Informatics and Technology

Emerging Trends and QSEN Competencies

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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

• Discuss emerging trends in Nursing Informatics and their impact on QSEN competencies.
• Provide exemplars & resources for teaching nursing informatics

Inpatient Days per 1,000 Persons, 1992 – 2012


Hospital Outpatient Visits per 1,000 Persons, 1992 – 2012

Previously Chart 3.13 in 2013 and earlier years’ Chartbooks.
Shift in the Hospital Centric Model of Care

Although the total number of nurses working in hospitals has increased, the proportion of the total RN workforce in acute care has declined from 67% in 1993 to 61% in 2014.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Hospitals; state, local, and private</td>
<td>61%</td>
</tr>
<tr>
<td>Nursing and residential care facilities</td>
<td>7%</td>
</tr>
<tr>
<td>Offices of physicians</td>
<td>7%</td>
</tr>
<tr>
<td>Home health care services</td>
<td>6%</td>
</tr>
<tr>
<td>Government</td>
<td>6%</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Supply</th>
<th>Registered Nurses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated supply, 2012</td>
<td>2,897,000</td>
</tr>
<tr>
<td>Estimated supply growth, 2012-2025</td>
<td>952,000</td>
</tr>
<tr>
<td>New entrants</td>
<td>1,950,000</td>
</tr>
<tr>
<td><strong>Attrition</strong></td>
<td>(998,800)</td>
</tr>
<tr>
<td>Change in average work hours**</td>
<td>800</td>
</tr>
<tr>
<td>Projected supply, 2025</td>
<td>3,849,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Demand</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated demand, 2012</td>
<td>2,897,000</td>
</tr>
<tr>
<td>Estimated demand growth, 2012-2025</td>
<td>612,000</td>
</tr>
<tr>
<td><strong>Changing demographies</strong></td>
<td>584,000</td>
</tr>
<tr>
<td>ACA-related increase in the number of insured</td>
<td>28,000</td>
</tr>
<tr>
<td>Projected demand, 2025</td>
<td>3,509,000</td>
</tr>
<tr>
<td>Supply in Excess of Demand, 2025</td>
<td>340,000</td>
</tr>
</tbody>
</table>

While the “bedless hospital” may exist only as a concept today, the idea of using bed counts to size up hospitals could be ready for retirement.

One notable example of this is the massive new $451 million replacement naval hospital being built at Camp Pendleton near San Diego. **Scheduled to be completed next January, the 497,000-square-foot facility will house only 67 beds.**

http://www.modernhealthcare.com/article/20130126/MAGAZINE/301269979
Technology Trends

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:PPTMooresLawai.jpg
Accessed from Wikipedia on Sept. 17, 2014 at:
http://en.wikipedia.org/wiki/Accelerating_change#mediaviewer/File:PPTMooresLawai.jpg
Sensor Data: Mobile Health & The Intranet of Things

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

http://www.youtube.com/watch?v=LVlT4sX6uVs

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

http://healthinformatics.wikispaces.com/mHealth
Electronic Health Record Data: HITECH and Meaningful Use

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.

<table>
<thead>
<tr>
<th>United States EMR Adoption Model SM</th>
<th>2012 Q2</th>
<th>2012 Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 7 Complete EMR; CCD transactions to share data; Data warehousing; Data continuity with ED, ambulatory, OP</td>
<td>1.7%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Stage 6 Physician documentation (structured templates), full CDSS (variance &amp; compliance), full R-PACS</td>
<td>6.5%</td>
<td>7.3%</td>
</tr>
<tr>
<td>Stage 5 Closed loop medication administration</td>
<td>11.5%</td>
<td>12.0%</td>
</tr>
<tr>
<td>Stage 4 CPOE, Clinical Decision Support (clinical protocols)</td>
<td>13.3%</td>
<td>14.2%</td>
</tr>
<tr>
<td>Stage 3 Nursing/clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology</td>
<td>42.4%</td>
<td>41.3%</td>
</tr>
<tr>
<td>Stage 2 CDR, Controlled Medical Vocabulary, CDS, may have Document Imaging; HIE capable</td>
<td>11.7%</td>
<td>11.2%</td>
</tr>
<tr>
<td>Stage 1 Ancillaries - Lab, Rad, Pharmacy - All Installed</td>
<td>5.1%</td>
<td>4.8%</td>
</tr>
<tr>
<td>Stage 0 All Three Ancillaries Not installed</td>
<td>7.9%</td>
<td>7.4%</td>
</tr>
</tbody>
</table>

Data from HIMSS Analytics® Database ©2012
Whole Gene Sequencing Data

• Process that determines the complete DNA sequence of an organism's genome at a single time.
• Data will be an important tool to guide therapeutic intervention in the future.

There are six billion base pairs in each human diploid genome

## Social Media Data

### Top Five US Websites in 2015

<table>
<thead>
<tr>
<th>Website</th>
<th>Subscribers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook</td>
<td>900,000,000</td>
</tr>
<tr>
<td>Twitter</td>
<td>310,000,000</td>
</tr>
<tr>
<td>LinkedIn</td>
<td>255,000,000</td>
</tr>
<tr>
<td>Pinterest</td>
<td>250,000,000</td>
</tr>
<tr>
<td>Google+</td>
<td>1,835,000,000</td>
</tr>
</tbody>
</table>
Geo-Spatial Data

Data which has a geographical or geospatial aspect including the use of geographic information systems and geometrics (GPS).

The geospatial web – blending physical and virtual spaces., Arno Scharl in receiver magazine, Autumn 2008

Big Data: Healthcare

- **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.
Human Graphic Information System (GIS)

• Multiple layers of demographic, physiologic, anatomic, biologic and environmental data about a particular individual.


https://twitter.com/erictopol/status/449529091536863233
Knowledge Engineering

Data Mash-ups

Knowledge Value

Figure 3: Intermediate HIE

www.onhealthtech.blogspot.com
Knowledge Engineering

- Decision trees
- Association rules
- Artificial neural networks
- Support vector machines
- Clustering
- Bayesian networks
- Genetic algorithms

Machine Learning

A simple neural network

input layer  hidden layer  output layer
Knowledge engineering of big data will dramatically change how healthcare providers treat and care for patients through their ability to describe, predict and prevent health events.
Knowledge Value
Embedded in Technology

iPhone

- Proximity sensor
- Ambient light sensor
- Accelerometer
- Magnetometer
- Gyroscopic sensor
- Camera/Video
- Voice recognition (Siri)
- Phone
- Email/Text
- Intranet
- NLP
Augmented Cognition Apps: Algorithmic Symptom Checkers

- 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

https://www.youtube.com/watch?v=CQqBMG578tA

Image: http://www.thinklabs.com/#!thinklink/cbor
Prediction: 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
Prevention: Asthma Attacks

Sensor Cluster:

- Air quality
- Pollen
- Inhaler use
- Geo-location
- Breath nitric oxide
- Lung function – Smartphone app
- RR, Temp, O2 sat.

Prevention: Heart Failure Events

Sensor Cluster
- Beat to beat variability
- Fluid status
- Sleep quality
- Apneic spells
- Vital signs
- Lab tests (via smart phone app)
- Med. adherence (via digitized pills)

https://www.youtube.com/watch?v=-uTsMCvT7X8

Step into the hospital room of the future — OK, so maybe all of these cool gadgets won't be in one hospital room (and certainly not by tomorrow), but advances in medical science and technology promise to provide you with better medicine and a more pleasurable experience.

1. **Smart Pill**
   Intelligent pill technology is currently being used to diagnose digestive conditions such as Crohn's disease and colon cancer.

2. **Smartphone Ultrasound**
   Researchers are working on a handheld machine that connects via USB to a smartphone. The device could prove life-changing in developing areas where people have little access to medical technology.

3. **Taking Control**
   Patients will be able to raise and lower the shades in the room, order food, shut off the lights and access the Web. Prototypes are being tested.

4. **Medical Tricorder**
   With a name borrowed from "Star Trek," this device would use technology to collect and analyze data on patients' health and then compare that data to electronic medical records. It also would run simulations to determine the best course of treatment. Military researchers are currently in the conceptual phase on the technology related to such a device.

5. **Artificial Womb**
   Straight out of "The Matrix," tanks are filled with amniotic fluid, and embryonic umbilical cords are attached to pumps that regulate nutrient intake and waste production. Such methods have been used for some animals, but they are still a theoretical possibility for use with human babies.

6. **Health Display**
   With the swipe of a card, patient information will be displayed on a computer monitor in the room. Doctors will see data they need to know (such as the full medical record). Nurses will see information pertinent to their jobs (like medical history and care requirements). Housekeeping staff will see information that helps them do their jobs. Prototypes are being tested.

7. **Centralized IV System**
   Nurses no longer need to program your IV manually, as a centralized system at the nurse's station or elsewhere will program them all automatically.

8. **Smartbed**
   Without you being hooked up to 25 monitors, your bed will track key health information: Temperature, blood pressure, heart rate while you sleep. The information could then be sent wirelessly to health care providers' cellphones or email. Project is in developmental stages in Europe.

9. **Organ Printer**
   A complex 3D printing process can create tissue adequate for transplantation, bypassing the potentially lengthy process of waiting for an acceptable donor. While such devices aren't in use now to create full organs, some of the biological material they can produce has been used to help patients.

10. **Robotic Surgeons**
    These guys have been around since the late 1980s, but they are seeing increasing usage in heart, intestinal, brain, pediatric and orthopedic surgery. Robotic "doctors" mirror human arms, allowing repetitive, controlled actions.

11. **Memory Restoration**
    This military project is aimed at restoring memory by bypassing brain injuries. The theory is that injured soldiers would be able to return to the battlefield with improved performance. Researchers also hope the project will improve overall knowledge of short-term memory and brain functions.

12. **Medication Security**
    A medication dispensing system will use bar codes and scanning technology to reduce medication errors.

Better Drugs
Research into gene therapy will provide personalized medication like never before. Your doctor will have access to your complete genome, so she'll be able to predict possible drug interactions and your body's reaction to potential treatments. Toxic reactions to drugs will plummet. Much of this work already is under way, and researchers predict many of the most life-changing advances will come in the next decade or so.

Sources:
- http://www.wvu.edu/qualityquality/digest/JBPTD-9753
Todays Barriers

- Interoperability of electronic health record systems across the continuum
- Poor workflow design, usability, functionality and human/computer interface
- Lack of standardized nursing terminologies and missing data to share and compare interventions and clinical outcomes
- Lack of financial and human resources to implement EHR and other systems
- Capacity to process and store multiple data forms (structured, unstructured, audio, video, streaming, waveforms)
- Computer literacy among healthcare providers and nursing school faculty
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.

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,

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!

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>
Pre-licensure QSEN Competencies: Knowledge

• **Explain** why information and technology skills are essential for safe patient care.

• **Identify** essential information that must be available in a common database to support patient care.

• **Contrast** benefits and limitations of different communication technologies and their impact on safety and quality.

• **Describe** examples of how technology and information management are related to the quality and safety of patient care.

• **Recognize** the time, effort, and skill required for computers, databases and other technologies to become reliable and effective tools for patient care.
QSEN Pre-licensure Competencies: Skills

- **Seek** education about how information is managed in care settings before providing care.
- **Apply** technology and information management tools to support safe processes of care.
- **Navigate** the electronic health record.
- **Document** and plan patient care in an electronic health record.
- **Employ** communication technologies to coordinate care for patients.
- **Respond** appropriately to clinical decision-making supports and alerts.
- **Use** information management tools to monitor outcomes of care processes.
- **Use** high quality electronic sources of healthcare information.
Graduate QSEN Graduate Competencies: Knowledge

• Utilize systems theory to plan, design, implement and evaluate the capacity of information systems and patient care technologies to improve the quality and safety of patient care.

• Participate in the design of continuous learning systems that identify, capture, store and communicate key electronic data elements that represent the impact of nurse sensitive performance measures.

• Support taxonomic and terminology systems used in national efforts to enhance interoperability of information systems and knowledge management systems.
Graduate  QSEN Graduate Competencies: Knowledge

• Participate in the **planning, design, implementation and evaluation** of information systems and technologies used to engage and empower patients as partners in managing their own care

• Provide **oversight regarding compliance** with federal and other regulations related to the selection and implementation of information systems and their capacity to protect the safety, confidentiality and security of patient data.
Emphasis on EHR & Meaningful Use

Transform health care

Access to information

Utilize technology

Stage 1 MU
- Basic EHR functionality, structured data
- Patient informed
- Privacy & security protections

Stage 2 MU
- Care coordination
- Patient informed
- Structured data utilized
- Privacy & security protections

PCMH 3-Part Aim
- Care coordination
- Evidenced based medicine
- Registries for disease management
- Privacy & security protections

ACO’s “Stage 3 MU”
- Data utilized to improve delivery and outcomes
- Patient self management
- Team based care, case management
- Registries to manage patient populations
- Privacy & security protections
Knowledge Complexity Framework

Complexity

Cognitive Load

Pre-licensure

Knowledge

Information

Data

Information Systems

Masters

Meaning

Decision Support Systems

Philosophy

Expert Systems

Wisdom

DNP
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.

Patient Safety
Provider Order Entry

Manage
• Non-Medication Patient Care Orders
• Orders for Diagnostic Tests Orders for Blood Products and Other Biologics
• Referrals
• Order Sets
• Manage Results

http://www.open-emr.org/
Patient Safety: Handwritten Notes

MD Progress Note

RN Progress Note

http://drwes.blogspot.com/2012/05/paper-based-charts-how-soon-we-forget.html

# Clinical Flowsheets

![Clinical Flowsheets](http://www.icare.org/)

## Cover Sheet
- **Patient:** Betty Smith, 94/F
- **Diagnosis:** Hip Fracture
- **Team:** Russell Regional
- **Location:** 3A East Medicine
- **Attending:** Doctor A

## Active Problems
- **Problem:** Closed Treatment of Pelvic Ring Fracture, Dislocation, luxation or Subluxation
- **Onset:** Jan 12, 2006
- **History:** Reflux
- **Other:** Alcoholism

## Allergies/Adverse Reactions
- **Allergen:** Penicillin, Sulfa
- **Severity:** High
- **Reaction:** Tachycardia

## Active Medications
- **Medication:** Allopurinol, Tiotropium, Atorvastatin, Furosemide
- **Status:** Active, Discontinued

## Clinical Reminders
- **Reminder:** Hepatitis C Risk Assessment
- **Due:** Diabetes mellitus type 2

## Vitals
- **Temperature:** 98.6°F, Date: Jan 16, 2003
- **Respiration:** 12, Date: Jan 16, 2003
- **Blood Pressure:** 120/80, Date: Jan 16, 2003

## Appointments/Visits/Admissions
- **Location:** GI
- **Date:** Jan 16, 2003

## Recent Lab Results
- **Description:** Complete Blood Count (CBC)...
- **Date:** Jan 16, 2003
- **Status:** Complete

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Evaluation of Hospital Quality Performance Program: Dashboards

Performance Analytics Dashboard

### Evidence Based Practice

#### Nursing Care Plans

Nursing Care Plans are designed to provide a comprehensive approach to patient care. These plans are evidence-based and focus on the specific needs of the patient.

#### Table: Nursing Care Plan

<table>
<thead>
<tr>
<th>ASSESSMENT</th>
<th>DIAGNOSIS</th>
<th>INFERENCE</th>
<th>PLANNING</th>
<th>INTERVENTION</th>
<th>RATIONALE</th>
<th>EVALUATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBJECTIVE:</td>
<td>Risk for prone behavior related to lack of knowledge about the disease</td>
<td>High blood pressure (HBP) or hypertension means high pressure (tension) in the arteries. Arteries are vessels that carry blood from the pumping heart to all the tissues and organs of the body. High blood pressure does not mean excessive emotional tension, although emotional tension and stress can temporarily increase blood pressure. Normal blood pressure is below 120/80; blood pressure between 120/80 and 139/89 is called &quot;pre-hypertension&quot;.</td>
<td>After 8 hours of nursing interventions, the patient will verbalize understanding of the disease process and treatment regimen.</td>
<td>INDEPENDENTLY: Define and state the limits of desired BP. Explain hypertension and its effect on the heart, blood vessels, kidney, and brain.</td>
<td>Provides basis for understanding elevations of BP, and clarifies misconceptions and also understanding that high BP can exist without symptom or even when feeling well.</td>
<td>After 8 hours of nursing interventions, the patient was able to verbalize understanding of the disease process and treatment regimen.</td>
</tr>
<tr>
<td>&quot;Bagit kaya natala ako mahilig?&quot; (Why do I always feel dizzy?) as verbalized by the patient.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OBJECTIVE:</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>- Request for information.</td>
<td></td>
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<td></td>
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<tr>
<td>- Agitated behavior</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>- Inaccurate follow through of instructions.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- VS taken as follows:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T: 37.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P: 84</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R: 18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP: 120/110</td>
<td></td>
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</tbody>
</table>

#### Image: Nursing Diagnosis and Interventions

Nursing Diagnosis and Interventions provides a detailed overview of nursing care plans and interventions. This resource is essential for understanding the evidence-based approach to patient care.

[Image of Nursing Diagnosis and Interventions]

[Image of Nursing Care Plans]

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http://ecx.images-amazon.com/images/I/51A0S360E1L.jpg

http://img.docstoccdn.com/thumb/orig/150407925.png
Evidence Based Guidelines

Example of window text display for diagnosis of Diabetes and Severe Hypertension

Recommendations:

Medication X is a derivative of the medication Y, which Mr. Johns has a documented allergy

This recommendation is specific to the patient’s diagnosis and available to the user at the point clinical decisions are made. In this case, the prescriber (physician or APRN) may see this information as they are writing orders to a new patient with diagnosis of Diabetes and severe hypertension.

http://www.icare.org/
Safety: Medication Errors

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.

Managing Complexity in Healthcare: Clinical Decision Support

- **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
Unintended Consequences of CDS: Lessons Learned

• Alert/Alarm Fatigue
• Interruptions while preparing medications
• Drop down menus with milligrams/kg vs total milligrams
• Robotic medication dispensing

Source: www.medicalnewstoday.com
Emphasis on EHR & Meaningful Use

Transform health care

Improved population health
Enhanced access and continuity
Data utilized to improve delivery and outcomes
Data utilized to improve delivery and outcomes
Patient self management
Patient engaged, community resources

Utilize technology

Access to information

Basic EHR functionality, structured data
Patient informed
Care coordination
Privacy & security protections
Structured data utilized
Privacy & security protections
Care coordination
Privacy & security protections
Evidenced based medicine
Patient centered care coordination
Registries for disease management
Registries to manage patient populations
Care coordination
Privacy & security protections
Registries to manage patient populations
Privacy & security protections

Stage 1 MU
Stage 2 MU
PCMH 3-Part Aim
ACO’s “Stage 3 MU”
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 Coordinator Role

- Care transitions
- Patient and family engagement
- Health maintenance and education
- Risk evaluation, planning, intervention and chronic disease population management
Care Coordination Software: 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

https://www.youtube.com/watch?v=Mnp9_cytUGM
Telecommunications Technologies:

Google Glass

Virtual Intensive Care Units

https://www.youtube.com/watch?v=jnEdasIPtEg

http://www.bizjournals.com/milwaukee/stories/2009/01/05/focus1.html?s=image_gallery
Virtual Office 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

2009
2011
2013
2015

High Value
Health impact
Large volume

1. HbA1c measured at appropriate interval

2. Results received, tracked to designated person

3. HbA1c value compared with target for patient

4. HbA1c target achieved?
   - Yes
     - Agree to continue current care plan
   - No
     - Implement improvement strategies

5. Reinforce guidelines & appropriate follow-up

Care Factors that May Have an Impact on the Critical Pathway:
PT = Patient


https://www.youtube.com/watch?v=NYrFHuHxCqU

https://www.youtube.com/watch?v=NYrFHuHxCqU
Care Coordination & Advanced Monitoring Devices

**Implantable Continuous Glucose Monitoring**

- Provides education and monitoring

http://www.medtronicdiabetes.com/treatment-and-products/continuous-glucose-monitoring
Health Maintenance and Home Monitoring Devices

- Home sensing devices
- Weight scale
- BP monitor
- Mattress monitors
- Baby monitors
- Spirometer medication monitoring
- Pedometer

http://www.youtube.com/watch?v=R-ypgw03sy0

Health Coaching Tools: Patient Engagement and The Quantified Self

Wearable Computing

• Activity monitors
• 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
## Health Coaching and Personal Health Records

### Personal Health Records and eHealth Hubs

<table>
<thead>
<tr>
<th>PHR System (PHRs)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Microsoft Health Vault</strong> Web Site Disclaimers</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> Web Site Disclaimers</td>
<td>A free standalone PHR system with some options for sharing information with doctors and others.</td>
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<tr>
<td><strong>MyMediConnect</strong> Web Site Disclaimers</td>
<td>A free standalone PHR system with some options for sharing information with doctors and others.</td>
</tr>
<tr>
<td><strong>NoMoreClipboard</strong> Web Site Disclaimers</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> Web Site Disclaimers</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

Health Coaching: Patient Engagement Software

Patient Portals

• Personal health records
• Patient engagement software
• Patient pathways
• Discharge, medication teaching, patient education and pain management.

Smart Homes: The Hospital Beds of the Future

- Video monitoring
- Continuous VS
- Gait sensors
- Smartphone symptom checkers
- Handheld Xray, lab
- Medication adherence dispensers
- Emergency alerts
- Remote temp control & security alarms

Safe Homes
https://www.youtube.com/watch?v=C3FS8-Ka7SU

Hype or Hope?

The Next 10 Years....

Top Technology Trends

• Nanotechnology
• Information Tech
• Networks
• Neurotechnology
• Biotechnology
• Robotics
• Quantum technology

The New Future for Nurses Will Be Driven By:

- Accelerated change
- Fast innovation
- Smart technology
- Predictive systems
- Connected markets
- Digital everything
- Mobile commerce

Image: http://www.accelerationwatch.com/

Emerging Roles

• Expanded scope of practice - APRN
• Digital Care Coordination
• Personalized medicine health consultant
• Population management teams
• Nurse data scientist
• Nurse entrepreneurs

https://thenpmom.wordpress.com/2012/01/01/the-future-of-nursing-a-nurse-practitioners-perspective/
Nursing Informatics Resources

Webinars

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

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

**Part III:** Improving Patient Outcomes and Safety through Electronic Health Records and Clinical Decision Support

**Part IV:** Identifying Nursing’s Unique Contribution to Patient Outcomes Through Standardized Terminologies

Pre-Conferences

[Image of a conference flyer]
# National Nursing Informatics Deep Dive Program

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
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<tbody>
<tr>
<td>Nov. 2014</td>
<td>AACN 2014 Baccalaureate Education Conference, Washington DC</td>
</tr>
<tr>
<td>Jan. 2015</td>
<td>AACN webinar series on nursing informatics (Jan., Feb., March, &amp; April)</td>
</tr>
<tr>
<td>April 2015</td>
<td>Workshop on nursing informatics, University of Mississippi Medical Ctr.</td>
</tr>
<tr>
<td>April 2015</td>
<td>Panel presentation on nursing informatics, Medical World of the Americas Conference, Houston, TX</td>
</tr>
<tr>
<td>May 2015</td>
<td>QSEN 2015 National Forum, San Diego, CA</td>
</tr>
<tr>
<td>June 2015</td>
<td>Nursing Knowledge: 2015 Big Data Science Conference, Minneapolis, MN</td>
</tr>
<tr>
<td>Oct. 2015</td>
<td>American Academy of Nursing Annual Conference, Washington DC</td>
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Nursing Informatics Resources

University of Minnesota National Nursing Informatics Deep Dive Resource Website:


Fundamentals of Nursing Informatics Course

• [https://ay14.moodle.umn.edu/my/](https://ay14.moodle.umn.edu/my/)
Questions?