

A to Z: A Year in Review 2013

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Conflict of Interest Disclosure

Sarah Collins PhD, RN and Patricia C. Dykes
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Have no real or apparent conflicts of interest to
report.

Learning Objectives

- ▶ Review purpose, objectives, search strategies and associated limitations.
- ▶ Review 2013 nursing informatics research topics, methods, findings and journals.
- ▶ Highlight gaps in nursing informatics research.
- ▶ Discuss opportunities for translating informatics evidence into clinical practice.

Purpose

- ▶ To survey the published literature in the area of nursing informatics using the following criteria:
 - Research (systematic reviews, RCTs, observational & qualitative research, case studies)
 - Informatics
 - Published (including early e-published) in peer-reviewed journal between January 1, –December 31, 2013
- ▶ To describe the corpus of publications collected in terms of:
 - Author country
 - Setting
 - Topic

Search Strategies

- ▶ Database: PubMed
- ▶ Terms: “nursing informatics” combined with keywords “research” and “interprofessional” narrowed to publication dates January 1 – December 31, 2013
- ▶ Inclusion criteria: Research, contributes to nursing informatics knowledge base, prototype development and testing, clinical care delivery focus; informatics
- ▶ Exclusions: Articles that focused on informatics education programs , nursing education, nursing students, competencies

Search Results

Identification

Records identified through database searching (n=153)

Records identified through NENIC membership (n=8)

Records excluded because not research/review or related to nursing education, nursing students, competencies (n= 113)

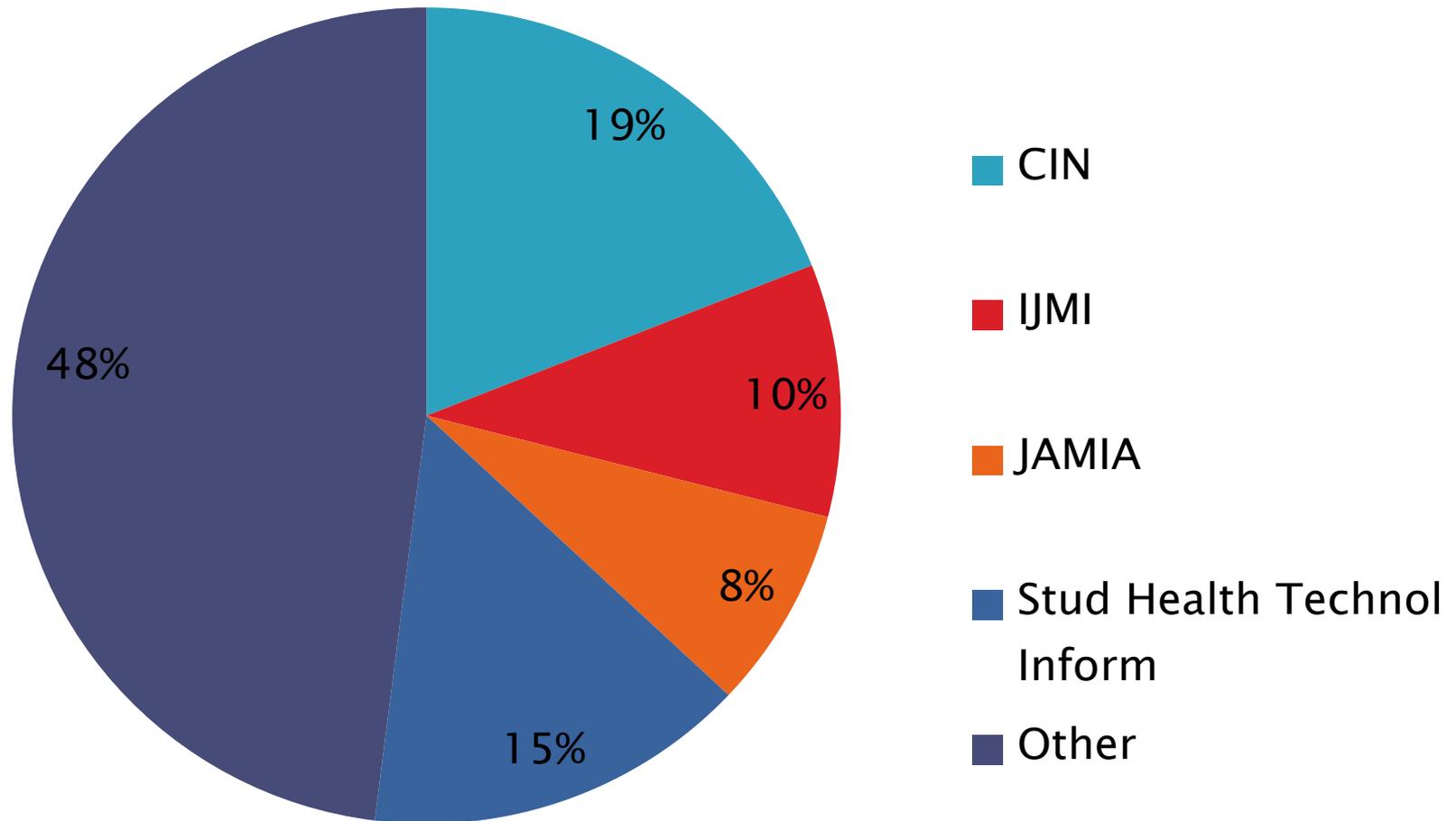
Eligibility

Full text records assessed for eligibility (n=48)

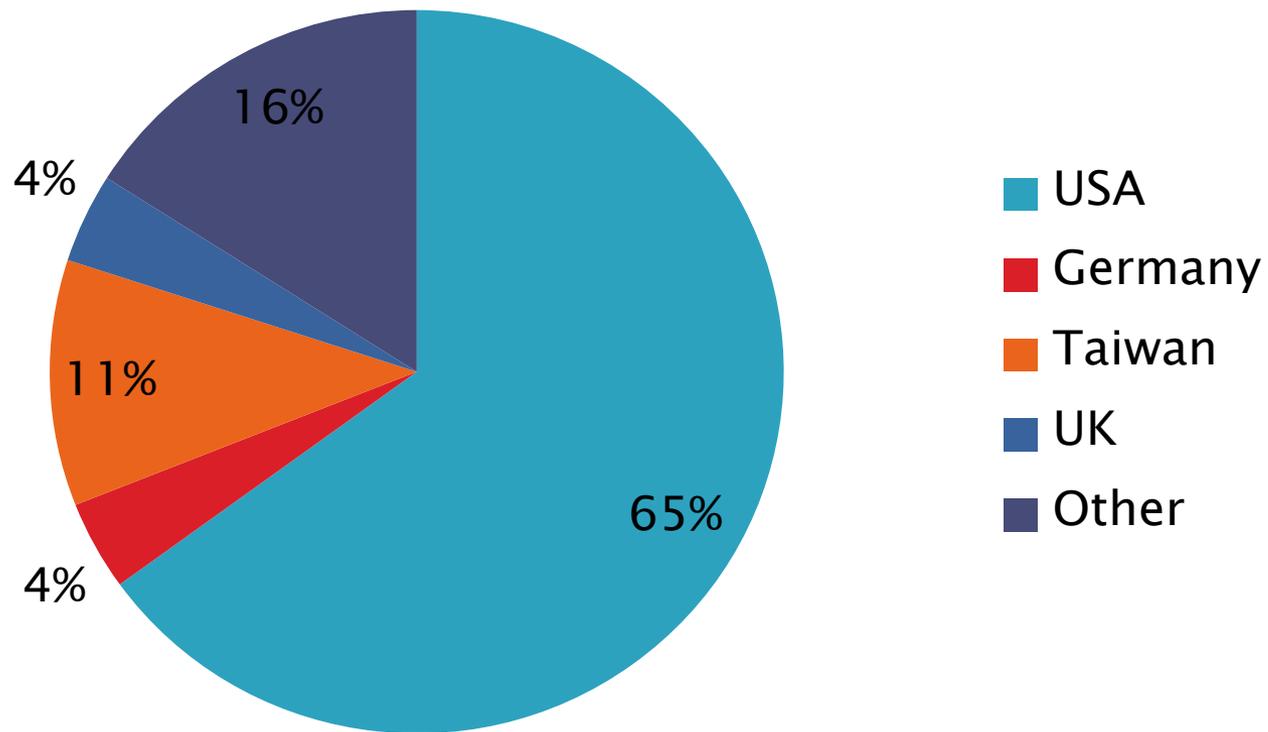
Included

Studies included in evaluation (n=48)

Journals



Countries of First Author



Research Settings and Topics

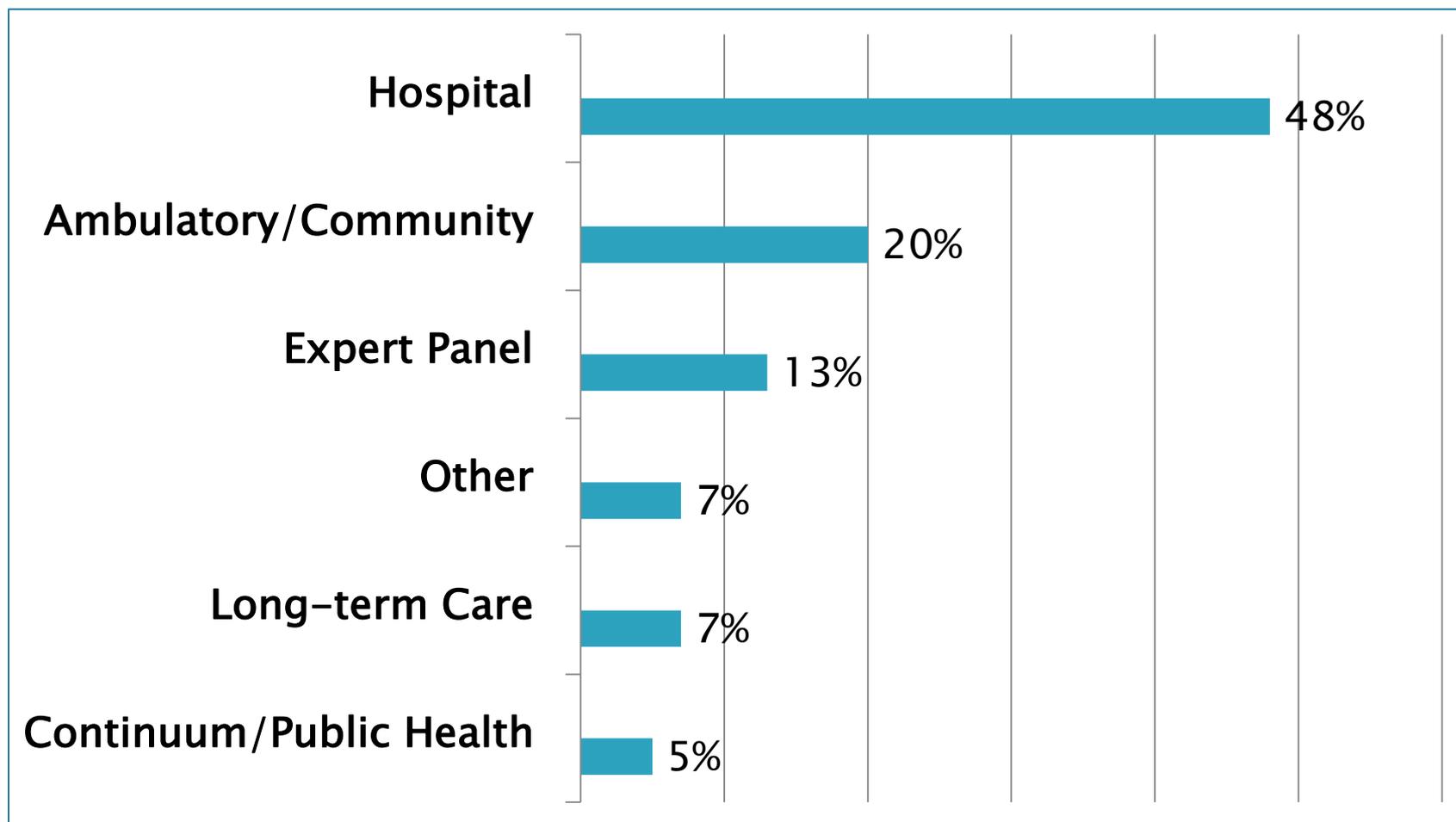
Settings

- ▶ Ambulatory/Community
- ▶ Continuum/Public health
- ▶ Expert panel
- ▶ Hospital
- ▶ Long-term Care
- ▶ Other

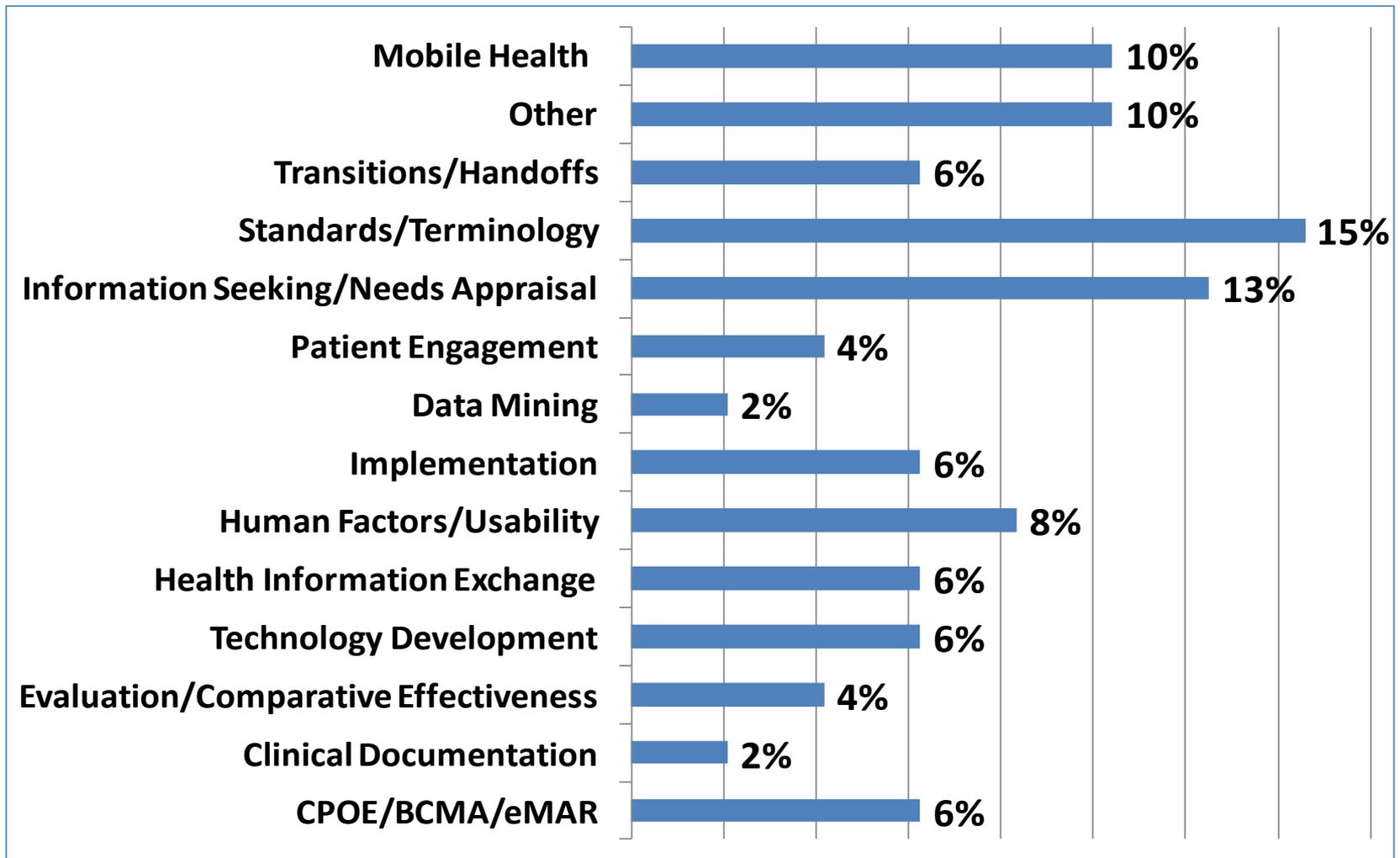
Topics

- ▶ Patient Engagement
- ▶ Information Seeking/Needs /Appraisal
- ▶ Mobile Health
- ▶ Standards/Terminology
- ▶ Data Mining
- ▶ Transitions/handoffs
- ▶ CPOE/BCMA/eMAR
- ▶ Clinical Documentation
- ▶ Evaluation/Comparative Effectiveness
- ▶ Technology Development
- ▶ Health Information Exchange
- ▶ Human Factors/Usability
- ▶ Implementation
- ▶ Other

Research Settings



Research Topics



2013 Highlighted Publications

Patient Engagement

Ronan JP Tailored care management with patient-centered web-based portal in primary health care: sustaining a relational context. *Stud Health Technol Inform.* 2013 183:319-24.

- ▶ **Topic:** Patient Engagement
- ▶ **Purpose:** To discuss relational contexts between patients and primary health care team (i.e., the need for engaged partnerships in patient-centered care delivery) as an antecedent to effective tailored health communications and optimal patient-centered web-based portal sustainability.
- ▶ **Setting:** Primary care
- ▶ **Methods:** Review of conceptual models focused on Relational Context, Tailored Health Communications, and Patient-Centered Web-Based Portals.
- ▶ **Findings:** Relational contexts and tailored health communications publications can inform the development of patient-centered web-based portals
 - ▶ May enhance effective health communications and optimized health outcomes in primary health care practices
 - ▶ This paper argues for dynamic web-based portals that offer communication exchange as opposed to static portals that information only

Information Seeking / Needs / Appraisal

Kelley T, Docherty S, Brandon D. Information Needed to Support Knowing the Patient. *Advances in Nursing Science* 2013 Oct; 36(4):351–363.

- ▶ **Topic:** Information Seeking/Needs/Appraisal
- ▶ **Purpose:** To describe the meaning of knowing the patient and investigate how nurses obtain the information needed to support knowing the patient.
- ▶ **Setting:** 2 pediatric intensive care units in southeastern academic medical center. Hybrid record: paper (notes and MAR) and electronic (documentation, CPOE, results)
- ▶ **Methods:** Descriptive qualitative study was conducted with 12 nurses.
- ▶ **Findings:** Knowing the patient was described as knowing clinical and personal information for individualized care. Information sources included: verbal, paper-based, and electronic tools. Paper-based supportive tools were seen as the most valuable information source for knowing the patient.
- ▶ **Implications:** Future studies should investigate the specific role of paper-based tools in meeting nurses information needs and develop adequate electronic solutions to support nurses in knowing their patients.

Chaudhuri S, Le T, White C, Thompson H, Demiris G. Examining health information-seeking behaviors of older adults. *CIN* 2013 Nov; 31(11):547-53.

- ▶ **Topic:** Information Seeking/Needs/Appraisal
- ▶ **Purpose:** To examine which resources older adults utilize for their health information needs, how trustworthy and reliable they find these resources, and the difficulties they face in obtaining health related information.
- ▶ **Setting:** Older adults in 11 retirement communities in Puget Sound area.
- ▶ **Methods:** 41-item survey designed to understand information-seeking characteristics, based on Health Information National Trends Survey (HINTS).
- ▶ **Findings:** 27% response rate. Greater economic status was associated with greater trust in providers and less desire for information/informed decision-making.
 - ▶ Trust in sources (highest to lowest):
 - ▶ 1) Providers, 2) Pharmacists, 3) Friends/relatives, 4) Retirement community staff, 5) Newspapers, 6) Internet, 7) Television, and 8) Radio
 - ▶ Most common sources: 1) Providers and 2) Internet.
- ▶ **Conclusion:** Older adults have a greater amount of trust in human-based vs. “nonliving” resources. eHealth Literacy efforts should target older adults.

Mobile Health

Albrecht UV, von Jan U, Sedlacek L, Groos S, Suerbaum S, Vonberg RP. Standardized, App-based disinfection of iPads in a clinical and nonclinical setting: comparative analysis. *J Med Internet Res* 2013 Aug 14 ;15(8):e176.

- ▶ **Topic:** Mobile Health
- ▶ **Purpose:** To test the ability of isopropanol wipes to decontaminate iPads
- ▶ **Setting:** Clinical and nonclinical settings
- ▶ **Methods:** Prospective, observer blind, comparative analysis of device disinfection protocol.
 - ▶ 10 iPads used by nurses in a clinical setting and disinfected daily.
 - ▶ 10 iPads used by informaticians in a non-clinical setting and not disinfected
- ▶ **Findings:** 2.7-fold (Mann-Whitney U test, $z=-3.402$, $P=.000670$) lower bacterial load on the disinfected devices.
 - ▶ Disinfection process helps with maintaining a low germ count during use. This should reduce the risk of subsequent nosocomial pathogen transmission.
- ▶ **Limitations:** Due to hospital policy could not have clinical control group that used iPads without any disinfection.
- ▶ **Implications:** Applying a disinfection procedure may lead to losing the manufacturer's warranty for the devices; this remains an unsolved issue.

Hyun S, Hodorowski JK, Nirenberg A, Perocchia RS, Staats JA, Velez O, Bakken S. Mobile health–based approaches for smoking cessation resources. *Oncol Nurs Forum* 2013 Jul ;40(4):E312–9.

- ▶ **Topic:** Mobile Health
- ▶ **Purpose:** To examine nurses' use and perceived usefulness of the National Cancer Institute's Cancer Information Service (CIS) smoking–related resources integrated in a mobilehealth (mHealth) platform.
- ▶ **Setting:** Acute and primary care, targeted at smokers
- ▶ **Methods:** mHealth platform with: (a) CIS integration with mobile decision support, (b) Infobuttons, (c) web–based information portal, and (d) information referral prescriptions. Analyzed system database, log files, CIS data, and usability survey.
- ▶ **Findings:** More than 60% of nurses perceived it as useful or somewhat useful.
 - ▶ Infobutton used 1,571 times
 - ▶ CIS referrals used 122 times, greater than pre–intervention (Quitline =40%, SmokeFree.gov =17%)
- ▶ **Conclusion:** Implementation of evidence into workflow using an mHealth DSS can assist nurses in managing smoking cessation and may expand their roles in referring smokers to reliable information resources.

Standards / Terminology

Thede LQ, Schwirian PM Informatics: the Standardized Nursing Terminologies: a national survey of nurses' experience and attitudes--SURVEY II: participants' perception of comfort in the use of standardized nursing terminology 'labels'. *Online J Issues Nurs* 2013 Mar 25 18(2)

- ▶ **Topic:** Standards/Terminology
- ▶ **Purpose:** To examine nurses' perceptions of ANA recognized terminologies
- ▶ **Methods:** Online survey asking questions such as:
 - ▶ 1. Do you feel comfortable applying the labels using X (terminology)?
 - ▶ 2. Do you feel that the education you received about using X (terminology) was adequate?
- ▶ **Findings:** NANDA/NIC/NOC were most recognized and used.
 - ▶ Nurses working in informatics are more familiar with the terminologies than those in non-informatics specialty.
 - ▶ Educational preparation was less than satisfactory (except CCC and NIC)
 - ▶ <30% of users received any follow-up education (except Omaha System)
 - ▶ > 85% of those who did have follow-up education found it to be helpful
- ▶ **Conclusion:** Just 'using a terminology' is insufficient. Terminologies must be used correctly and with ongoing education.

Jensen R, de Almeida Lopes Monteiro da Cruz D, Gomes LC Jr, Lopes MH. Attributing fuzzy values to nursing diagnoses and their elements: the specialists' opinion. *Int J Nurs Knowl* 2013 Oct; 24(3):134-41.

- ▶ **Topic:** Standards/Terminology
- ▶ **Purpose:** To test the viability of using specialists' opinions to establish degrees of membership between NANDA-I nursing diagnoses and defining characteristics or risk factors based on concepts of fuzzy sets theory.
- ▶ **Methods:** Experts rated relationship between diagnoses and defining characteristics/risk factors (signs and symptoms) using Likert scale
- ▶ **Findings:** 4 matrices of 28 diagnoses and 62 elements were generated. Out of 905 possibilities, 286 relationships were identified and represented in graphs.
- ▶ **Conclusions and Implications:** Successful strategy to identify degrees of membership between nursing diagnoses and elements.
 - ▶ This method could be used to refine and map NANDA-I and standardize the defining characteristics/risk factors.

Data Mining

Collins S, Cato K, Albers D, Scott K, Stetson P, Bakken S, Vawdrey D. Relationship Between Nursing Documentation and Mortality. *Am J Crit Care* 2013 Jul; 22(4):306–313

- ▶ **Topic:** Data Mining
- ▶ **Purpose:** To explore if optional documentation reflects concern about a patient's status and if it might help predict patients' deterioration and mortality.
- ▶ **Setting:** Hospital
- ▶ **Methods:** Mortality rates, frequency of vital sign measurements, and optional nursing comment documentation were analyzed for random set of patients and cardiac arrest patients. Charlson comorbidity index was used for stratification.
- ▶ **Findings:** Patients who died had on average more optional comments (0.9 to 1.5) and more vital signs (6.1 to 10) than patients who survived. A higher frequency of optional documentation was associated with a higher likelihood of arrest. Cardiac arrest patients with more comments were more likely to die.
- ▶ **Recommendations:** Nursing documentation patterns were linked to patients' mortality and with future work could be used in real time to establish a threshold of concern indicating a risk for deterioration in a patient's condition.

Transitions / Handoff

Effken JA, Gephart SM, Brewer BB, Carley KM. Using *ORA, a network analysis tool, to assess the relationship of handoffs to quality and safety outcomes. *CIN* 2013 Jan; 31(1):36–44.

- ▶ **Topic:** Transitions/Handoff
- ▶ **Purpose:** To explore the relationship between handoff communication network characteristics and patient safety, quality, and satisfaction outcome measures
- ▶ **Setting:** 7 units at 3 hospitals, including day and night shifts
- ▶ **Methods:** *ORA, a dynamic network analysis tool to visualize and analyze handoff communication network metrics for day to night shift handoff.
- ▶ **Outcomes:** Patient falls, medication errors, patients' self-reported improvement in simple and complex self-care and symptom management, and patient satisfaction were associated with staff communication patterns.
- ▶ **Findings:** Unique patterns were shown for different types of outcome variables.
 - ▶ Staff communication pattern that facilitates improvement in patients' management of their symptoms may not be the same as one that prevents falls or improves patient satisfaction.

Matney SA, Maddox LJ, Staggars N Nurses As Knowledge Workers: Is There Evidence of Knowledge in Patient Handoffs? *West J Nurs Res* 2013 Jul 25 epub

- ▶ **Topic:** Transitions/Handoff
- ▶ **Purpose:** To determine whether knowledge and wisdom were exchanged during medical and surgical patient care handoffs and to discover how these were expressed.
- ▶ **Setting:** Hospital medical and surgical units
- ▶ **Methods:** Directed content analysis of 93 handoffs using the data/information/knowledge/wisdom framework.
- ▶ **Findings:** Knowledge was present in all handoffs, comprising 41% of the phrases across the two types of units. No wisdom was coded. The percentage and types of knowledge phrases differed between medical and surgical units.
- ▶ **Recommendations:** Handoffs could be more knowledge based by linking handoff content to patient problems and goals. Improved data visualization and cognitive support are needed and may be context-specific.

CPOE/BCMA/eMAR

Glover, N. (2013). Challenges implementing bar-coded medication administration (BCMA) in the emergency room in comparison to medical surgical units. *CIN* 31(3): p. 133–41.

- ▶ **Topic:** BCMA/eMAR
- ▶ **Purpose:** To discuss the varying success in utilization of BCMA on medical-surgical units and in ED
- ▶ **Setting:** Acute Care Hospital (ED/Med-Surg)
- ▶ **Methods:** Utilization report analysis
- ▶ **Findings:** Barriers to BCMA use in ED related to verbal orders, or to documentation of medications distributed by the prescribing providers, alert fatigue, unique nursing workflow in ED. Hardware problems affected all users.

Implementation

Kirkendall ES, Goldenhar LM, Simon JL, Wheeler DS, Spooner AS. (2013). Transitioning from a computerized provider order entry and paper documentation system to an electronic health record: Expectations and experiences of hospital staff. *International J of Medical Informatics* 82(11), 1037–45.

- ▶ **Topic:** Implementation
- ▶ **Setting:** Acute Care Hospital
- ▶ **Purpose:** To examine healthcare worker's perceptions, expectations, and experiences regarding how work processes, patient-related safety, and care were affected with transition from single CPOE system to a full EHR.
- ▶ **Methods:** Information Systems Expectations and Experiences (I-SEE) Survey
- ▶ **Findings:** Respondants were positive about transition and understood the associated goals. Ratings improved over time. The I-SEE survey, when modified based on population, was useful for assessing patient care and safety related expectations and experiences during the transition from one CPOE system to an EHR.

Evaluation / Comparative Effectiveness

Fujino Y, Kawamoto R. (2013). Effect of information and communication technology on nursing performance. *CIN* 31(5):244–50.

- ▶ **Topic:** Evaluation/Comparative Effectiveness
- ▶ **Purpose:** To investigate the influence of information and communication technology (ICT) use and skills on nursing performance.
- ▶ **Setting:** Hospital
- ▶ **Methods:** Survey
- ▶ **Intervention:** Advanced ICT system
- ▶ **Outcome measures:** Skills related to use of information technology; appropriate use of technology
- ▶ **Findings:** Improved nursing performance was associated with use of computers for sending and receiving e-mails, but had negative association with use of cell phones for e-mail and if information and communication technology are inappropriately used. Authors recommend informatics education and it should include information use relating to cell phones and computers.

Technology Development



Dykes PC, Carroll DL, Hurley AC, Benoit A, Chang F, Pozzar R, Caligtan CA. Building and testing a patient–centric electronic bedside communication center. *J Gerontol Nurs* 2013 Jan; 39(1):15–9.

- ▶ **Topic:** Patient Engagement
- ▶ **Purpose:** Development and pilot testing of an electronic bedside communication center (eBCC) prototype to improve access to health information for hospitalized adults and their family caregivers.
- ▶ **Setting:** Hospital
- ▶ **Methods:** Focus groups were used to identify improvements for the initial eBCC prototype developed by the research team. Face–to–face bedside interviews and questions were presented while patients used the eBCC for usability testing to drive further development.
- ▶ **Findings:** The eBCC prototype was considered both easy to use and helpful for accessing tailored patient information during an inpatient hospitalization to receive acute care.
- ▶ **Recommendation:** An iterative, participatory approach with qualitative evaluation is useful to inform development of tools for patient engagement.

Health Information Exchange



Phillips AB, Wilson RB, Kaushal R, Merrill JA. Implementing health information exchange for public health reporting: a comparison of decision and risk management of three regional health information organizations in New York state. *J Am Med Inform Assoc* 2013 Aug 23 Epub.

- ▶ **Topic:** Health Information Exchange
- ▶ **Purpose:** To document the process and outcome of health information exchange use case implementation in three New York regions and to identify assessment criteria and generalizable lessons learned.
- ▶ **Setting:** Community/Public Health
- ▶ **Methods:** Comparative case study using 3-step approach
 - ▶ **Define and design.** Conducted formative phone calls with RHIO/HIE technology vendors to provide background, inform interview guides and site visit agendas.
 - ▶ **Prepare, collect and analyze.** Included site visits/status checks, artifact collection, system specifications, interviews. Qualitative data analysis.
 - ▶ **Comparative analysis** using a software project risk matrix developed by Wallace et. al as organizing framework
- ▶ **Findings:** Many factors increase risk for public technology projects. Leadership/organizational characteristics associated with successful HIE implementation were 1) a strong organizational vision and 2) agile decision-making.
- ▶ **Recommendation:** Strong HIE governance model is needed to minimize risk and maintain stability over the course of the project.

Human Factors / Usability

Balatsoukas P, Ainsworth J, Williams R, et, al. (2013). Verbal protocols for assessing the usability of clinical decision support: The retrospective sense making protocol. *Stud Health Technol Inform* 192:283–7.

- ▶ **Topic:** Human Factors/Usability
 - ▶ **Purpose:** To compare the effectiveness of two types of verbal protocol, concurrent think aloud vs. retrospective sense making, for evaluating the usability of a clinical decision support tool.
 - ▶ **Setting:** NA
 - ▶ **Methods:** Task analysis using two types of verbal protocol
 - ▶ **Findings:** The retrospective protocol more sensitive for recording usability problems related to users' cognitive behavior (i.e., interpretation and comprehension of statistical output, search results and system messages). Retrospective protocol was better able to detect compound usability problems including the cognitive dimensions of users' interactions with the interface.
- Recommendations:** An evidence-based approach should be used for protocol selection.

Other

Walsh C, Siegler EL, Cheston E, O'Donnell H, Collins S, Stein D, Vawdrey DK, Stetson PD (2013). Provider-to-provider electronic communication in the era of meaningful use: A review of the evidence. *J Hosp Med* 8(10):589-97.

- ▶ **Topic:** Technology Development
- ▶ **Purpose:** To assess the impact of provider-to-provider electronic communication tools on communication and healthcare outcomes.
- ▶ **Setting:** Continuum
- ▶ **Methods:** Review
- ▶ **Findings:** Literature describing the effectiveness of provider-to-provider electronic communications is limited and focuses on physicians. The majority of published studies describe electronic specialist referral tools. No published studies of the effectiveness of intra-EHR messaging.

Dowding DW, Currie LM, Borycki E, Clamp S, Favela J, Fitzpatrick G, Gardner P, Hamer S, Hardiker N, Johnson O, Lawton R, O'Brien A, Randell R, Westbrook J, Whitewood–Moore Z, Dykes PC. International priorities for research in nursing informatics for patient care. *Stud Health Technol Inform* 2013 ;192:372–6.

- ▶ **Topic:** Nursing Informatics (NI) research priorities
- ▶ **Purpose:** To outline key findings of a survey exploring international research priorities for nursing informatics.
- ▶ **Setting:** Survey was available online during May–August 2012.
- ▶ **Methods:** Respondents were asked to rate each of 20 listed research topics in terms of priority for NI research.
- ▶ **Findings:** 468 surveys were completed representing six World Health Organization regions. The two most highly ranked areas of importance were: 1) Development of systems to provide real time feedback to nurses, and 2) Assessment of HIT impact on nursing care and patient outcomes.
 - ▶ The lowest ranked research topics were theory development and integrating genomic data into clinical information systems.
- ▶ **Conclusion:** The identification of these priorities should inform future international collaborative research in the field of nursing informatics.

Summary

- In 2013 nursing informatics research was published on a wide variety of topics and in informatics, nursing and health care journals.
- The most common research topic was terminology/standards.

Summary: Nursing Informatics Research Gaps

- Very few research publications related to the following:
 1. Development of systems to provide real-time feedback to nurses and patients
 2. Assessment of HIT impact on nursing and patient outcomes
 - Clinical decision support
 - Communication technologies
 - Data mining

Summary: Nursing Informatics Research Gaps (Methods)

- Methods gap: Evaluation/comparative effectiveness of health IT interventions.
- Measurement gap: “Relevant” patient reported outcomes– what outcomes are important to the patient?

Discussion Questions

- ▶ What studies did we miss?
- ▶ Which of these studies have relevance for your practice?
- ▶ What are the barriers to implementing the findings from these studies?
- ▶ What additional recommendations do you have for future research?

Questions?

Thank You!

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