

# A to Z: A Year in Review Spring 2015–Winter 2016

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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 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)
  - Nursing informatics
  - Published (including early e-published) in peer-reviewed journal between March 1 2015 – February 29 2016
- ▶ To describe the corpus of publications collected in terms of:
  - Author country
  - Setting
  - Topic

# Search Strategies

- ▶ Databases: PubMed and CINAHL
- ▶ Terms: “nursing informatics” combined with keywords “research” and “interprofessional” narrowed to publication dates March 1 2015 – February 29 2016
- ▶ 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, simulation

# Search Results

Identification

Records identified through database searching (n=590)

Records identified through NENIC members (n=17)

Records excluded because duplicates, not research/review or related to nursing education, nursing students, competencies (n=483)

Eligibility

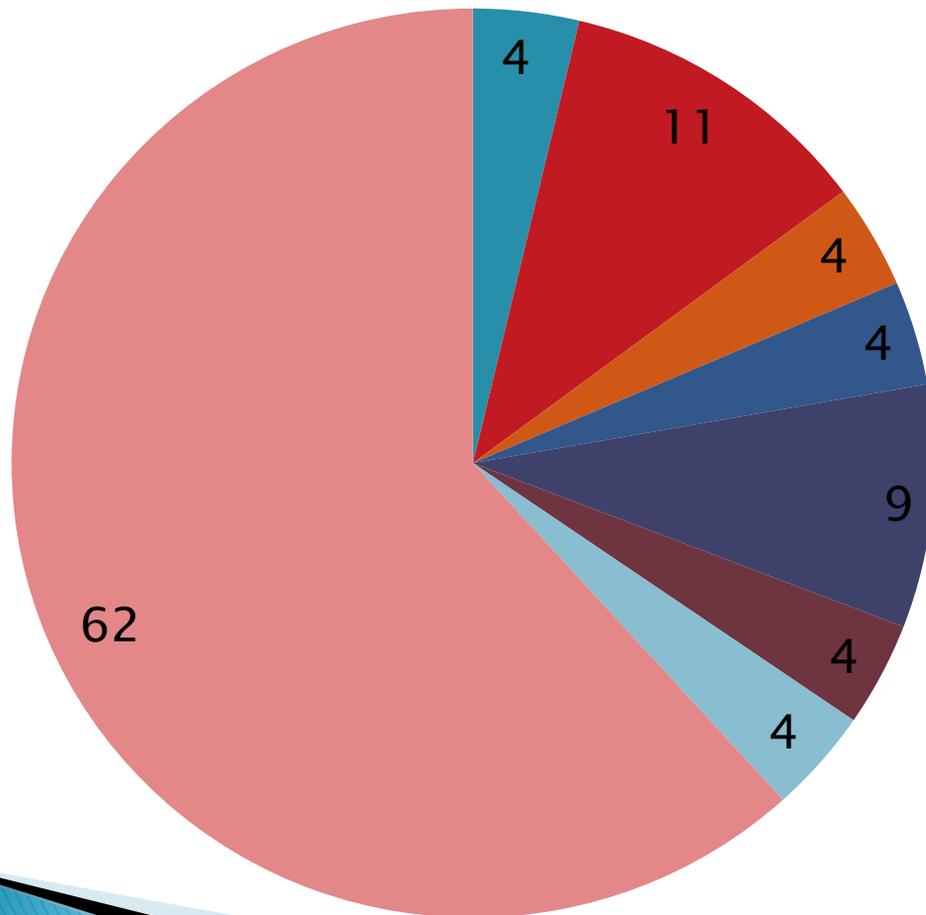
Full text records assessed for eligibility (n=124)

Excluded on full review did not meet criteria (n=43)

Included

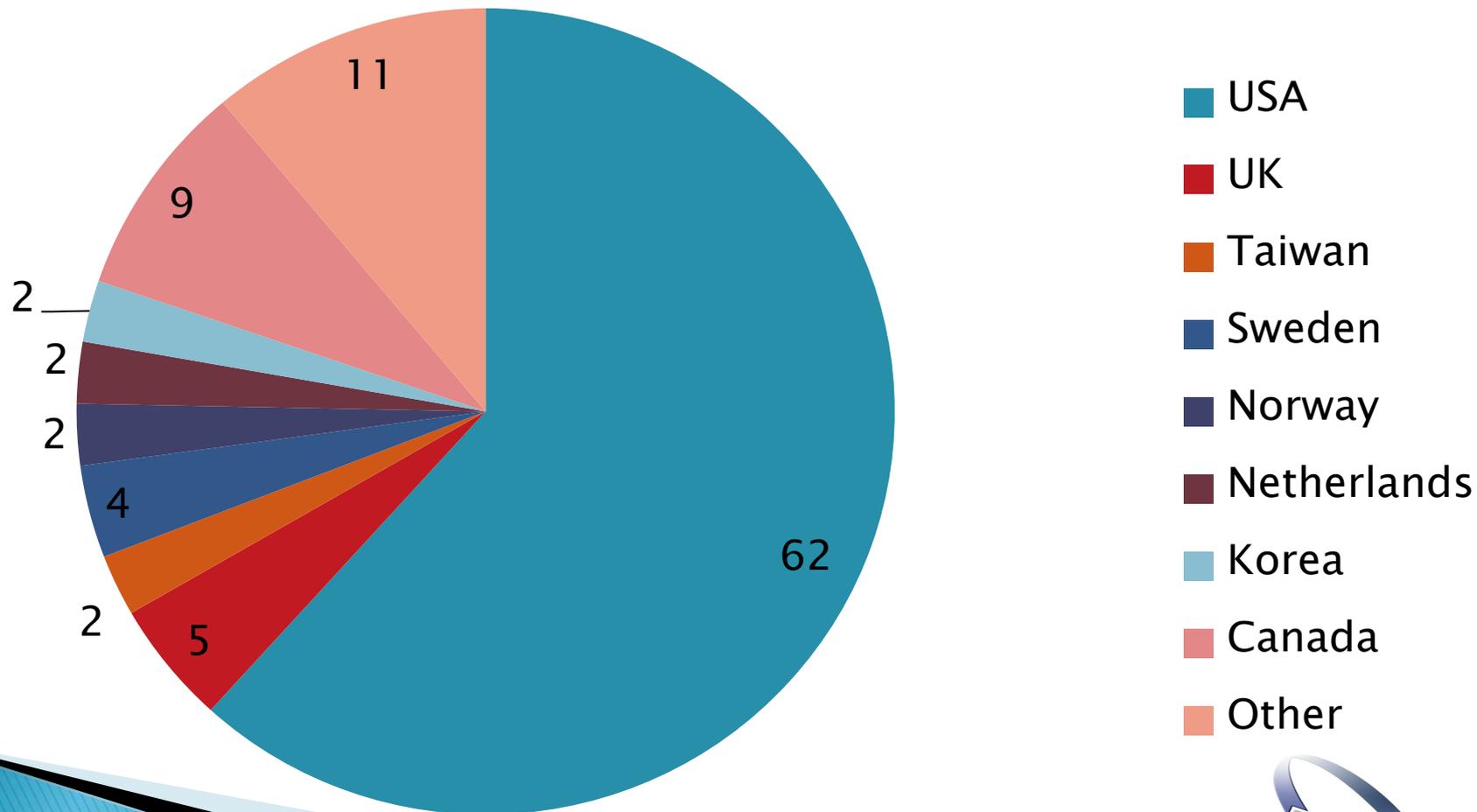
Studies included in evaluation (n=81)

# Journals (%)



- Adv Nurs Sci
- CIN
- Eur J Oncol Nurs
- IJMI
- J Clin Nurs
- JAMIA
- Nurs Res
- Other

# Countries of First Author (%)



# Research Settings and Topics

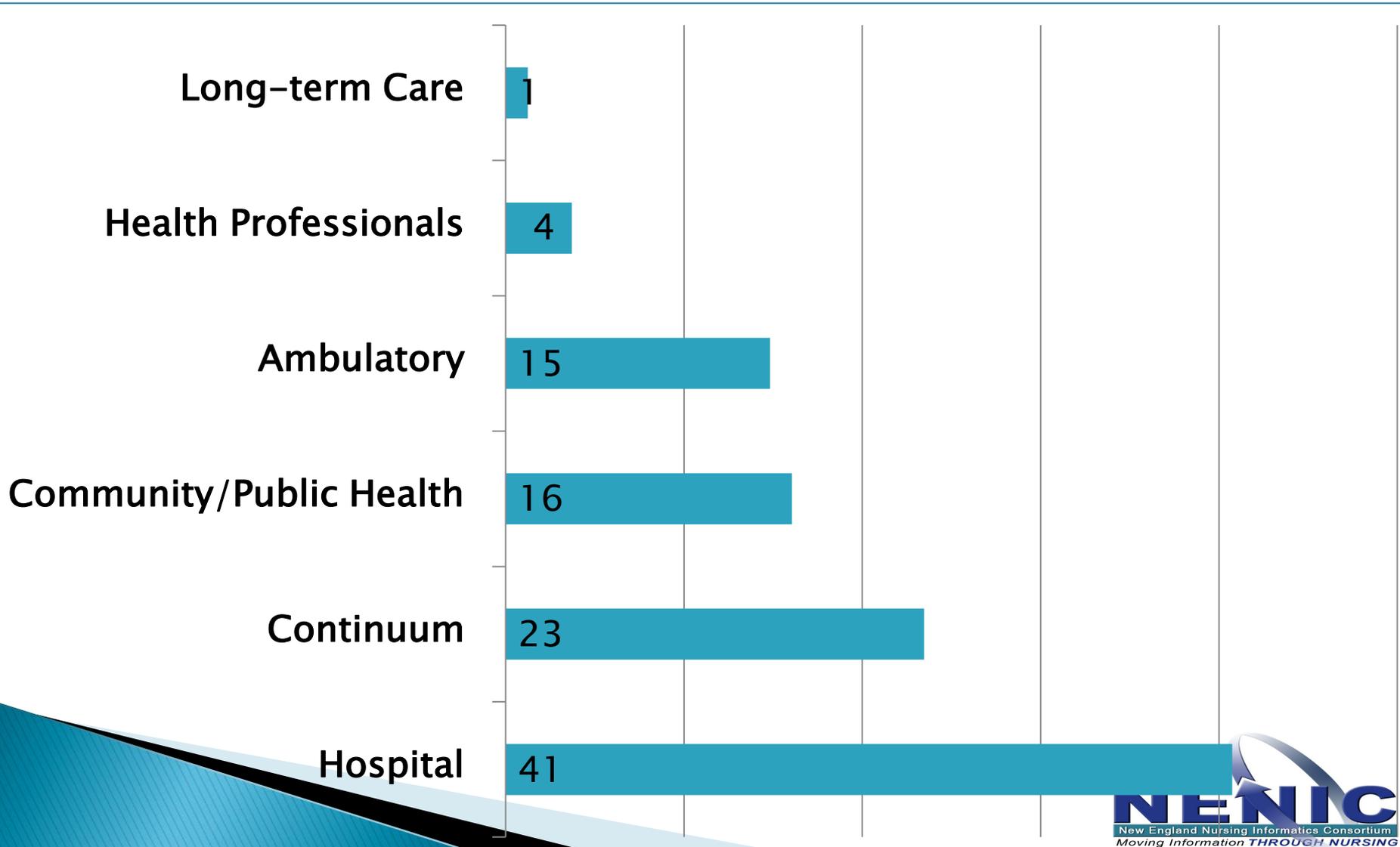
## Settings

- ▶ Ambulatory
- ▶ Community / Public health
- ▶ Continuum
- ▶ Health Professionals / Expert panel
- ▶ Hospital
- ▶ Long-term care
- ▶ Other

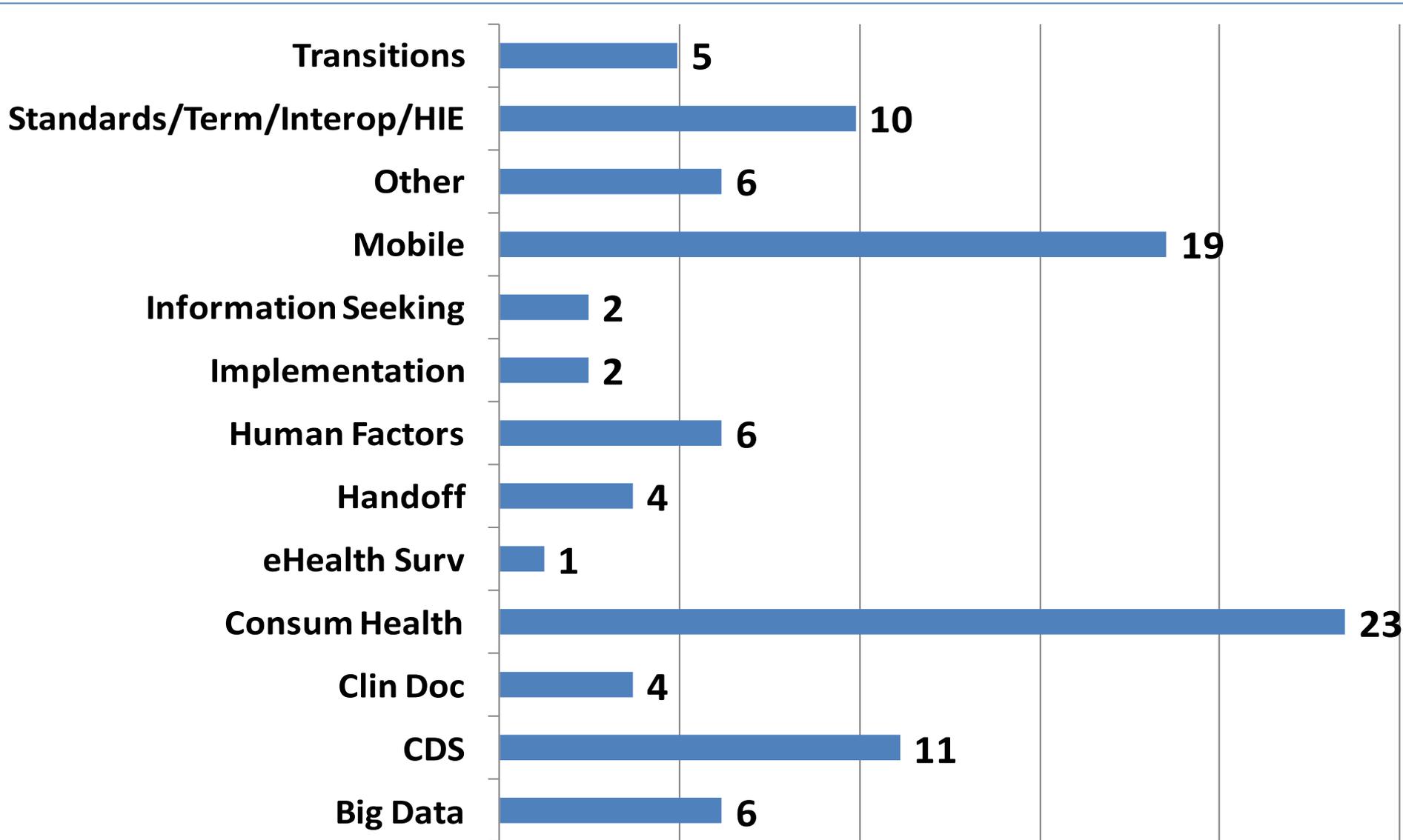
## Topics

- ▶ Handoff
- ▶ Transitions of Care
- ▶ Consumer Health
- ▶ Implementation
- ▶ Clinical Decision Support
- ▶ Human Factors / Usability / Design
- ▶ Standards / Terminology / Interoperability / Health Information Exchange
- ▶ Mobile health (mHealth)
- ▶ ehealth Surveillance
- ▶ Big data
- ▶ Information Seeking / Needs / Appraisal
- ▶ Clinical Documentation
- ▶ Other

# Research Settings %



# Research Topics %



# NENIC Publications (up from 5 in 2015)

1. Cho I, Slight SP, Nanji KC, Seger DL, Maniam N, Fiskio JM, **Dykes PC**, Bates DW. The effect of provider characteristics on the responses to medication-related decision support alerts.
2. Slight SP, Beeler PE, Seger DL, Amato MG, Her QL, Swerdloff M, Dalleur O, Nanji KC, Cho I, Maniam N, Eguale T, Fiskio JM, **Dykes PC**, Bates DW. A cross-sectional observational study of high override rates of drug allergy alerts in inpatient and outpatient settings, and opportunities for improvement.
3. **Whalen, K., Bavuso, K., Bouyer-Ferullo, S., Goldsmith, D., Fairbanks, A., Gesner, E., Lagor, C., Collins, S** Analysis of Nursing Clinical Decision Support Requests and Strategic Plan in a Large Academic Health System
4. **Bouyer-Ferullo S**, Androwich IM, **Dykes PC**. Clinical Decision Support and Perioperative Peripheral Nerve Injury: A Quality Improvement Project.
5. **Gaudet CA**. Electronic Documentation and Nurse-Patient Interaction.
6. Prey JE, Polubriaginof F, Kuperman GJ, Tiase V, **Collins SA**, Vawdrey DK. International perspectives on sharing clinical data with patients.
7. Katsulis Z Ergai A Leung W Schenkeld L Rai A Adelman J Benneyan J Bates DW **Dykes PC** Iterative user centered design for development of a patient-centered fall prevention toolkit.
8. **Collins SA**, Yoon S, Rockoff ML, Nocenti D, Bakken S. Digital divide and information needs for improving family support among the poor and underserved.
9. **Dykes PC**, Stade D, Dalal A, Clements M, **Collins S**, Chang F, Fladger A, Getty G, Hanna J, Kandala R, Lehmann LS, Leone K, Massaro AF, Mlaver E, McNally K, Ravindran S, **Schnock K**, Bates DW. Strategies for Managing Mobile Devices for Use by Hospitalized Inpatients.
10. Stade D, **Dykes P**. Nursing leadership in development and implementation of a patient-centered plan of care toolkit in the acute care setting.
11. Dalal AK, **Dykes PC**, **Collins S**, Lehmann LS, **Ohashi K**, Rozenblum R, Stade D, McNally K, Morrison CR, Ravindran S, Mlaver E, Hanna J, Chang F, Kandala R, Getty G, Bates DW. A web-based, patient-centered toolkit to engage patients and caregivers in the acute care setting: a preliminary evaluation.
12. **Phillips AB**, Merrill JA. Innovative use of the integrative review to evaluate evidence of technology transformation in healthcare.
13. **Schnock KO**, **Dykes PC**, Albert J, Ariosto D, Call R, Cameron C, Carroll DL, Drucker AG, Fang L, Garcia-Palm CA, Husch MM, Maddox RR, McDonald N, McGuire J, Rafie S, Robertson E, Saine D, Sawyer MD, Smith LP, Stinger KD, Vanderveen TW, Wade E, et al. The frequency of intravenous medication administration errors related to smart infusion pumps: a multihospital observational study.
14. **Collins SA**, Alexander D, Moss J. Nursing domain of CI governance: recommendations for health IT adoption and optimization.
15. Harris MR, Langford LH, Miller H, Hook M, **Dykes PC**, Matney SA. Harmonizing and extending standards from a domain-specific and bottom-up approach: an example from development through use in clinical applications.
16. Gesner E, **Collins SA**, Rocha R. Pain Documentation: Validation of a Reference Model.
17. **Collins S**, Gesner E, Morgan S, Mar P, Maviglia S, Colburn D, Tierney D, Rocha R. A Practical Approach to Governance and Optimization of Structured Data Elements.

# Spring 2015 – Winter 2016 Highlighted Publications

# Transitions

# Yeaman B, Ko KJ, Alvarez Del Castillo R. Care Transitions in Long-term Care and Acute Care: Health Information Exchange and Readmission Rates. *Online J Issues Nurs*. 2015 Sep 30;20(2):5.

- ▶ **Topic:** Transitions
- ▶ **Purpose:** To describe a pilot project using HIT and secure messaging in Long Term Care (LTC) to facilitate electronic information exchange during care transitions
- ▶ **Methods:** Five LTC facilities were included, all located within Oklahoma and serviced by the same regional health system. The study duration was 20 months, with 6 month pre-intervention baseline data collection. CCO Health Information Exchange transmits data using HL7 standard in secure messaging system via Cerner Direct to transmit structured documents. Implemented an electronic clinical documentation tool (CDT) with CDS alerts for change in patient status, SBAR (Situation/Background/Assessment/Recommendation) documents, and universal transfer form (UTF). The CDT used in the study is a lightweight-hosted electronic point-of-care documentation tool that is wall mounted outside of a resident's room. CDT could be sent to the state's HIE, LTC facilities were also able to access the state HIE
- ▶ **Findings:** 83% of transfers used CDT tools. Inpatient readmission (33.6% to 12.5%) and return emergency department (ED) visit (85.3% to 14.1%) rates were lower than baseline following implementation.
- ▶ **Implications:** Easy to use, convenient system is critical for real-time documentation of early signs and symptoms that can be used to alert appropriate personnel to prevent and facilitate care transitions.

# Melby L, Brattheim BJ, Helles , R. Patients in transition – improving hospital–home care collaboration through electronic messaging: providers' perspectives. *J Clin Nurs*. 2015 Dec;24(23–24):3389–99.

- ▶ **Topic:** Transition
- ▶ **Purpose:** To explore how the use of electronic messages support hospital and community care nurses' collaboration and communication concerning patients' admittance to and discharges from hospitals.
- ▶ **Methods:** Descriptive, semi–structured interviews with hospital nurses and community care nurses. Thematic analysis related to three main topics: e–messaging: efficiency, quality, and safety. These topics were further divided into sub–themes.
- ▶ **Sample:** 41 participants from one hospital and three adjacent communities.
- ▶ **Findings:**
  - Electronic messaging is more efficient (less time–consuming)
  - Writing electronic messages raises awareness of content of the information exchanged
    - More conscious communication than oral communication
  - Electronic messaging enables improved information security, but depends on nurses using the system as intended
- ▶ **Implications:** Information and communication technologies can support nurses' work in the transition situations, and this is likely to benefit the patients.

# Standards / Terminology / Interoperability / Health Information Exchange

Harris MR, Langford LH, Miller H, Hook M, Dykes PC, Matney SA. Harmonizing and extending standards from a domain-specific and bottom-up approach: an example from development through use in clinical applications. J Am Med Inform Assoc. 2015 May;22(3):545-52

- ▶ **Topic:** Standards/Terminology/ Interoperability/ Health Information Exchange
- ▶ **Purpose:** Collaborative project to develop common information models, terminology bindings, and term definitions based on nursing documentation systems, and to carry the findings through to the adoption in standards development organizations (SDOs) and technical implementations in clinical applications.
- ▶ **Methods:** Nursing flowsheet documents from six large organizations were analyzed to generate common information model & terminologies that:
  - Fully expressed documentation across all systems
  - Sufficient for evidence-based decision support, reporting, and analysis.
- ▶ **Findings:** Identified significant gaps in existing standards. The models and terminologies were submitted to and incorporated by standards development organizations, published, implemented, and now serve as a foundation for an eMeasure.

Table 2: Mapping of concepts to standard terminologies

	Concepts in models (n)	Present in terminologies (n)	New requests (n)	Requests denied or withdrawn (n)	Concepts identified by SDO (n)
SNOMED CT	320	261	59	Two denied	5
				Four withdrawn	
LOINC	87	29	58	0	0
LOINC Panels	12	4	8	0	0
Total	419	294	125	6	5

- ▶ **Implications:**
- ▶ Standards do not yet fully address needs for detailed clinical data (e.g., CDS, reporting, analytics).
- ▶ Documentation artifacts can be used in a bottom-up approach to develop common models and sets of terms that are complete from the perspective of clinical implementation.

# Filipova AA. Health Information Exchange Capabilities in Skilled Nursing Facilities. *Comput Inform Nurs.* 2015 Aug;33(8):346–58.

- ▶ **Topic:** Standards/Terminology/ Interoperability/ Health Information Exchange
- ▶ **Purpose:** To analyze health information exchange at skilled nursing facilities for clinical functions, the benefits and barriers, and the facility characteristics associated with health information exchange capabilities. **Methods:** Cross-sectional survey of nursing home administrators
- ▶ **Findings:** 39.30% response rate (156/397). Highest level of electronic exchange for clinical functions was intra-facility exchange, and more prevalent in for-profit skilled nursing facilities.

Frequency of Health Information Exchange of Clinical Functions (N = 156)

Function/Application	Within Facility Electronic Information Sharing	Within Corporation/ Affiliated Organization Electronic Information Sharing	Send and/or Receive and Integrate Electronic Information with Nonaffiliated Provider	No Electronic Information Sharing Capabilities
Resident (patient) demographics	48.7 (76)	30.1 (47)	3.2 (5)	18.0 (28)
Advance directives	26.9 (42)	14.8 (23)	1.9 (3)	56.4 (88)
Recent medical history	31.4 (49)	17.3 (27)	3.2 (5)	48.1 (75)
Clinical notes and observations	39.7 (62)	19.3 (30)	3.2 (5)	37.8 (59)
Lists: problems <sup>a</sup> , allergies, meds	46.2 (72)	19.9 (31)	3.8 (6)	30.1 (47)
MDS assessment <sup>b</sup>	48.7 (76)	26.9 (42)	10.9 (17)	13.5 (21)
Non-MDS assessments	42.3 (66)	14.7 (23)	2.6 (4)	40.4 (63)
Care plans	54.5 (85)	21.2 (33)	0.6 (1)	23.7 (37)
Summary reports (discharge, transfer, consults)	35.3 (55)	20.5 (32)	1.9 (3)	42.3 (66)
Lab orders and results	21.8 (34)	14.7 (23)	7.1 (11)	56.4 (88)
Radiology orders and results	23.1 (36)	15.4 (24)	6.4 (10)	55.1 (86)
Diagnostic test orders and results other than radiology and labs <sup>c</sup>	20.5 (32)	14.1 (22)	5.8 (9)	59.6 (93)
Medical orders/e-prescribing	26.9 (42)	12.8 (20)	3.2 (5)	57.1 (89)
Public health reporting (eg, tuberculosis)	16.7 (26)	8.9 (14)	7.1 (11)	67.3 (105)

Data are presented as % (n).

<sup>a</sup>Problem list (eg, resident diagnoses, conditions, and limitations requiring facility evaluation, treatment, and monitoring).

<sup>b</sup>MDS assessments/resident assessment protocols (RAPs).

<sup>c</sup>Diagnostic tests other than radiology or labs (eg, lung function, stress tests).

- ▶ **Identified barriers:** financial, technological, and connectivity
- ▶ **Identified benefits:** faster and accurate billing, improved care planning, and improved quality of documentation

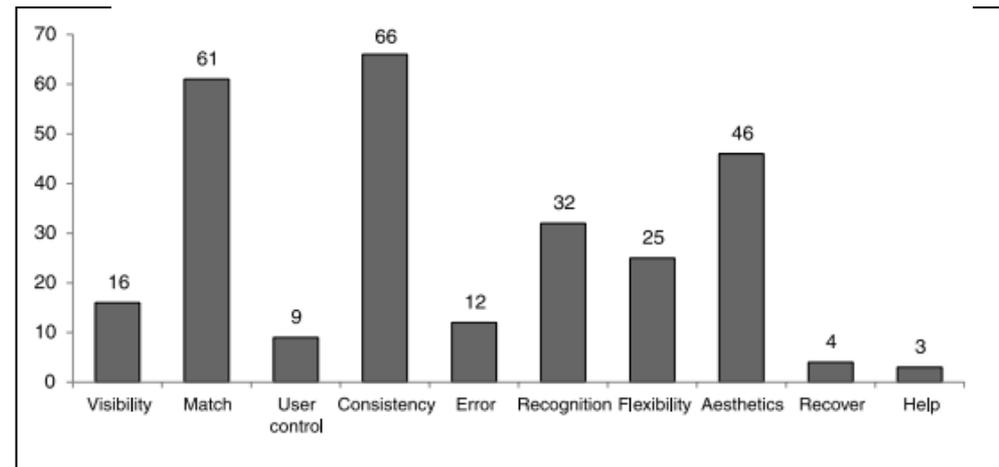
# Mobile Health



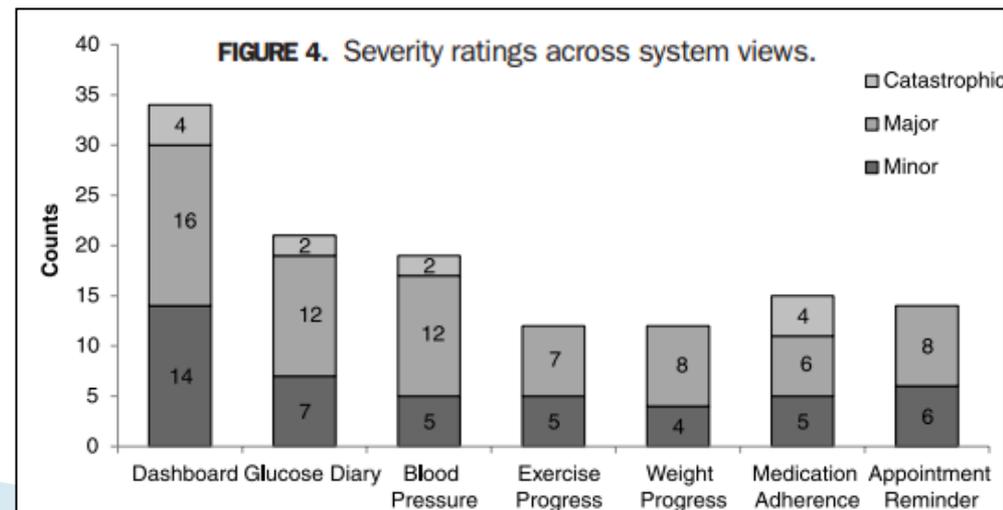
# Georgsson M, Staggers N, Weir C. A Modified User-Oriented Heuristic Evaluation of a Mobile Health System for Diabetes Self-management Support. *Comput Inform Nurs.* 2016 Feb;34(2):77-84.

- ▶ **Topic:** Mobile Health
- ▶ **Purpose:** Usability evaluation of a mobile health system for diabetes patients
- ▶ **Methods:** Modified heuristic evaluation technique of (1) dual-domain experts (healthcare professionals, usability experts), (2) validated scenarios and user tasks related to patients' self-care, and (3) in-depth severity factor ratings. [Nielsen J., Heuristic evaluation, 1994]
- ▶ **Findings:** 129 usability problems with 274 heuristic violations for the system.
- ▶ **Implications:** Consumer health systems and applications in mHealth should be evaluated for usability as well as medical adequacy. Demonstrated fast, resource-efficient and user-oriented heuristic evaluation method.

**FIGURE 3.** Frequencies of heuristic violations by heuristic category.



**FIGURE 4.** Severity ratings across system views.



# DeKoekkoek T, Given B, Given CW, Ridenour K, Schueller M, Spoelstra SL. mHealth SMS text messaging interventions and to promote medication adherence: an integrative review. J Clin Nurs. 2015 Oct;24(19-20):2722-35.

- ▶ **Topic:** Mobile Health
- ▶ **Purpose:** Integrative review of the evidence for mobile health Short Message Service text messages as an innovative and emerging intervention to promote medication adherence. Literature gap of evidence in guiding theories and content of text messages used in clinical practice.
- ▶ **Methods:** Searched CINAHL, Excerpta Medica dataBASE, Scopus, the Cochrane Library and PubMed were searched for relevant studies between 2004-2014.
- ▶ **Results:** 13 articles met inclusion criteria. “Doses” ranged widely: 3/day to 1 every 3 months. Adherence measured via self-report, Rx refill, Rx bottle opened. 9/13 studies found adherence rates improved between 15.3—17.8% when using text messages to promote medication adherence. Text messages that were standardised, tailored, one- or two-way and timed either daily to medication regimen, weekly or monthly showed improvement in medication adherence.
- ▶ **Implications:** Established a scientific basis for text messages as an intervention to improve medication adherence across multiple diseases. Future RCTs needed.

# Kleinpell R, Barden C, Rincon T, McCarthy M, Zapatochny Rufo RJ. Assessing the Impact of Telemedicine on Nursing Care in Intensive Care Units. Am J Crit Care. 2016 Jan;25(1):e14–20.

- ▶ **Topic:** Mobile Health
- ▶ **Purpose:** To conduct a national benchmarking survey of nurses working in intensive care telemedicine facilities in the United States.
- ▶ **Methods:** 2-phased study: 1) online survey to assess nurses' perceptions of intensive care telemedicine, and 2) modified 2-round Delphi study to identify priority areas.
- ▶ **Findings:** 1213 respondents "agreed" to "strongly agreed" that using tele-intensive care enables them to:
  - Accomplish tasks more quickly (63%)
  - Improves collaboration (65.9%)
  - Improves job performance (63.6%)
  - Improves communication (60.4%)
  - Useful in nursing assessments (60%)
  - Provides more time for patient care (45.6%)
- ▶ **Benefits** => trend vital signs, detect unstable status, medical management, and enhance safety
- ▶ **Barriers** => technical problems, interruptions in care, perceptions telemedicine as interference, and staff attitudes.

**Table 4**

**Most important priority areas of care for tele-intensive care unit (ICU) nursing<sup>a</sup>**

1. Critical thinking skills
2. Expert clinician with ICU experience
3. Skillful communication
4. Mutual respect for bedside and tele-ICU colleagues
5. Emergency patient care management
6. Monitor for unstable physiological status
7. Knowledge of ventilator management
8. Correlation of arterial blood gases to mechanical ventilation
9. Knowledge of hemodynamic monitoring
10. Understanding laboratory values
11. Knowledge of medications
12. Monitor trends in vital signs
13. Use the tele-ICU system to enhance patient safety
14. Ability to interact with multiple disciplines
15. Ability to mentor

<sup>a</sup> As ranked by 60 tele-ICU nurses in a modified 2-round Delphi.

Dykes PC, Stade D, Dalal A, Clements M, Collins S, Chang F, Fladger A, Getty G, Hanna J, Kandala R, Lehmann LS, Leone K, Massaro AF, Mlaver E, McNally K, Ravindran S, Schnock K, Bates DW. Strategies for Managing Mobile Devices for Use by Hospitalized Inpatients. AMIA Annu Symp Proc. 2015; 2015: 522–531

*Recipient of Harriet H. Werley Award*

- ▶ **Topic:** Mobile Health
- ▶ **Purpose:** To describe the device-related decisions and challenges faced including device and accessory selection, integration, information and device security, infection control, user access, and ongoing operation and maintenance.
- ▶ **Requirements:**
  - ▶ Device type and accessories
    - ▶ BEDSIDE access to devices
    - ▶ Patient/care partner access to PHI and ability to communicate with the team
    - ▶ Devices connection to Partners secure wireless network
  - ▶ Device storage and user access
    - ▶ Easy access at all times (bed, chair, couch)
    - ▶ Easy to charge
    - ▶ Does not increase risk for adverse events (falls, infections)
  - ▶ Device and information security
  - ▶ Infection control procedures
    - ▶ Will not increase risk for infection
    - ▶ Devices must not be taken in/out of room for cleaning/processing (Albrecht, 2013)



Enterprise Mobile Device Management Solution

- Locked devices in Kiosk mode
- Controlled assignment of device to users
- Managed compliance policies
- Tracked devices centrally

# Human Factors / Usability

Kent B, Redley B, Wickramasinghe N, Nguyen L, Taylor NJ, Moghimi H, Botti M. Exploring nurses' reactions to a novel technology to support acute health care delivery. *J Clin Nurs*. 2015 Aug;24(15-16):2340-51.

- ▶ **Topic:** Human Factors/Usability
- ▶ **Purpose:** To explore nurses' reactions to new novel technology for acute health care
- ▶ **Methods:** Exploratory descriptive design to capture nurses' immediate impressions of novel technology. Four focus groups (52 nurses from medical and surgical wards at two hospitals in Australia; one private and one public).
- ▶ **Findings:** Wide variation across sites. Challenging reactions => perceived threat to clinical skill, and the potential capability of the novel technology to capture their clinical workflow. Enabling reactions => visions tool could help integrate care between departments; support of nursing processes; and coordinate care
- ▶ **Implications:** Nurse engagement in design

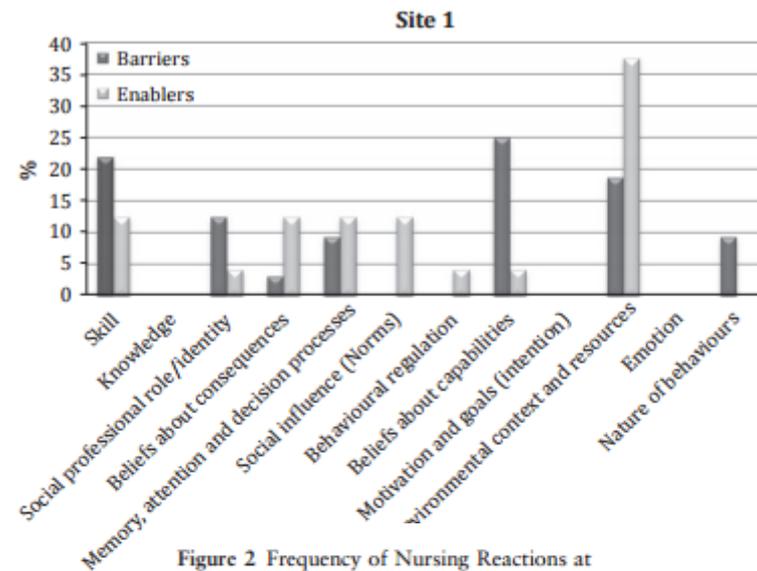


Figure 2 Frequency of Nursing Reactions at Site 2 aligned with the theoretical domains framework (Michie *et al.* 2005).

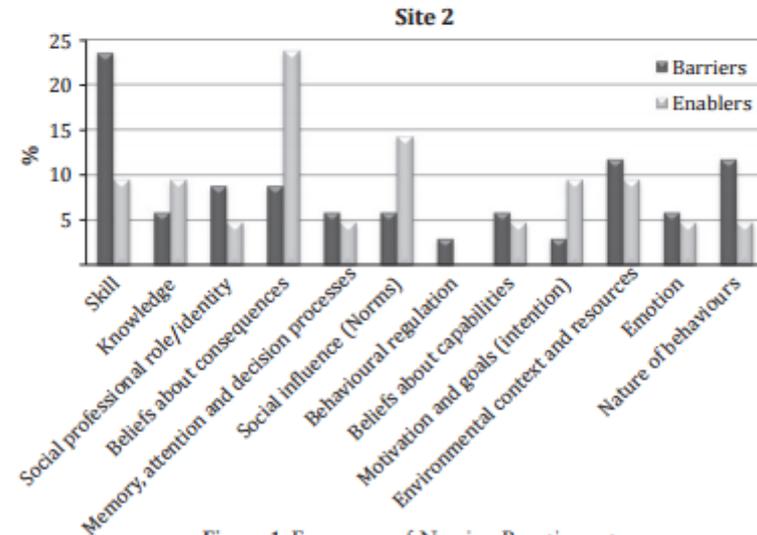


Figure 1 Frequency of Nursing Reactions at Site 1 aligned with the theoretical domains framework (Michie *et al.* 2005).

# Baggott C, Baird J, Hinds P, Ruland CM, Miaskowski C. Evaluation of Sisom: A computer-based animated tool to elicit symptoms and psychosocial concerns from children with cancer. Eur J Oncol Nurs. 2015 Aug;19(4):359-69

- ▶ **Topic:** Human Factors/Usability
- ▶ **Purpose:** Assess participants' reports of symptom occurrence using Sisom application compared to a standard symptom checklist and determine the time requirements, ease of use, and perceived usefulness of the Sisom tool by children with cancer and their parents
- ▶ **Methods:** 100 dyads of patients 7-12 years of age and their parents. Child and parent participants completed both Sisom and the Memorial Symptom Assessment Scale. Symptoms on the two tools were compared and 20 items were similar to allow for comparisons.
- ▶ **Findings:** Children reported a significantly higher number of 20 symptoms using Sisom as compared to the checklist (i.e., 6.8 versus 4.9 symptoms,  $p < 0.001$ ). A similar pattern was noted for parental proxy reports (i.e., 8.7 versus 5.7 symptoms,  $p < 0.001$ ). Sisom was completed in less than 30 min, with high ratings of ease of use and perceived usefulness from parent participants.
- ▶ **Implications:** Sisom provides a systematic and engaging method to elicit symptom reports from children for use in clinical care and research.

# Handoff

# Drach–Zahavy A, Hadid N. Nursing handovers as resilient points of care: linking handover strategies to treatment errors in the patient care in the following shift. *J Adv Nurs*. 2015 May;71(5):1135–45

- ▶ **Topic:** Handoffs
- ▶ **Purpose:** To examine the relation between the strategies the nurses employ during handover and the number and types of treatment errors in patient care in the following shift.
- ▶ **Methods:** Prospective study. 200 randomly selected handovers in five internal wards from 2012–2013. Handover strategies previously adopted from High Reliability Organizations were assessed via observations; treatment errors – dosage discrepancy, order postponed, no documentation – captured from the patient's files and demographical data were collected via questionnaires.
- ▶ **Findings:** Average 20% of a patient's records included inaccurate medication dosage; in 30% of records a care order was fulfilled late; and ~50%, documentation was partially missing. Handover strategies varied substantially.

**Table 2** Negative binomial regression analysis for predicting number of treatment errors (N = 200).

Variables	Model 1: controls		Model 2: direct effects	
	B	SE	B	SE
Departing nurse's tenure	-0.010	0.02	-0.275	0.03
Patient's complexity score	-0.115	0.28	0.162	1.04
Ward	0.606*	0.43	0.822**	0.27
Face-to-face verbal update with interactive questioning			-0.842*	1.45
Update from practitioners other than the outgoing			-0.721**	0.79
Limit interruptions during update			-0.136	0.62
Topics initiated by incoming and outgoing			-0.801**	0.81
Include outgoing team's stance on care plans			-0.742**	0.35
Outgoing writes summary prior to handover			-0.432*	0.40
Outgoing participated in medical round			-0.117	0.73
Incoming check medical equipment			-0.363	1.32
Log likelihood Δ	-		10.57**	
d.f.	3		11	

\*P < 0.05; \*\*P < 0.01.

# Anderson J, Malone L, Shanahan K, Manning J. Nursing bedside clinical handover – an integrated review of issues and tools. J Clin Nurs. 2015 Mar;24(5–6):662–71

- ▶ **Topic:** Handoff
- ▶ **Purpose:** Review available literature that supports implementing bedside clinical handover in nursing clinical practice and identify key issues.
- ▶ **Methods:** Integrated literature review of 45 articles.
- ▶ **Findings:** A number of clinical handover mnemonics are available that provide structure to the process. Areas such as confidentiality, inclusion of the patient/carer and involving the multidisciplinary team remain issues for practitioners in implementing good clinical handover practices.
- ▶ **Implications:** Remains a lack of literature available about the transfer of responsibility and accountability during clinical handover and auditing practices of the clinical handover process. Nurses were more concerned about confidentiality issues than were patients. Multidisciplinary approaches were recommended by a few authors, but research indicated they were poorly implemented. The use of a structured tool was strongly supported; however, no one singular tool was considered suitable for all clinical areas.

# Consumer Health

Prey JE, Polubriaginof F, Kuperman GJ, Tiase V, Collins SA, Vawdrey DK. International perspectives on sharing clinical data with patients. *Int J Med Inform.* 2016 Feb;86:135–41.

## Overview of Patient Information Sharing by Country

	Maturity of Pt Engagement	Government Involvement	Patient Portal Strategy	National Patient Identifier
Europe	Emerging–established	Moderate–major	Institutional–National	Yes (except Switzerland)
Asia	Limited – established	None– minor	Institutional–Regional	Yes (except Japan)
S. America	Emerging	None–moderate	Limited–Institutional	Yes (except Brazil)
N. America	Established	Moderate–major	Institutional–Regional	Yes (Canada) No (USA)
Australia	Established	Major	National	Yes
Africa	Limited	None	None	Yes

de Jong CC, Ros WJ, van Leeuwen M, Schrijvers G. Exploring the effects of patients taking a vigilant role in collaborating on their e-medication administration record. *Int J Med Inform.* 2016 Apr;88:18-24.

- ▶ **Topic:** Consumer health and Patient Engagement
- ▶ **Purpose:** To investigate whether the quality of the eMAR improves when patients use a patient communication tool linked to their eMAR (eMAR-PCT) to communicate asynchronously with the pharmacist about errors.
- ▶ **Methods:** Polypharmacy patients ( $\geq 5$  medications) randomly selected and invited to use their eMAR-PCTs. Participants received 2 digital questionnaires assessing health and self-care (week 0 and 26). Statistical analyses were performed on two subgroups: eMAR-PCT users and non-users.
- ▶ **Findings:** 43.5% ( $n = 152$ ) of invited participants accepted (56% women). Among the eMAR-PCT users, 75% logged in more than once, and 17.9% communicated asynchronously with the pharmacist. No improvement in the quality of the eMAR was found. The self-care variables self-efficacy ( $p = .006$ ) and collaboration with the pharmacist ( $p = .021$ ) improved more in the users group.
- ▶ **Implications:** Modest patient participation; more work needed to better understand why some patients choose not to participate in these types of evaluations.

Asiodu IV, Waters CM, Dailey DE, Lee KA, Lyndon A. Breastfeeding and use of social media among first-time African American mothers. *J Obstet Gynecol Neonatal Nurs*. 2015 Mar-Apr;44(2):268-78.

- ▶ **Topic:** Consumer Health
- ▶ **Purpose:** To describe the use of social media during the antepartum and postpartum periods among first-time African American mothers and their support persons.
- ▶ **Methods:** A qualitative critical ethnographic research design. African American participants recruited from community-based, public health, and home visiting programs (n=14 Pregnant women; n=8 support persons).
- ▶ **Findings:** Frequently used social media for education and social support. Searched Internet for perinatal and parenting information. Most participants reported using at least one mobile application during perinatal period. Participants recalled many facts re: infant development. Did not recall information about feeding.
- ▶ **Implications:** Social media are an important vehicle to disseminate infant feeding information; however, they are not currently being used to full potential. The increasing popularity and use of social media platforms offers the opportunity to create more innovative, targeted mobile health interventions for infant feeding and breastfeeding promotion.

Constantino RE, Braxter B, Ren D, Burroughs JD, Doswell WM, Wu L, Hwang JG, Klem ML, Joshi JB, Greene WB. Comparing Online with Face-to-Face HELPP Intervention in Women Experiencing Intimate Partner Violence. *Issues Ment Health Nurs*. 2015 Jun;36(6):430-8.



FIGURE 1. WHO Ecological Model: A conceptual framework.

on on Safety, and Legal  
ng IPV survivors.

d to: 1)Online (ONL),  
ures: anxiety,  
vention was offered  
ack).

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C participants  
and (2) decreased

to be feasible,  
rticipants in the WLC  
delivery modes (e-

Gartrell K<sup>1</sup>, Trinkoff AM, Storr CL, Wilson ML. Electronic Personal Health Record Use Among Nurses in the Nursing Informatics Community. *Comput Inform Nurs.* 2015 Jul;33(7):306–14.

- ▶ **Topic:** Consumer Health–Nurses Use of Electronic Personal Health Records (ePHRs)
- ▶ **Purpose:** To examine the personal adoption of ePHRs by nurses.
- ▶ **Methods:** Survey disseminated to members of the AMIA and HIMSS Nursing Informatics listservs. Multiple logistic regression used to identify factors associated with ePHR use.
- ▶ **Findings:** 72% of 183 respondents were ePHR users. Nurse characteristics associated with electronic PHR use:
  - older (aged >50 years)
  - highly educated (72% master's or doctoral degrees)
  - hold positions as clinical informatics specialists or chief nursing informatics officers
  - healthcare providers used electronic health records
  - less concerned about privacy of health information online
- ▶ **Implications:** Informatics nurses with expertise in and enthusiasm for the ePHRs can promote the adoption and use among healthcare providers and patients and influence design to address barriers to use.

# Implementation

Bowers AM, Goda K, Bene V, Sibila K, Piccin R, Golla S, Dani F, Zell K. Impact of Bar-code Medication Administration on Medication Administration Best Practices. *Comput Inform Nurs*. 2015 Nov;33(11):502–8.

► **Topic:** Implementation Evaluation

Types of Medical Errors by Implementation Period



	Total (n = 70)	Postimplementation (n = 40)	Preimplementation (n = 30)	P
Type of medication event				.65
Wrong time	34 (48.6%)	20 (50.0%)	14 (46.7%)	
Wrong medication	6 (8.6%)	2 (5.0%)	4 (13.3%)	
Wrong dose	19 (27.1%)	11 (27.5%)	8 (26.7%)	
Wrong route	11 (15.7%)	7 (17.5%)	4 (13.3%)	

- **Implications:** Several limitations of the technology may have impacted findings. The dispensing cabinet and eMAR databases were not in sync so nurses were required to check eMAR when removing meds and did this <50% of the time. Nurses relied on handwritten notes re: meds/dose/route.

# Clinical Documentation

Piscotty RJ Jr, Kalisch B, Gracey-Thomas A. Impact of Healthcare Information Technology on Nursing Practice. *J Nurs Scholarsh*. 2015 Jul;47(4):287-93.

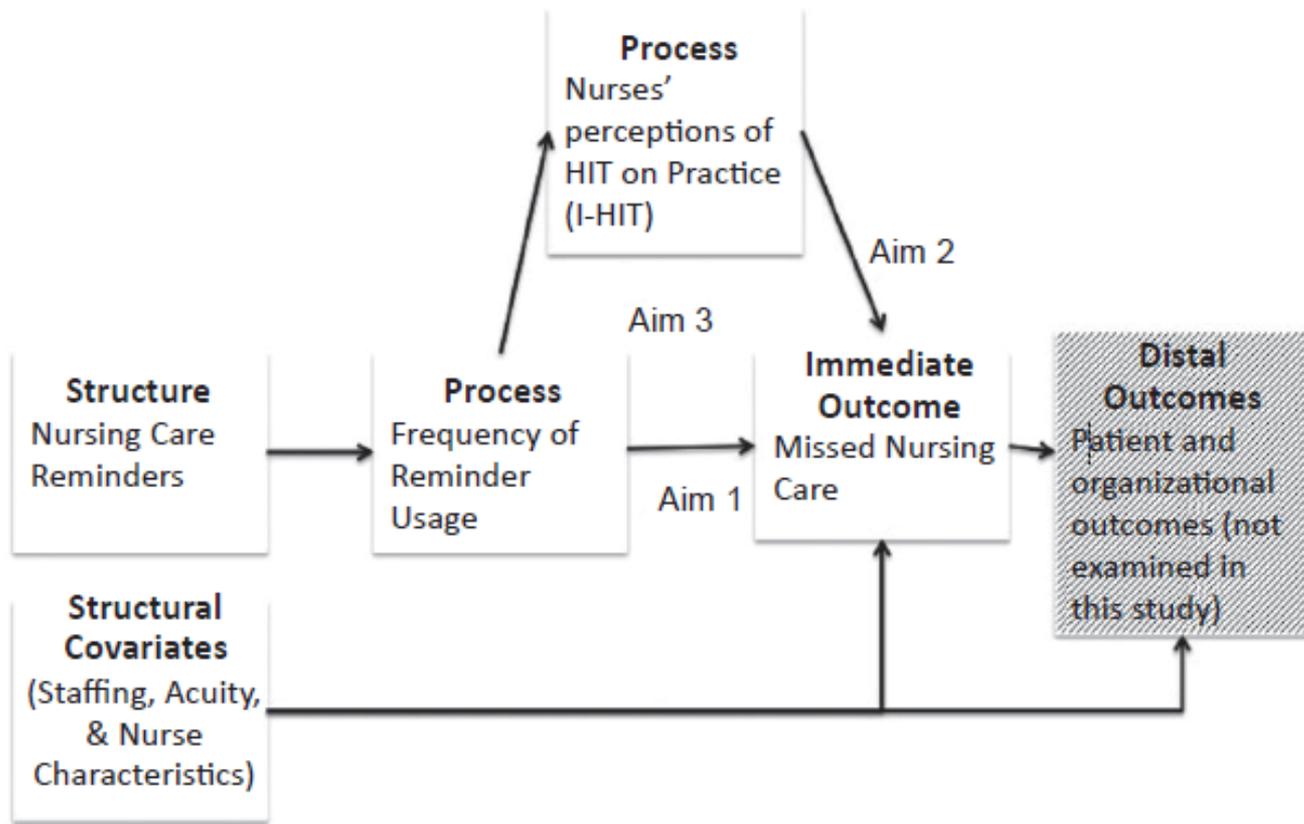


Figure 1. Modified structure process outcome model.

are information  
n electronic nursing care

teaching hospital in  
nders Usage and the

the outcome variable,  
e mediator variable  
care information

I nursing care ( $t = -$   
*care. With IHIT present,*  
 $70, p = .48$ ). Thus, the

nursing care when  
t least one of the  
ed nursing care.

on technology mediates  
sing care. Perceptions

# Clinical Decision Support

# Bouyer–Ferullo S, Androwich IM, Dykes PC. Clinical Decision Support and Perioperative Peripheral Nerve Injury: A Quality Improvement Project. *Comput Inform Nurs.* 2015 Jun;33(6):238–48; quiz E1.

Medications Catheters /Tubes & **Nursing Assessment** Hysteroscopy

Pre Procedure  
e

dressing location

Intraop x-ray taken?  Yes  No

Counts  
Lead protection for patient during intraoperative x-ray?  Yes  NA Lead protection describe site

Intraop  
Type of protection

Was tissue and implant documentation sheet completed  Yes  N/A

Specimens  
MORE  
↓

Post procedure  
Report given/transport to  PACU  Day Surgery  ICU  Other Other description

Surgical Safety Checklist  
Peripheral Nerve Injury Reminder: Document your interventions

ACT Results  
Post-Procedure nursing note

Time shortcuts From:

Whalen K., Bavuso K, Bouyer–Ferullo S, Goldsmith D, Fairbanks A, Gesner E, Lagor C, Collins S. Analysis of Nursing Clinical Decision Support Requests and Strategic Plan in a Large Academic Health System. *Applied Clinical Informatics*. 2016; 7 (2): 227–237.

### Data Information Knowledge Wisdom Categorization Results for Nursing CDS Requests

Framework Concepts	Request Rates (n/total)	Examples
Data	4% (2/46)	Medication information/Micromedix
Information	56% (26/46)	Alerts pertaining to lab values that affect medication administration
Knowledge	33% (15/46)	CDS that recommends evidence-based nursing interventions to the operating room nurse.
Wisdom	7% (3/46)	Sepsis alert
Total	100% (46/46)	

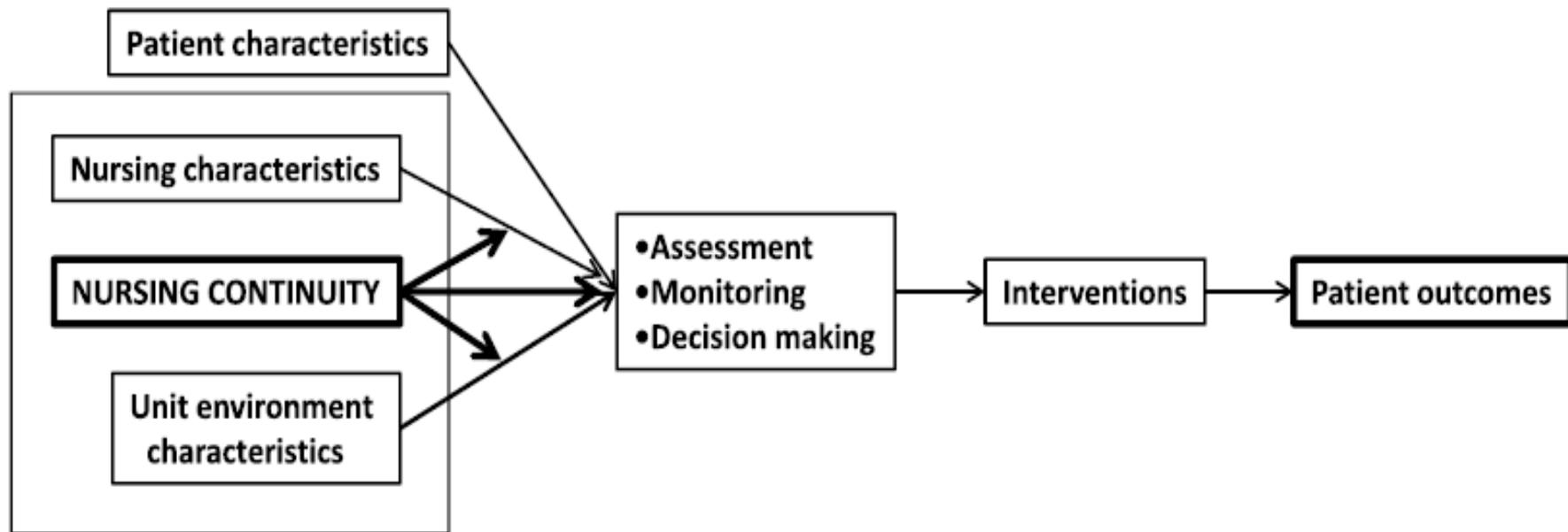
**Data**

**Facilitate Data Capture**

**Fig. 1** Nursing CDS needs along the Data-Information-Knowledge-Wisdom (DIKW) Framework

# Big Data

Stifter, J, Yao Y, Lodhi MK, Lopez KD, Khokhar A, Wilkie DJ, Keenan GM. Nurse Continuity and Hospital-Acquired Pressure Ulcers: A Comparative Analysis Using an Electronic Health Record "Big Data" Set. *Nursing Research* 2015 Sep-Oct;64(5):361-71.



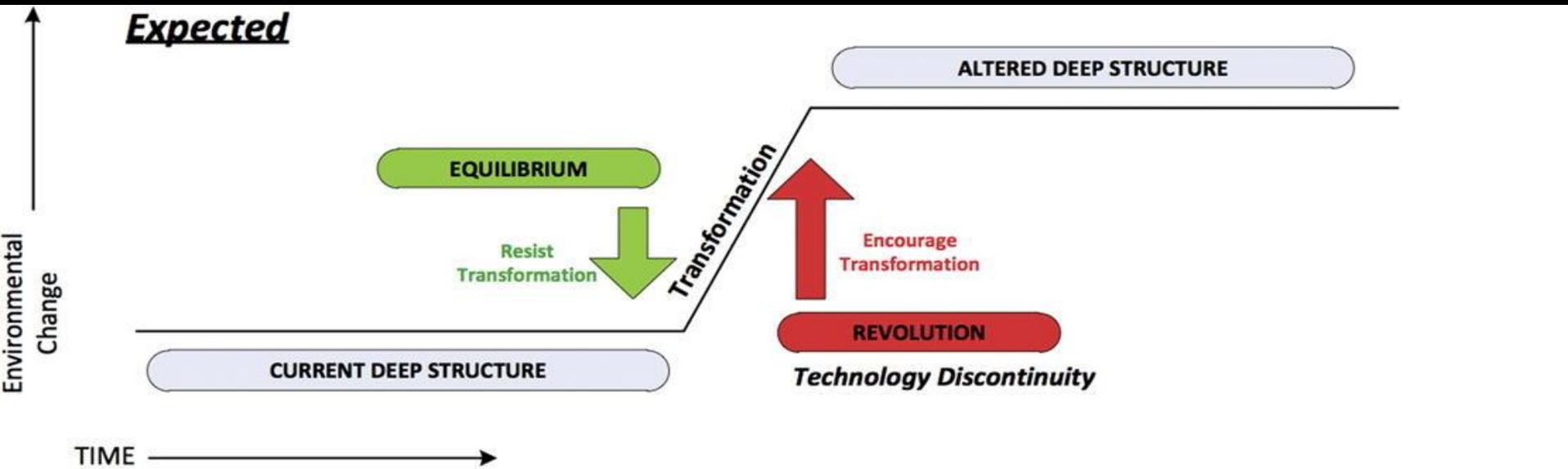
Potential care day



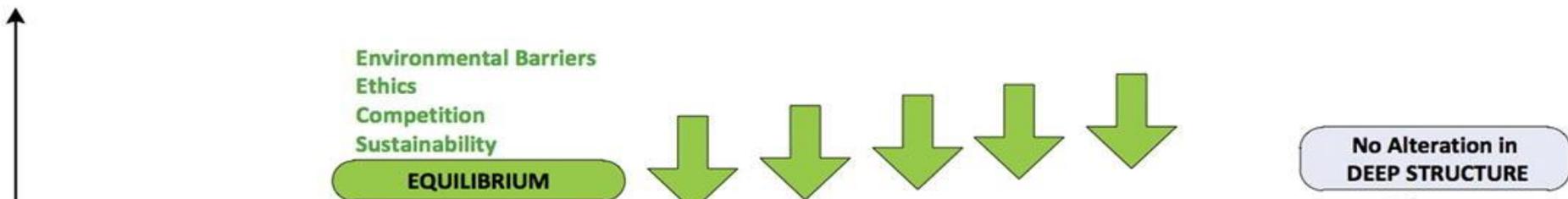
Consecutive care day

# Other

Phillips AB, Merrill JA. Innovative use of the integrative review to evaluate evidence of technology transformation in healthcare. *J Biomed Inform.* 2015 Dec;58:114–21.



**Observed**



# Summary

- ▶ In Spring 2015– Winter 2016 nursing informatics research was published on a wide variety of topics and in informatics, nursing and health care journals.
- ▶ The 3 most common research topics were Consumer Health, Mobile Health, and Standards/Terminology/HIE.
- ▶ Fewer studies published on Transitions/Handoff, Human Factors/Usability.
- ▶ Continued trend towards “mainstreaming” of informatics literature
- ▶ More diversity in research settings (↑Ambulatory,↑Continuum,↓Hospital)
- ▶ More contributions by NENIC members to informatics research literature!

# Summary: NENIC Contribution

- ▶ More research related to Clinical Decision Support for nurses to close the gap identified in 2015:
  1. Bouyer-Ferullo S, Androwich IM, Dykes PC. **Clinical Decision Support and Perioperative Peripheral Nerve Injury: A Quality Improvement Project.**
  2. Cho I, Slight SP, Nanji KC, Seger DL, Maniam N, Fiskio JM, Dykes PC, Bates DW. **The effect of provider characteristics on the responses to medication-related decision support alerts.**
  3. Slight SP, Beeler PE, Seger DL, Amato MG, Her QL, Swerdloff M, Dalleur O, Nanji KC, Cho I, Maniam N, Eguale T, Fiskio JM, Dykes PC, Bates DW. **A cross-sectional observational study of high override rates of drug allergy alerts in inpatient and outpatient settings, and opportunities for improvement.**
  4. Whalen, K., Bavuso, K., Bouyer-Ferullo, S., Goldsmith, D., Fairbanks, A., Gesner, E., Lagor, C., Collins, S. **Analysis of Nursing Clinical Decision Support Requests and Strategic Plan in a Large Academic Health System**

# Summary: Nursing Informatics Research Gaps

- ▶ Very few research publications related to the following:
  1. Rigorous evaluation of the impact of HIT on nursing care and patient outcomes
  2. Big data

# 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?
- ▶ What opportunities exist for multisite evaluation studies now that many organizations have implemented EHRs?

# Questions?

# Thank You!

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