory. (User Guide 2.6)
8	S_METH	TEXT	50	Submitter's Type of Method. If required. (User Guide 2.7)
9	S_REL_NAM	TEXT	250	Submitter's Related Names. Strongly recommended. Common names, acronyms or synonyms. (User Guide - Appendix A)
10	S_LOINC	TEXT	10	Submitter's LOINC number. Strongly recommended. This is the LOINC number that is similar, but not the same as, the submitter's test.
11	S_RESULTS	TEXT	50	Submitter's Example Results. Strongly recommended. As reported by your lab.
12	S_UNITS	TEXT	20	Submitter's Example Units. Strongly recommended. As reported by your lab.
13	S_ID	TEXT	50	If the submitter includes a reference code ID for each unique submission to LOINC, record that ID here, and this will be returned with questions or an assigned LOINC number on a returned file
14	S_COMMENT	TEXT	250	Comments from the submitter may wish to pass to RI when needed.
15	BLANK1	TEXT	50	Place holder. Do not use
16	BLANK2	TEXT	20	Place holder. Do not Use
Table 20b Content Added by Regenstrief (Fields left blank in submission)				
17	RI_REF	TEXT	50	Regenstrief Reference code. A unique reference code assigned by RI to the submitted concept. This code is produced by concatonating RIs abbreviation to the submitter, the date the file was received by RI, and the row # position of the concept in the submitted spread sheet/file
18	LOINC	TEXT	10	Assigned LOINC code for submitted concept. This may be a new code or a pre-existing code. Blank if questions still remain about the meaning of the concept.
19	RI_ACTION	TEXT	30	Regenstrief Action Code: ADD – term accepted and new code assigned DUP – submitted term already exists in LOINC databsae IDUP – submitter inadvertently submitted same term twice (internal Duplicate) INFO – more information needed from submitter HOLD – submission is area not currently being considered
20	RI_COMMENT	TEXT	250	RI's comments to submitter.
21	R_COMPO	TEXT	150	RI's revised version of submitter's analyted/component
22	R_PROP	TEXT	10	RI's revised version of submitter's kind of property
23	R_TIME	TEXT	10	RI's revised version of submitter's time aspect
24	R_SYS	TEXT	35	RI's revised version of submitter's system/sample type
25	R_SCALE	TEXT	30	RI's revised version of submitter's type of scale
26	R_METH	TEXT	50	RI's revised version of submitter's type of method
27	L_COMPO	TEXT	150	Formal LOINC name for analyte/component if LOINC number assigned
28	L_PROP	TEXT	10	Formal LOINC name for kind of property if LOINC number assigned
29	L_TIME	TEXT	10	Formal LOINC name for time aspect if LOINC number assigned
30	L_SYS	TEXT	35	Formal LOINC name for system/sample type if LOINC number assigned
31	L_SCALE	TEXT	30	Formal LOINC name for type of scale if LOINC number assigned
32	L_METH	TEXT	50	Formal LOINC name for type of method if LOINC number assigned
33	L_CLASS	TEXT	20	Formal LOINC name for class if LOINC number assigned
The following fields are used only for internal Regenstrief purposes and should not be of much interest to the submittor:				
34	STATUS	TEXT	20	Regenstrief's Status for submitted term
35	ID	TEXT	50	Regenstrief 's internal assigned ID for the submitter's file. (Internal path and file name information.)
36	COMMENT	TEXT	250	Regenstrief's automated comments about the submitted term. These identify internalcontraditions, automated equivalencing (e.g., serum to SER/plas).
37	UNIQ	TEXT	150	This lists any words in a concept that are new to the LOINC data base. These may indicate typo's, mis-statements of words or new words in the concepts.
38	DUPS	TEXT	150	These are lists of subsets or near matches for submitted terms. These are produced only to assist the submission review process and should not be given too much credence.
38	EDIT_CTL	TEXT	10	Regenstrief's Edit Control

Tables 1a and 1b describe a submission that is in the form of a Microsoft Access database. If you send an Access data base you should use this template to be sure the field names are right. A blank Access database template named SUBMIT.MDB is included in the RELMA software package. You should be diligent in filling in the first 13 fields of the table for each term in your submission.

Along with the database file for your submission, you should also include a cover letter (or email) that contains the following information:

1. The name of the organization making the submission
2. A contact name and their telephone number
3. A contact FAX phone number
4. A contact email address

Including this information will help us to respond to your request in a more efficient manner.

Access Database and Excel Submissions

You may make a submission in the form of a Microsoft Access database or an Excel spreadsheet. Most of the actual processing of a submission ends up in the form of an Access database, so, when feasible, send the submission as an Access database file. If you wish to submit an Access database, the fields described in Table 20 of this appendix must be used as the field names in the database. You may also use the field names presented in Table 20 as column names in an Excel spreadsheet. We will assume, for purposes of illustration, that the submission is in the form of an Access database.

Note that the field names are stored in uppercase letters and must be spelled exactly as shown in Table 20. Once you have created an empty database with the fields specified in Table 20, you may enter your submission data. (A blank database template named SUBMIT.MDB is included in the RELMA software package.)

The data could then be entered into a row of the Access database with values similar to those above. Note that fields 15 through 39 in Table 20 are empty when first submitted to RI. You should, however, make every attempt to supply information for first 14 fields presented in Table 20. Other fields in the database (e.g. R_COMPO, R_PROP, L_COMPO, L_PROP, etc.) become populated by us during the evaluation process.

Using a previously shown example, a submission may appear as follows:

Corresponding Row In Table 1a	Field Name	Submitted Data
1	S_ROW	1
2	S_LOCAL_CD	G23
3	S_COMPO	GLUCOSE^90m POST 50g LACTOSE PO
4	S_PROP	MCNC
5	S_TIME	PT
6	S_SYS	UR
7	S_SCALE	ORD
8	S_METH	TEST STRIP
9	S_REL_NAME	(null)
10	S_LOINC	6762-9
11	S_RESULTS	(null)
12	S_UNITS	MG/DL
13	S_ID	(null)
14	S_COMMENT	(null)

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Submission in ASCII File Format

Although we prefer that submission be in an Access database format, you may also send your submission data as an ASCII file, it must have the following format:

S_ROW|S_LOCAL_CD|S_COMPO|S_PROP|S_TIME|S_SYS|S_SCALE|S_METH|
S_REL_NAM|S_LOINC|S_RESULTS|S_UNITS|S_ID|S_COMMENT<CRLF>

Each field is separated from the other by a Tab character. That is, each vertical bar above would actually be a Tab character (i.e., an ASCII 9). Each line is terminated by a carriage-return/line-feed pair (i.e., the <CRLF> above). Therefore, each <CRLF>-terminated line in the ASCII file becomes a submission record. Note that the field lengths presented in Table 20 still apply to ASCII file submissions because we read the ASCII file data you submit into an Access database as described in Tables 20a and 20b.

Using the previous example, one line might appear as:

1|G23|GLUCOSE^90m POST 50g LACTOSE PO|MCNC|PT|UR|ORD|TEST STRIP|||6762-9||MG/DL|||

where the vertical bars represent the Tab character. Notice that two vertical bars appear between "TEST STRIP" and "6762-9". In this example, this means that the related names field is empty (i.e., a null field value). The example also shows that fields S_RESULTS, S_ID, and S_COMMENT are also empty. Without the empty field, the field information would get out of sync and it would appear that the related names for this submission was actually the closest LOINC number for the submission (i.e., "6762-9"). Therefore, the ordering of the fields and the use of the Tab character to delimit the fields is very important.

Printed Reports

Submissions ultimately end up being processed by various software programs at RI to help evaluate the submissions. One such program, named "Filter", is used to scan the information, looking for duplicates with existing LOINC tests, errors, and similar inconsistencies. The output of Filter can be printed, and RI may send you a copy of the Filter program output as part of our communication with you. The purpose of this section is to explain the information that is presented in the Filter report.

Table 21 Filter Reports
SUBMITTER: SMITH – FILE:TEST.MDB – DATE SUBMITTED:2/98 (14911 LOINC RECORDS)

Index	Comment	LOINC #	Component	Property	Time	System	Scale	Method
1	Hit 5 of 8 micromol/L	A123	5-HYDROXYINDOLEACETATE	SCNC	PT	UR	QN	
	ADD		5-[HYDROXYINDOLEACETATE]	SCNC***	PT	UR	QN	
			5-HYDROXYINDOLEACETATE	MCNC	PT	UR	QN	
			5-HYDROXYINDOLEACETATE/ CREATININE	MCRTO	PT	UR	QN	

At the beginning of Line 1 (Table 21) is the index number, which is actually the value stored in the REGEN_ROW field of the submitted database after being processed by the Filter program. Next is the comment: "Hit 5 of 8". Each submission record is "decomposed" by the filter program into words. For the submission with the local code name of "A123" (which you can see in Line 1), there were six words: "5", "HYDROXYINDOLEACETATE", "SCNC", "PT", "UR", and "QN". Notice that hyphens, as well as several other special characters, are temporarily "ignored" by Filter when the words are parsed. Therefore, Filter sees six words in the submission with a local code of A123.

Table 21 also shows "micromol/L" in Line 1, which is the unit of measure for the submission. (This is the S_UNITS field of the database.)

The first line of Table 21 continues with the remainder of the submission data. The Property of the submission is "SCNC" (stored in field S_PROP), then the Time field with the value "PT" (field S_TIME), System is "UR" (field S_SYS), Scale is "QN" (field

S_SCALE), and Method is null (field S_METH). Notice that Line 1 contains the original data as received from the submitter.

Line 2 is a blank line, used to separate the original submitter's data from the remaining data for the submission.

Line 3 is the revised submitter's data (i.e., R_COMPO, R_PROP, R_TIME, etc.). The data in this line represents the submitter's data, but perhaps revised by RI to more clearly fit the LOINC naming conventions. Often, the revisions represent correction of typographical errors and inconsistencies. **NOTE**: These revisions may change the intention of your submission. Therefore, it is very important that you review such revisions very carefully when we return the mapped codes to you.

Notice the three asterisks ("***") following SCNC in the Property field. The asterisks are used to mark the "word" where the revised item deviated from a similar test as stored in the LOINC database. So how is the database search done? Simply stated, Filter looks at each "word" in the submission (e.g., "5", "HYDROXYINDOLEACETATE", "SCNC", and selects one to use as the keyword in the query for searching the database. To speed up the search process, every word in the LOINC database is indexed, along with how many times that word appears in the database. In our example, Filter looks at the word count for each word (e.g., "5", "HYDROXYINDOLEACETATE", "SCNC", etc.) and selects the one with the lowest frequency count as the keyword. In this example, HYDROXYINDOLEACETATE has the lowest count, so it was used to return all LOINC records that contain this keyword. For example, the word "5" has 66 occurrences in the database but HYDROXYINDOLEACETATE has only 7 (at the present time). By contrast, PT has 13,887 instances. By using HYDROXYINDOLEACETATE as the keyword, Filter only has to return 7 records from the database search. (Keywords for searches are almost always found in the Component field.)

The Filter program is fairly complex and performs numerous probes on the submitted data. However, we can categorize the probes into two broad types of database search: 1) perfect match searches, and 2) *ad hoc* searches. A search for a perfect match means that the Filter program is looking to see if your submission already exists in the database. If Filter did find a perfect match, it would be marked as such in your submission file (A "DUP" entry in field RI_ACTION in Table 20b.)

An ad hoc search uses the "lowest-frequency keyword" approach described earlier to select a keyword in order to search the database more efficiently. The keyword used in the search is surrounded by brackets ("[", "]") in the printed report, as shown in Table 21.

Lines 4 and 5 show two existing LOINC records that come fairly close (5 out of 6 words) to matching the submission. The first LOINC term (1694-9) differs only in the Property field (which explains the three asterisks in Line 3). Line 5 is simply another near match. Filter may print up to a maximum of 10 near-match terms as part of an *ad hoc* search.

If there was a perfect match between the submission and an existing LOINC record, there would only be four lines of output for the term, and the "LOINC #" column would have the matching LOINC number displayed in the column.

The Filter program replicates the data in Tables 2a and 2b for each submitted term.

Conclusion

There may be a need to communicate with you about your submission. To simplify this communication, we may return your submission as an Access database with queries/comments about specific terms in the submission. You may edit the S_* fields returned to you, with the exception of the S_LOCAL_CD field, which should remain unchanged.

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Appendix D -- LOINC Printed Report Description

Changes to standard report format: We have changed the content of the printable (WordPerfect and Word) LOINC reports in the following ways:

The ASTM Code, IUPAC Code, MetPath Code, and Comments columns are no longer displayed. They are still maintained in the database, they are just not printed on the word processing reports. Columns representing the Exact Core Component Synonym, Change Reason, IUPAC Analyte Code, and Molar Mass have been added to the report. (The Exact Core Component Synonym, IUPAC Analyte Code, and Molar Mass fields are new to LOINC with Release 1.0h -- see Section 4 for a description.) We stress that this is a change to the printed reports only; we have not and never will change the order of the fields in the database itself (in either the tab-delimited ASCII "LOINDBT1.TXT" or the dBase "LOINC.DBF" formats).

Table 22: Columns Appearing on Printed Reports
The order of the columns on the reports is:
Status
Class
Loinc Number
Map To
Analyte/Component Name
Type of Property
Time Aspect
System/Specimen
Type of Scale
Method
Related Names
Exact Core Component Synonym
Date Last Changed
Reason for Change
Answer List
EUCLIDES Code
IUPAC Analyte Code
Molar Mass

Appendix E -- Examples for LOINC Property Matching

1. Content (CNT). Like concentration except that *volume* in the denominator is replaced by *mass*. By extension:

CCNT Catalytic Content, catalytic activity of a component per unit mass of a sample (system).
1813-5|ALPHA GALACTOSIDASE:CCNC:PT PLAS QN

MCNT Mass Content, mass of component per unit mass of a sample (system).
9435-9|ISOPROPANOL:MCNT:PT:TISS:QN

NCNT Number Content, number of component entities per unit mass of a sample (system).
Hypothetical: Number of organisms per gram of tissue.

Note: All of the heavy metal measurements in hair, nails, and tissue should all be mass contents. Example:

Should be : 8157-0|ARSENIC:MCNT:PT:NAIL:QN

2. Fraction (FR). Fraction of component A in group of entities B, C, Y, N in system 1. By extension:

CFR Catalytic Fraction
2536-1|LACTATE DEHYDROGENASE.FRACTION 1:CFR:PT:SER:QN

NFR Number Fraction
10602-1|SPERMATOZOA.ABNORMAL HEAD/100:NFR:PT:SMN:QN
764-1|NEUTROPHILS BAND FORM/100:NFR:PT:BLD:QN:MANUAL COUNT

MFR Mass Fraction
2614-6|METHEMOGLOBIN:MFR:PT:BLD:QN

Note: Hematocrit is a volume fraction.

4545-0|HEMATOCRIT:VFR:PT:BLD:QN:SPUN

Note: CK BB (also MB, MM) is a catalytic fraction.

Current Bad: 9642-0|CREATINE KINASE.BB/CREATINE KINASE.TOTAL :PCT:PT:SER:QN

3. Ratio (RTO). Ratio of component A to component B in system 1. By extension:

CRTO Catalytic Concentration Ratio
2325-9|GAMMA GLUTAMYL TRANSFERASE/ASPARTATE AMINO TRANSFERASE
:CCRTO:PT:SER:QN

SCRTO Substance Concentration Ratio
2958-7:SODIUM/POTASSIUM:SCRTO:PT:SWT:QN

MCRTO Mass Concentration Ratio
2768-0|PHENYLALANINE/TYROSINE:MCRTO:PT:SER:QN

Note: CSF/SERUM Protein calculation is not a ratio, because the measured components are not in the same system. It should be a relative mass concentration (RLMCNC), e.g.:
2858-9|PROTEIN CSF/PROTEIN SERUM:RLMCNC:PT:CSF+SER:QN

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4. **Relative (RL)**. Relative amount of component A in system 1 compared to system 0. By extension:

   RLCCNC Relative Catalytic Concentration
   RLMCNC Relative Mass Concentration
   RLSCNC Relative Substance Concentration

RL should be used anywhere an actual measurement is divided by a measurement on a normal or control. It should also be used when a quotient is created by dividing a measured substance in SERUM by the same substance measured in CSF, URINE, etc.

RLCCNC Relative Catalytic Concentration

6302-4|COAGULATION TISSUE FACTOR INDUCED.NORMAL/ACTUAL:RLCCNC:PT: PPP^PATIENT:QN

RLM Relative mass

3278-9|KININOGEN.HIGH MOLECULAR WEIGHT.ACTUAL/NORMAL|RLM|PT:PPP:QN

RLMCNC Relative Mass Concentration (as noted previously)

2858-9|PROTEIN CSF/PROTEIN SERUM:RLMCNC:PT:CSF+SER:QN

RLSCNC Relative Substance Concentration

3190-6|COAGULATION FACTOR IX AG ACTUAL/ NORMAL :RLSCNC:PT:QN

5. **CMPLX**. Other divisions of one measurement by another that are not covered by the above rules should be classed as having Complex (CMPLX) properties, and the exact formula for deriving the quantity should be explicitly stated.

6. **ARBITRARY**. Arbitrary concentration of items. If we are **not** measuring the activity of an enzyme then the units of measure and properties are:

Possible Values	Property	Precision
Units, International Units, IU	ARB	QN
Units/ml, IU/ml, etc.	ACNC	QN
Units/gm, IU/gm, etc.	ACNT	QN
Unit/min, IU/24hr, etc.	ARAT	QN
Unitless (Patient/Control)	AFR	QN

When measuring presence/absence or ordering measures of a component, ACNC is also the correct property.

If we **are** measuring the activity of an enzyme then the units of measure and properties are:

Possible Values	Property	Precision
Units, International Units, IU	CRB	QN
IU/ml, Units/ml, etc.	CCNC	QN
IU/gm, Units/gm, etc.	CCNT	QN
IU/24hr, Unit/min, etc.	CRAT	QN
Unitless (Patient/Control)	CFR	QN

7. If the property is TITR then the precision is always QN.
   For:
   Any X AB
   Any X AG

Possible Values	Property	Precision
<1:2, 1:4, 1:8...	TITR	QN

8. For:
   Any X AB
   Any X AG

Possible Values	Property	Precision
Neg, Indeterminate, Pos	ACNC	ORD
1+, 2+, 3+, ...	ACNC	ORD
<1:2, 1:4, 1:8...	TITR	QN
Neg, 1:4, 1:8, ...	ACNC/TITR	ORDQN

9. For any intensive evaluation whose value comes from a finite set of unranked (independent) coded items the property will be PRID (TYPE?) and precision NOM. For extensive measures whose value comes from a finite set of unranked coded items, the property will be the extensive property, and the precision will be NOM.

Intensive Properties	Possible Values (coded)	Property	Precision
Organism Identified	E. coli, S. aureus, etc.	PRID	NOM
ABO Group	A, B, AB, O	PRID	NOM
Surgery (Dis. Summary)	Cholecystectomy, Appendectomy	PRID	NOM

Extensive Properties	Possible Values (coded)	Property	Precision
Urine Color	Amber, straw, etc.	COLOR	NOM
Urine Turbidity	Hazy, cloudy, opaque	TURBIDITY	NOM

10. For any intensive evaluation whose value comes from a finite set of unranked free text items (or a paragraph) the property will be PRID, FIND, or ATTRIBUTE, and precision NAR to indicate that the result is free text narrative. For extensive measures whose value comes from a finite set of unranked text items (or a paragraph), the property will be the extensive property, and the precision will be NAR.

Intensive Properties	Possible Values (text)	Property	Precision
Organism Identified	E. coli, S. aureus, etc.	PRID	NAR
ABO Group	A, B, AB, o	PRID	NAR
Surgery (Dis. Summary)	Cholecystectomy, Appendectomy	PRID	NAR

Extensive Properties	Possible Values (text)	Property	Precision
Urine Color	Amber, straw, etc.	COLOR	NAR
Urine Turbidity	Hazy, cloudy, opaque	TURBIDITY	NAR

11. IMP is used to represent the property when the evaluation is a mental abstraction based on one a collection of measurements and or data. For example, if several measurements are made relative to immunoglobin levels in SERUM and CSF in a myasthenia gravis panel, and if by examining all of the evidence a pathologist decided that this pattern of findings represented active disease (which could be represented as a coded value), the result of the pathologist thought process would be represented as:

	Possible Values (text)	Property	Precision
Myasthenia Evaluation	No disease, chronic disease	IMP	NOM

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If the pathologist evaluation was free text or a paragraph of information, the representation would be:

Myasthenia Evaluation	No disease, chronic disease	IMP	NAR

12. Methods are only used to distinguish things that are identical in the other five LOINC fields but may differ because the sensitivity or specificity is different for the given methods.

13. Need to be careful in distinguishing end point detection method from property. For example, if sodium is measured using an ion specific electrode, the property is not a voltage difference. The voltage difference is just a method for indirectly measuring the sodium concentration. Concentration is the real property. Likewise, many antigens and antibodies are now measured using optical density as the detection method. However, the property we are really measuring is an arbitrary concentration (ACNC), not the optical density. If it is a ratio of optical densities (as with Gliadin AB, Parvovirus B19 AB, etc.) that are compared (patient value divided by a standard control), then the property should be ACRTO (arbitrary concentration ratio).

14. ml/min/1.73sqM (Milliliters per min per 1.73 square meters BSA): Similar to the immediately preceeding item. This result has the same property as if it had units of ml/min/sqM. The property of this measurement should be called "areic volume rate". The hierarchy of units should be RateUnits->AereicVolumeRateUnits->ml/min/sqM. A sibling to ml/min/sqM should be ml/min/1.73sqM.