Development of a Standard Terminology to Support Medication Messages

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The development of the Health Level 7 (HL7) messaging standard is providing an exciting forum for discussions about health data modeling in general. As a result, some areas of commonality about what to put *in* the message are arising as well. One area of interest to many involves messages about medications. Such messages include the reporting of patient history (e.g., past and current medications, history of adverse reactions, etc.), transmission of physician orders (in-patient and out-patient), and dispensing and inventory information such as that found in pharmacy systems. Despite the fact that the medications available are finite, countable and identifiable, no universally accepted standard exists for naming them.

The several drug knowledge base vendors (DKBVs) have expressed an interest in cooperating to develop a publicly-available standard for encoding information about medications. The HL7 Vocabulary Special Interest Group (SIG), made up of vendors, users, regulators, and many others, has been reviewing the data models of the DKBVs in order to develop a unifying model that will satisfy the requirements of the diverse parties involved in sending and receiving medication messages. Panelist will present a variety of viewpoints, including: (1) a description of the various roles of medication terms in HL7 messages and plans for vocabulary standardization in HL7, (3) the details of the model in its current form, (4) the perspectives of the drug knowledge base vendors, and (5) how this work will be coordinated with the Unified Medical Language System (UMLS). Each speaker will make a brief (5-10 minute presentation) of the issues from his or her particular perspective. The remainder of the time will be used for open audience discussion, with the focus being on viable ways to make the standard a reality, including funding and logistical support for its maintenance and distribution.

The goals of this panel are to:
- inform the public of the activities of the SIG
- report on progress thus far on model development
- discuss the various challenges to transforming the model into a populated, well-maintained database of medication terminology
- to invite wide participation in discussing possible mechanisms by which this goal can be realized

Who should attend: those with an interest in modeling, exchanging or using health information related to medications, including system developers, health care practitioners, clinical researchers, information system vendors, government regulators, and informaticians.

Proposal

The development of the Health Level 7 (HL7) messaging standard is providing an exciting forum for discussions about health data modeling in general. As a result, some areas of commonality about what to put *in* the message are arising as well. The development of the Logical Observations, Identifiers, Names and Codes (LOINC) standard is a case in point, in which those wishing to exchange information between ancillary systems and central repositories needed some way of recognizing the observations (initially, laboratory test results) being transmitted.

A similar problem exists for those wishing to exchange messages about medications. Such messages include the reporting of patient history (e.g., past and current medications, history of adverse reactions, etc.), transmission of physician orders (in-patient and out-patient), and dispensing and inventory information such as that found in pharmacy systems. Despite the fact that the medications available are finite, countable and identifiable, no universally accepted standard exists for naming them. The Food and Drug Administrations National Drug Code (NDC) system is generally deemed in adequate for a number of reasons, including its decentralized control (each manufacturer determines the codes assigned to products), lack of a clinically relevant hierarchy (each manufacturer can classify and organize its own products as it sees fit), and the reuse of codes. Other available standards, such as SNOMED, do not provide codes to the level of the actual products.

However, some proprietary terminologies do exist. Most pharmacy systems obtain their terminologies from drug knowledge base vendors (DKBVs) which each must obtain information from all US (and, in some cases, international) manufacturers, model it in their systems, disseminate it to their customers, and maintain it over time. For

a variety of reasons, the DKBVs would like to see the development and maintenance of a publicly-available standard which would provide them with the basic information they need. At the same time, they naturally wish to protect their investment in "value added" knowledge to support their products. Several of these vendors have come forward to place, or offer to place, their terminologies in the public domain as a way to initiate the development of a public standard. To this end, the HL7 Vocabulary Special Interest Group (SIG), made up of vendors, users, regulators, and many others, has been reviewing the data models of the DKBVs in order to develop a unifying model that will satisfy the requirements of the diverse parties involved in sending and receiving medication messages.

The purpose of this panel is to inform the public of the activities of the SIG, report on progress thus far, discuss the various challenges which must be addressed in order to transform the emerging model from an interesting specification to a populated, well-maintained database of medication terminology, and to invite wide participation in discussing possible mechanisms by which this goal can be realized. Participants will present a variety of viewpoints, including: (1) a description of the various roles of medication terms in HL7 messages, (2) the plans for vocabulary standardization in HL7, (3) the details of the model in its current form, (4) the perspectives of the DKBVs, and (5) how this work will be coordinated with the Unified Medical Language System (UMLS). Each speaker will make a brief (5-10 minute presentation) of the issues from his or her particular perspective. The remainder of the time will be used for open audience discussion, with the focus being on viable ways to make the standard a reality, including funding and logistical support for its maintenance and distribution.

For this proposal, each panelist has provided a brief statement of the position they will take during the discussion:

Stanley Huff, M.D. (*Vocabulary SIG Co-chair and Senior Medical Informaticist for Intermountain Health Systems*) will discuss the role of HL7 in controlled vocabulary development and use. Many fields in HL7 messages require the use of coded data but in most cases the specific codes to be used are not specified. The HL7 Vocabulary SIG is identifying, for each field, acceptable, publicly-available terminologies. Dr. Huff will describe the process the SIG is using for approving terminologies and the methods being explored for dissemination. He will then provide an overview of the parts of HL7 messages which are relevant to medication terms.

James Cimino, M.D. (*Vocabulary SIG Co-chair and chief vocabulary architect for New York-Presbyterian Hospitals*) will report on the work of the Vocabulary SIG on the development of a model for representing medication terminologies. This model is intended to serve the needs for HL7 messaging but also to accommodate the needs of drug knowledge base vendors who will be likely sources of content for the model. Several working meetings have been held and additional ones will take place between this writing and the Fall Symposium. Dr. Cimino will current state of the model.

Carol Broverman, Ph.D. (*Director of Healthcare Informatics, First DataBank*) will present the viewpoint of two drug knowledge base vendors, First DataBank and Medispan. Our primary goal as DKB vendors is to agree upon a standard set of well-behaved concepts, represented by codes and terms, that represent a hierarchy of drug abstractions. These drug abstractions should be chosen such that they: (a) facilitate information exchange, (b) support requirements of typical and diverse usages of drug concepts (e.g.; ordering, dispensing, administration, inventory), (c) provide the basis for decision support, and (d) address internationalization concerns. We should beware of the intractable problem of the daunting task of "remodeling" the drug universe, but should rather concentrate on reconciling the set of existing drug knowledge models, making major design changes only when well-motivated. The amount of the information model that needs to be exposed within the "standard" should be neither more nor less detailed than is required to support the levels of description that satisfy the interoperability needs just stated. The abstractions that we define should: (a) be representative of the concepts clinical users need to express, (b) embody sound semantics, (c) be represented by unique codes or compositions of unique codes, and (d) be supportable by drug knowledge base vendors. The availability of the set of "terms" for these concepts is secondary to, and directly follows from, the sound specification of the concepts, along with the assurance that the major suppliers are able to support those concepts. Given the requirements thus specified, and the heavy maintenance burden of a complete drug vocabulary, the priorities for this "standardization" include codes/concepts for: active ingredient sets, the "clinical drug" abstraction, trade-name-manufactured-drugs, and route and dose form vocabularies. This first

cut at the scope of the standard would: (a) be feasible to maintain within the UMLS or by a standards-sponsored consortium, (b) be most likely for all vendors to be able to map to, (c) be governed by a somewhat limited rate of change, and (d) support the largest set of usage requirements such as ordering (including the various "not fully specified orders"), dispensing, and the requirements of a range of decision support applications. Additional granularity and detail can be derived from the actual mapping and "decoding" of the standard codes to a licensed drug knowledge base accessed by the application, and represents the value-added of the drug knowledge base vendors.

Timothy McNamara, M.D., M.P.H.&T.M. (*Vice President of Research, Multum Information Services, Inc.*) will present the viewpoint of Multum, a drug knowledge base vendor. We at Multum Information Services, Inc. believe that the creation of a detailed standard data model for drug and drug product nomenclature is essential for system interoperability in health care. We also believe that a data model alone is insufficient for interoperability and that a detailed, expansive, and standard set of drug-related concepts (spanning multiple levels of granularity) is required before system interoperability in this area can be practically achieved. In addition, we believe that without widespread system interoperability, portable drug decision support will not be achievable. We think that such a data model and the requisite set of concepts with corresponding terms should be available in the public arena at a low enough cost to encourage widespread use. We also believe that the maintenance of such a model and vocabulary set should be undertaken by either 1) an independent not-for-profit organization supported by other standard-setting organizations, or 2) a consortium consisting of those drug information vendors and other appropriate parties who contribute substantial collections of terms and concepts for use in the creation of a publicly-available vocabulary set. The urgency for action in this area is great. Until such a standard is developed, we will continue to do our part by providing comprehensive and continuously updated listings of drug and drug product terms to the public and the health information industry.

Stuart J. Nelson, M.D. (*Head, Medical Subject Headings, National Library of Medicine*) will present the NLM's perspective on the relationship between the HL7 work and the Unified Medical Language System. In achieving a standard model for drug messaging, HL-7 will provide guidance for the level of granularity in which the UMLS will represent information about pharmaceuticals. The HL-7 model will provide us a level of common ground where we will represent the drug naming information from the various vocabulary sources, e.g., Multum and First Databank. While many of the vocabulary sources presently in the UMLS have naming information about drugs, the granularity of these vocabularies is quite variable; having a standard model will allow a more intelligible representation of each of those vocabularies. This model will allow us to decide where one vocabulary (e.g., READ) is making a type of finely granular distinction that we do not wish to represent in the UMLS (e.g., the various flavors of the cough syrup), and allow us to develop a set of rules for dealing with this type of finely granular information. We do not want to continue to represent Aspergum as a synonym of Aspirin, but do want to represent that Aspergum is a gum containing acetylsalicylic acid. Reasoning about suitability of medications (should Aspergum be prescribed for someone with nasal polyps and asthma), aggregation of clinical data (let me see all the patients who have received some form of aspirin), or literature retrieval would be supported by the representations of the relationships between drugs, ingredients, and forms at the level agreed on and in the semantics of the UMLS. A purpose of the UMLS is to assist in mapping clinical information to a variety of other information sources; another is providing a representation which will allow aggregation of this clinical data for administrative purposes. Incorporation of additional sources of drug vocabularies, such as those participating in the HL-7 process, and establishing a standard model which can serve as a basis for normalization of the Metathesaurus will further these purposes.