Objectives: Overview

- Describe why it is important for nursing students to develop successful knowledge, skills and attitudes for information management and patient technology.
- Discuss methods of integrating professional standards for nursing informatics into program curricula aimed at prelicensure nursing students.
- Provide nursing informatics resources and tools that can be easily incorporated into existing prelicensure program curricula.
Objectives: Part 1

Part I: Aligning AACN Essentials for Information Management and Patient Care Technologies with QSEN & TIGER

• Compare and contrast how information management and patient care technology has impacted nursing in the last 35 years.
• Describe how rising complexity in healthcare is driving the need for continuous learning systems enabled by technology.
• Discuss challenges nursing school faculty face in learning and teaching information technology today.
• Identify nursing school accreditation expectations and standards for integration of information management and patient care technology in pre-licensure nursing programs.

Part 2: February 25, 2015

Supporting Safe Nursing Practice Through Patient Care Technologies and Workflow Design:

• Basic computer concepts, information literacy, current patient care technologies (IV smart pumps, bar code medication management and other), new technology (eMobile health, wearable technology, big data, and other) and telehealth.

Part 3: March 26, 2015

Improving Patient Outcomes and Safety through Electronic Health Records & Clinical Decision Support

• Navigating the electronic health record (EHR), clinical decision support, workflow design and the selection, implementation and evaluation of information technologies.
Part 4: April 22, 2015

Identifying Nursing’s Unique Contribution to Patient Outcomes Through Standardized Terminologies

- Information technology as an enabler of evidence based practice and outcomes research (standardized nursing terminologies, descriptive and predictive analytics, population management, dashboards), ethics, information security, and protected health information as they relate to regulatory requirements, confidentiality, and clients’ right to privacy

National Nursing Informatics Deep Dive Workshop Websites

Workshop Packet (AACN)


Workshop Webpage (University of Minnesota School of Nursing)

- z.umn.edu/nnideepdive

Why Informatics?

Computer and information literacy are crucial to the future of nursing for advancing improvements in:

- Safety
- Evidence based practice
- Outcomes research
- Inter-professional care coordination
- Cost effectiveness

Graduates of nursing programs must have competence in using both patient care technologies and information management systems.

This illustration is an example of a hand-written prescription for Metadate ER 10 mg tablets. Metadate is a drug used in the treatment of Attention Deficit Hyperactivity Disorder (ADHD). Due to the similarity in name, poor penmanship and the omission of the modifier "ER", the pharmacy filling the prescription incorrectly dispensed methadone 10 mg tablets. Methadone is a morphine-based product used as a heroin substitution therapy and analgesic. Methadone is not used for the treatment of ADHD.


This illustration is an example of similar looking packaging from the same manufacturer for two unrelated drugs. On the left are 50 mg tablets of hydroxyzine HCL, a sedating antihistamine. On the right are 50 mg tablets of hydralazine HCL, an antihypertensive drug. The packaging of these products may lead to a serious medication error.


Evidence Based Practice

Evidence Based Guidelines

Outcomes Research

Federal Health IT Strategic Plan 2011-2015
coordinated strategy between the public and private sector to improve the quality, efficiency, safety and patient-centeredness of health care through use of information and technology.

Goal I: Achieve Adoption and Information Exchange through Meaningful Use of Health IT
Goal II: Improve Care, Improve Population Health, and Reduce Health Care Costs through the Use of Health IT
Goal III: Inspire Confidence and Trust in Health IT
Goal IV: Empower Individuals with Health IT to Improve their Health and the Health Care System
Goal V: Achieve Rapid Learning and Technological Advancement

Better Information
Better Technology
Transform Health Care
Outcomes Research

Despite these efforts, a lack of standardization and integration within key technologies such as electronic health records (EHR) and administrative systems persists and prevents information exchange, quality measurement, research, and the expansion of data-based, knowledge driven solutions for the delivery of health care. No more evident is this than in Nursing where after decades of implementing EHR’s nurses still cannot consistently use electronically collected data to conduct research or report quality and patient safety outcomes.

Standardized Terminologies

• Multidisciplinary terminologies (SNOMED-CT, LOINC)

• Nursing terminologies (CCC, ICNP, NANDA, NIC, NOC, OS, PNDS)

AACN Content Sample: Information management for patient safety.

http://z.umn.edu/nndeepdive

New Multi-institution Networks

• CTSA – Clinical Translational Science Award.
• PCORI – Patient Powered and Clinical Data Research Network
• NIH Big Data to Knowledge Initiative

On-The-Go Big Data

http://www.ostrowskireeks.com/
http://www.visimobile.com/
Interdisciplinary Practice

Lack of interoperability between the nurse and physician workflows as reason Ebola patient was sent home.

Texas Health Presbyterian Hospital Dallas cites lack of interoperability between nurse and physician workflows in its electronic health record system as the reason Texas Health Presbyterian Hospital Dallas initially sent home Ebola patient Eric Duncan, according to the healthcare facility. And similar interoperability issues could threaten other healthcare organizations, industry executives caution.

Exponential Growth in Complexity

Decades of rapid innovation and technological improvement have created an extraordinarily complex healthcare system. So much so that healthcare often falls short of its potential.


Exponential Growth in Interactions

Typical Patient
• See 7 doctors across 4 practices
• 27 different health providers (surgery patient)
• 19 medications per day


Exponential Growth in Activities

Typical Physician
• Interacts with 229 other physicians in 117 different practices.

Typical ICU Nurse
• Manages 180 activities per patient per day!

Exponential Growth in New Knowledge

Most physicians, nurses, and other health care professionals work diligently to care for their patients, but they often are contending with:

- challenges of a system that is poorly configured, for the current complexity of treatments, technologies, and clinical science.

---

Transformation: Nurses must be engaged in technology solutions.

Institute of Medicine

- These problems point to the need for a transformation in how the health care enterprise generates, processes, and applies information to further patient care.

Key Imperatives

- To manage the health care system’s ever-increasing complexity, and curb ever-escalating costs.

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Healthcare as a Learning System

“Opportunities exist to address these problems—opportunities that did not exist even a decade ago.”

1. Vast computational power that is affordable and widely available;
2. Connectivity that allows information to be accessed in real time virtually anywhere;
3. Human and organizational capabilities that improve the reliability and efficiency of care processes; and
4. The recognition that effective care must be delivered by collaborations between teams of clinicians and patients, each playing a vital role in the care process.
IOM: Characteristics of continuously Learning Healthcare System

Science and Informatics
- Real-time access to knowledge. The system continuously and reliably captures, curates and delivers the best available evidence to guide and improve clinical decision-making and healthcare safety and quality (EMR).
- Digital capture of the care experience. The system captures the care experience on digital platforms for real-time generation and application of knowledge for care improvement (on-the-go big data).

Patient-Clinician Relationships
- Engaged, empowered patients. The system focuses on patient needs and perspectives and promotes the inclusion of patients, families and other caregivers as vital members of the continuously learning care team (telehealth, eMobile health, quantified self).

Characteristics of a Continuously Learning Healthcare System

Incentives
- Incentives aligned for value. The system actively aligns incentives to encourage continuous improvement, identify and reduce waste and reward high-value care (Meaningful Use).
- Full transparency. The system systematically monitors the safety, quality, processes, prices, costs and outcomes of care, and makes information available for care improvement and informed choices and decision-making by clinicians, patients and their families (Dashboards and OpenNotes).

Culture
- Leadership-instilled culture of learning. The system has leadership committed to a culture of teamwork, collaboration and adaptability in support of continuous learning as a core aim.
- Supportive system competencies. The system constantly refines complex care operations and processes through ongoing team training and skill building; systems analysis and information development; and creation of the feedback loops for continuous learning and system improvement.

8 Recommendations Supporting 4 Key Messages
- Nurses should practice to the full extent of their education and training.
- Nurses should achieve higher levels of education and training through an improved education system that promotes seamless academic progression.
- Nurses should be full partners, with physicians and other health care professionals, in redesigning health care in the United States.
- Effective workforce planning and policy making require better data collection and information infrastructure.
2006 NLN of Survey of Deans & Faculty

2006 National League for Nursing Survey
- Five hundred deans and 1,557 faculty
- Only 50 to 60 percent of respondents said that informatics was integrated into the curriculum.
- Clinical experience with information systems was provided during clinical experiences.

2013 Survey: Moore Foundation Grant on Nursing Informatics

SCHOOL OF NURSING FACULTY SURVEY – 28 Nursing Schools – 2013
- 94.7% did not provide course content regarding theories of nursing informatics and key terms.
- 53.3% did not provide content on how to use data gathered through the Electronic Health Record (EHR) to improve patient care.
- 70.8% did not provide content on how to monitor and analyze data on nurse sensitive quality indicators through electronic dashboards and other tools.
- 40% did not provide content on the application and benefits of EHR’s in enabling the use of evidence based practices (For example: developing evidence based care plans and executing electronic order sets, using standardized nursing languages, decision support, links to resources or other)
2013 Survey: Moore Foundation Grant on Nursing Informatics

SCHOOL OF NURSING FACULTY SURVEY – 28 Nursing Schools – 2013

- 40% did not provide content on how the EHR can be used as a bridge for interdisciplinary learning (for example: the integration of information systems for nursing, pharmacy, lab, radiology, medicine and other).
- 50% did not provide content on consumer informatics in a course (for example: shared medical records, consumer health websites, virtual office visits and other).
- 68% did not engage with clinical sites/partners to discuss developing/enhancing nursing informatics curriculum, provide feedback on demands and priorities of each organization, hospital/regional advisory councils, etc.

Faculty Challenges

SCHOOL OF NURSING FACULTY SURVEY – 28 Nursing Schools – 2013

- Confusion on what nursing informatics is.
- NI is a new field and faculty must find ways to integrate the content into an already full schedule of courses.
- To meet the accreditation requirements for NI many Schools rely on a clinical site’s EHR.

Distribution of Nurse Informaticists by Workplace

HIMSS Annual Survey 2011 (660 Respondents)

<table>
<thead>
<tr>
<th>Workplace</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital</td>
<td>48%</td>
</tr>
<tr>
<td>Health System</td>
<td>20%</td>
</tr>
<tr>
<td>Academic Setting</td>
<td>9%</td>
</tr>
<tr>
<td>Vendor Organization</td>
<td>10%</td>
</tr>
<tr>
<td>Consulting Firm</td>
<td>5%</td>
</tr>
<tr>
<td>Government/Military</td>
<td>4%</td>
</tr>
<tr>
<td>Ambulatory Setting</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>7%</td>
</tr>
</tbody>
</table>

- Only 9% of nurse informaticists are employed in academic institutions.
- Of the 3,179 total nursing programs in the US, only 317 (10% of total) have either a certificate program or advanced degree in nursing informatics.
Faculty Resources

Content and teaching methods needed by nurse educators for nursing informatics is:

- Scattered among numerous websites
- Aimed primarily at professional development of working informatics professionals.

QSEN Nursing Informatics Deep Dive Workshop

The goal of the workshop was to develop the content and skills of local nursing school faculty so that they would more effectively develop the QSEN informatics KSAs (Knowledge, Skill and Ability) in pre-licensure students.

<table>
<thead>
<tr>
<th>Survey Choice</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A series of webinars on specific nursing informatics topics, hosted through professional organizations such as AACN and others (webinars)</td>
<td>92</td>
<td>59</td>
<td>151</td>
</tr>
<tr>
<td>2. A 10 module on-line, introductory course that meets the AACN BSN Essentials and QSEN competencies for nursing informatics. The course provides access to multiple resources and an instructor manual. (modules)</td>
<td>71</td>
<td>65</td>
<td>136</td>
</tr>
<tr>
<td>3. A week-long summer institute that would provide nurse educators a comprehensive review of how to meet AACN BSN Essentials and QSEN competencies for nursing informatics (institute)</td>
<td>59</td>
<td>21</td>
<td>80</td>
</tr>
<tr>
<td>4. A series of one-day pre-conference workshops (For example: prior to an AACN regional conference) that would provide an overview of nursing informatics and how to meet AACN Essentials and QSEN competencies for nursing informatics (conferences)</td>
<td>55</td>
<td>17</td>
<td>72</td>
</tr>
<tr>
<td>5. A customized on-site consultation, provided by domain experts aimed at meeting AACN BSN Essentials and QSEN competencies for Nursing Informatics (consultations)</td>
<td>43</td>
<td>23</td>
<td>66</td>
</tr>
<tr>
<td>6. A certificate program aimed at nurse educators whose purpose is to provide an in-depth program of study covering the fundamentals of nursing</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Biomedical Informatics**

- **BIOMEDICAL INFORMATICS** - The science that develops methods, techniques, and theories regarding how to use data, information, and knowledge to support and improve biomedical research, human health, and the delivery of healthcare services.

  [http://www.amia.org/glossary](http://www.amia.org/glossary)

**Interdisciplinary Nature of Biomedical Informatics**

- **Cognitive Science & Decision Making**
- **Management Sciences**
- **Clinical Sciences**
- **Basic Biomedical Sciences**
- **Computer Science (hardware)**
- **Computer Science (software)**
- **Bioengineering**
- **Epidemiology And Statistics**

**Clinical Informatics**

- **CLINICAL INFORMATICS** - The application of biomedical informatics methods and techniques, including information technology, to deliver healthcare services. AMIA considers all informatics when used for healthcare delivery to fall in this category, regardless of the health professional group involved (dentist, pharmacist, physician, nurse, or other health professional).

- Clinical informatics includes a wide range of topics ranging from clinical decision support to clinical documentation to provider order entry systems, and from system design to system implementation and adoption issues.

  [http://www.amia.org/glossary](http://www.amia.org/glossary)
Nursing Informatics Defined

- Nursing informatics (NI) is a specialty that integrates nursing science, computer science, and information science to manage and communicate data, information knowledge and wisdom in nursing practice.
- NI supports consumer, patients, and other providers in their decision-making in all roles and settings. This support is accomplished through the use of information structures, information processes, and information technology.

Nursing Informatics: Scope and Standards of Practice, ANA 2008

Standards and Guidelines

AACN Essentials for Information Management and Patient Care Technologies

Quality, Safety & Education for Nurses Knowledge, Skills and Attitudes

Technology Informatics Guiding Education Reform Competencies for Practicing Nurses

Competency Matrix for Nursing Informatics

<table>
<thead>
<tr>
<th></th>
<th>AACN/BN Essentials</th>
<th>TIGER Competencies</th>
<th>QSEN Integrated KSA’s</th>
<th>AACN Essential KSA’s</th>
<th>QSEN Gradute KSA’s</th>
<th>AACN Essentials DNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generalist</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Masters</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Doctor of Nursing Practice</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
AACN Essentials

Demonstrate skills in using patient care technologies, information systems, and communication devices that support safe nursing practice.

Use telecommunication technologies to assist in effective communication in a variety of healthcare settings.

Apply safeguards and decision making support tools embedded in patient care technologies and information systems to support a safe practice environment for both patients and healthcare workers.

Understand the use of CIS systems to document interventions related to achieving nurse sensitive outcomes.

Use standardized terminology in a care environment that reflects nursing’s unique contribution to patient outcomes.

Evaluate data from all relevant sources, including technology, to inform the delivery of care.

Recognize the role of information technology in improving patient care outcomes and creating a safe care environment.

Uphold ethical standards related to data security, regulatory requirements, confidentiality, and clients’ right to privacy.

Apply patient care technologies as appropriate to address the needs of a diverse patient population.

Advocate for the use of new patient care technologies for safe, quality care.

Recognize that redesign of workflow and care processes should precede implementation of care technology to facilitate nursing practice.

Participate in evaluation of information systems in practice settings through policy and procedure development.
Information Management Systems as Enablers of BSN Essentials

III. Scholarship for Evidence Based Practice
The baccalaureate program prepares the graduate to evaluate the credibility of sources of information, including but not limited to databases and Internet resources.

- locating and evaluating sources of evidence
- electronic database search strategies (e.g., CINAHL, PubMed, the Cochrane Database of Systematic Reviews)

IV. Information Management and Application of Patient Care Technology
- Baccalaureate graduates must have competence in the use of information technology systems, including decision support systems, to gather evidence to guide practice.
- “Improvement of cost effectiveness and safety depend on evidence based practice, outcomes research, interprofessional care coordination, and electronic health records, all of which involve information management and technology (McNeil et al., 2006).”

Tiger Competencies

A. Basic Computer Skills – Hardware, software, networks, information & technology communication, security, law, operating systems, file management, utilities, print management, work processing & applications, the intranet & browsers, using the web, and email.


C. Information Management (EHR) – Demographics, consents, medications, care planning, provider order entry, results reporting, clinical documentation, clinical decision support (alerts, reminders, notifications), communication.

QSEN: Knowledge, Skills & Attitudes

INFORMATICS

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Skills</th>
<th>Attitudes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understands how information is managed in care settings before providing care</td>
<td>Uses technology and information management tools to support safe practice</td>
<td>Appreciates the necessity for all health professionals to seek lifelong, continuous learning of information technology skills</td>
</tr>
<tr>
<td>Identifies essential information that must be available in an EHR to support patient care</td>
<td>Navigates the electronic health record efficiently</td>
<td>Identifies essential information in a common database to support patient care</td>
</tr>
<tr>
<td>Identifies and utilizes a variety of communication technologies and their impact on safety and quality</td>
<td>Documents and communicates care in an electronic health record</td>
<td>Identifies examples of how technology and information management are critical for the quality and safety of patient care</td>
</tr>
<tr>
<td>Recognizes the interplay of information and technology in patient care</td>
<td>Protects confidentiality of protected health information in electronic health records</td>
<td>Recognizes the time, effort, and skill required to design, select, implement, and evaluate information technologies to support patient care</td>
</tr>
<tr>
<td>Responds appropriately to clinical decision support triggers</td>
<td>Evaluates the effectiveness of information management tools</td>
<td>Values the importance of technology and information management in safe patient care</td>
</tr>
<tr>
<td>Values communication technologies to support clinical decision making</td>
<td>Integrates high quality electronic sources of healthcare information</td>
<td>Values the role of nurses in design, selection, implementation, and evaluation of information technologies to support patient care</td>
</tr>
</tbody>
</table>
Course by AACN Essential

Sample Crosswalk Between AACN BSN Essentials for Information Management and Patient Care Technologies and Curriculum

Key

1. Classroom Activities
2. Simulation Activities
3. Clinical Activities
4. Syllabus
5. Readings
6. Assignments

1.0 Demonstrate skills in using patient care technologies, information systems, and communication devices that support safe nursing practice.

2.0 Understand the use of CIS (clinical information systems) to document interventions related to achieving nurse sensitive outcomes.

3.0 Advocate for the use of new patient care technologies for safe, quality care.

4.0 Use telecommunication technologies to assist in effective communication in a variety of healthcare settings.

FALL SOPHOMORE YEAR

NURS 3703 Assessment and Basic Nursing (lab I) 1,2,4,5,6 1,2,4,5,6 1,5

NURS 3801PCC Adults/Older Adults I or NURS 3802 Nursing Care of Families I (1/2 Class in each) 1,5 1,5 1,5 1,5

NURS 3806 Professional Nursing 1,5 1,5 1,5 1,5 1,5

NURS 5010 Foundations of Interprofessional Communication/Collaboration 1,2,4,5,6 1,2,4,5,6 1,5 1,2,4,5,6

http://z.umn.edu/nnideepdive

Knowledge Complexity Framework

<table>
<thead>
<tr>
<th>Time</th>
<th>Union</th>
<th>Data</th>
<th>Information</th>
<th>Knowledge</th>
<th>Meaning</th>
<th>Philosophy</th>
<th>Wisdom</th>
</tr>
</thead>
</table>

As a clinical nurse I review the blood pressure readings in the assessment screen of the EHR.

I note that one of my patients has an "alert" signal next to the blood pressure reading because it is outside of the normal range parameters.

I review the patient’s history, physical and previous notes regarding their disease condition. I do a quick search of the Cochrane Collaboration website using an "info-button" and learn that an elevated blood pressure is dangerous in conjunction with the disease condition.

Knowing the patient has an elevated BP, means that I need to intervene quickly. So I review the evidence based guidelines embedded in the EHR for what actions to take.

Before taking action I stop and integrate a holistic philosophy. Is there something else going on in this individual’s life that could be elevating his blood pressure (a stressful event, fear, diet?) So I review the patients clinical dashboard.

I integrate all of the information gathered and prepare to call a very busy specialist. Having experienced phone calls in the past with this specialist I use the SBAR technique and successfully communicate my concerns and document assessment and interventions on the electronic flowsheet.
Knowledge Complexity Curriculum Framework

<table>
<thead>
<tr>
<th>Year</th>
<th>ICL, 1,5,6</th>
<th>ICL, 1,5,6</th>
<th>ICL, 1,5,6</th>
<th>ICL, 1,2,4,5,6</th>
<th>ICL, 1,2,4,5,6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td></td>
<td></td>
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<tr>
<td>Junior</td>
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<tr>
<td>Senior</td>
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</tbody>
</table>

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Questions?

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