Understanding Information in EHR Systems: Paving the Road for Semantic Interoperability through Standards

By Anna Orlova, PhD, and Kenneth Salyards

Today, both clinicians and health information management (HIM) professionals have been experiencing overwhelming challenges with the usability of electronic health record (EHR) systems due to shortcomings in supporting user needs.[1,2,3,4] A five-year study recently published by the US National Institute of Standards and Technology (NIST) on usability of EHR systems identified the following four issues with adoption that may negatively impact patient safety:[5]

1. Clinically relevant information is not available for the task at hand
2. Inadequate documentation
3. Inaccurate information
4. Irretrievable information

These four issues result from an inability of today's EHR systems to support semantic interoperability, which is the ability for senders and receivers of information to interpret or understand in the same way information captured and shared using health information technology (HIT).[6]

Clinical documentation improvement (CDI), defined by AHIMA as "any manual or electronic notation (or recording) made by a physician or other healthcare clinician related to a patient's medical condition or treatment," is a facility-wide activity that, according to an AHIMA Press book on CDI, enhances "the quality of the clinical record, thus affecting patient care, reimbursement, severity and quality scores."[7] CDI programs have been employing informatics-based methods to enable facility-wide standardization of the representation of the clinical content in the EHR system to produce "legible, reliable, precise, complete, consistent, clear, and timely information."[8]

Quote on Standards Role in CDI

"Because standards are an accepted practice in the medical community, the CDI process was endorsed by the medical staff. It's also clear that the value of streamlining clinical communication with a succinct, standard definition has been well received. Our organization continued the process of identifying clinical terms that lack standardization across our community. The process has been successfully replicated by defining standards in the clinical diagnoses of malnutrition, anemia, obesity, respiratory failure, heart failure, renal failure, and other content. To further promote sustainability, queries from the CDI team and coders to the provider community reference the definitions as appropriate... Standard clinical definitions have been incorporated into resident and new provider on-boarding and training within respective disciplines including training in the use of the electronic medical record—this serves as a means to standardize clinical communication and assure sustainability. Finally, as an added financial bonus, this process ensures the provider and the hospital are accurately represented with patient acuity."—Katherine Lusk, chief information exchange officer, Children's Health System of Texas[9]

In various healthcare organizations, multidisciplinary work groups of physicians, nurses, and CDI specialists have been defining the clinical pathways (clinical workflow and data flow) and case definition templates (data content) based on clinical literature review and organizations' best practices for proper documentation of the clinical encounter in EHR systems.

The Role of Standards Developers in Content Standardization

Standards development organizations (SDOs) have been searching for HIT solutions to enhance capabilities of creating semantically exchangeable documents. Over the past few years, various information exchange formats have been created, including Health Level Seven (HL7) Clinical Document Architecture (CDA)[10] and HL7 Fast Interoperability Healthcare Resources (FHIR).[11] Still, the healthcare industry continues to be challenged by the difficulty of current applications to interpret information exchanged between the sender and the receiver.

Given the variety of standard formats, there is a need for an approach that can bridge multiple exchange formats, syntaxes, and semantics when sharing health information. The advancement of semantic interoperability with the use of model-driven content development tools has been explored in the past few years for this purpose.

In 2011 to 2012 the Public Health Data Standards Consortium (PHDSC), with support from the Centers for Disease Control and Prevention (CDC), conducted a project aimed at the standardization of public health case reports based on the HL7 CDA standard. Using the open source Model Driven Health Tool (MDHT), in collaboration with the Council of State and Territorial Epidemiologists (CSTE), PHDSC developed CDA-based case reports for 15 conditions[12] using the HL7 Implementation Guide for CDA Release 2: Public Health Case Reports (US Realm).[13] Two of these reports, for tuberculosis and pertussis, were used in the PHDSC CDA Pilot Projects on electronic public health reporting. These projects were conducted in partnership with the health departments from the states of New York and Delaware, as well as San Diego County, CA.[14]

Jurisdiction-specific instances of the public health case reports for these two conditions were also built in MDHT to support jurisdiction-specific data exchange needs, adding them to the MDHT public health report library. In 2012 to 2013, PHDSC continued their public health report standardization effort developing [15] CDA-based laboratory reports.15 This approach was supported by the community-led Public Health Reporting Initiative of the Office of National Coordinator for Health IT's Standards and Interoperability (S&I) Framework.[16]

The US Substance Abuse and Mental Health Services Administration (SAMHSA) has been using a similar approach in its Information Exchange Hub (IExHub), the transformation/interface engine supporting semantic interoperability in health information exchanges (HIEs) for behavioral health and healthcare at large.

AHIMA's Role in Standards Development

Built upon the CDI program's advancements of content standardization in the form of standardized clinical pathways and case definition templates, and SDOs approach for using content standardization tools, AHIMA has been working with standards developers on assessing if their tool-based approach for building standardized templates can be suitable for healthcare organizations' CDI programs.

The AHIMA Standards Team has been collaborating with SAMHSA and the CDI programs of several healthcare organizations to assess the feasibility of using web-based tools for the standardization of information when providing healthcare delivery and public health reporting. The AHIMA Standards Team envisions providing HIM and public health professionals with a web-based service that they can use within their organizations to:

- Build their organization- and jurisdiction-specific document templates from the standards-based template models supplied by the service.
- Store their templates in the tool library as needed for use or reuse by their HIT vendors.
- Contribute to an ongoing virtual validation of the semantic content standards that were used in the template models, providing valuable feedback to SDOs to improve their standards.

There are several web-based tools that are used today by SDOs to enable content standardization. They include:

- **ART DÉCOR** is an open source tool used by European countries to build document templates in healthcare (https://art-decor.org/mediawiki/index.php/Main_Page).
- **CAM** (Content Assembly Mechanism) is an open source tool developed by OASIS,[17] an SDO, for specifying machine-processable information content templates of business transactions and the associated rules (https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=cam).
- **CAP eCC** (College of American Pathologists, Electronic Cancer Checklist) is used to build structured pathology cancer reports (www.cap.org/web/home/lab/proficiency-testing/cap-eCC?

_afrLoop=170447475115268#%40%3F_afrLoop%3D170447475115268%26_adf.ctrl-state%3Day6gitadg_4).

- **MDHT** (Model Driven Health Tool) was used by PHDSC to build public health report templates (www.projects.openhealthtools.org/sf/projects/mdht/).
- **Open EHR** is an international tool for e-health content standardization (www.openehr.org/home).
- **Trifolia** is the tool used to develop standardized templates, specifically for the Centers for Medicare and Medicaid Services quality measures (www.lantanagroup.com/newsroom/press-releases/trifolia-workbench-hl7-web-edition/).

The AHIMA Standards Team has been facilitating the demonstrations of the tools listed above via webinars to help HIM professionals understand the tools' capabilities to support CDI programs in healthcare organizations, as well as content standardization activities in public health agencies. Specifically, the team has been looking for tools to have the following capabilities:

a. Easy to navigate and use by general user without an IT background

b. Support the ability to develop case definition templates based on the business rules defined in the clinical pathways. This also includes the search for already developed templates that are stored in the tool's library for reuse

c. Validate new templates for completeness and correctness

d. Easily update earlier developed templates

e. Maintain templates' versioning

f. Maintain journaling function (notes from discussions with subject matter experts (SMEs))

g. Generate an electronic and printed copy of the template

Webinars with the tool demonstrations have been recorded and posted on the AHIMA Information Governance and Standards Engage Community's webpage at http://engage.ahima.org/viewdocument/2016-ahima-content-s. Those interested in looking at these tools and sharing their opinion about their capabilities can complete an online survey upon completion of a webinar. Individuals will receive one CEU credit for listening to each of the webinars and completing the associated survey.

Please contact Diana Warner, MS, RHIA, CHPS, FAHIMA, AHIMA director of HIM practice excellence, at diana.warner@ahima.org for more information about the AHIMA Content Standardization Project.

Notes

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[17] Organization for the Advancement of Structured Information Standards. www.oasis-open.org.

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