The Use of Health Information Technology to Improve Care and Outcomes for Older Adults

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Objectives

1. Discuss the use of the EHR and decision support to improve care for older adults.
2. Review current evidence and future trends of remote monitoring systems and discuss practical and ethical implications using examples of ongoing projects and initiatives.
3. Review research opportunities and future directions related to blending care of older adults and health IT.
Three HIT Programs of Research that Improve Care for Older Adults

What research is in the pipeline.
How nurses can get involved
Challenges and new directions.
INTRODUCTION

- Health Information Technology for Economic and Clinical Health (HITECH) Act (Blumenthal, 2010; Institute of Medicine [IOM], 2011)


- Both documents call for the implementation of electronic health records (EHRs) and HIT solutions to improve the safety, quality, and efficiency of care
Three HIT programs of research

• Using the EHR to improve outcomes
• Decision Support
• Telehealth Technology
• Dowding, Turley, and Garrido (2012) evaluated the impact of an integrated EHR in 29 Kaiser Permanente hospitals on process and outcome indicators for patient falls and hospital-acquired pressure ulcers

• EHR use was associated with improved documentation of both fall and pressure ulcer risk assessments

• Improved documentation using the EHR was associated with a 13% decrease in hospital-acquired pressure ulcer rates

• Patient fall rates remained unchanged after EHR implementation

• an integrated EHR that captures data in a structured, coded format and provides clinical decision support, can ensure that all older adults receive evidence-based, personalized care and that nursing documentation is reused to build evidence for future practice
USING THE EHR TO IMPROVE OUTCOMES FOR OLDER ADULTS

- Providing input on which evidence-based assessment and decision-support tools are embedded in the EHR
- The number of malnourished residents significantly decreased after embedding evidence-based assessment tools into the EHR that prompted nutritional and pressure ulcer risk assessments and documentation (Fossum, Alexander, Ehnfors, & Ehrenberg, 2011)
- Data recorded at the individual patient level during an encounter can be used to personalize care for that patient and can be simultaneously applied to spur discovery and innovation for future care delivery for older adults (Greene et al., 2009)
DECISION SUPPORT INTERVENTIONS

• Discharge Planning (Bowles, et al, 2014)
  – implemented the expert discharge decision support system (D2S2) within the hospital nursing admission assessment to identify older adults in need of post-acute care, such as skilled home care or skilled nursing facility care
  – An algorithm generates a daily report sent to discharge planners alerting them of patients at risk for poor discharge outcomes
  – Use of the D2S2 achieved a 26% relative reduction in both 30- and 60-day readmissions
DECISION SUPPORT INTERVENTIONS (Cont’d)

• Symptom management (Cooley et al., 2013)
  – Computable algorithm that adapts research evidence for use in a clinical decision support system, providing individualized symptom management recommendations to clinicians at the point of care
DECISION SUPPORT INTERVENTIONS (Cont’d)

- Advanced care planning (Hickman, et al., 2014)
  - created a multimedia decision support intervention that delivers education about advanced directives to patients recovering from critical illness
  - Brought to the bedside via laptop computer
  - Increased the intent to sign an advanced directive by 25 times
DECISION SUPPORT INTERVENTIONS (Cont’d)

• Pressure ulcer prevention (Beeckman et al., 2013)
  – evaluated whether a decision support system for pressure ulcer prevention improves guideline adherence with pressure ulcer prevention recommendations in a nursing home setting
  – Nurses who used the pressure ulcer prevention decision support were more likely to provide guideline-based pressure ulcer prevention interventions than nurses in the control group who received a paper copy of the practice guidelines
DECISION SUPPORT INTERVENTIONS (Cont’d)

• Fall prevention (Dykes, et al., 2010).
  – illustrates the value of integrating fall risk assessment and clinical decision support into the EHR
  – Researchers learned that communication problems were a barrier to falls prevention
  – RCT of more than 10,000 patients, using HIT to integrate fall risk assessment and clinical decision support for tailored fall prevention plans into the workflow,
  – older patients were more likely to have personalized fall prevention plans and were less likely to fall during an acute hospitalization
Remote Monitoring

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Technology in the Home

• Pervasive, ubiquitous computing is affecting home health care

• Bridge geographic distance, increase access to information and experts
  – In 2003 a total of 556 Medline indexed articles on home care AND technology were published; in 2013 that number rose to 1390.

• Active vs. Passive Technologies in the Home
## Examples

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<thead>
<tr>
<th></th>
<th>Active Monitoring</th>
<th>Passive Monitoring</th>
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<tbody>
<tr>
<td>Physiological Monitoring</td>
<td>Integrated Solutions that can be operated by patients and/or their families and caregivers to measure blood pressure, pulse oximetry, weight etc.</td>
<td>Sensor based tools that passively measure vital signs. Example: Bed sensor that measures respiration, restlessness at night, sleep interruptions</td>
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<tr>
<td>Functional monitoring/ Emergency detection and response</td>
<td>Wearable systems that detect emergencies such as falls</td>
<td>Gait monitors that detect falls or near falls, sensor based systems that detect sedentary behavior</td>
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<tr>
<td>Safety monitoring and assistance</td>
<td>Alarm systems that detect fire or flooding, systems that support hands free communication with safety professionals</td>
<td>Stove sensors (combining heat and motion sensors) to detect and distinguish between meal preparation and having forgotten the stove on for too long</td>
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<td>Security monitoring and assistance</td>
<td>Camera-based monitoring systems that allow for remote monitoring of residential space and visitors</td>
<td>Sensor based system that captures level of activity, number of visitors or if abnormal/unusual patterns of activity are recorded</td>
</tr>
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### Examples (cont.)

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<tr>
<th>Social interaction monitoring and assistance</th>
<th>Use of social network software platforms, social media, using software that assesses self-perceived social connectedness</th>
<th>Sensor based systems that track number of visitors, time inside and outside the home, sedentary behavior</th>
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<tbody>
<tr>
<td>Cognitive and sensory assistance</td>
<td>Technologies that generate alerts and reminders, locators for lost objects, medication dispensing units</td>
<td>Automated features that operate in the background and trigger warnings, alerts and reminders.</td>
</tr>
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![Image of a device](image1.jpg)

![Image of a room](image2.jpg)
Evidence Base

• Growing
• At times contradicting
• Technology developments more rapid than research grant cycles
• Tailoring sometimes prohibitive in research
Lessons Learned

• Technology does not need to be sophisticated to be effective
PISCES

• Problem Solving Intervention to Support Caregivers in End of Life Care Settings

• Use of video to deliver PST

• 3 arm clinical trial (N=500)

http://www.hospice-research.org

Funded by NIH (R01NR012213)
Clinical Trial Record NCT01444027
The ACTIVE Intervention

• Assessing Caregivers in a Team Intervention through Video Encounters
• Family caregivers become team members

Funded by the NIH (R01NR011472)
Lessons Learned

• Technology does not need to be sophisticated to be effective

• Tools to capture what we have always captured, more efficiently and tools to capture new knowledge
Smart Home Study

• Stove sensor
• Sensor mat
• Motion sensors
• HydroSense
• ElectroSense

Funded by:
-NSF-CDI-1028195: Transforming Community-Based Elder Care through Heterogeneous Activity Sensing Analytics
-NSF-CNS-1405682: HomeSHARE - Home-based Smart Health Applications across Research Environments

HIMSS
transforming health through IT
“New” data

- Sleep quality
- Bathroom visits
- Restlessness at night
- Sedentary behavior
- Hygiene patterns
- Meal preparation
- Detecting patterns and deviations from what would be the norm for that participant
Lessons Learned

• Technology does not need to be sophisticated
• Tools to capture what we have always captured, more efficiently and tools to capture new knowledge
• Interface Design
Tailoring hardware and software

Addressing:
• Functional limitations
• Hearing impairment
• Cognitive decline
• Prior experience with computers
• Visual impairment

http://www.health-e.info
My Wellness in October 2011

My Wellness Score Is 81.5/100

My progress over the last 12 months

Dr. Fisher's Note:
Results looking good!
Oct 21, 2011
Hi Laura, I just reviewed the CT result and looks good to me...

Calendar:
- TODAY: Jane's Birthday, 4:30 pm Hair Cut
- TOMORROW: 6 pm Jane's Birthday Party

Next Week:
- MONDAY: 10:30 am Doctor’s Appointment, 12 pm Lunch with Paul, Harry...
- TUESDAY: 7 pm Movies Night
- THURSDAY: 8 pm Happy Hour
- FRIDAY: 11 am Lunch with Amy, Sam, 3 pm Shopping

Messages:
Re: Happy Birthday Jane!
27 mins ago
Thanks, Laura :) I am having a wonderful day. Are you coming...
Lessons Learned

• Technology does not need to be sophisticated to be effective
• Tools to capture what we have always captured, more efficiently and tools to capture new knowledge
• Interface Design
• Understanding Acceptance
Obtrusiveness

• A summary evaluation by the user based on characteristics or effects associated with the technology that are perceived as undesirable and physically and/or psychologically prominent.

Obtrusiveness Framework

Blending the Care of Older Adults and HIT: Research Opportunities and Future Directions

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What is in the nursing research pipeline?

- **Research Portfolio Online Reporting Tools (RePORT):** A central point of access to reports, data, and analyses of NIH research.

http://projectreporter.nih.gov/reporter.cfm
Technology In Home Intervention To Sustain Dementia Patients Dressing Abilities

• Daily dressing struggles are the most common source of dementia caregiver distress

• Intervention: The DRESS System
  – Retrofits in one's ordinary home bureau
  – Provides context-aware affective computing
  – Wireless arm bracelet has imbedded signal sensor that transmits emotional responsiveness of the participant to the DRESS system
  – Offer words that coach and videos that demonstrate dressing tasks
  – Prompts and tailors to individual’s abilities and limitations with attention, initiation of action, and follow-through

Diane F. Mahoney RN, PhD, FAAN, MGH Institute Of Health Professions
EHR-Based Health Literacy Strategy To Promote Medication Therapy Management

- Older patients with chronic disease have difficulty performing routine medication management tasks
- Limited literacy compounds problem and can cause dangerous medication errors and jeopardize treatment efficacy
- **Intervention:** Suite of EHR-based tools to support primary care-based medication therapy management
  - Promote patient understanding of how to use medications
  - Reduce medication discrepancies
  - Improve adherence and improve disease control

Stephen Persell, Northwestern University at Chicago
Health Information Technology To Reduce Healthcare-Associated Infections: HIT-HAI

- HIT holds promise for improving coordination and standardization of clinical care and health outcomes, but its potential is yet to be fulfilled.

- **Intervention:** HIT-HAI, a registry with data from >600,000 patient discharges, that is used to examine the effectiveness of 3 different practices aimed at reducing HAIs.
  1. Adherence to transmission-based isolation precautions for preventing the spread of infections in acute care settings using transmission visualization techniques
  2. Nursing organizational factors (e.g., staffing, skill mix, turnover) on rates and types of HAI among hospitalized patients
  3. Universal contact precautions with standard practice in intensive care units (ICUs) to reduce infection caused by multidrug-resistant organisms (MDROs) and Clostridium difficile

Elaine Larson RN, PhD, Columbia University
How Can Informatics Nurses Get Involved?

• Adopt standardized, evidence-based risk assessments in practice
  – Morse Fall Scale
  – Braden Scale

• Partner with IT departments and vendors to assess, corresponding interventions and patient outcomes are represented in a structured coded fashion in the EHR

Linking evidence-based interventions to assessment data in the EHR will ensure that all patients receive evidence-based care during each encounter and that nurses can build evidence from practice
How Can Informatics Nurses Get Involved?

• Submit risk assessment and outcome data to a national nursing outcomes database
  – National Database for Nursing Quality Indicators (NDNQI)
  – Collaborative Alliance for Nursing Outcomes (CALNOC)
  – Veterans Administration Nursing Outcomes Database (VANOD)
  – Military Nursing Outcomes Database (MiNOD)

Nursing data are needed to support quality benchmarking while contributing to a learning health system that will improve the care of older adults nationally.
Challenges Associated with HIT Research

• Difficult to conduct rigorous evaluation studies of Health IT interventions
  – Consider confounding factors
  – Institute adequate controls to compensate for the lack of randomization

• Informatics interventions are often multifaceted, need evaluation framework to address each facet
  – Type of equipment used
  – Frequency of use and by whom
  – Quality of team communication

• Fidelity of the intervention needs to be captured to understand exposure or “dose”

• Other interventions are occurring simultaneously that could affect outcomes.

• Clinical decision support is applied at population level but requires tailoring at the patient level
The RE-AIM Framework

- **Reach** your intended target population
- **Efficacy** or effectiveness
- **Adoption** by target staff, settings, or institutions
- **Implementation** consistency, costs and adaptations made during delivery
- **Maintenance** of intervention effects in individuals and settings over time

http://www.re-aim.hnfe.vt.edu/index.html
New Directions To Advance the Science of HIT Research

1. Understand how nurses use HIT systems in practice, the factors associated with adoption, and the effect of EHR systems on nursing practice

2. Identify the organizational factors that lead to improved quality and safety outcomes after implementation of an EHR

3. Determine how patient reported data can be captured and used to provide clinical decision support that is aligned with patient preferences

4. Develop HIT interventions that will facilitate the engagement of older adults in their recovery plan within hospital, homecare, and long-term care settings and in maximizing self-management, wellness, and independence as they age at home

5. Expand the settings in which HIT research occurs.
   • More studies needed in homecare and long term care
Discussion

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