National Nursing Informatics Deep Dive Program

Integrating AACN Essentials for Information Management and Patient Care Technologies Across the Continuum

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Clinical Professor and Assistant Dean
Faculty Practices, Partnerships and Professional Development

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Disclosure

I have no relevant financial interest to disclose nor am I endorsing any commercial products identified in this presentation.
Objectives: Overview

• Discuss how nursing informatics content builds across BSN, MSN and DNP curricula.
• Demonstrate how nursing informatics content can be threaded into existing didactic and clinical courses.
• Provide exemplars of resources, assignments and other tools used to teach nursing informatics.
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 BSN Essentials</th>
<th>TIGER Competencies</th>
<th>QSEN Undergrad. KSA’s</th>
<th>AACN Essentials Masters</th>
<th>QSEN Graduate 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></td>
<td></td>
<td></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>
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.

Typical chronic disease pt.

• 79 years old,
• Osteoporosis,
• Osteoarthritis,
• Type 2 diabetes,
• Hypertension,
• COPD,

## Knowledge Complexity Framework

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data</strong></td>
<td>Obtain raw facts (numbers, text, symbols)</td>
</tr>
<tr>
<td><strong>Information</strong></td>
<td></td>
</tr>
<tr>
<td>(Procedural)</td>
<td>Give meaning to data as vital signs, lab values, IV flow rates, patient names, medication (name, route, time, frequency), radiology images, provider orders, standards, guidelines.</td>
</tr>
<tr>
<td><strong>Knowledge</strong></td>
<td></td>
</tr>
<tr>
<td>(Functional)</td>
<td>Analyze and synthesize information for values outside of normal range (vital signs, lab values, IV flow rates, medication dosage), trend lines and historical data.</td>
</tr>
<tr>
<td><strong>Meaning</strong></td>
<td></td>
</tr>
<tr>
<td>(Managing)</td>
<td>Use critical thinking to assess and act upon knowledge. Provide appropriate nursing interventions.</td>
</tr>
<tr>
<td><strong>Philosophy</strong></td>
<td></td>
</tr>
<tr>
<td>(Systems)</td>
<td>Assess and evaluate the impact of actions on the entire person. What and how are other systems (physiologic and sociologic) affected by the interventions.</td>
</tr>
<tr>
<td><strong>Wisdom</strong></td>
<td></td>
</tr>
<tr>
<td>(Renewing)</td>
<td>Use knowledge, meaning and philosophy to reflect upon past experiences and recognize patterns that aid in establishing and achieving goals.</td>
</tr>
</tbody>
</table>

Knowledge Complexity Framework

Cognitive Load

Complexity

Data
Information Systems
Knowledge
Information
Decision Support Systems
Meaning
Philosophy
Expert Systems
Wisdom
Masters
DNP

Pre-licensure
<table>
<thead>
<tr>
<th><strong>Knowledge Complexity Framework</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data</strong></td>
</tr>
<tr>
<td><strong>Information (Procedural)</strong></td>
</tr>
<tr>
<td><strong>Knowledge (Functional)</strong></td>
</tr>
<tr>
<td><strong>Meaning (Managing)</strong></td>
</tr>
<tr>
<td><strong>Philosophy (Systems)</strong></td>
</tr>
<tr>
<td><strong>Wisdom (Renewing)</strong></td>
</tr>
</tbody>
</table>

| **Digital data** can be created, reproduced and stored at a fraction of the cost of paper data. |
| Digital data can be configured to be displayed in specific fields in EHR’s or LED’s to turn raw data into information (vital signs, medications, flow rates). |
| Information can be transformed into knowledge through **clinical decision support** alerts/reminders for values outside of normal range (vital signs, lab values, IV flow rates, medication dosage), trend lines and historical data. |
| The creation of meaning from knowledge can be enabled through **expert systems** by predicting outcomes and recommending appropriate nursing interventions. |
| Assess and evaluate the impact of actions on systems with **electronic dashboards and benchmarks**. |
| Use knowledge, meaning and philosophy to reflect upon past experiences and recognize patterns through **data visualization tools** that aid in monitoring outcomes for entire populations of patients with specific disease conditions. |
Learning Progression

Information Systems
- Admission, discharge, transfer
- Order entry system
- Ancillary systems (lab, pharmacy, radiology)
- Results reporting systems
- Documentation systems
- Administrative systems (scheduling)

Decision Support
- Medication dosing
- Order facilitators
- Point of care alerts
- Point of care reminders
- Information displays

Expert Systems
- Predictive
  - DX
  - Readmit
  - Sepsis
  - Other
- Pop. Mgt

# BSN Program

<table>
<thead>
<tr>
<th>Fall Junior Year</th>
<th>CR</th>
</tr>
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<tbody>
<tr>
<td>NURS 4301 PCC Adults/Older Adults II</td>
<td>4</td>
</tr>
<tr>
<td>Practicum I: NURS 4303 PCC Adults in Acute Care I</td>
<td>3</td>
</tr>
<tr>
<td>NURS 3115 Informatics (online)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>10 cr</strong></td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>NURS 4312 Nursing Care of Families II</td>
<td>4</td>
</tr>
<tr>
<td>Practicum I: NURS 4305 Community-based Family Care-lifespan I</td>
<td>3</td>
</tr>
<tr>
<td>NURS 4321 Public Health Nursing</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>9 cr</strong></td>
</tr>
<tr>
<td>NURS 4106 Nurse as Collaborator (online, all students)</td>
<td>1</td>
</tr>
<tr>
<td>NURS 4104 Ethical Sensitivity and Reasoning in Health Care (all students)</td>
<td>2</td>
</tr>
<tr>
<td>NURS 3710 Stats for Clinical Research (or other approved statistics course)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>15-16</strong></td>
</tr>
<tr>
<td>Week/Dates 2014</td>
<td>Topics</td>
</tr>
<tr>
<td>----------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Introductions and Course overview</td>
</tr>
<tr>
<td>2</td>
<td>Introduction to Health Informatics and Information Technology</td>
</tr>
<tr>
<td>3</td>
<td>Current trends/issues in health informatics and information technology</td>
</tr>
<tr>
<td>4</td>
<td>Research/Evidence-based Practice</td>
</tr>
<tr>
<td>5</td>
<td>Technology and Data Standards</td>
</tr>
<tr>
<td>6</td>
<td>Software Applications and Technological Trends</td>
</tr>
<tr>
<td>7</td>
<td>Evaluating technology functionality: Workflow/business processes/system</td>
</tr>
<tr>
<td>8</td>
<td>Selecting, implementing and evaluating technology for healthcare</td>
</tr>
<tr>
<td>9</td>
<td>Information systems</td>
</tr>
<tr>
<td>10</td>
<td>Geographic Information Systems part 1</td>
</tr>
<tr>
<td>11</td>
<td>Geographic Information Systems part 2</td>
</tr>
<tr>
<td>12</td>
<td>Standardized Language in Clinical and Public Health</td>
</tr>
<tr>
<td>13</td>
<td>Human Factors Engineering/Clinical Involvement</td>
</tr>
<tr>
<td>14</td>
<td>Peer review of final assignment</td>
</tr>
<tr>
<td>15</td>
<td>Ethical and Political Issues</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Masters Program

<table>
<thead>
<tr>
<th>Course Name</th>
<th>Course Number</th>
<th>Term &amp; Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holistic Health Assessment</td>
<td>NURS 5190</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical Foundations/Skills Lab</td>
<td>NURS 5030</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Physiology</td>
<td>NURS 5222</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharmacotherapy for the Health Professions</td>
<td>PHAR 5800</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HRHI: Adults &amp; Elders</td>
<td>NURS 5031</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HRHI: Children &amp; Childbearing Families</td>
<td>NURS 5032</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research in Nursing</td>
<td>NURS 8170 or 7103</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interprofessional Healthcare Informatics</td>
<td>NURS 5115</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science of Nursing Intervention</td>
<td>NURS 8100 or 6200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population Resp. to Health / Mental Illness</td>
<td>NURS 5033</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar: Complex Health Conditions</td>
<td>NURS 5034</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practicum: Complex Health Conditions</td>
<td>NURS 5035</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nursing Leadership for Effective Practice</td>
<td>NURS 5241</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moral &amp; Ethical Positions in Nursing</td>
<td>NURS 8140 or 7202</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# DNP Core Courses

The courses below are the core DNP courses that are on each specialty area recommended plans of study. These are the semesters these courses are offered.

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
<th>Summer Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurs 5115 Interprofessional Health Care Informatics</td>
<td>Nurs 5115 Interprofessional Health Care Informatics</td>
<td>Nurs 5200 Holistic Health Assessment &amp; Therapeutics for APN</td>
</tr>
<tr>
<td>Nurs 5200 Holistic Health Assessment &amp; Therapeutics for APN</td>
<td>Nurs 5229 Clinical Pharmacotherapeutics</td>
<td>Nurs 7101 DNP Seminar II</td>
</tr>
<tr>
<td>Nurs 5222 Advanced Physiology</td>
<td>Nurs 6100 Epidemiology in Nursing</td>
<td>Nurs 7102 DNP Seminar III</td>
</tr>
<tr>
<td>Nurs 5228 Pharmacology for Advanced Practice Nursing</td>
<td>Nurs 6200 Science of Nursing Intervention</td>
<td>Nurs 7111 DNP Project Direction II: Implementation</td>
</tr>
<tr>
<td>Nurs 6102 Family Health Theory</td>
<td>Nurs 7100 DNP Seminar I</td>
<td>Nurs 7112 DNP Project Direction III: Evaluation</td>
</tr>
<tr>
<td>Nurs 6200 Science of Nursing Intervention</td>
<td>Nurs 7101 DNP Seminar II</td>
<td>Nurs 7111 DNP Project Direction I: Planning</td>
</tr>
<tr>
<td>Nurs 7000 DNP Proseminar</td>
<td>Nurs 7110 DNP Project Direction III: Implementation</td>
<td>Nurs 7200 Economics of Health Care</td>
</tr>
<tr>
<td>Nurs 7100 DNP Seminar I</td>
<td>Nurs 7102 Moral &amp; Ethical Positions &amp; Actions in Nursing</td>
<td>Nurs 7300 Program Evaluation</td>
</tr>
<tr>
<td>Nurs 7102 DNP Seminar III</td>
<td>Nurs 7110 DNP Project Direction III: Evaluation</td>
<td>Nurs 7300 Program Evaluation</td>
</tr>
<tr>
<td>Nurs 7110 DNP Project Direction I: Planning</td>
<td>Nurs 7111 DNP Project Direction II: Implementation</td>
<td>Nurs 7400 Health Policy Leadership</td>
</tr>
<tr>
<td>Nurs 7112 DNP Project Direction III: Evaluation</td>
<td>Nurs 7202 Moral &amp; Ethical Positions &amp; Actions in Nursing</td>
<td>Nurs 7900 Scholarly Teaching and Learning in Nursing</td>
</tr>
<tr>
<td>Nurs 7202 Moral &amp; Ethical Positions &amp; Actions in Nursing</td>
<td>Nurs 7300 Program Evaluation</td>
<td>CSpH 5101 Introduction to Integrative Healing Practices</td>
</tr>
<tr>
<td>Nurs 7300 Program Evaluation</td>
<td>Nurs 7400 Health Policy Leadership</td>
<td></td>
</tr>
<tr>
<td>Nurs 7600 Nursing Research and Evidence Based Practice</td>
<td>Nurs 7600 Nursing Research and Evidence Based Practice</td>
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</tr>
<tr>
<td>Nurs 7610 Health Innovations and Leadership</td>
<td>Nurs 7610 Health Innovations and Leadership</td>
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</tr>
<tr>
<td>Nurs 7900 Scholarly Teaching and Learning in Nursing</td>
<td>Nurs 7900 Scholarly Teaching and Learning in Nursing</td>
<td></td>
</tr>
<tr>
<td>CSpH 5101 Introduction to Integrative Healing Practices</td>
<td>CSpH 5101 Introduction to Integrative Healing Practices</td>
<td></td>
</tr>
</tbody>
</table>
# Master/DNP Health Informatics Course

<table>
<thead>
<tr>
<th>Module</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Evolution and Theory of Informatics</td>
</tr>
<tr>
<td>2</td>
<td>Electronic Health Records</td>
</tr>
<tr>
<td>3</td>
<td>Health Information Systems</td>
</tr>
<tr>
<td>4</td>
<td>Governance and Organizational Structures for Informatics</td>
</tr>
<tr>
<td>5</td>
<td>Home Health and Public Health</td>
</tr>
<tr>
<td>6</td>
<td>Research and Evidence Based Practice</td>
</tr>
<tr>
<td>7</td>
<td>Education and Informatics</td>
</tr>
<tr>
<td>8</td>
<td>Ehealth and Social Network Networking</td>
</tr>
<tr>
<td>9</td>
<td>Quality, Usability and Standards in Informatics</td>
</tr>
<tr>
<td>10</td>
<td>International and the Future of Health informatics</td>
</tr>
</tbody>
</table>
BSN & Masters

Demonstrate skills in using:

• Patient care technologies,
• Information systems and
• Communication devices that support safe nursing practice.

DNP Level

Analyze and communicate critical elements necessary to the selection, use and evaluation of health care information systems and patient care technology.
AACN Patient Care Technologies

Patient Care Technologies

• Computers, printers
• IV smart pumps,
• Bar coded medication management systems,
• Monitoring devices (temp, pulse, BP, ECG, respirations, PaO2)
  • Wearable technology
  • Intranet of Things

AACN Sample Content
Use of patient care technologies
AACN Information Systems

Operations Support

• Basic computer software applications (spread sheets, email, word processing, databases)

Core Systems

• Admission, discharge, transfer
• Financial systems
• Order entry system
• Ancillary systems (lab, pharmacy, radiology)
• Results reporting systems
• Documentation systems
• Administrative systems (scheduling)

Sample AACN Content

Computer skills that may include basic software, spreadsheet, and healthcare databases.
Communication Devices

- Smart phones,
- Hands free mobile communication devices (Vocera),
- Tablets (iPads)
- Email
- Wearable technology
- Telemedicine
Requirements Analysis

- Determine organizational goals & meaningful use
- Gap analysis, key stakeholder buy-in
- Champions and Steering committee
- Functional requirements document & selection criteria
- Vendor demonstrations
- Selection

http://www.healthit.gov/providers-professionals/frequently-asked-questions/397#id67
Design

• Implementation Team
• Implementation timeline
• Training timeline
• Change management strategy
• Current workflow analysis
• New workflow analysis
• Prototype testing

Implementation

• Conduct the EHR build
• Initiate training
• Gradual vs big bang implementation
• Ongoing training resources and superusers
• Follow up on feedback

Health Information Technology

http://healthit.ahrq.gov/health-it-tools-and-resources/workflow-assessment-health-it-toolkit
Testing and Evaluation

- Performance metrics
  - Medical errors
  - Number of users
  - Productivity
  - Clinical outcomes
  - Cost outcomes
- Patient and provider satisfaction

z.umn.edu/nnideepdive
AACN Essentials For Information Management and Application For Patient Care Technology

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

**Masters & DNP Level**
Provide oversight and guidance in the integration of technologies to document patient care and improve patient outcomes.
AACN Clinical Information Systems

Clinical Information Systems

Electronic health records in:
- Acute care
- Ambulatory care
- Skilled nursing care
- Home, public and community health systems

Applications to manage care.
- Provider order entry
- Clinical documentation (assessment, care planning, other)
- Results reporting
- Bar coded medication administration (BCMA)
- Electronic medication administration record (eMar)
- Ancillary systems (pharmacy, lab, radiology)

AACN Sample Content
Electronic health records/physician order entry.
Technology Informatics Guiding Education Reform (TIGER)
Informatics Competencies for Every Practicing Nurse:

TIGER Competencies

European Computer Driving License

Information Management

1.0 Demographic
2.0 Consents
3.0 Medication Mgt
4.0 Planning care
5.0 Order results
6.0 Care documentation
7.0 Decision Support
8.0 Notifications
9.0 Communications
TIGER: 6.0 - 6.4

Care Documentation

- Manage Patient Clinical Measurements
- Manage Clinical Documents and Notes
- Manage Documentation of Clinician Response to Decision Support Prompts
- Generate and Record Patient-Specific Instructions
Academic EHR’s

- Commercial
- Open Source
- Development Partner
- Health System Partnership
- Home Grown
Integration of Technologies to Document Care: Flowchart Development

![Flowchart Development Image]

https://www.icare.com/
Integration of Patient Technologies to Document Care: Personal Health Records

Patient Portals

- Personal health records
- Patient engagement software/wearable technology
- Patient pathways
- Discharge, medication teaching, patient education and pain management.

Co-development Partner

• Plan, design and implement an application with a commercial vendor
• EHR
• Handheld devices
• Mobile app’s
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.
Value of Information Technology
Clinical Decision Support

Enabler of:

- Medication dosing
- Order facilitators
- Point of care alerts
- Point of care reminders
- Information displays
CDS: Bar-coded Medication Management

- **Medication dosing** support (medication pick lists, dosing calculators)
- **Order facilitators** (order sets for specific conditions based on evidence based guidelines: pneumonia, adult prosthetic hip replacement, myocardial infarction)
- **Point of care alerts** (drug to drug interactions, duplicate therapy, drug allergies, contraindications to specific conditions)
- **Point of care reminders** (immunizations, cancer screenings, fall prevention, pain management).
- **Information displays** (dashboards of relevant data)

AACN Sample Content

- Use of technology and information systems for clinical decision-making.
- Technology and information systems safeguards

http://z.umn.edu/nnideepdive
## Event Response Table

### Immunizations

<table>
<thead>
<tr>
<th>Event</th>
<th>Source</th>
<th>Trigger</th>
<th>Activity</th>
<th>Response</th>
<th>Destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphtheria, Tetanus and Pertusis x 4</td>
<td>Vitera EHR Immunizations Tab</td>
<td>If age &lt; 2 years and frequency &lt; 4 DPT (code)</td>
<td>Send alert to Vitera Health Tab</td>
<td>Nurse reviews alert and orders immunization.</td>
<td>Patient receives immunization</td>
</tr>
<tr>
<td>Polio Vaccination x 3</td>
<td>Vitera EHR Immunizations Tab</td>
<td>If age &lt; 2 years and frequency &lt; 3 PV (code)</td>
<td>Send alert to Vitera Health Tab</td>
<td>Nurse reviews alert and orders immunization.</td>
<td>Patient receives immunization</td>
</tr>
<tr>
<td>HIB x 4</td>
<td>Vitera EHR Immunizations Tab</td>
<td>If age &lt; 2 years and frequency &lt; 4 HIB (code)</td>
<td>Send alert to Vitera Health Tab</td>
<td>Nurse reviews alert and orders immunization.</td>
<td>Patient receives immunization</td>
</tr>
<tr>
<td>Hepatitis B x 3</td>
<td>Vitera EHR Immunizations Tab</td>
<td>If age &lt; 2 years and frequency &lt; 3 HB (code)</td>
<td>Send alert to Vitera Health Tab</td>
<td>Nurse reviews alert and orders immunization.</td>
<td>Patient receives immunization</td>
</tr>
<tr>
<td>Pneumococcal vaccination before 2nd year</td>
<td>Vitera EHR Immunizations Tab</td>
<td>If age &lt; 2 years and frequency not equal to 1</td>
<td>Send alert to Vitera Health Tab</td>
<td>Nurse reviews alert and orders immunization.</td>
<td>Patient receives immunization</td>
</tr>
</tbody>
</table>
Advance CDS: Expert Systems
Modified Early Warning System (MEWS)

Scoring is based on:
- Respiratory rate
- Heart rate
- Systolic blood pressure
- Conscious level
- Temperature
- Hourly urine output (for previous 2 hours)

Image: http://www.ihi.org/resources/Pages/ImprovementStories/EarlyWarningSystemsScorecardsThatSaveLives.aspx
Advanced CDS: Augmented Cognition

- WebMD Mobile
- iTriageHealth
- Medscape Mobile
- Diagnosaurus DDx
- Symptoms TakTools
- iHeadache
- SignsSx Handbook
- Symptom Mate
- Differential Dx i-pocket
- STATworkUP
- eRoentgen Radiology DX
- Symptom Minder

Pocket Symptom Analyzer

Image: http://www.thinklabs.com/#!thinklink/cbor
Best Practice Advisory Design Logic

Patient placed on inpatient unit

- Admission order entered into EHR
  - Yes: End
  - No: BPA fires to remind provider to place admission order

BPA fires to remind provider to place admission order

- Admission order entered into EHR
  - Yes: End
  - No: BPA remains on patient chart until admission order placed
## AACN Essentials For Information Management and Application For Patient Care Technology

<table>
<thead>
<tr>
<th>BSN Level</th>
<th>Masters &amp; DNP Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use telecommunication technologies to <strong>assist in effective communication</strong> in a variety of healthcare settings.</td>
<td>Use information and communication technologies, resources, and <strong>principles of learning</strong> to teach patients and others.</td>
</tr>
</tbody>
</table>
DNP Project: Evaluation of Online Learning

Appendix D: 2012 TDD Course Survey Summary

Question: Please rate your online learning and assessment experience

<table>
<thead>
<tr>
<th>Categories</th>
<th>1 (poor)</th>
<th>2 (Okay)</th>
<th>3 (Neutral)</th>
<th>4 (Satisfactory)</th>
<th>5 (Excellent)</th>
<th>Total responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of use</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>8</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td>Technical Support</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>8</td>
<td>15</td>
<td>26</td>
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<td>Process was effectively communicated</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>7</td>
<td>12</td>
<td>26</td>
</tr>
<tr>
<td>In class assessments</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>10</td>
<td>11</td>
<td>26</td>
</tr>
</tbody>
</table>
DNP Project: Evaluation of an Online Serious Game

Pre-Test
Traditional Power Point Education
Post-Test
Evaluation of learning in a real setting

Group One

Group Two

Pre-Test
Traditional Power Point Education
SIMS Gaming Education
Post-Test
Evaluation of learning in a real setting

Compare the results of Final Evaluation
BSN Level

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

Masters & DNP Level

Analyze current and emerging technologies to support safe practice environments, and to optimize patient safety, cost-effectiveness, and health outcomes.

Use current and emerging technologies in the care environment to support lifelong learning for self and others.
AACN Essentials For Information Management and Application For Patient Care Technology

**BSN & Masters Level**
Evaluate data from all relevant sources, including technology, to inform the delivery of care.

**DNP Level**
Evaluate consumer health information sources for accuracy, timeliness, and appropriateness.
What is Driving Change?

1. Exponential growth in computer processing speed,
2. The digitization of everything,
3. Build-out of the Intranet,
4. Mobile technology, social media & increased connectivity

Moores Law

Courtesy of Ray Kurzweil and Kurzweil Technologies, Inc. - en:Image:PPTMooreLawai.jpg
Accessed from Wikipedia on Sept. 17, 2014 at:
http://en.wikipedia.org/wiki/Accelerating_change#mediaviewer/File:PPTMooreLawai.jpg
eHealth Components

- **Mobile Health (mHealth):** Provision of health services and information via mobile and wireless technologies.

- **Health Information Systems (HIS):** Systems to gather, aggregate, analyze and synthesize data from multiple sources to report on health; can include information related to patient records, disease surveillance, human resources, management of commodities, financial management, service delivery and other data needed for reporting and planning purposes.

- **Telemedicine:** Provision of health care services at a distance; can be used for inter-professional communication, patient communication and remote consultation.

- **Distance Learning (eLearning):** Education and training in electronic form for health professionals.
Emerging Care Delivery Models: eHealth

Cost-effective and secure use of information and communications technologies in support of health and health related fields, including health care services, health surveillance, health literature, health education, knowledge and research.

• http://www.axisteleulsolutions.com/satisfied-customers.html

eHealth Components

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• **Distance Learning (eLearning):** Education and training in electronic form for health professionals.
Mobile Health (mHealth) Explosion

- 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

Mobile Health (mHealth)

Medical and public health practices supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices.

mHealth: New horizons for health through mobile technologies, World Health Organization, Global Observatory for eHealth series - Volume 3, 2011

http://healthinformatics.wikispaces.com/mHealth
mHealth & Care Coordination for Chronic Disease Mgt

Continuous Glucose Monitoring

• Provide education and monitoring

http://www.medtronicdiabetes.com/treatment-and-products/continuous-glucose-monitoring
mHealth & Care Coordination
Chronic Disease Mgt

*Cardiac rhythm and heart failure*

- Comprehensive remote monitoring

Health Coaching Tools: Patient Engagement and The Quantified Self

Wearable Computing

- Activity monitors
- Smart Scales
- Diet & weight loss monitors
- Sleep and mood
- HealthIt.gov

http://www.healthit.gov/patients-families/stay-well#devices

http://www.ted.com/talks/gary_wolf_the_quantified_self?language=en
Telecommunications Technologies:

- Patient monitoring technologies (virtual assessments, ICU’s)
- Home sensing devices (weight scale, BP monitor, bed chair, glucose meter, implant monitors, baby monitors, spirometer, medication monitoring, pedometer)

AACN Sample Content

- Technology for virtual care delivery and monitoring.
- Interstate practice regulations (e.g., licensure, telehealth).
- Information literacy

University of Minnesota
School of Nursing
BSN & Masters

Participate in evaluation of information systems in practice settings through policy and procedure development.

DNP Level

Demonstrate the conceptual ability and technical skills to develop and execute an evaluation plan involving data extraction from practice information systems and databases.
Program Evaluation Logic Model: Medical Home Diabetes Care Planning Tool

Organizational Plan
- CEO/CNO
- IRB
- Regional Clinic Manager
- Administrative Director
- Quality Management
- Medical Home Nurses Providers
- Electronic Doc Spec
- IT Electronic Report Spec
- EHR
- Clinical Space

Service Plan
- Build and Test Tools
- Protocol for Using Tools
- Pre/Post Implementation Surveys (PE/Care Plan)
- Education Re Tools/Medical Home Enrollment
- Regional Facility
- Provider Inservice
- Nursing Inservice
- Process for Collecting EHR Data
- DM Patients Evaluated
- Utilization of Tools on Enrolled DM Patients

Antecedent Factors
- Patients Not Identified
- And Formally Enrolled
- In Medical Home Program
- Patients Decline Participation in Medical Home Program
- MHN Base Line ED Level

Determinants
- Provider/Nurse Knowledge of Careplan Tools
- Appropriate Use of Tools
- Provider/Nurse Perceived Benefits of Doc Tools
- Time Constraints for Implementing Tools

Problem: No Standardized Documentation to Capture Medical Home Interventions for DM Patients

Contributing Factors
- Increased Knowledge of Tools/Protocol Enrolment Process by Providers and Nurses
- Enrollment of DM Patients to Medical Home
- Appropriate Use of Tools
- Delivery of Updated EHR Data to Monitor/Evaluate Utilization of Tools
- Completed Pre/Post Implementation Surveys Use of POCON and NDOT

Process Objectives

Impact Theory
- Increased Communication Regarding DM Care
- Improved Overall Healthcare Outcomes for DM Patients
- Ability to Capture Medical Home Interventions/Outcomes
- Improved Financial Reimbursement

ARROW KEY
- Points to a product of the previous input
- Points to where intervention is being applied
- Indicates two way impact
- Indicates a one way impact
Evaluation of Hospital Quality Performance Program: Dashboards

Plan, design and implement a dashboard and evaluate its impact on performance.

Performance Analytics Dashboard

Image:
Evaluate Clinical Outcomes Against National Benchmarks

- **CMS** – Center for Medicare & Medicaid
- **NIH** - Clinical Translational Science Award
- **PCORnet** – Patient centered outcomes research
- **Commercial** – Optum Labs Research Collaborative

- 2 billion data points per year
- 62 medical research institutions in 32 states
- 11 Clinical research networks & 18 patient powered networks
- 150 million lives, 3200 data points per life, over 20 years.
BSN Level
**Recognize** the role of information technology in improving patient care outcomes and creating a safe care environment.

Masters Level
**Evaluate outcome data** using current communication technologies, information systems, and statistical principles to develop strategies to reduce risks and improve health outcomes.

DNP Level
**Design, select, use, and evaluate programs** that evaluate and monitor outcomes of care, care systems, and quality improvement including consumer use of health care information systems.
The Future of the Nursing Workforce: National- and State-Level Projections, 2012-2025

- Approximately 2.9 million RNs were active in the workforce in 2012.
- The number of new graduates that entered the workforce has substantially increased from approximately 68,000 individuals in 2001 to more than 150,000 in 2012 and in 2013.
- The RN supply is expected to outstrip demand by 12% between 2012 and 2025.
- While not considered in this study, emerging care delivery models, with a focus on managing health status and preventing acute health issues, will likely contribute to new growth in demand for nurses, e.g., nurses taking on new and/or expanded roles in preventive care and care coordination.

Managing Health Status and Preventing Acute Health Issues

Care Coordination (patient centered medical homes)
• Advanced monitoring devices (diabetic pumps, pace-makers)
• Health Maintenance (smart scales, home monitoring devices)
• Population management (descriptive and predictive)

Telemedicine
• Virtual ambulatory care (protocol driven virtual home visits)
• Telehealth (patient assessment via telemonitoring equipment)
• Remote nursing units (virtual ICU’s)

Health Coaching
• Patient engagement (personal health records & health literacy)
• The quantified self movement (wearable technology & the Intranet of Things)
• Social Networks (self and family caregiver on-line support groups)

Data Science & Big Data
• Descriptive and predictive analytics
Care coordination in the primary care practice involves deliberately organizing patient care activities and sharing information among all of the participants concerned with a patient's care to achieve safer and more effective care.

Care Coordinator Role

- Care transitions
- Patient and family engagement
- Health maintenance and education
- Risk evaluation, planning, intervention and chronic disease population management
Plan, Design and Evaluate a Population Management Application: Diabetes

- Monitor A1c, fasting lipids, blood pressure, microalbumin and identify high risk patients
- Establish and compare national benchmarks and variations in care
- Monitor and report on key indicators for diabetes complications
- Predict high risk acute care admissions

http://www.slideshare.net/dalesanders1/disease20registries20webinar20-nov202014-tv2
Plan, Design and Evaluate the Efficacy of Personal Health Records

<table>
<thead>
<tr>
<th>Personal Health Records and eHealth Hubs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Microsoft Health Vault</strong>&lt;br&gt;<a href="#">Web Site</a>&lt;br&gt;<a href="#">Disclaimers</a></td>
<td>A free PHR system that integrates with multiple web sites and personal health devices.</td>
</tr>
<tr>
<td><strong>WebMD Health Manager</strong>&lt;br&gt;<a href="#">Web Site</a>&lt;br&gt;<a href="#">Disclaimers</a></td>
<td>A free standalone PHR system with some options for sharing information with doctors and others.</td>
</tr>
<tr>
<td><strong>MyMediConnect</strong>&lt;br&gt;<a href="#">Web Site</a>&lt;br&gt;<a href="#">Disclaimers</a></td>
<td>A free standalone PHR system with some options for sharing information with doctors and others.</td>
</tr>
<tr>
<td><strong>NoMoreClipboard</strong>&lt;br&gt;<a href="#">Web Site</a>&lt;br&gt;<a href="#">Disclaimers</a></td>
<td>A secure, online, easy-to-use tool that helps you compile, manage and share your medical records.</td>
</tr>
<tr>
<td><strong>iBlueButton</strong>&lt;br&gt;<a href="#">Web Site</a>&lt;br&gt;<a href="#">Disclaimers</a></td>
<td>A mobile and secure app to access, compile and share your Blue Button and other records with your doctors.</td>
</tr>
</tbody>
</table>

1. Select a PHR
2. Sign up for record
3. Review applications
4. Recognize how to assist pts

Telemedicine: Virtual Visits

Growing Scope of Virtual Primary Healthcare

- Complex chronic
- Population health management
- Predictive care
- Chronic disease screening and management
- 50%+ of primary care covered
- EMR integration for new and existing patients

9 simple conditions
13+ years old
Kids 2+ now treated
Well-managed chronic
Over 50 conditions

High Complexity
Medical
Technical
Payment
Regulatory
Social

High Value
Health impact
Large volume

Care factors that may have an impact on the Critical Pathway:
PT + Patient

1. HbA1c measured at appropriate interval
2. Results received. Brought to designated group on
3. HbA1c value compared with target for patient
4a. Target addressed?
No
Yes
5. Implement improvement strategies
6a. Agree to continue current care plan
6b. Reinforce guidelines and appropriate follow-up


Build a Virtual Visit Protocol

1. Select one aspect of the critical pathway.
2. Build a protocol for screening and intervention.
3. Role play a virtual visit using “Face Time” or “Skype”

Plan, Design and Evaluate Consumer Engagement Websites

- **HPT** - Automated blood pressure cuffs that sync with phones
- **Heart disease** - tracks blood pressure, physical activity, cholesterol, glucose, weight and medications.
- **Asthma** - sensors that track triggers for asthma attacks.
- **Smoking** - Online tools for quitting smoking from the American Lung Association
- **Cancer** - iPad app designed to help store and track information related to their care

[Website Link]

http://www.healthit.gov/patients-families/health-conditions#resourcesc

[Health IT logo]
Health website evaluation tool

- This page helps you evaluate the quality, credibility, and transparency of a health website by guiding you through questions related to the HON code principles and the EU Quality Criteria for Health-related Websites. After answering a series of questions, the site will be given a score and indications regarding its level of transparency and production quality.

Are the sources of information available clearly identified?

- Yes, valid HTML links to the source information are provided
- Yes, a bibliographic reference to the source of information is given
- Yes, but the contents on the website are originally written by the editor
- No, no reference to the source of information is made
- Don't know
Plan, Design and Evaluate Self Management Application

App Challenge:

• Recognize how technology can enable patients with chronic disease conditions to better manage their disease.

• Demonstrate the use of an app and its benefits.

**Glucose Buddy:** Includes charts for logging blood-glucose levels, medications, food and exercise. The free app graphically displays log information in graphs, includes an a1c calculator and provides push notifications.

http://www.fiercemobilehealthcare.com/slideshows/7-mobile-apps-chronic-condition-management
AACN Essentials For Information Management and Application For Patient Care Technology

BSN, Masters and DNP Levels

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

• Multidisciplinary terminologies (SNOMED-CT, LOINC)

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

AACN Content Sample: Information management for patient safety.

http://z.umn.edu/nnideepdive
Bill T., a 69-year-old man, was referred to the local visiting nurse association following a four day hospitalization for an aortic valve replacement. He had a history of hypertension. Because Bill lived alone, he was discharged to his daughters home until he became stronger and his sternal incision was stable. His discharge instructions included not to lift more than ten pounds, take his temperature daily, and call his physician if his temperature was higher than 100 F. His medications were enalapril (Vasotec) 20 mg daily, warfarin (Coumadin) 5 mg daily, docusate (Surfak) 240 mg daily, and tramadol hcl 37.5 mg/acetaminophen 325 mg (Ultrace) 1-2 tablets every 4-6 hours.
Develop Care Plan
Selecting problems

- Click on the charting icon
Selecting problems

• A pop up will appear and all 42 problems will be listed in order of the domains.

1. Click the appropriate Problems
2. Click save
3. Problems will appear as tabs on the next screen
4. Click on the edit icon to add symptoms and ratings
Problem Ratings

- To expand problem specific rating examples, click on the blue icon next to the concept.
- Then select rating value in the drop down.
- Repeat for each concept rating.
- Rating will appear on problem page.
Recognize that redesign of workflow and care processes should precede implementation of care technology to facilitate nursing practice.
Case Study

WORKFLOW FOR A PRIMARY CARE CLINIC WITH A PAPER MEDICAL RECORD

Each student should write a narrative summary (no longer than 4 pages, 12 point font, double spaced excluding references and title page) that describes how information technology could address each of the workflow problems listed.

Key Workflow Problems

• Patients frequently complain about having to fill out and update the registration forms and health history in the waiting room when they first arrive at the clinic for their appointment.
• Paper charts occasionally become lost and staff spend a substantial amount of time searching for them.
Ishikawa Diagram (Fishbone Cause & Effect)

**Ishikawa diagram,**
Fishbone shape, showing factors of Equipment, Process, People, Materials, Environment and Management, all affecting the overall problem. Smaller arrows connect the sub-causes to major causes.

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Standard Flowcharting

A flowchart is a type of diagram that represents an algorithm or process, showing the steps as boxes of various kinds, and their order by connecting these with arrows.

Accessed 8/24/2012
Workflow Analysis:  
Translation of Narrative Text to a Flowchart

• The day of the clinic visit, the patient enters through the front door and proceeds to the check-in window where a receptionist greets the patient
• Receptionist finds the patient in Intergy by querying their social security number and verifying the patient identity using the last name, and if needed, first name
• Any missing demographic information is completed at check-in with the receptionist
  • (The receptionist is allowed access to the EMR portion of Intergy)
BSN, Masters & DNP Level

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

Institute for Family Health
Early adopter of the patient portal, introducing the Epic MyChart, MyHealth in 2007 and the Spanish-language version, MiRecord, MiSalud, in 2011.
Uphold ethical standards related to data security, regulatory requirements, confidentiality, and clients’ right to privacy.

Promote policies that incorporate ethical principles and standards for the use of health and information technologies.

Provide leadership in the evaluation and resolution of ethical and legal issues within healthcare systems relating to the use of information, information technology, communication networks, and patient care technology.
QUESTIONS?

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Minneapolis, MN
clanc027@umn.edu

National Nursing Informatics Deep Dive Program Resources Webpage:
http://www.nursing.umn.edu/continuing-professional-development/nnideepdive/