Standardized Nursing Terminology Use in Electronic Health Records in Minnesota

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Abstract. The extent to which standardized nursing terminologies are used in electronic health records (EHRs) is not known. The goal of this project was to identify standardized nursing terminologies in use in Minnesota EHRs. Graduate nursing students with guidance from the Minnesota Department of Health eHealth Initiative surveyed representatives of 360 healthcare systems and organizations throughout the state. Entities included clinics, hospitals, long-term care facilities, public health agencies, group homes, and the state prison system. Results show that 92% of these healthcare entities utilized EHRs; however only 30% of entities used a standardized nursing terminology within their EHR; and of these, the Omaha System (80.5%) and SNOMED CT (6.5%) were most frequent. Analysis of respondent comments showed a general lack of awareness regarding standardized nursing terminologies and the importance of using them to document nursing interventions, assessments, outcomes, continuity of care, and research.

Keywords: Standardized nursing terminology; electronic health record; interoperability; Omaha System; SNOMED CT

1   Introduction

The desired outcome of using electronic health record (EHR) technology is to improve health care delivery in terms of quality, safety, efficiency, and to reduce health disparities [1, 2]. Electronic health record technology should engage patients and families, improve coordination of care, and promote population and public health, while maintaining the privacy and security of patient health information [1, 3]. In the United States, efforts to use clinical standards to improve EHR documentation quality and health information exchange (HIE) using clinical standards were incented through federal rule [1-3]. The Health Level 7 (HL7) Clinical Document Architecture (CDA) defined a standard for a continuity of care document (CCD) designed to facilitate communication for HIE [4]. The structure provided by the CDA is intended to "unlock" clinical notes such that there is ease of storage and the exchange of information over both time and distance [4]. The CCD became the main HIE mechanism described in Meaningful Use rule [4]. More recently, the Medicare Access and CHIP Authorization Act of 2015 (MACRA) has replaced Meaningful Use and the implications of MACRA for use of standards in clinical documentation are as yet unclear [5].

The Minnesota eHealth Initiative is a state-wide agency with the goal of collaborating across sectors to improve health care quality, increase patient safety, reduce costs, and improve public health through the accelerated and effective use of health information technology [6]. Within the eHealth Initiative, a Standards and Interoperability Workgroup was developed in 2011 in response to recommendations of the Office of the National Coordinator (ONC) related to implementation of standards in EHRs [6].

There are numerous terminology standards, defined as previously-agreed upon terms used to record and exchange data across systems of information [7]. The American Nurses Association (ANA) recognized twelve terminology standards for use in nursing [7-9]. The standards that may be used for clinical coding are ABC codes, Clinical Care Classification System (CCC), International Classification for Nursing Practice (ICNP), Logical Observation Identifiers Names and Codes (LOINC), North American Nursing Diagnosis Association (NANDA), Nursing Interventions Classification (NIC), Nursing Management Minimum Data Sets (NMMDS), Nursing Minimum Data Sets (NMDS), Nursing Outcomes

Classification (NOC), Omaha System, Perioperative Nursing Data Set (PNDS), and Systemized Nomenclature of Medicine Clinical Terms (SNOMED CT) [9]. Barriers to use of terminology standards in EHRs include decisions by proprietary EHR developers and the lack of governmental emphasis on the adoption of standardized nursing terminologies [7, 10]. For example, Meaningful Use Federal Rule was silent regarding the use of standardized nursing terminologies [1-3].

Nursing informatics experts and organizations have long recognized the importance of nursing data in EHRs to measure and improve population health [7, 12-14]. Standardized nursing terminologies contribute important information about patients and their care [13-14]. Optimal communication among nurses and the health care team improves patient care with increased visibility of nursing intervention and supports HIE. This also helps to achieve the goal of improving quality and satisfaction of the patient [14]. Scholars assert that the use of standardized nursing terminology is essential for documentation of nursing interventions, outcomes, continuity of care, and nursing research [7, 12-15]

In 1997, nursing leaders from local public health departments in Minnesota encouraged adoption of nurse-centric clinical documentation systems for public health nurses [16]. This effort fostered the widespread use of standardized nursing terminologies in home care and public health nursing in Minnesota [17-20]). In 2001, public health nurses and Minnesota Department of Health leaders who were users of these clinical systems self-organized, beginning the first Omaha System Users Group. This group is now called the Omaha System Community of Practice, an international organization leading practice quality improvement through collaboration and development of tools for clinical decision making, support, and evaluation [15]. In 2010, the University of Minnesota School of Nursing's Center for Nursing Informatics initiated the Omaha System Partnership for Knowledge Discovery and Healthcare Quality, a practice-based research network for advancing use of standardized nursing terminology data [21]. This emphasis on terminology expertise was a hallmark of the UMN Center for Nursing Informatics, a research and development center of the International Classification of Nursing Practice (ICNP) [22]. Knowledge of these efforts to leverage standardized nursing terminologies was in part responsible for the MDH eHealth Standards Committee awareness of nursing's terminology expertise. In 2013, the eHealth Standards Committee requested a survey to evaluate nursing standards, adoption, and interoperability readiness in Minnesota. The goals of the project were identification of current nursing standards utilized in health care systems in Minnesota and analysis of the use of primary nursing terminology standards in Minnesota in relationship to the CCD.

2   Methods

This project was completed at the request of the Minnesota Department of Health eHealth Initiative and was exempt from review by the University of Minnesota Institutional Review Board. The data collection tool was developed by University of Minnesota graduate nursing students using google forms online survey tool. Items were: respondent name, phone number, e-mail address, city, zip code, affiliation and position in agency, affiliation with a healthcare system, affiliation with an EHR or software company, type of care setting, use of a standardized nursing terminology in the EHR, and use of a CCD with or without a standardized nursing terminology. Pick-list menu responses were provided for health systems (e.g. Allina Health Care System, Fairview Health System, Hennepin County Health System, St. Luke's Health Care System in Duluth), identified EHR in use (e.g. PH-Doc, Riversoft, Epic, Meditech), type of care (e.g. acute care, ambulatory care, long term care, group home, community care), and standardized nursing terminologies used (e.g. ICNP, NIC, Omaha System, SNOMED CT). Finally, a text field was provided for narrative summary of relevant information provided by respondents in addition the above structured responses.

3   Sampling Method

In the absence of a comprehensive list of diverse Minnesota health care settings, a snowball sampling method was employed in this project. Snowball sampling is used to increase survey sample size and to gather data from a large sample of a hidden population where formal sampling frames are not available [23]. Initially, potential respondents were identified through professional colleagues of informatics students and faculty. Contacts were made via phone calls, emails, and face-to-face meetings with

administrators, nursing supervisors, EHR vendors, and information technology specialists in order to identify the key respondent(s) for all Minnesota healthcare organizations, health systems, and/or EHR software companies serving them. Respondents were asked to suggest additional contacts.

4   Data Analysis

Survey data were exported from the on-line survey into an Excel spreadsheet for analysis. Standard descriptive statistical methods were employed. Geographic Information Systems (GIS) mapping of the survey data enabled visualization of patterns in EHR distribution, type of setting, use of standardized nursing terminologies, and use of CCDs.

5   Results

Students made 228 contact attempts that resulted in interviews of 79 healthcare leaders, clinicians, or informatics professionals. Respondents self-reported 13 job titles (Table 1); most were registered nurse/electronic health record manager (24.1%) or supervisor (24.1%).

Table 1. Respondent's title with percentage comparison to total contacts made:

Respondents Title	Number of Respondents	Percent of Total
Registered Nurse (RN)–Electronic Health Record (EHR) manager	19	(24.1%)
Supervisor	19	(24.1%)
Not identified	17	(21.5%)
Director of Nursing (DON)	11	(13.9%)
Nurse	8	(10.1%)
Information Technology (IT) Specialist	2	(2.5%)
Assistant Director of Nursing (ADON)	1	(1.3%)
Associate Professor of Nursing – Informatics Specialist	1	(1.3%)
Totals	79	

They provided information about a total of 360 Minnesota health care entities across numerous healthcare settings in urban and rural areas (Table 2).

Table 2. Healthcare entity by Setting (N=360)

	Rural	Urban	Total N	(%)
Public Health	72	15	87	(24.1%)
Group Home	29	54	83	(23.0%)
Clinic	50	23	73	(20.2%)
Long-term Care	41	32	73	(20.2%)
Hospital	13	15	28	(7.7%)
Home Care	6	5	11	(3.0%)
Prison System		1	1	(0.2%)
University		1	1	(0.2%)
Not Identified	3		3	(0.8%)
Total	214	146	36	(100%)

Public Health agencies comprised the largest group of healthcare entities surveyed (24.1%) followed by group homes, primary care clinics, long-term facilities, and hospitals. Respondents named a total of

35 EHRs; the most frequent across all entities were Champ / Nightingale Notes (52) and Point Click Care (48).

Epic was most frequent EHR named by respondents for Minnesota hospitals. Respondents named 13 EHRs that were unique to a single entity, and were not able to identify an EHR for 82 entities (Table 3).

Table 3. Identified Health Care Records in use in ten or more health care entities

Electronic Health Record Identified	Number of Entities
NA/None/Unaware/Unable to answer	82
Champ / Nightingale Notes	52
Point Click Care	48
Service Minder	40
PHDOC	40
eClinicalworks	31
EPIC	28
Centricity	22
CareFacts	19
Computerized Patient Record System (CPRS)	16
Meditech	15

While 331 of the 360 entities (92%) used EHRs, 252 (70%) could not or did not identify a standardized nursing terminology within their EHR. Of the 12 ANA-recognized standardized nursing terminologies utilized in various EHRs, five were identified through this survey. The most frequently used standard nursing terminology was the Omaha System (87 entities). Additional standardized nursing terminologies identified included SNOMED CT (7 entities), and a combination of NANDA, NIC, and NOC (1 entity). Geographic distribution of standardized nursing terminology use was plotted using GIS (Figure 1).
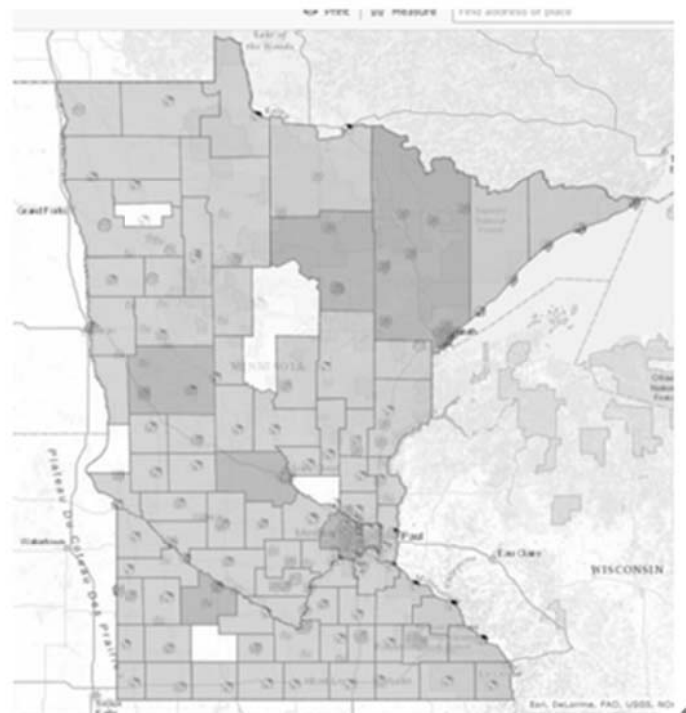

Figure 1. Geographic representation of counties in which terminologies are used in EHRs in any setting (N=82 of 87)

Review of comment data revealed three predominant recurring themes: 1) lack of interoperability of major vendors and systems; 2) trust that software will provide standards as needed for interoperability; and 3) community setting approach differed from acute/inpatient care setting approach. The theme 'lack of interoperability in major vendors and systems' was shown by the comments from larger healthcare entities in Minnesota. These entities typically used a large, nationally-known EHR. Comments indicated the EHR did not have a CDA-defined CCD design. Instead, the EHR had the capability of sending discharge summaries to the inboxes of participating providers, and information transfer was therefore limited to users of this EHR. The theme 'trust that software will provide standards as needed for interoperability' was common across respondents who indicated that the EHR vendor was believed to provide the necessary clinical terminologies for HIE and compliance with federal rule. Respondents relied on the EHR for expertise in use of standardized nursing terminologies. However, EHR vendors who were contacted rarely had this expertise; rather they were unaware of the existence of standardized nursing terminologies and were not able to respond to the terminology-related survey questions. Lastly, the theme 'community setting approach differed from acute/inpatient care setting approach' was shown by responses from public health agencies as compared to other entities. The public health agency respondents commented on collaboration across EHRs and agencies as they employed the same standardized nursing terminology (the Omaha System) and developed a unified approach to HIE in the CDA-defined CCD.

6   Discussion

This study identified standardized nursing terminologies utilized in health care systems in Minnesota in EHRS and in the CDA-defined CCD. The majority of health care entities used EHRs; however, respondents indicated that most EHRs did not use standardized nursing terminologies, with the exception of community settings. The data collected through this project was shared with the Minnesota Department of Health eHealth Initiative and eHealth Standards Committee to inform policy development around recommendations for use of standard nursing terminology in EHRs.

The Omaha System was identified as the most widely adopted standardized nursing terminology, present in the majority of Minnesota counties. This finding likely is the result of earlier grass-roots efforts to establish interoperability among Minnesota's local public health agencies in the 1990's [15-22]. Such widespread adoption has enabled progress towards interoperability in community care settings that exceeds that of acute care settings despite federal mandates and incentives [1-4, 15-22]. Despite the fact that few respondents mentioned use of SNOMED CT as a standardized terminology, respondents may not have been aware of previous mapping of the Omaha System and SNOMED CT. This mapping ensures that any EHR based on the Omaha System would be dual encoded with SNOMED CT [24], thus meeting federal mandates for use of SNOMED CT as a clinical terminology [1-4].

Several challenges were encountered throughout this project related to the lack of understanding and knowledge regarding nursing terminologies. Many of the respondents could not identify the name of the EHR used in their facility. Respondents had a difficult time identifying persons in their respected organization who could answer the survey questions about standardized nursing terminologies. Typical responses were "I don't know" and when the list of standardized nursing terminologies was provided a common response was "none of those sound familiar". These challenges highlight the greater challenge of meaningful data and information management beyond required data entry. It is essential to improve understanding about the importance of data to support population health and healthcare across settings and EHRs, including the use of standardized nursing terminologies.

7   Conclusion

A broad sample of healthcare organizations was captured from respondents regarding use of standardized nursing terminologies in EHRs and in CDA-defined CCDs, ranging from those for whom standardized terminologies were a foreign concept to those who used the Omaha System for daily documentation, data management, and information exchange. While most respondents had little appreciation of the importance of understanding the type of EHR or standardized terminology used and related implications, the value of standardized nursing terminologies was demonstrated in the successes

of local public health nurses. Further study is needed to advance adoption of standardized nursing terminologies, both in EHRs and also toward the goal of using standards for rigorous nursing documentation and research.

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