National Health Information Infrastructure (NHII) and Nursing: Implementing the Omaha System in Community-Based Practice

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INTRODUCTION

Robert Wood Johnson (RWJ) Executive Nurse Fellowship

The RWJ Executive Nurse Fellowship program is an "advanced leadership program for nurses in senior executive roles who are aspiring to lead and shape the US health care system of the future."[1]. Through a 3-year program, the RWJ Fellowship offers "experiences, insights, competencies and skills necessary to achieve, or advance in executive leadership positions in a health care system undergoing unprecedented change." The program is done in conjunction with support from the nurse executive's employing institution.

As an RWJ Fellow, my focus is on influencing the National Health Information Infrastructure to assure that nursing and community-based practice are adequately represented in the evolving electronic health record (EHR). The focus of this paper is to provide an update on the NHII Initiative and discuss the importance of including standardized nursing terminology in an EHR to support the workflow of nursing documentation and aggregation of data to demonstrate patient outcomes.

National Health Information Infrastructure Initiative

In April of 2004, President Bush issued an Executive Order establishing the position of the National Coordinator for Health Information Technology (NCHIT) and calling for all Americans to have an interoperable electronic health record within 10 years. Dr. David Brailer was appointed as the National Coordinator. He is responsible for coordination of Health Information Technology (HIT) within Health and Human Services (HHS), including the NHII and the Consolidated Health Informatics Initiative (CHI), as well as other HIT initiatives. He presented a *Framework for Strategic Action* to HHS in July 2004 outlining a plan for accomplishing 4 major goals of an EHR: inform clinical practice, interconnect clinicians, personalize care, and improve population health. [2]

The *Framework for Strategic Action* builds on previous work by the National Committee on Vital and Health Statistics (NCVHS) [3], National Library of Medicine's Unified Medical Language System (UMLS)[4], Health Level Seven's (HL7) Electronic Health Record System Functional Model (EHR-S)[5], SNOMED CT[6], CHI[7], and many more initiatives to facilitate computerizing health information. A common thread throughout all these efforts is that for an EHR to be effective, it must contain information from all providers involved in health care. The EHR needs to include nationally recognized standardized clinical terminologies to facilitate interoperability of data between systems and across health care delivery sites.

Following a brief overview of the development of nursing standardized terminologies, an example is provided of how one EHR – CareFacts Information Systems, incorporated a standardized clinical terminology to streamline data collection in homecare and aggregate data for outcome analysis.

HISTORICAL DEVELOPMENT OF NURSING STANDARDIZED DATA

Nursing information has a parallel development alongside national efforts to standardize clinical terminology in preparation for computerization of health information.

Development of the Nursing Minimum Data Set (NMDS)

Development of the NMDS was built on the work of the NCVHS' minimum health data sets for ambulatory, long-term care, and hospital discharge[8]. Missing in these minimum data sets were elements that described the nursing process – nursing diagnoses, interventions, outcomes, and intensity of nursing care. In 1977, a conference was held at the University of Illinois College of Nursing in Chicago to encourage nurses to identify the minimum data required to describe the practice of nursing in preparation for computerization. In 1985, the University of Wisconsin-Milwaukee School of Nursing conducted a follow-up conference, resulting in the revised NMDS. The NMDS contains 16 data elements for enabling the comparison of nursing data across clinical populations, settings, geographical areas, and time; describing nursing care of patients and their families; explaining or projecting trends in nursing care; and, facilitating nursing research through linkage with other nursing and health care data. There are 3 categories of elements: *Nursing Care Elements, Patient or Client Demographic Elements, and Service Elements.* Of the 16 data elements, all were included in other minimum data sets except the *Nursing Care Elements*: Nursing Diagnosis, Nursing Intervention, Nursing Outcome, and Intensity of Nursing Care.

American Nurses Association (ANA)'s Committee on Nursing Practice Information Infrastructure (CNPII)

In 1986, the ANA established a committee, the Steering Committee on Databases to Support Clinical Practice, which now is known as CNPII[9]. The purpose of this committee is to influence health policy related to health information. One activity of the CNPII is to establish criteria for recognizing nursing terminologies consistent with the International Organization of Standardization (ISO) criteria. The CNPII then reviews terminologies submitted by developers. Currently, there are 13 terminologies recognized by the ANA.

- North American Nursing Diagnosis Association, Inc. (NANDA)
- Nursing Interventions Classification System (NIC)
- Nursing Outcomes Classification System (NOC)
- Nursing Management Minimum Data Set (NMMDS)
- Home Health Care Classifications (HHCC)
- Omaha System

- Patient Care Data Set (PCDS)
- PeriOperative Nursing Dataset (PNDS)
- SNOMED CT
- Nursing Mininum Data Set (NMDS)
- International Classification for Nursing (ICNP®)
- ABCcodes
- Logical Observation Identifier Names & Codes (LOINC®)

Detailed discussion of the Omaha System is provided to show how its usefulness for documenting 3 of the NMDS elements – nursing diagnoses, interventions, and outcomes.

Omaha System

The Omaha System was developed for community-based practice between 1975 and 1986 through successive studies funded by the Division of Nursing.[10] It is included UMLS Metathesaurus, SNOMED CT®, LOINC, and HL7. The Omaha System includes a Problem Classification Scheme, Intervention Scheme, and a Problem Rating Scale for Outcomes.

In the Problem Classification Scheme, problems (nursing diagnoses) are organized at 4 levels:

- **Level 1 – Domai**n – general 4 areas for problem identification – Environmental, Psychosocial, Physiological, and Health Related Behaviors
- **Level 2 – Problems** – there are 42 specific health related concerns
- **Level 3 – Modifiers**
  - Type of Problem – Actual, Potential, Health Promotion
  - Client Type – Individual, Family, or Community
- **Level 4 – Signs and Symptoms (S&S)** - evidence of a problem**.**

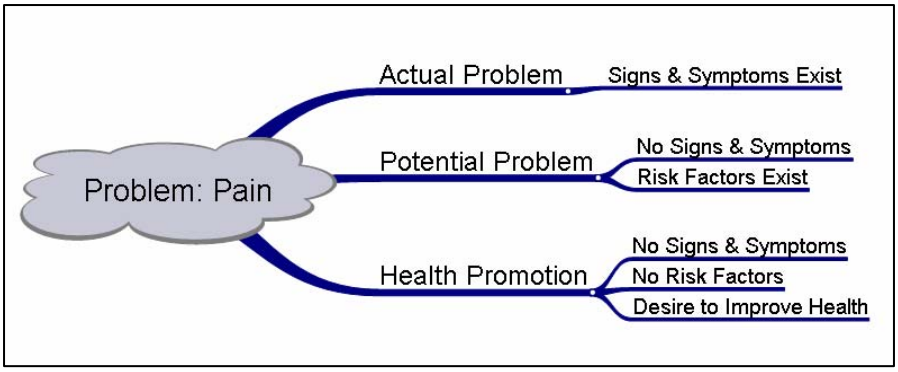
An example of Problems within Domains is displayed in Table 1:

Table 1 – Omaha System Domains and Sample Problems

Level 1 – Domain	**Level 2 – Sample Problems**
Environment	Income, Sanitation
Psychosocial	Mental Health, Grieving, Abuse
Physiological	Hearing, Vision, Speech, Circulation
Health Related Behaviors	Nutrition, Medication Regimen

In Figure 1, the rules for naming a problem in the Omaha System are depicted.

Figure 1. Rules for Naming Omaha Problems



Once a problem is assessed and the Type of Problem determined, it is modified further by Client Type - Individual, Family, or Community. A decision is made then regarding if follow-up action is required and if so, by whom. Selection of an Action includes one of the following:

Care Plan – indicating that the nurse will develop a plan of care
Low Priority – indicating that the problem will not be addressed at this time
Self Care – indicating that the client will manage the problem
Other Provider – indicating that a different provider is managing the problem

An example of one problem in the Omaha System that might be identified for a client who is receiving home care for follow-up after a total knee arthroplasty is assessment of pain. Pain is a problem in the Physiological Domain. It includes the following signs and symptoms:

SIGNS/SYMPTOMS OF ACTUAL:
01. expresses discomfort/pain
02. elevated pulse/respirations/blood pressure
03. compensated movement/guarding
04. restless behavior
05. facial grimaces
06. pallor/perspiration
07. other

After the nurse selects the appropriate signs and symptoms, the problem would be identified as an Actual Problem for an Individual Client. The nurse then selects an Action of Care Planning to document what will be done to help the client manage this problem.

When a problem is added to the care plan a baseline rating and a Desired Outcome is established regarding the client's Knowledge, Behavior, and Status using the Omaha System Outcome Rating Scale. The Omaha System Outcome Rating Scale is shown in Table 3.

Table 2. Omaha System Outcome Rating Scale

	Knowledge	*Behavior*	*Status*
1	No Knowledge	Never Appropriate	Extreme Signs/ Symptoms
2	Minimal Knowledge	Rarely Appropriate	Severe Signs/ Symptoms
3	Basic Knowledge	Inconsistently Appropriate	Moderate Signs/ Symptoms
4	Adequate Knowledge	Usually Appropriate	Minimal Signs/ Symptoms
5	Superior Knowledge	Consistently Appropriate	No Signs/ Symptoms

Guidelines for reliability in using the Outcome Rating Scale are included in the Omaha System book by Martin. A care plan is created using the Omaha System Intervention Scheme. The Intervention Scheme is composed of building blocks:

- **Category** (which is like the verb in a sentence),
- **Target** (which is like the subject in a sentence).
- **Care Descriptions** (which is rurther delineation of the subject) and,
- **Note field**

The later 2 elements are not part of the Omaha Intervention Scheme, but are published in the book on the Omaha System. Examples of interventions for Circulation are shown in Table 3.

Table 3. Sample Omaha Interventions for Pain

Category	Target	Care Description	Note
Health Teaching, Guidance and Counseling (HTGC)	S&S	S&S: Pain	Notify clinician or MD if pain increases significantly
Treatment & Procedure (TP)	Exercises	Range of Motion	To decrease stiffness and swelling
Case Management	Medical/ Dental Care	Coordinate with Physician	Pain medications
Surveillance	Signs/ Symptoms	Effectiveness of Control Measures	

FUNCTIONAL REQUIREMENTS FOR A COMMUNITY-BASED EHR CONSISTENT WITH THE NHII REQUIREMENTS

Home care is provided predominantly by nurses in conjunction with other disciplines such as therapists. To be consistent with the NHII requirement for interoperability, standardized clinical terminology should be used. The ANA has recommended 13 terminologies. An example using the Omaha System is provided. There are many additional data requirements in home care, including the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), Community Health Accreditation Program (CHAP) and Medicare requirements. Functional requirements for a homecare EHR need to incorporate all data in a streamlined manner. An example of one system is provided to demonstrate the usefulness of an ANA recognized terminology and show how computerization can streamline workflow processes.

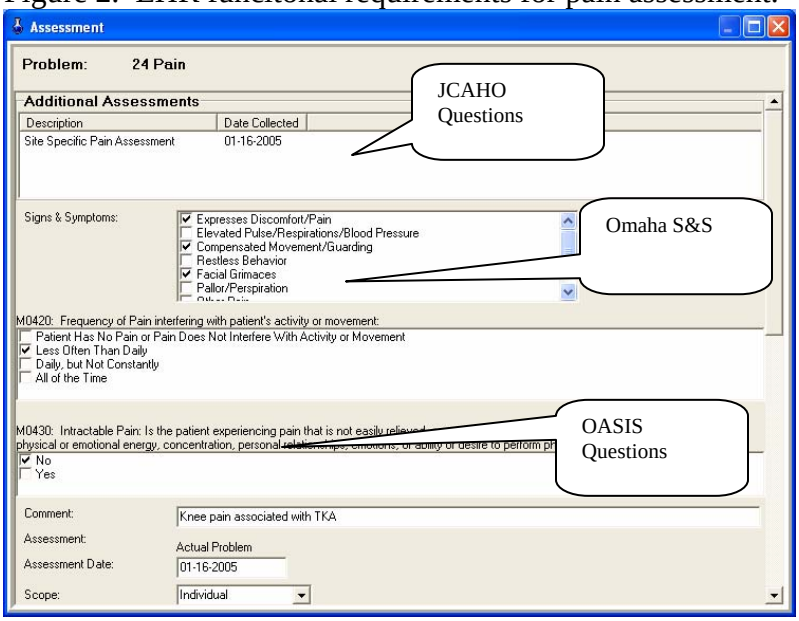
CareFacts' Use of the Omaha System for Homecare

CareFacts began as an electronic health record, later incorporating back-end office functions. From its inception the goal was to streamline workflow processes by capturing data once and reusing for multiple business processes. Further, the goal was to have ready access to a comprehensive chart that included updated care planning. In addition to creating a simple and easy to use information system for the clinician, managers need aggregated clinical data for Outcomes-Based Quality Improvement (OBQI), program evaluation, and evidence for improving best practice guidelines.

The Omaha System was selected since it is nationally recognized by ANA, is simple and easy to use by nursing and other disciplines, and includes the nursing process elements of diagnoses, interventions, and outcomes. However, additional data are required for in-depth assessments. In 1998, the Centers for Medicare and Medicaid Services (CMS) required the use of the OASIS data set, which was envisioned as a minimum set of data to assess home care clients. In 2000, CMS changed from a pay per visit to a prospective payment system, abstracting key items of information from the OASIS data set to determine payment. Many agencies are accredited by the (JCAHO) or the (CHAP), so additional data are needed to meet accreditation requirements. These multiple data requirements were integrated into a streamlined assessment, preventing inconsistent or missing information.

In Figure 2, an example of the EHR functional requirements for assessing Pain in home care incorporating the Omaha System, JCAHO data for pain assessments, and CMS required OASIS data. All are combined into a comprehensive assessment of Pain.

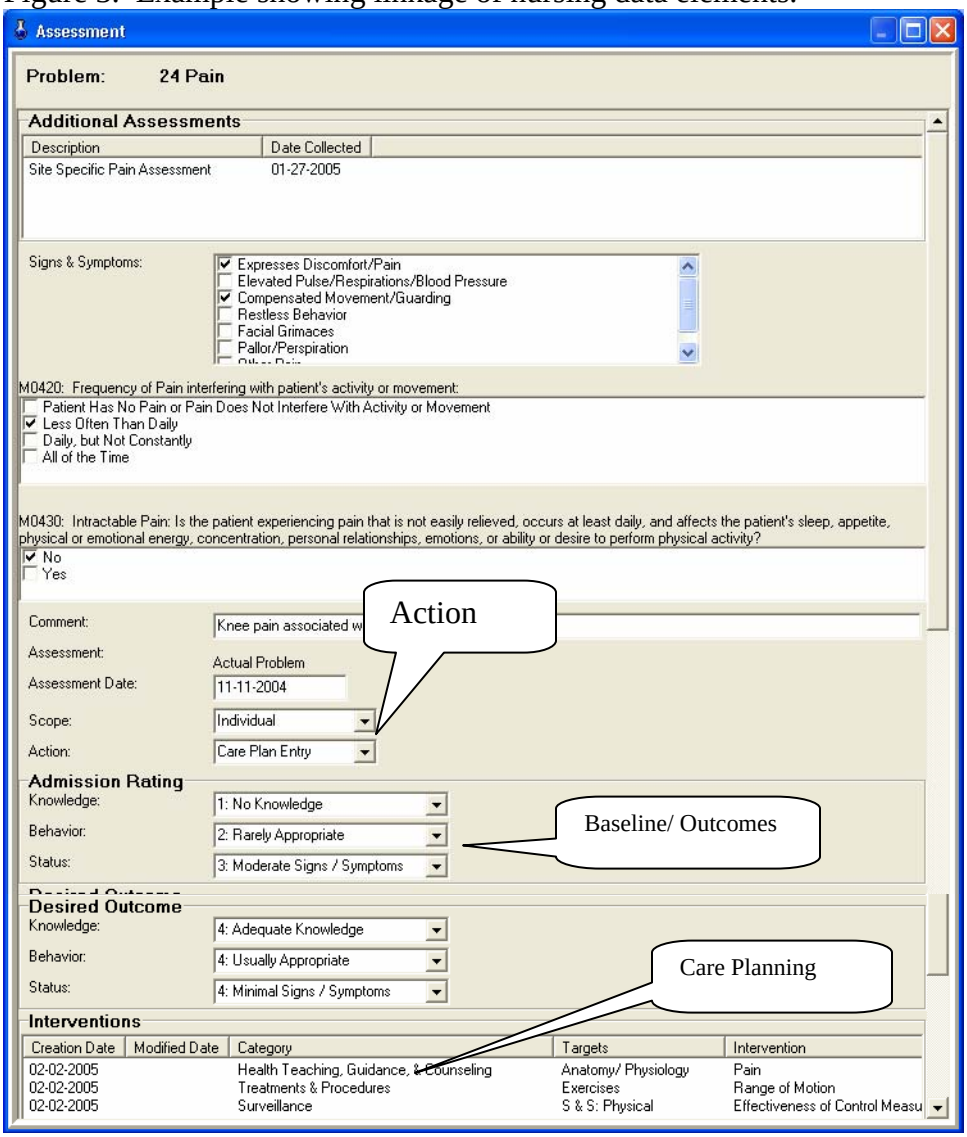
Figure 2. EHR funcitonal requirements for pain assessment.



Once a problem is assessed, incorporating all data requirements in an integrated way, a decision is made about whether the nurse will address the problem on the care plan. If so, Admission Ratings and Desired Outcomes are established and interventions added.

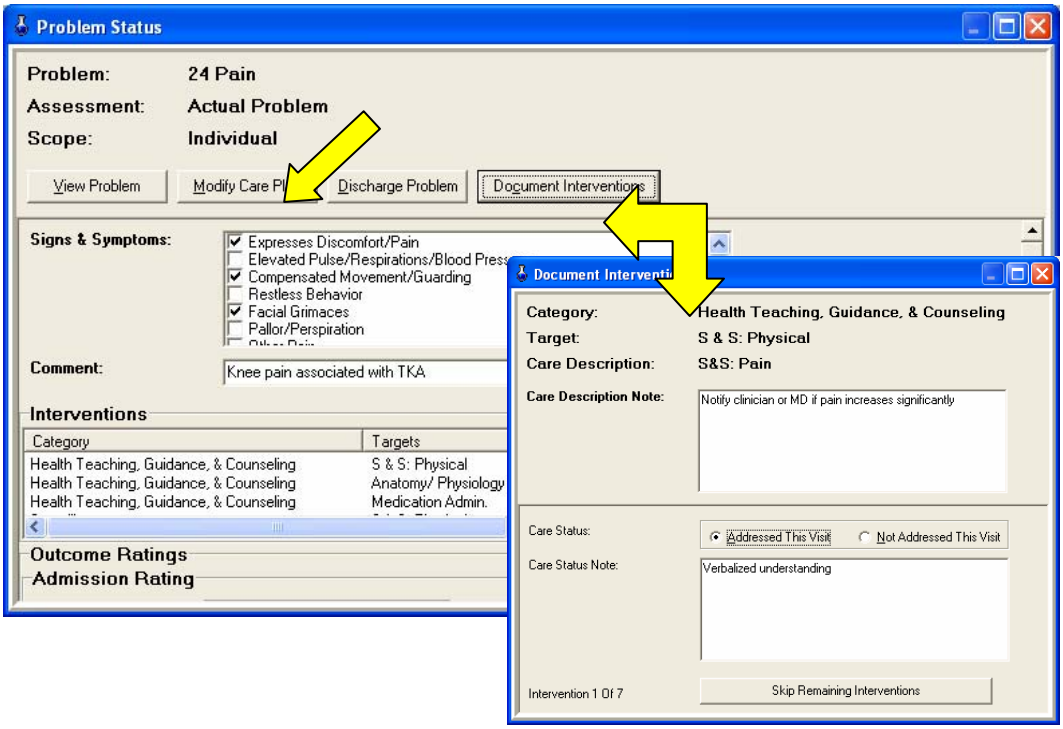
In Figure 3, is an example of the linking the workflow processes from assessment to care planning are demonstrated

Figure 3. Example showing linkage of nursing data elements.



In the past, a major problem with care plans is that they weren't used once they are developed and/or weren't updated, hence they didn't really guide clinical practice. In an EHR, this can be overcome by having the nurse document against the care plan and then immediately be able to update it by clicking on the Modify Care Plan button without having to leave the screen as shown in Figure 4.

Figure 4. Modifying Care Plan.



The Care Plan can be modified by discontinuing interventions no longer required, adding new interventions for the future, or modifying existing interventions. In subsequent visits, updated interventions display for accurate documentation of what still needs to be done for the client.

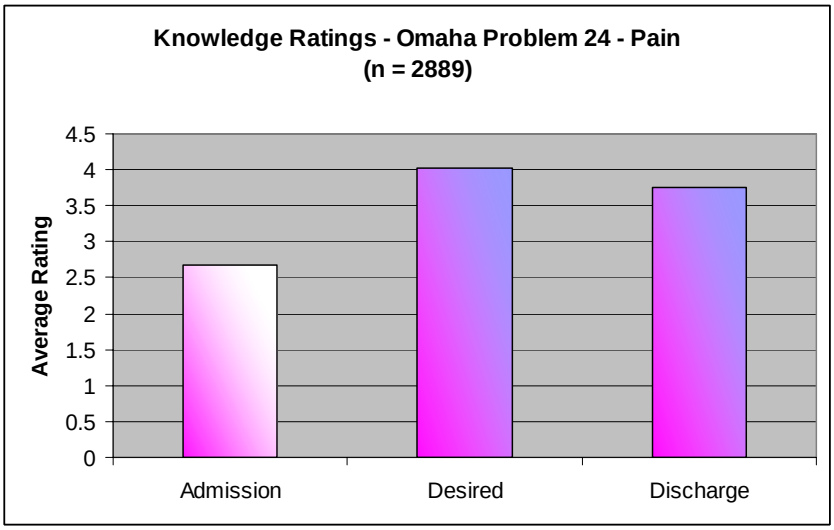
In an EHR, linkage of data from one screen/ form to another can minimize the number of duplicate processes and streamline workflow for the nurse.

The examples provided demonstrate how one standardized nursing terminology, the Omaha System, can streamline documentation, following the nursing process while meeting other requirements for CMS, JCAHO or CHAP.

Use of Standardized Data and Reports

One of the benefits of using a standardized terminologies is that data elements have uniform definitions and codes. **This allows the data to be aggregated for purposes of quality improvement, program evaluation, and research.** Comparisons can be made overtime for a single client or for groups of clients. With the use of nationally recognized standardized terminologies, comparisons also can be made across vendors.

An example of documented care exported to Excel for the Omaha Problem 24 – Pain, shows a comparison of Admission Ratings for Knowledge, Desired Outcome, and Discharge Outcome Rating.



Additional reports can be produced to determine the most frequent interventions and compare the effectiveness of interventions for producing optimal outcomes.

CONCLUSION

The computerization of health information has evolved over many years and through multiple efforts. Nursing has worked diligently to identify essential data to describe the practice of nursing and develop terminologies to standardize nursing data elements. The ANA has developed evaluation criteria based on ISO standards for recognizing vocabularies as ready for inclusion in health policy. The NHII is rapidly moving forward toward a comprehensive EHR that incorporates standardized clinical terminology. An example was provided regarding how one standardized nursing terminology has been used in a homecare information system to streamline documentation and demonstrate outcomes by aggregating chart data. It is essential that nurses stand up for information that describes their practice and use standardized terminologies in EHRs.

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