Nursing Informatics: Challenges and Opportunities in the 21st Century
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Objectives
1. Describe the emerging challenges of information technology in health systems today.
2. Review nursing informatics (NI) competencies required of students and practicing nurses.
3. Describe challenges faced by nursing programs in providing NI education.
4. List opportunities to collaboratively enhance and improve NI education to students and practicing nurses.

Over the last 50 years we have seen:
• An explosion in biomedical knowledge,
• Dramatic innovations in therapies and surgical procedures and,
• Management of conditions that were previously viewed as fatal.
Dramatic progress has been made in identifying patient safe practices. These five practices alone have been shown to significantly reduce medication errors and adverse outcomes at a minimum of cost.

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provider order entry</td>
<td>81% decrease in medication errors</td>
</tr>
<tr>
<td>Pharmacist Rounding</td>
<td>78% reduction in preventable ADE’s</td>
</tr>
<tr>
<td>Rapid response teams</td>
<td>15% decrease in cardiac arrests</td>
</tr>
<tr>
<td>Team training in labor and delivery</td>
<td>50% reduction in adverse outcomes</td>
</tr>
<tr>
<td>Reconciling medications upon hospital discharge</td>
<td>90% decrease in medication errors</td>
</tr>
</tbody>
</table>

Despite this, national health expenditures as a share of gross domestic product (GDP) are currently at 17.6% and projected to rise to 20% by 2020.
American healthcare continues to fall short on basic dimensions such as quality, cost, outcomes, and equity.


Despite finding small improvements at the margins, it is harder to see the overall, national impact of “Too Err is Human” on patient safety.


• Over 30 years ago the IOM estimated that up to 98,000 Americans die each year from medical errors in hospitals
• Current estimates for 2013 are:
  – 210,000 – 440,000!


1 East 75th Street New York, NY 10021 1-800-342-0225
Despite the progress in information technology to improve the speed and effectiveness of communication, we have seen a 2800% increase in medical errors resulting from electronic health records.

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.

Typical chronic disease pt.
- 79 years old,
- Osteoporosis,
- Osteoarthritis,
- Type 2 diabetes,
- Hypertension,
- COPD,

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

### TABLE 2-1: Potential Treatment Interactions for a Hypothetical 79-Year-Old Woman with Multiple Chronic Diseases

<table>
<thead>
<tr>
<th>Type of Interaction</th>
<th>Medications for Hypertension</th>
<th>Medications for Diabetes</th>
<th>Medications for Other Diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease</td>
<td>Hypertension</td>
<td>Diabetes</td>
<td>Other Diseases</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Glucose</td>
<td>Diuretics</td>
<td>Antihypertensive agents</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

- Diabetes medications: NAIDs plus aspirin increase the risk of bleeding
- Diabetes medications: Insulin and oral antihypertensive agents may increase the risk of hypoglycemia, aspirin may decrease the effectiveness of bisoprolol

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
- To curb ever-escalating costs.

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"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.

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Moores Law

- First described in 1965 by Gordon Moore, the number of transistors on integrated circuits doubles approximately every two years.
  - Calculations per second
  - Processing speed
  - Size of devices

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• 85% of adults own a cellphone.
• 76% own a computer
• 80% have access to the Intranet
• Mobile device growth is estimated at 30% per year.
• 10 billion users by 2020

• 86% of providers use the Intranet to gather clinical information
• The 3rd most popular use of the Intranet is looking up health information by individuals

BENEFITS of EHR
Quality, Safety & Education
• Data integrity – readable, accurate, organized and complete.
• Clinical decision support
• Care coordination, EBG’s and population mgt.
• Patient safety – Alerts, drug interactions
ACCESS
• Simultaneous access to patient records
• Security and privacy
• Graphs, charts, trending that facilitate comparison of current and past data.
• Access to drug information, decision support tools, and literature searches,

Cost and Revenue
• Increased productivity,
• Improved billing and reimbursement rates,
• Faster turnaround for accounts,
• Lower medical record costs,
• Improved revenue cycle,
• Enhanced regulatory, requirement compliance,

• President Bush’s goal in 2004
  “... an Electronic Health Record for every American by the year 2014. By computerizing health records, we can avoid dangerous medical mistakes, reduce costs, and improve care.”

  - State of the Union address, Jan. 20, 2004

  • Executive order established the Office of the National Coordinator for Health Information Technology (ONCHIT) as part of the Dept of Health & Human Services (HHS)

    - Dr. David Brailer appointed the first National Coordinator

Accessed at AHRQ website: http://www.ahrq.gov/ignouj/oblation/off01/01fallent.htm on November 4, 2014
"To lower health care cost, cut medical errors, and improve care, we'll computerize the nation's health records in five years, saving billions of dollars in health care costs and countless lives."

- First Weekly Address
Jan. 24, 2009

February 17, 2009 – the American Reinvestment and Recovery Act (ARRA – Stimulus Bill) is signed into law

- HITECH component of ARRA provides an incentive program to stimulate the adoption and use of HIT, especially EHR's
- Dr. David Blumenthal appointed the new National Coordinator

President Obama's goal in 2009

HITECH ACT
The Health Information Technology for Economic and Clinical Health (HITECH) Act:

- Provides $30 billion in Medicare and Medicaid incentive payments
- For the meaningful use of health information technology by clinicians and hospitals,
- Estimated to yield savings of $93 billion between 2011 and 2019.

Taken from: Blumenthal, D. "Launching HITECH," posted by the NEJM on 12-30-2009.
Projections are for 90 percent of providers to have access to a fully operational electronic health records by 2019, up from 34-35 percent in 2011.
Competency in Health Information Technology (HIT) is critical for nursing:
• Largest number of health care providers in the US.
• 19.6% of all healthcare workers or over 3 million nurses.

• 1988 - Nursing Informatics: Where Caring and Technology Meet (Ball, Hannah, Newbold, and Douglas)
• 1981- International Medical Informatics Association – Nursing Working Group
• 1982 – Computers in Nursing (1st journal)
• 1984 – Council on Computer Applications in Nursing (ANA) and National Forum on Computers in Health Care (NLAN).
• 1988 – 1st master’s program, U of Maryland.
• 1992 – ANA specialty recognition, nursing informatics
• 1995 – Standards of Practice, nursing informatics

NURSING INFORMATICS
The goal of Nursing informatics (NI) is to improve the health of populations, communities, families, and individuals by optimizing information management and communication.

NURSING INFORMATICS
The design and use of informatics solutions and technology to support all areas of nursing:
• Direct provision of care,
• Establishing effective administrative systems,
• Designing useful decision support systems
• Managing and delivering educational experiences,
• Supporting lifelong learning, and supporting nursing research.


INTERPROFESSIONAL
• American Medical Informatics Association (AMIA)
• Healthcare Information and Management and Systems Society (HIMSS)
• American Health Information Management Association (AHIMA)
• College of Healthcare Information Management Executives

NURSING
• Alliance for Nursing Informatics (ANI)
• American Nursing Informatics Association (ANIA)

COMPETENCIES IN NI
• ANA – Scope and Standards of Practice
  http://www.nursingworld.org/Homepage/Category/NursingInsider/Archive_1/2008NI/Jan08NI/RevisedNursingInformaticsPracticeScopeandStandardsofPractice.aspx
• AACN – American Association of Colleges of Nursing Essentials for BSN, Masters and Doctoral students
  http://www.aacn.nche.edu/education-resources/essential-series
• TIGER – Technology Informatics Guiding Educational Reform
  http://www.tigersummit.com/About_Us.html
• Demonstrate skills in using patient care technologies, information systems, and communication devices that support safe nursing practice.

• 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.

• Use telecommunication technologies to assist in effective communication in a variety of healthcare settings.
• Understand the use of CIS systems to document interventions related to achieving nurse sensitive outcomes.

10 Dimensions of the EHR

• 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.

http://news.brown.edu/pressreleases/2012/05/braingate2
• 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.

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.
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 EHRs 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).

- 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).
- 83% did not require students to demonstrate use of a mobile device (smart phone, iPad, laptop) to access real time information.
- 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.

- 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.

Distribution of Nurse Informaticists
HIMSS Annual Survey 2011 (600 Respondents)

<table>
<thead>
<tr>
<th>Workplace</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital</td>
<td>68%</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>
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 Training for Nurse Informaticists by Program Type
HIMSS Annual Survey 2011 (660 Respondents)

<table>
<thead>
<tr>
<th>Training Program Type</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Masters/PhD (Informatics Specialty)</td>
<td>23%</td>
</tr>
<tr>
<td>Bachelors (Informatics Courses)</td>
<td>2%</td>
</tr>
<tr>
<td>Certificate (ANCC, CPHIMS, Other)</td>
<td>15%</td>
</tr>
<tr>
<td>On the Job Training (courses, workshops, e-learning &amp; other)</td>
<td>15%</td>
</tr>
<tr>
<td>None</td>
<td>32%</td>
</tr>
</tbody>
</table>

Content and teaching methods needed by nurse educators for nursing informatics:
- Scattered among numerous websites
- Aimed primarily at professional development of working informatics professionals.
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.
Establish academic partnerships with health systems.
- Establish a consistent policy for access to EHR’s during students clinical practicums.
- Co-develop a standard curriculum for use of EHR in health facilities.
Establish academic partnerships with commercial information technology vendors:
- Co-develop academic versions of EHR's
- Case studies
- Teaching methods

Establish regular reviews with academic institutions to review:
- Existing curriculum
- New trends in IT
  - Consumer informatics & pt. engagement
  - eMobile health
  - Big data
  - Robotics
  - Virtual health
  - Computer simulation and serious games

Consumer Informatics and Patient Engagement
- Personal health records
- Portals
- eHealth literacy
- Patient engagement

http://www.ohsu.edu/eheducation/schools/schools/mtc/clinical_departments/family_medicine/pcfdi/training/
eMobile Health
- Caregiver Alerts
- Voice Prompts
- Floor Sensors
- Safety Features
- Smart Beds
- Video Monitors
- Vital Sign Monitoring
- Medical Condition Monitoring

Robotics

Big Data
- Virtual Experiments
- Standardized Nursing Languages
- Knowledge discovery and data mining
- Data Visualization

Serious Games
• Problem solving
• Meaningful goals
• Possibility spaces
• Feedback and information
• Empowerment and reward

Thank You!

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