Nursing Knowledge: Big Data Research for Transforming
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# Actionable Barriers and Gaps

## A. Use of standardized terminologies

Standardized nursing terminologies have evolved for the past 40 years for consistent documentation and reuse of the data for research.[1] For simplicity, terminologies, nomenclatures, and classifications will be used interchangeably. There are 10 terminologies and 2 minimum data sets that are recognized by the American Nurses Association (ANA).[2] These terminologies contain concepts displayed in an electronic health records (EHRs) to users that are easy to understand and document care. Subsets of terminologies can be used for clinical documentation, but more importantly, they provide a bridge for exchanging or integrating different terminologies.[3] In 2012, Schwirian and Thede[4] conducted two surveys of nurses to determine their knowledge of standardized nursing terminologies. Informatics nurses were more knowledgeable than other nurses about nursing terminologies and school as well as reading was the highest source of knowledge. Missing is information about actual use in practice.

Nursing terminologies are not required; only two terminologies required through meaningful use of EHR criteria represent nursing: SNOMED-CT (Systematized Nomenclature of Medicine – Clinical Terminology) and LOINC (Logical Observation Identifiers Names and Codes). Nursing has a concerted effort to map terminologies and some assessment instruments to these federally required standards as well as mapping to the ICNP (International Classification of Nursing Practice). The ongoing effort to assure semantic comparability is essential, particularly as terminologies continuously change over time. The Unified Medical Language System (UMLS) from the National Library of Medicine's (NLM), supports the integration and mapping between terminologies. The lack of funding to support valid semantic mapping in an evolving world of new concepts is a challenge. Additionally, there is no open source tool for mapping local concepts to standards that predominately represent flow sheet data in EHRs. Therefore, each health system or vendor, if they choose to use standardized terminologies, often have to invest significant dollars and efforts to standardize nursing data, which is largely flowsheet data in acute care hospital EHRs. Having a common resource for nursing mappings that is easy to use at the local level would provide significant value.

[1] Westra, B.L., Delaney, C.W., Konicek, D., & Keenan, G. (2008). Nursing Standards to Support the Electronic Health Record. Nursing Outlook, 56, 258-266.e1

[2] American Nurses Association. (June 4, 2012). ANA Recognized Terminologies that Support Nursing Practice. http://nursingworld.org/npii/terminologies.htm

[3]Lundberg, C., Warren, J.., Brokel, J., Bulechek, G., Butcher, H., McCloskey Dochterman, J., Johnson, M., Mass, M., Martin, K., Moorhead, S., Spisla, C., Swanson, E., & Giarrizzo-Wilson, S. (June, 2008). Selecting a Standardized Terminology for the Electronic Health Record that Reveals the Impact of Nursing on Patient Care. Online Journal of Nursing Informatics, 12(2). Available at http://www.ojni.org/12_2/lundberg.pdf.

[4]Schwirian, P., Thede, L., (May 21, 2012) "Informatics: The Standardized Nursing Terminologies: A National Survey of Nurses' Experience and Attitudes—SURVEY II: Participants, Familiarity and Information Sources" *OJIN: The Online Journal of Issues in Nursing* Vol. 17 No. 2.

Hobbs, J. (2011). Political dreams, practical boundaries: the case of the Nursing Minimum Data Set, 1983-1990, Nursing History Review, 19: 127-55.

## B. Minimum data sets in nursing

In the 1970s and 80s, the Federal government defined minimum data sets for hospital discharge, ambulatory care, and long-term care. Werley[1] noted that nursing data were missing from these efforts, resulting in the development of the Nursing Minimum Data Set (NMDS). The NMDS is a minimum set of 16 essential high level data elements to define the clinical practice of nursing. The nursing care elements are nursing diagnosis, nursing intervention, nursing outcome, and intensity of nursing care. The remaining patient demographics and service elements (indicated by an *) are included in the Uniform hospital discharge data set (UHDDS).[2]

- **Nursing Care Elements:** nursing diagnosis, nursing intervention, nursing outcome, and intensity of nursing care
- **Patient or client demographic elements:** personal identification*, date of birth*, sex*, race and ethnicity*, residence*
- **Service elements:** unique facility or service agency number*, unique health record number or patient or client*, unique number of principle registered nurse provider, episode admission or encounter date*, discharge or termination date*, disposition of patient or client*, expected payer for most of this bill (anticipated financial guarantor for service)*

The Nursing Management Minimum Data Set (NMMDS) was developed to compliment the NMDS. The NMMDS includes core essential data needed to support the administrative and management information needs for the provision of nursing care. The standardized format allows for comparable nursing data collection within and across organizations. Developed by Huber and Delaney[2], nursing leaders in the United States, the NMMDS is a research based data set that has the potential to support the diverse information needs of nurse managers, executives and health care administrators. Included in the NMMDS[2] are

- **Environment:** Unit/Service Unique Identifier, Type of nursing delivery unit/service, Patient/Client population, Volume of nursing delivery unit/service, Nursing delivery unit/service accreditation, Decisional participation, Unit/service complexity, Patient/client accessibility, Method of care delivery, Complexity of clinical decision making

- **Nursing Care:** Manager demographic profile, Nursing staff and client care support personnel, Nursing care staff demographic profile, Nursing care staff satisfaction
- **Financial Resources:** Payer type, Reimbursement, Nursing delivery unit/service budget, Expenses

Both the NMDS and the NMMDS provide high level concepts representing the practice and context of care. Updating of the NMMDS conceptual and operational definitions and measure has recently been completed and will are distributed through LOINC. The NMDS has not been updated since it was first published; however, it has provided the umbrella for which data elements are needed using standardized terminologies in EHRs. The major challenge in this effort according to Hobbs, is that dissemination and actual use has largely failed. In a historical study, Hobbs pointed out major opportunities for improving an action plan to move from a dream to reality to move from development to implementation of nursing data for subsequent use in big data research.

[1] Werley, H.,H. & Lang, N.M. (Ed.) (1995). *Nursing Data System: The Emerging Framework*. American Nurses Association: Washington, DC.

[2] The University of Minnesota School of Nursing Center for Nursing Informatics. http://www.nursing.umn.edu/ICNP/home.html (last updated 2013).

[2] Huber DG, Delaney C, Crossley J, Mehmert M, Ellerbe S. A Nursing Management Minimum Data Set: Significance and development. *J Nurs Adm.* 1992;22:35-40.

## C. Recognition for a nursing information system

In 1997, the ANA developed the Nursing Information and Data Set Evaluation Standards (NIDSEC)[1] to evaluate and recognized nursing information systems. The purpose was to guide the development and selection of nursing systems that included standardized nursing terminologies integrated throughout the system wherever it was appropriate. There were four high level standards: the inclusion of ANA recognized terminologies, the linkages among concepts represented by the terminologies were retained in a logical and reusable manner, the data were included in a clinical data repository, and general system characteristics. CCHIT had similar criteria for EHR certification, which was later adopted by ONC, however, nursing data was no longer included. ANA was ahead of its time in their thinking and development. The criteria are still valuable for nurse executives for input to EHR and update or optimization of EHRS but the challenge is that NIDSEC is no longer published.

One potential method of beginning to integrate the NIDSEC criteria into EHRs is to include them as part of Magnet Recognition, either as separate criteria or integrated into other criteria such as quality improvement and research.

One potential method of beginning to integrate the NIDSEC criteria into EHRs is to include them as part of Magnet Recognition, either as separate criteria or integrated into other criteria such as quality improvement and research. Another recommendation recently proposed by Dr. William Goossen on the AMIA Nursing Informatics Working group listsrv is developing a way to measure implementation of

nursing terminologies that would complement the HIMSS stages of implementation of an EHR. The proposed measures are:

Stage 0 no nursing terminology (NT)
Stage 1 an NT on paper
Stage 2 NT in structured electronic format
Stage 3 NT implemented in a single EHR for daily documentation
Stage 4 NT used from Stage 3 to obtain data for analysis
Stage 5 NT used in a EHR or message standard (for health information exchange)
Stage 6 NT modeled in standard information models
Stage 7 NT with standard information models deployed across multiple vendor systems for continuity of care and/or reporting.
Stage 8 NT in information model collected from multiple sites and multiple vendor systems and used for collaborative analysis and research. Could support NMDS deployment on state and national levels from records and not from separate study forms
Stage 9 Same as Stage 8 on international level. Would allow retrieval from EHRs in different countries based on NT and data models and could facilitate deployment of the international NMDS.

[1] American Nurses Association. (1997). NIDSEC Standards and Scoring Guidelines. (A high level summary can be found at): http://ana.nursingworld.org/DocumentVault/NursingPractice/NCNQ/meeting/ANA-and-NIDSEC.aspx.

American Nurses Credentialing Center (n.d.) Forces of Magnetism. http://www.nursecredentialing.org/Magnet/ProgramOverview/HistoryoftheMagnetProgram/ForcesofMagnetism

## D. Nursing clinical data repositories for research

Clinical data repositories (data warehouses) provide a centralized repository of clinical and other data for research, quality improvement, and outcomes analysis. Variables representing the NMDS and NMMDS integrated with other health professionals and patient data are needed for discovering new knowledge. One of the earliest nursing data repositories that capture comparable nursing data across hospital settings is the National Database for Nursing Quality Indicators (NDNQI) developed by the ANA.[1] The NDNQI was developed in 1994 to help support patient safety and quality improvement through national comparative hospital data. The data is available for researchers to use. There are a couple of opportunities for expanding and making the data useful for big data nursing research: 1) expand the data collection to more than hospital settings, and 2) code data using national data standards.

Academic health centers (AHCs) funded through Clinical Translational Science Awards (CTSA) develop clinical data repositories (CDRs) to support research, however, the type of data included varies across CTSAs. The type of data captured in CTSA CDRs varies from one academic health center to another. There has been a shift noted in a 2010 survey of CTSAs' CDRs to include more EHR data along with other external data sources, such as administrative data, clinical trial data, registries, social security or death index, and genomic or proteonomic data.[2] Hylock et al[3] outlined key design for a clinical data repository

that includes nursing data. However, little research can be found about the design and use of nursing documentation in data warehouses, particularly within CTSA related data warehouses. Only two CTSAs were found that include electronic health record (EHR) flowsheet data, which predominately represents nursing data: the University of Minnesota and the University of Kansas. The collaboration across CTSAs could provide a profound opportunity for big data research.

[1]ANA (n.d.) NDNQI. http://www.nursingquality.org/. (last updated 2013).

[2] Hylock, R., Street, W.N., Lu, D., & Currim, F. (2008). NursingCareWAre: Warehousing for Nursing Care Research and Knowledge Discovery. Proceedings of the 3rd INFORMS Workshop on Data Mining and Health Informatics, J. Li, D. Aleman, & R. Sikora (Eds.)

[3]MacKenzie SL, Wyatt MC, Schuff R, Tenenbaum JD, Anderson N. Practices and perspectives on building integrated data repositories: Results from a 2010 CTSA survey. *J Am Med Inform Assoc*. 2012;19(e1):e119-24.

## E. Faculty preparation – informatics workforce

The American Nurses Credentialing Center (ANCC) accredits school of nursing based on their successfully addressing the essential education requirements related to a specific level of nursing education. The Baccalaureate, Masters, and Doctor in Nursing Practice educational program all require that faculty teach about information management and technology.[1,2,3] Faculty may not be educated about informatics, making it difficult to address the informatics related essentials.

The Gordon and Betty Moore Foundation funded a pilot conference to teach faculty how to teach informatics. The QSEN Nursing Informatics Deep Dive Workshop was co-sponsored by the American Association of Colleges of Nursing and the Schools of Nursing at the Universities of Minnesota and Maryland. The presentations and resources are available on the AACN website for free use by anyone (http://www.aacn.nche.edu/qsen-informatics/2012-workshop). The challenge is to continue enhancing and disseminating resources and teaching strategies for all faculties across the country. An additional challenge is the lack of requirements for PhD programs in nursing to include informatics. Moreover, the methods required for big data research need to be integrated into curriculum for future faculty and nurse researchers.

[1]American Association of Colleges of Nursing (AACN). (2008). The Essentials for Baccalaureate Education for Professional Nursing http://www.aacn.nche.edu/publications/position/DNPEssentials.pdf

[2]American Association of Colleges of Nursing (AACN). (2011) The Essentials for Master's Education for Advanced Nursing Practice. http://www.aacn.nche.edu/education-resources/MasEssentials96.pdf.

[3]American Association of Colleges of Nursing (AACN) Essentials for DNP Nursing program http://www.aacn.nche.edu/publications/position/DNPEssentials.pdf

## F. Certification in nursing informatics

The American Nurses Credentialing Center (ANCC), a subsidiary of the ANA, provides certification testing for nursing informatics.[1] It is the first professional certification for an informatics specialty and is based on the ANA Scope and Standards of Nursing Practice. ANCC conducted a study in 2010, reporting results of a survey of 412 of 729 ANCC certified informatics nurses. [2] The purpose was to understand the actual work activities performed by practicing informatics nurses and to identify major areas of knowledge and skills needed to perform the activities. The results were used to update the certification examination. Nurses represented a broad geographical area and were predominately white middle-aged females with an average of 27 years of experience in nursing, and on average 6 years in informatics. The A bachelor's, diploma, or associate degree was the highest degree in nursing for about 50% of respondent. The top 20 work activities from the report are shown next (p. 11-12). The one activity "Promotes the integration of nursing vocabularies and standardized nomenclatures in applications" rates near the bottom third for critical importance for informatics nurses. If informatics nurses are not prioritizing the standardization of nursing data based on national standards, what are the possibilities that data will be available for big data research?

[1] America Nurses Credentialing Center (ANCC). http://www.nursecredentialing.org/InformaticsNursing

[2]ANCC. (2011). 2010 Role Delineation Study: Informatics Nurses National Survey Results. http://www.nursecredentialing.org/Certification/NurseSpecialties/Informatics/RELATED-LINKS/Informatics-RDS2012.pdf

## G. Professional Organizations

Professional organizations provide an opportunity for nurses to lead initiatives and advocate for the validation and implementation of a nursing knowledge model to have standardized nursing data for reuse in big data research. There are innumerable organizations to which nurses belong,[1] ranging from nursing or interprofessional informatics organizations, specialty organizations, broad professional organizations, and specialty interprofessional organizations. Several organizations are "organizations of organizations" which share common interests. The Alliance for Nursing Informatics (ANI)[2] is an organization of nursing informatics organizations. Some are specialty organizations have a focus on informatics such as the American Organization of Nurse Executives[3] or the National Association of School Nurses.[4] The American Nurses Association,[5] which is the professional home for nurses, is and has been a leader in developing informatics tools, resources, and defining the scope and practice for nursing informatics. Two key interprofessional informatics organizations are AMIA[6] and HIMSS,[7] which has nursing specific sections as well as nurses involved in interprofessional workgroups and committees. Additionally, a the TIGER Initiative[8] focuses on making informatics the 21st century stethoscope for nurses. Professional organizations provide an opportunity to engage nurses and interprofessional

colleagues in joint action. The challenge is the lack of a consistent action plan that is owned and implemented across organizations.

[1]Nursing Organizations. http://www.nurse.org/.

[2] Alliance for Nursing Informatics (ANI). http://www.allianceni.org/

[3]American Organization of Nurse Executives (AONE). http://www.aone.org/

[4]National Association of School Nurses (NASN). http://www.nasn.org/

[5]American Nurses Association. http://www.nursingworld.org/

[6]AMIA. http://www.amia.org/ and AMIA's Nursing Informatics Work Group, http://www.amia.org/programs/working-groups/nursing-informatics

[7]HIMSS. http://www.himss.org/ and HIMSS Nursing Informatics Community http://www.himss.org/get-involved/community/nursing-informatics?navItemNumber=13379

[8]The TIGER initiative. http://www.thetigerinitiative.org/

## H. Meaningful use of electronic health records

Under the Meaningful Use of EHRs incentive program, hospitals and eligible providers (physicians, nurse practitioners and nurse midwives, and other provider who can bill Medicare or Medicaid, or both). As of June 2013, 405,437 providers registered for MU incentive payments; 6.7% are nurses. Payment received totals $15,507,963,743; nurses received 2.7% of the payments. There is a major discrepancy in payments by providers; nurses can only be reimbursed under Medicaid and not Medicare.

CMS. (June, 2013). EHR Incentive Program. http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Downloads/June_PaymentRegistration_Summary.pdf

As part of Meaningful Use of EHRs, an increasing number of clinical quality measures are required to be abstracted from EHRs rather than manual data collection or use of other software systems. Documentation for many of these

National Quality Forum (NQF) serves as a recognition body for all quality indicators and especially eMeasures required in Meaningful Use, www.qualityforum.org. Their new Quality Positioning System can help you stay current on all quality indicators and which ones are linked to federal programs, http://www.qualityforum.org/Qps/QpsTool.aspx. NQF also brings indicator developers and users together in forums and has advisory panels to give feedback to CMS.

## I. Continuity of care document/ transition of care

For an overview of the Continuity of Care Document go to Wikipedia, http://en.wikipedia.org/wiki/Continuity_of_Care_Document. The attached companion guide will walk you through what is required for Meaningful Use Stage Two. Pages 23-25 outline the content of the CCD. As you can see there is need for more information concerning what nurses need to see when the care of the patient is transitioned to a new venue.

Companion_Guide_to_CCDA_for_MU2_r0.| Double click to open document.

Canada-Health Outcomes for Better Information and Care (C-HOBIC) is an initiative to collect standard data to analyze and improve patient care and outcomes, http://www2.cna-aiic.ca/c-hobic/about/default_e.aspx. To view the measures, review, http://community.hobic-outcomes.ca. There is also an article by Kathryn Hannah for free download, http://www.ncbi.nlm.nih.gov/pubmed/19261936.

## J. Representation of nursing in decision-making circles

While strides have been made in appointing nurses to key policy committees, it has only been with much lobbying effort. Nurses are not thought about when these appointments are considers—physicians always are. We bring a strong patient advocacy perspective to our work and need to be considered for appointments because of that strength.

While many nurses volunteer and participate, there is no strong nursing voice. Most volunteer due to their employment. We need a way to coordinate their efforts. Additionally, there are too few nurses volunteering. We need a mentoring program for them and a strong communications community so that they can call on one another for information and assistance. This community would identify those nurses who participate so that resources can be put at their disposal.

For each of the listed organizations, see if you can find nurses in the staff or the volunteers or the appointees: Office of the National Coordinator, National Committee on Vital and Health Statistics. CMS Panels, NQF committees and panels, IOM, S&I Framework, HL7, IHTSDO and LOINC. What other organizations have nurses or need nurses working with them?

## K. Funding for big data research

NIH has established Big Data to Knowledge (BD2K, http://bd2k.nih.gov/#sthash.2WE5yJQM.dpbs) to enable biomedical scientists to capitalize more fully on the Big Data being generated by those research communities. With advances in technologies, these investigators are increasingly generating and using large, complex, and diverse datasets. The ability of researchers to locate, analyze, and use Big Data is often limited for reasons related to access to relevant software and tools, expertise, and other factors.

BD2K aims to develop the new approaches, standards, methods, tools, software, and competencies that will enhance the use of biomedical Big Data by supporting research, implementation, and training in data science and other relevant fields that will lead to: (1) Appropriate access to shareable biomedical data through technologies, approaches, and policies that enable and facilitate widespread data sharing, discoverability, management, curation, and meaningful re-use; (2) Development of and access to appropriate algorithms, methods, software, and tools for all aspects of the use of Big Data, including data processing, storage, analysis, integration, and visualization; (3) Appropriate protections for privacy and intellectual property; Development of a sufficient cadre of researchers skilled in the science of Big Data, in addition to elevating general competencies in data usage and analysis across the behavioral research. On July 22, 2013, NIH committed $24 million annually to establish 6-8 Big Data Centers of Excellence to meet the above challenge.

Big data research can also occur where there is a Clinical and Translational Science Award (CTSA), http://www.ncats.nih.gov/research/cts/ctsa/ctsa.html, and from members of the CTSA Consortium, https://www.ctsacentral.org.

For an overview of "big data" in healthcare, review the report by McKinsey & Company, http://www.mckinsey.com/insights/health_systems_and_services/the_big-data_revolution_in_us_health_care. Double click on the following icon to open the report

The_big_data_revolution_in_healthcare.pc

## L. Funding for advanced education in informatics

The Office of the National Coordinator allocated $116 million dollars in health information technology workforce development under the AARA with the intent to rapidly train a workforce that can assist with all aspects of selection, implementation, and optimizing EHRs. Funding was for three years and non-renewable.[1] For community colleges, funding covered curriculum development, 6-month certificate programs for 6 specific roles and a competency examination.

1. Practice workflow and information management redesign specialists
2. Clinician/practitioner consultants
3. Implementation support specialists
4. Implementation managers
5. Technical/software support
6. Trainers

The curriculum developed under this funding is available to the public. University-based training programs were also included under this funding.[2] The six roles targeted by this program are:

1. Clinician/Public Health Leader

2. Health Information Management and Exchange Specialist
3. Health Information Privacy and Security Specialist
4. Research and Development Scientist
5. Programmers and Software Engineer
6. Health IT Sub-specialist

Funding for advanced degrees in nursing informatics is expanding through Health Resources and Services (HRSA) grants. Traditionally HRSA funding supports primary care providers, however, newer grants include a variety of roles: nurse practitioners, clinical nurse specialists, nurse-midwives, midwives, nurse anesthetists, nurse educators, nurse administrators, public health nurses or other nurse specialists.[3] Nurse informaticians may be included as "other nurse specialists". faculty development in the use of information and other technologies in order to expand the capacity of collegiate schools of nursing to educate students for 21st century health care practice.

Graduate medical education funding includes a variety of resources, but one in particular that is unique to medical vs nursing education is Department of Health and Human Services (HHS), through the Centers for Medicare and Medicaid Services is the largest payor for medical education.[4] With the recent approval of board certification for physicians in informatics, advanced education in informatics will qualify for CMS funding.[5] This same funding does not apply to nurse informaticians with the same level of advanced training through Doctor in Nursing Practice programs. Funding for nurse informaticians is essential to achieve the vision of designing EHRs that capture nursing data along with other health professionals to reuse for big data research.

[1]ONC. Workforce Programs. http://www.healthit.gov/providers-professionals/workforce-development-programs.

[2]ONC. Health IT Workforce Curriculum Components. http://www.onc-ntdc.org/.

[3]HRSA. Nursing grant programs. http://bhpr.hrsa.gov/nursing/.

[4]Dower, C. (August 11, 2012). Graduate Medical Education. Health Affair, 32 (8). http://www.healthaffairs.org/healthpolicybriefs/brief.php?brief_id=73

[5]AMIA. (September 22, 2011). Clinical Informatics Becomes a Board-certified Medical Subspecialty Following ABMS Vote. http://www.amia.org/news-and-publications/press-release/ci-is-subspecialty

## M. Occupational Codes for Informaticians

The US Department of Labor's Bureau of Labor Statistics develops and publishes the Standard Occupational Classification (SOC Codes, http://www.bls.gov/SOC). This system is used by Federal statistical agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data. All workers are classified into one of 840 detailed occupations

according to their occupational definition. The requirements for the occupation are published in the Bureau of Labor Statistics' Occupational Outlook handbook.

- The SOC code for Registered Nurses is 29-1141.
- The SOC definition for Registered Nurse is: Assess patient health problems and needs, develop and implement nursing care plans, and maintain medical records. Administer nursing care to ill, injured, convalescent, or disabled patients. May advise patients on health maintenance and disease prevention or provide case management. Licensing or registration required. Includes Clinical Nurse Specialists. Excludes "Nurse Anesthetists" (29-1151), "Nurse Midwives" (29-1161), and "Nurse Practitioners" (29-1171).
- Broad Occupation: 29-1140 Registered Nurses
- Minor Group: 29-1000 Health Diagnosing and Treating Practitioners
- Major Group: 29-0000 Healthcare Practitioners and Technical Occupations

The Bureau is currently in process of updating and receiving additional proposals for codes for release in 2018. AMIA Nursing Informatics Work Group led an effort to get into the 2010 codes—it was denied. Informatics is needed as an occupational code to support the understanding of the role and to document shortages and surpluses.

soc_2010_faqs_and_acknowledgements.pdf Double click on the icon to open the SOC document.

## N. Implementation Science

Implementation science is the study of methods to promote the integration of research findings and evidence into healthcare policy and practice. It seeks to understand the behavior of healthcare professionals and other stakeholders as a key variable in the sustainable uptake, adoption, and implementation of evidence-based interventions. It is supported by the NIH Fogarty International Center, http://www.fic.nih.gov/researchtopics/pages/implementationscience.aspx. Furthermore, the NIH National Center for Advancing Translational Sciences (NCATS) aims to transform the translational science process so that new treatments and cures for disease can be delivered to patients faster, http://www.ncats.nih.gov.

Implementation Science goes hand-in-hand with Big Data. Once the science has been turned into actionable content and knowledge within an EHR, the Big Data analytics can study the data and information that nurses capture about their patients. NIH Fogarty International Center sponsors this type of research.

Implementation Science is a journal, http://www.implementationscience.com, that publishes scientific study of methods to promote the uptake of research findings into routine healthcare in clinical, organisational or policy contexts.