

## Are Nurses Happier After an Electronic Health Record Is Implemented at a Nurse-Managed Practice for the Elderly?

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## Importance of Health Information Technology (HIT) Evaluation

- Federal funding to increase EHR adoption
- Need for improved implementation, reporting of HIT evaluation studies<sup>1,2</sup>
- EHR evaluations are sparse in literature
  - ✓ Few, inconclusive studies of nursing HIT
  - ✓ CPOE studies: EHR induce change

1 Dobrev, 2008  
 2 Ammenwerth, 2004

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## Evaluating EHR in a Nurse-Managed Geriatric Practice

- Patients with 5+ chronic conditions: 68% Medicare, 17% annual health care spending
- HIT can avoid uncoordinated care: adverse drug events; duplicate services
- PACE: Program for All Inclusive Care for Elders
  - ✓ Community-based, managed care
  - ✓ 17,000 members nationally, 61 sites, 29 states

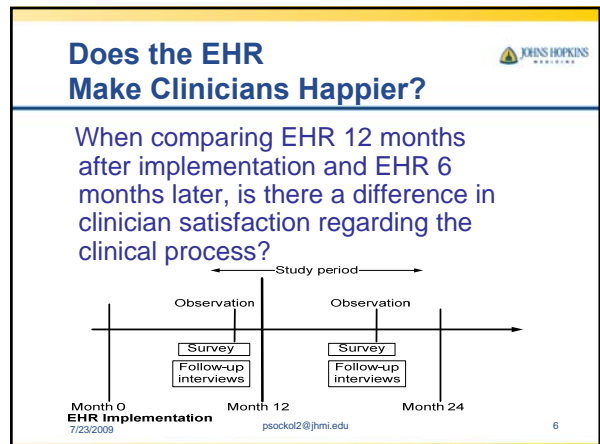
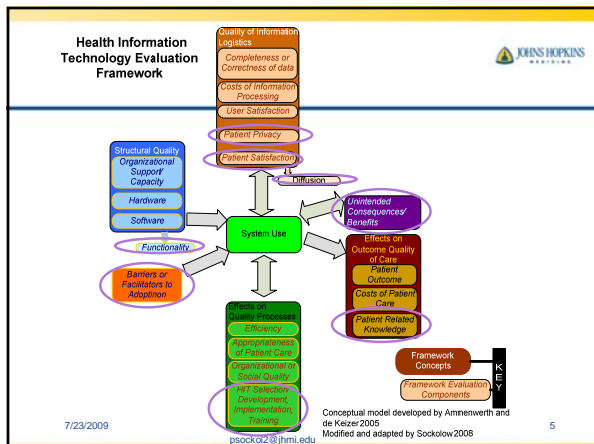
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## Goals

- **PACE site**
  - ✓ Implement EHR to improve clinical operation to maintain quality of care with increasing membership
- **Research**
  - ✓ Assess clinician satisfaction with impact of EHR on clinical process
    - HITREF: evidence-based Health Information Technology Reference-based Evaluation Framework<sup>3</sup>
    - HITREF operationalized as clinician survey

<sup>3</sup> Sockolow, Crawford, Lehmann (in review)

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## Study Setting, Population

- PACE site
  - ✓ Sole nurse-managed Pace
  - ✓ Associated with school of nursing
  - ✓ 39 clinicians provide and document care
  - ✓ 10 years old, 325 members
  - ✓ West Philadelphia
- EHR
  - ✓ Implemented 10/2007
  - ✓ Vendor-supplied

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## EHR Description

- Enable generalizability of findings
- Functionality
  - ✓ Source: EHR documentation, observation
  - ✓ Compare to CCHIT
- Diffusion
  - ✓ Breadth: Source: System audit logs
  - ✓ Depth: Frequency of clinicians updating orders, notes during 2 observation periods

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## Observation

- Consented clinicians who provide & document clinical care
- Observe and shadow clinicians
  - ✓ Clinician comments about work-arounds
  - ✓ Researcher's prior implementation experience
- Visits
  - ✓ 8 visits, 6 weeks, 15 of 39 clinicians
  - ✓ Randomly selected from each team/ role

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## Evidence-based Health Information Technology Evaluation Framework

Variables

Conceptual model developed by Aronowitz and de Keizer 2005. Modified and adapted by Sockoloff 2008.

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## Clinician Satisfaction Survey

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## Follow-up Interviews

- Develop open-ended questions
  - ✓ Item responses with lowest satisfaction
  - ✓ Prompt responses: frequency of evaluation components in evaluation framework
- Select clinicians who commented on multiple aspects of EHR in survey prompt
  - ✓ Interview until saturation
- Analyze responses for frequency of evaluation components in evaluation framework

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## Concordance of Actual Results And Expected Results (Evidence)

- Actual survey item responses
  - Disaffirming (0) — Neutral (2.5) — Affirming (5)
  - ✓ Triangulated with responses to the survey prompt and follow-up interviews
- Expected response from literature of nurse use of EHRs
  - Disaffirming > Affirming (0 studies)
  - Neutral (No consensus)
  - Disaffirming = Affirming

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## RESULTS: EHR Description

- Functionality
  - ✓ Meets 10 of 38 ambulatory EHR CCHIT criteria
  - ✓ Of clinical interest:
    - Data management/ reporting: identify, maintain patient record
    - Clinical functionality management: documentation; problem lists; patient history
    - Orders/ results: manage results; order diagnostic tests; support non-medication ordering (referrals)
    - Electronic communication and connectivity: capture external clinical documents (scanning)
    - Medication management: documents/ notes
- Diffusion
  - Breadth: used by all clinicians who provide, document care
  - Depth:

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## EHR Description

- Diffusion
  - ✓ Breadth: used by all clinicians who provide, document care
  - ✓ Depth:
    - Volume comparing week 1 and week 2
      - Clinical notes: 12% increase in volume (369 -> 412)
      - Clinical orders: 20% increase (918 -> 1106) (50% of orders printed)
    - Role
      - Notes: Nurses created 45% wk1 -> 53% wk 2 (p=0.0001)
      - Orders: Nurse practitioners, MDs created 85% wk 1 (p=0.0001) -> 62% wk 2 (p=0.05)
    - Timeliness
      - Shift in days of week
        - Notes: Fri (29%) -> Mon (29%), Thurs (24%) (p=0.0001)
        - Orders: Tu (30%), Wed (22%) -> Tu (25%), Thurs (26%) (p=0.046)
      - Decrease in duration for note completion: no change in median=0, IQR=0; 57% decrease in upper range (210 -> 90)

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## Observations

- Patient visit types observed
  - ✓ Assessments, care planning, episodic care
- EHR use "at 100%"; not as intended
  - ✓ EHR infrequently viewed before/ during visit
    - Patient rapport, hardware/ software usability issues
  - ✓ Delayed transcribing from notes on paper to EHR
- Entering information in EHR as narrative
  - ✓ As designed
  - ✓ Barrier to data retrieval

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## Clinicians: Descriptive Statistics

Demographic	(N=32)
Average Age	49
Yrs health care	23
% Nurses, NP	62%
% EHR exp	68%
Yrs EHR	4
Computer knowledge	Avg

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## Survey Responses

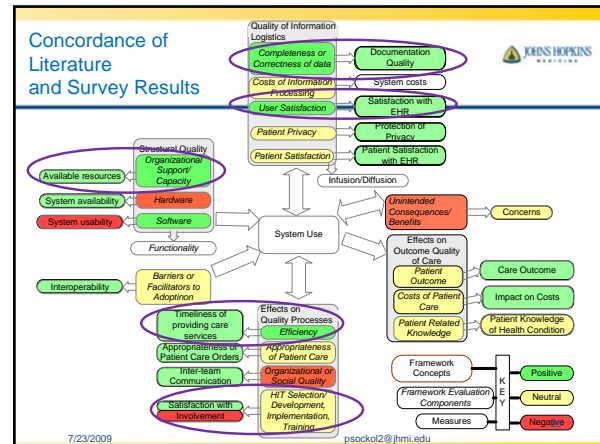
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## Survey Responses Triangulated (N=37)

Observation    Observation  
Survey    Survey  
Follow-up interviews    Follow-up interviews

Evaluation Component	Item avg. Δ	Prompt Interview (Negative)		Ob-served?
Usability	2.2, +	22/22	24/25	Yes
Functionality	NA	12/14	32/32	Yes
Efficiency	3.4, -	5/8	11/11	Yes
Complete/ accurate	3.7, +	5/6	12/16	Yes
Org'l support	3.9, +	1/2	1/2	?
Availability	4.3, -	1/1	2/4	Yes
Team communication	3.5, -	0/0	1/2	No
Worthwhile				
Patient Safety				

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- ## Discussion
- Multi-dimensional methods
    - Enabled 'black box' of HIT intervention to be opened for comparability
    - Description of EHR: functionality and diffusion
    - Provided information about workflow and functionality
  - Triangulation of responses, survey prompts, interviews
    - 4 significant variables
      - Accounted for sizable amount of variation in Satisfaction
      - Include in parsimonious survey
    - Non-significant variables may improve the model
  - Concordance with literature reached 55%
    - Lack of previous studies: how does this compare?
  - Significant differences in diffusion between observations support research design
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- ## Strengths and Limitations
- Strengths
    - Identified an evidence-based HIT evaluation framework, HITREF
    - Included assessment of conceptual model in evaluation
    - Employed a more robust evaluation design
    - Use of multi-dimensional methods to evaluate HITREF
    - Triangulation of evaluation results
  - Weaknesses
    - Power: only 1 nurse-managed PACE with EHR
    - History or maturation bias
    - Evaluation framework may not be correctly or completely operationalized by the survey items
    - Generalizability
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- ## Conclusion
- This evaluation provides insight into nurse use of EHRs in community-based, long-term care settings
    - Increasingly important as health information technology (HIT) is used to manage the health of the growing elderly population with multiple chronic conditions
    - Clinician satisfaction with EHR, decline in satisfaction between observations
    - clinician documentation in EHR increased in volume, timeliness
  - First assessment of HITREF
  - Planned research using HITREF
  - Larger study using psychometric methods to further validate survey
  - Assess EHR in a community-based, long-term care setting
  - Evaluate very different health information system in a different setting
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