Cognitive and System Factors Impacting Nurses' Postoperative Pain Management

Funding: *Adult Clinical Practice Collaborative Research Award*

Session Outline

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- Human Factors Engineering in Health Care

  Priyadarshini R. Pennathur, PhD

- Cognitive and System Factors Impacting Nurses' Postoperative Pain Management

  Laura Cullen, DNP, RN, FAAN

- Evidence-Based Pain Management Solutions

  Michele Farrington, BSN, RN, CPHON

Objectives and Conflicts

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- Objectives
  - To identify cognitive and system factors that impact pain management practices
  - Discuss the primary goals of human factors engineering.
  - Describe application of human factors engineering in health care through example scenarios.

- Conflict of Interest
  - L. Cullen – reimbursement for 3M training program
  - No other conflicts to report

Interprofessional Team

- **Principal Investigators**
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  - Priyadarshini Pennathur, PhD, Department of Mechanical and Industrial Engineering, University of Iowa
- **Co-Investigators**
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  - Lister Onsongo, Msc, RN, PhD(c), UI CON; Lecturer-Kenyatta University, Kenya
  - Michele Farrington, BSN, RN, CPHON, UIHC
  - Barbara Rakel, PhD, RN, UI CON
  - Keela Herr, PhD, RN, AGSF, FAAN, UI CON
  - Carol Strabala, BSN, RN, ONC, UIHC
  - Sherri Schomberg, BSN, RN, ONC, UIHC

Human Factors Engineering in Healthcare

Priya Pennathur, PhD

Department of Mechanical and Industrial Engineering

University of Iowa

Outline

Definition

Major principles

Design

Applications

What is Human Factors (HF)?

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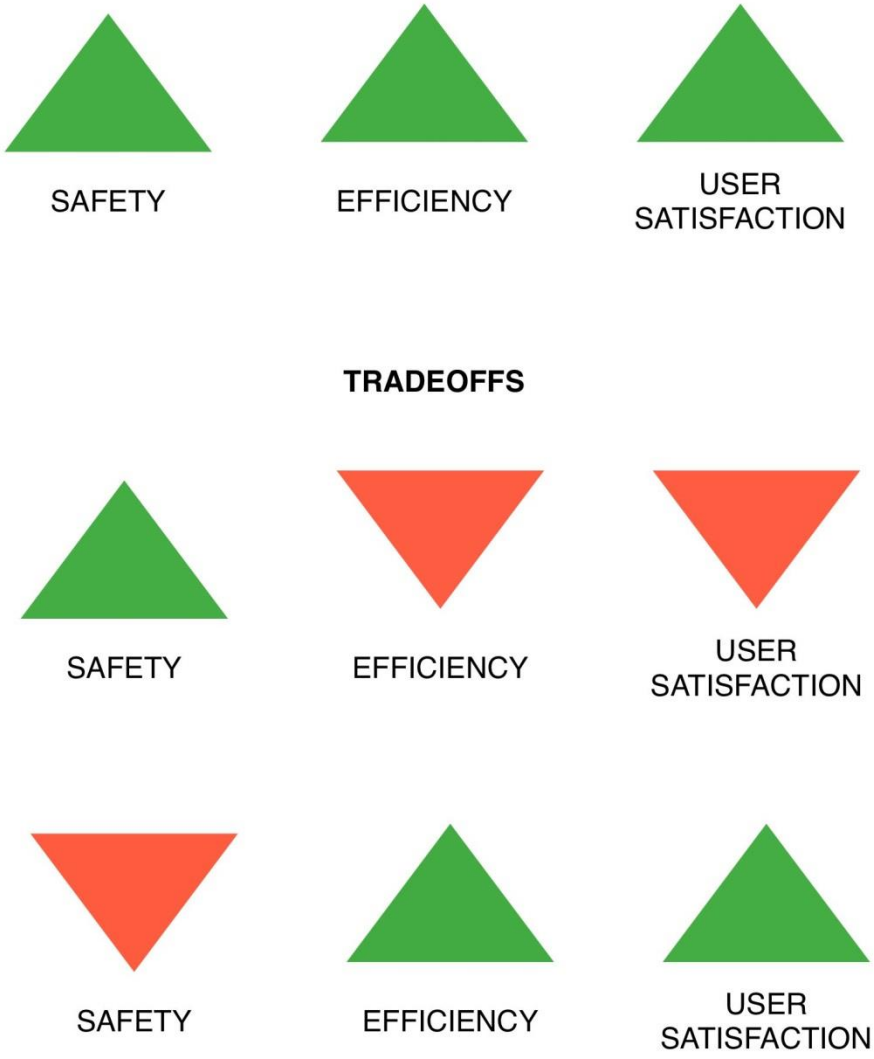
International Ergonomics Association defines human factors (ergonomics) as

"*the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance*."

Goals of HFE


SAFETY
EFFICIENCY
USER SATISFACTION
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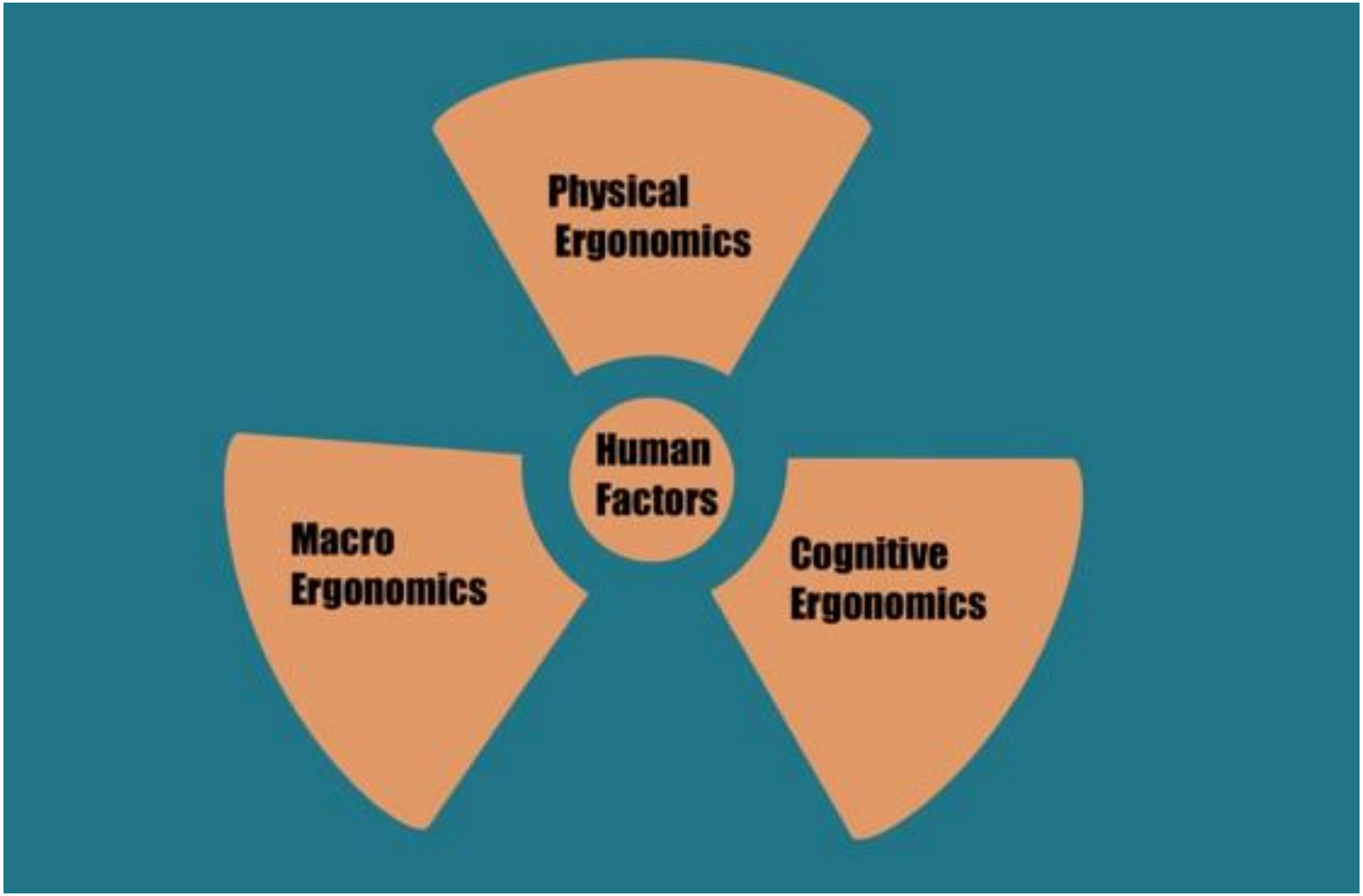
Domains of Specialization in HFE



Example Topics

Occupational Injuries

Teamwork

Information Technology
Usability

HFE Specialties/ Application Areas

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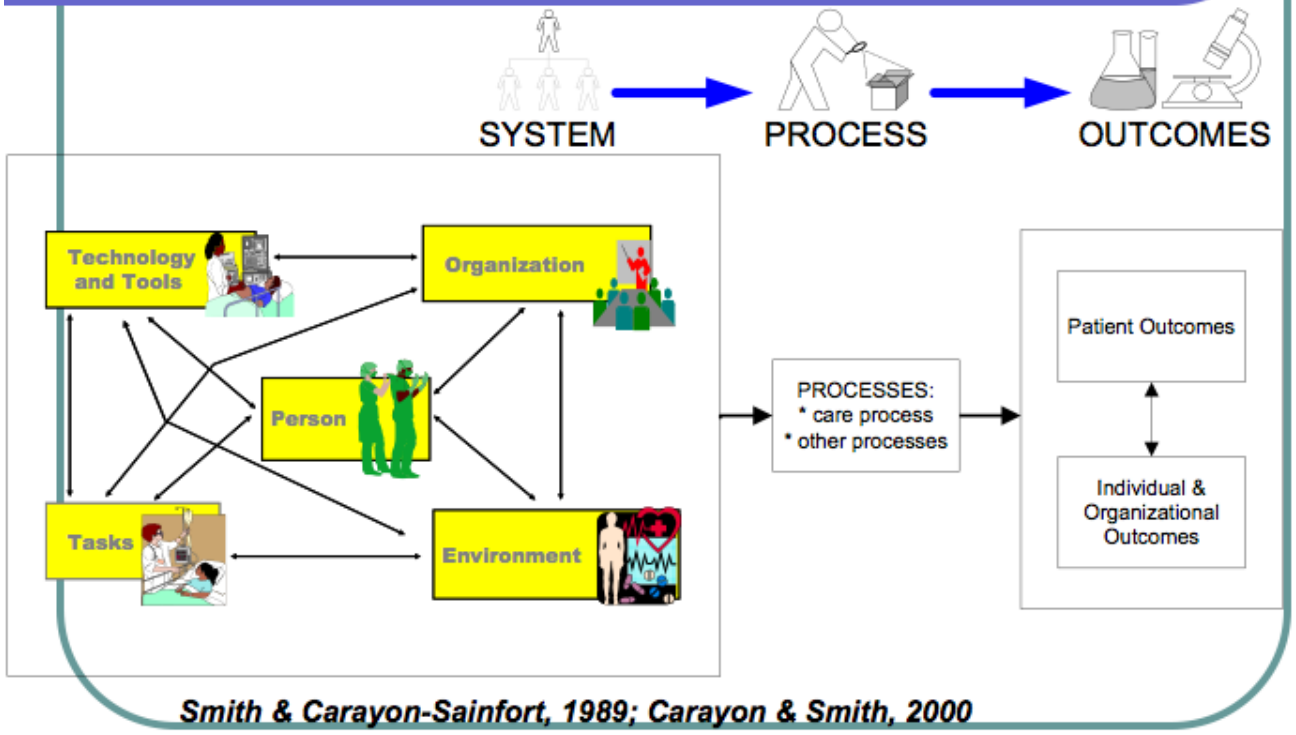
- Aerospace Systems
- Aging
- Cognitive Engineering and Decision Making
- Communications
- Computer Systems
- Consumer Products
- Education
- Environmental Design
- Forensics Professional
- Individual Differences
- Industrial Ergonomics
- Internet
- Health Care
- Macroergonomics
- Perception and Performance
- Safety
- Surface Transportation
- System Development
- Test and Evaluation
- Virtual Environments

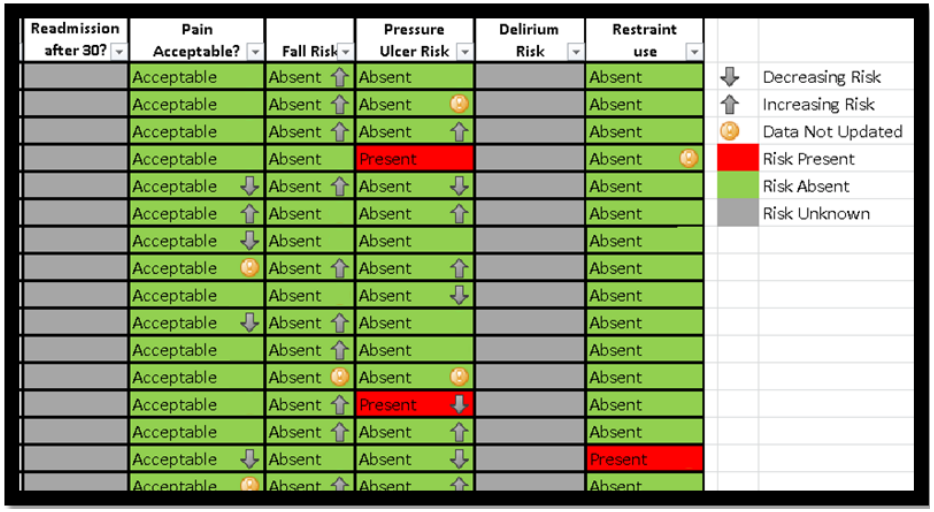
Systems Engineering Initiative for Patient Safety (*SEIPS*) Model

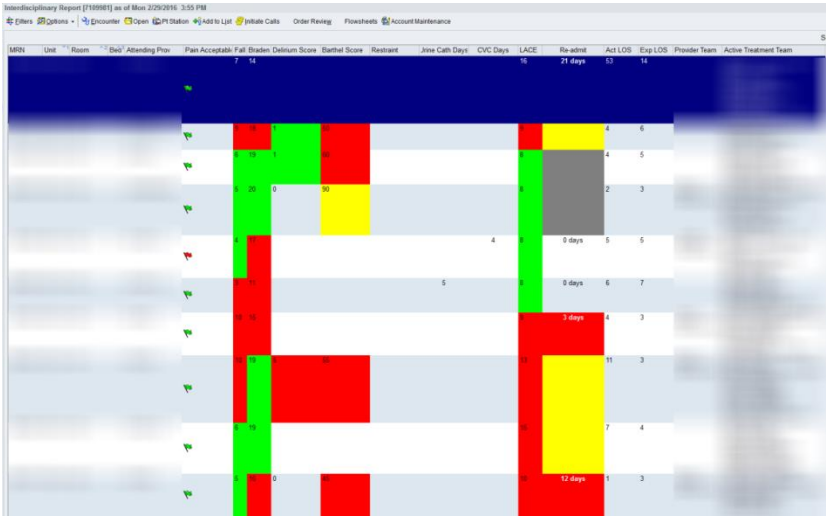


Smith & Carayon-Sainfort, 1989; Carayon & Smith, 2000

APPLICATIONS OF HFE

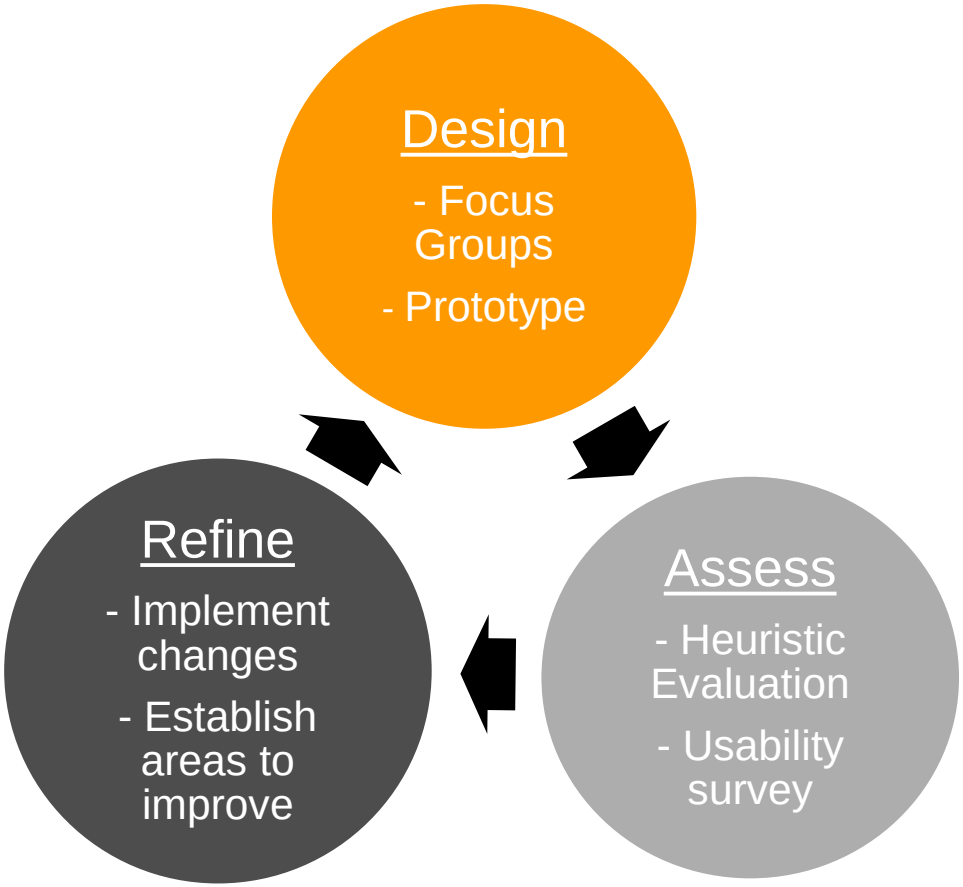
Health Information Technology Usability



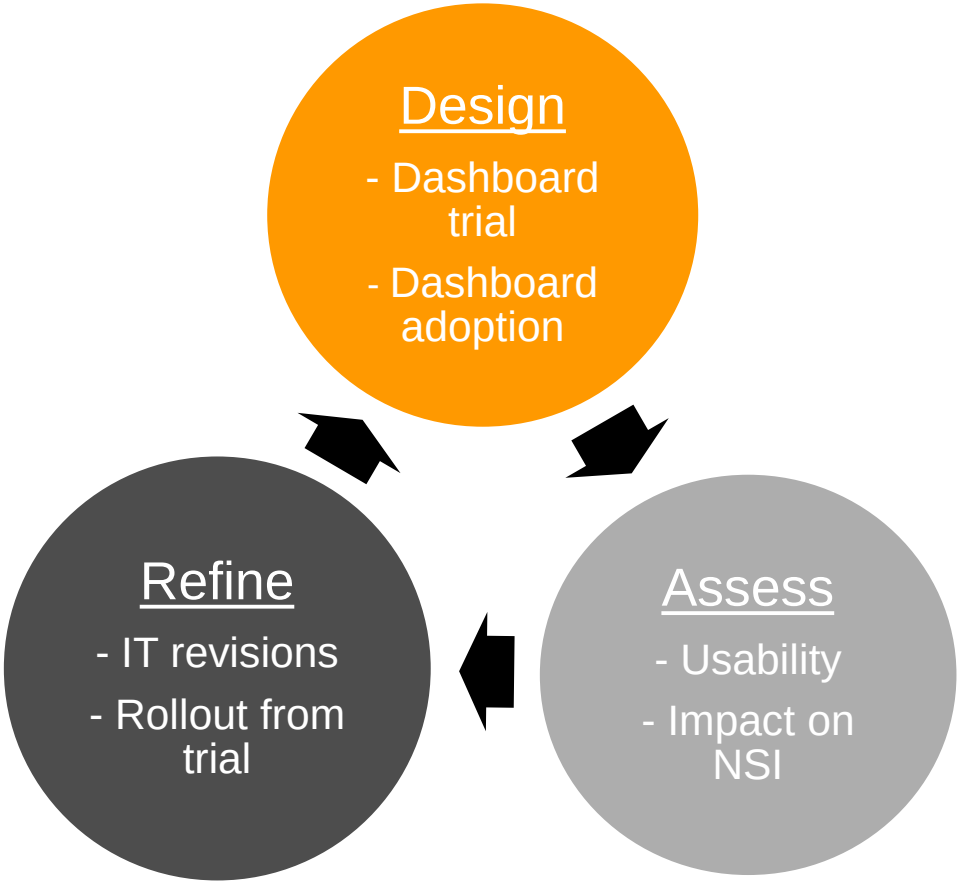


Schall, Cullen, Pennathur et al., 2017. Usability Evaluation and Implementation of a Health Information Technology Dashboard of Evidence-Based Quality Indicators, Computers, Informatics, Nursing.

Phase I: Initial Evaluation and Design



Phase II: Iterative Process

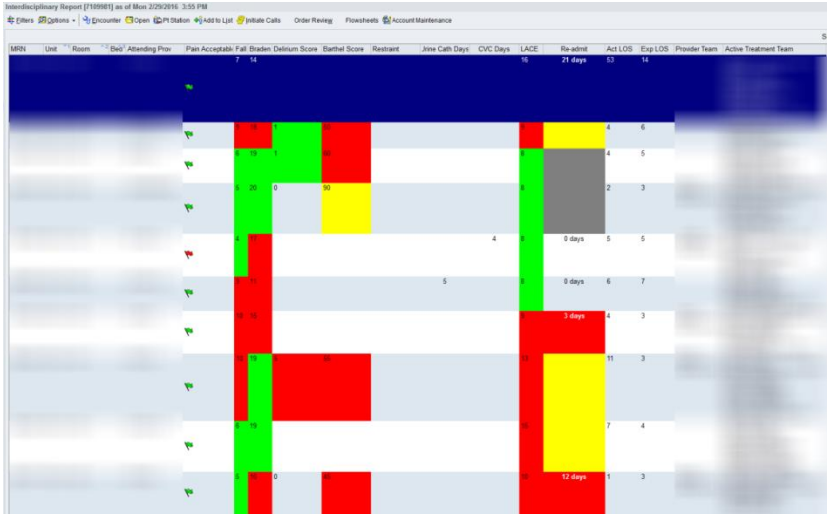


1

Readmission after 30?	Pain Acceptable?	Fall Risk	Pressure Ulcer Risk	Delirium Risk	Restraint use
	Acceptable	Absent ↑	Absent		Absent
	Acceptable	Absent ↑	Absent ○		Absent
	Acceptable	Absent ↑	Absent ↑		Absent
	Acceptable	Absent	Present		Absent ○
	Acceptable ↓	Absent ↑	Absent ↓		Absent
	Acceptable ↑	Absent	Absent ↑		Absent
	Acceptable ↓	Absent	Absent		Absent
	Acceptable ○	Absent ↑	Absent ↑		Absent
	Acceptable	Absent	Absent ↓		Absent
	Acceptable ↓	Absent ↑	Absent		Absent
	Acceptable	Absent ↑	Absent		Absent
	Acceptable	Absent ○	Absent ○		Absent
	Acceptable	Absent ↑	Present ↓		Absent
	Acceptable	Absent ↑	Absent ↑		Absent
	Acceptable ↓	Absent	Absent ↓		Present
	Acceptable ○	Absent ↑	Absent ↑		Absent

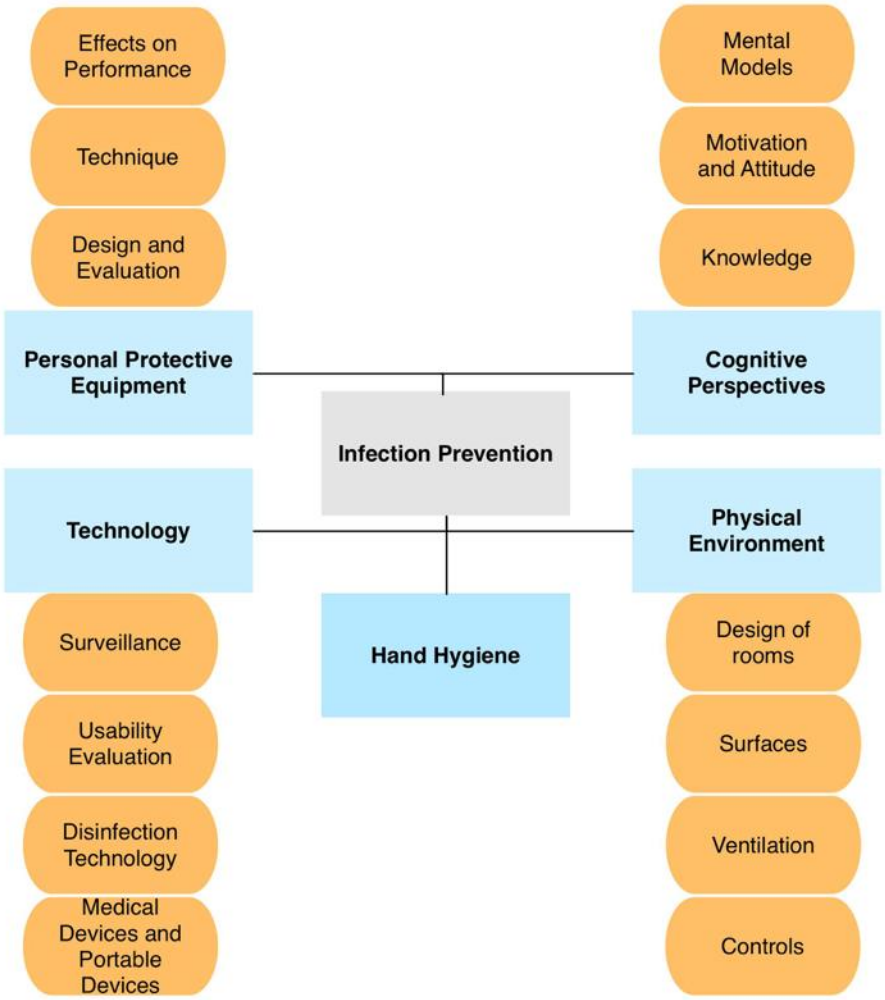
↓ Decreasing Risk
↑ Increasing Risk
○ Data Not Updated
Risk Present
Risk Absent
Risk Unknown

2



3

Infection Prevention and HFE



Pennathur and Herwaldt, 2017. Role of Human Factors Engineering in Infection Prevention: Gaps and Opportunities, Current Treatment Options in Infectious Diseases.

Environment design factors such as physical layout of a unit can affect how nurses provide timely and safe patient care. Having patients in different locations can increase physical and cognitive workload.

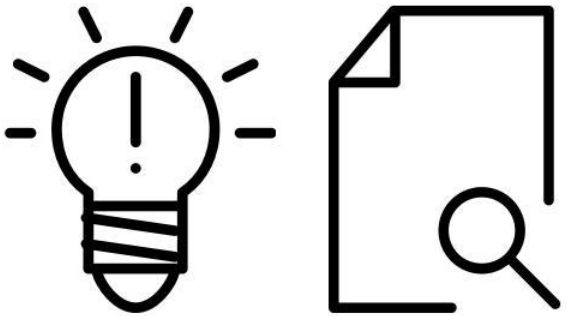
Effective teamwork and coordination depend on organizational structure, policies, and culture, and can significantly influence performance and well-being of nurses.

Technologies must be usable in a high-risk, high-consequence environment. Technologies must support nurses' workflow and enable them to effectively coordinate, communicate and manage information.

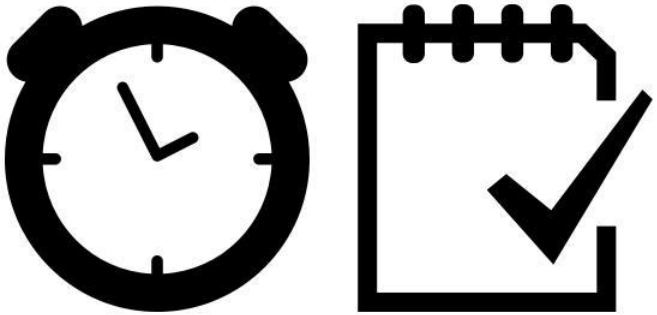
01 PAIN MANAGEMENT: INDIVIDUALIZING CARE

Pain affects each patient in a different way, demanding customized care from nurses.

Nurses are required to individualize care for each patient with pain, accounting for clinical and individual characteristics, tolerance for pain, and evidence-based guidelines on pain management.



02 PAIN MANAGEMENT: PRIORITIZATION

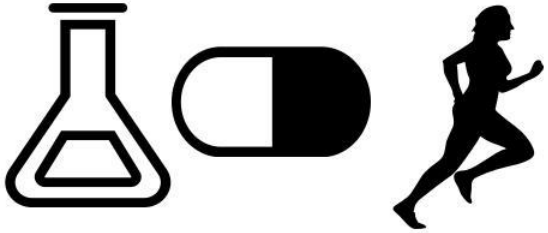


The most challenging aspect of cognitive work in pain management involves constant prioritization of tasks between pain management and non-pain management patients.

03 PAIN MANAGEMENT: COORDINATION

Multiple stakeholders including pharmacy, physical therapy and labs may be involved in pain management.

Nurses often coordinate among these different entities for effective pain management, further increasing their cognitive work.



04 PAIN MANAGEMENT: COGNITIVE WORKFLOW

Nurses may perform cognitive work involving planning, prioritization, coordination, problem solving, and decision-making on any routine day.

Demand on cognitive work increases with the need to manage patients with pain.

Understanding nurses' cognitive work involved in caring for a patient and designing support systems to facilitate their cognitive work will ensure a safe and productive system.

Conclusions

- System factors influencing pain management require study
- Cognitive work components crucial in pain management
- Human factors principles and methods can examine pain management problems from a systems perspective

Cognitive and System Factors Affecting Nurses' Postoperative Pain Management

Laura Cullen, DNP, RN, FAAN

Purpose

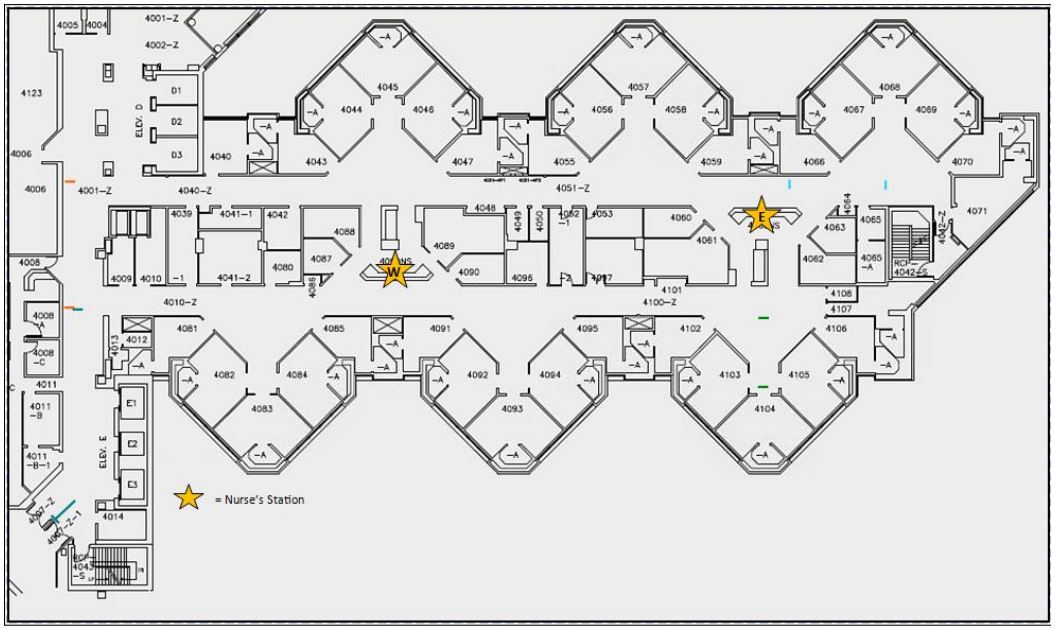
- Objectives
  - Discuss cognitive and system factors impacting nurses' pain management practices.
  - Describe use of nurses use of postoperative pain management.

Converging Factors Complicating Nurses' Work

- Practice recommendations for pain management are complex (ASA, 2016; Chou, et al., 2016)
- Cognitive factors: Nurses cognitive work is complex (Beuscart-Zephir, et al., 2010; Cornell, 2010; Ebright, et al., 2003; Hollnagel, 2003; Lopez, et al., 2010; Pingenot, et al., 2003; Potter, et al., 2004)
  - Interruptions, distractions and stacking
  - Complex care coordination and communication
  - Attention to EBP recommendations adds complexity (IOM, 2013; May, et al., 2013; Shaffer, et al., 2013; Solomons & Spross, 2011)
- System factors (Carayon, et al., 2006; Ebright, et al., 2003; Hall, et al., 2012; Potter, et al., 2004; Rathert, et al., 2012; Titler, 2010)
  - Facility layout
  - Organizational aspects (e.g., staffing)
  - Social aspects
  - Technology and tools

Setting

- 48-bed adult surgical unit (orthopedics, urology, and ophthalmology)
- Post-operative pain management for patients with Total Knee Replacement on 1st post-op day
- RN Full Time Equivalent = 54



- *IRB/Nursing Research & EBP Committee approval*

Design and Methods

Contextual inquiry using human factors engineering concepts and ethnography

- Mixed Methods (Parallel Convergent with Qualitative Driver)
  - Qualitative:
    - Shadowing
    - Interviews after shadowing
    - Focus group
  - Quantitative:
    - Nurses' subjective ratings of workload (NASA TLX) (Hart & Staveland, 1988)

Data Collection

- Preparation for data collection
  - Training sessions
  - Pilot observation – techniques and tools
  - Refine approach
  - Synchronized Livescribe Pen™
- Field Data
  - Shadowing:
    - Observed 5 nurses for 4 hour blocks
      - Parallel observation by nurse and HF engineer (40 hours)
    - NASA TLX after shadowing
    - Interview after shadowing
- Focus Group: 5 nurses

Coding Process – Iterative, Inductive Approach

- Developed tentative codes – individually
- Reviewed 2 interview transcripts; 5 investigators created separate list of codes; coding template was created
- Codes from observations, interviews and focus groups were integrated into one hierarchical structure to reduce redundancy and increase clarity
- Created definitions
- Combined observer notes into a single transcript
- Team refined and confirmed coding template and definitions; Iterative process – adding and refining nodes
- Reconciled coding for distractions and interruptions

Coding Phases

- Sample from Observation

1129 **Observer A** After checking on something goes to SPT2 room again #5 **Observer B** Walks back in when patient states they are done Walks to main desk Writes note #003 DISTRACTIONS walking; Comment: see survey track #003		Distractions Professional communication? Paperwork/charting?	System level factors • Distractions Distractions by whom or what? Not sure about this one	I THINK WE SHOULD NOT WORRY ABOUT DISTRACTIONS HERE OR SHOULD WE? WE CODED THOSE SEPARATELY.	System level factors • Distractions Who-Patient; stimulus - other
1130 **Observer B** Puts patient TV on channel for patient education in 3046-2 Adjust TV settings **1131** **Observer A** Asks for pain rating- states you must have a high pain tolerance **Observer B** Asks pain intensity 3046-2, patient initiates discussion of their pain tolerance Discuses patient high tolerance and "should teach others" **1132** **Observer A** Comes out and back to computer States that trying to get all things ready/caught up, so that when they get admissions, they'll have some more time, although in reality there is not much time.	Direct Patient Care (non-pain)-Patient Education Patient Care for Pain-Assessment Technology-Computer Paperwork/Charting Adjusting Care/reprioritizing-Pacing care System level factors-workflow-Distractions-NA System level factors-workflow-Distractions-RN	Patient education assessment Technology-computer; Pacing care; stacking Professional communication	Direct Patient Care (non-pain) • Patient Education Patient Care for Pain • Assessment Technology • Computer Paperwork/Charting Adjusting Care/reprioritizing • Pacing care • Stacking System level factors • workflow-Distractions ➢ NA ➢ RN Teamwork/Care coordination and communication • What-Professional communicat	Direct Patient Care (non-pain) • Patient Education Patient Care for Pain • Assessment Technology • Computer Paperwork/Charting Adjusting Care/reprioritizing • Pacing care • Stacking Teamwork/Care coordination and communication What-Professional communication NEED FOR DISTRACTIONS?	System level factors • Distractions WHO-NA; stimulus - information provided System level factors • Distractions

- Confirmation completed prior to entry into QSR-Nvivo©

Narrative Analysis – Inductive Approach

1. Single node, combination and matrix analysis in QSR-NVivo©
2. Narrative analysis of selected cells of the matrix by 4 investigators
3. Team discusses and finalizes synthesis through consensus

Coding Hierarchy [Template]

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Nodes

Name	Source	Refer
Adjusting care or reprioritizing	5	7
Alter other e.g dose	4	16
Delay or Omit activity	10	16
Individualizing care-what	11	28
Interruptions-what	7	63
How-In person	0	0
How-Phone or Page- see tech	0	0
See-WHO codes	0	0
Pacing care-what	11	51
Patient characteristics-why	4	8
Expectations	1	1
Health status or complexity or	8	11
Preferences	3	5
Stacking	11	66

Nodes

Name	Sourc	Referenc
Patient care for pain	3	5
Assessment	13	72
Comfort	10	27
Follow-up	8	14
Intervention	3	4
Non-pharmacologic	5	7
Pain-Rx	16	122
Patient characteristics	4	5
Expectations	7	22
Health status or complex	13	43
Preferences	4	8
Performance	3	6
Phases of care	1	1
Admission	12	57
Discharge	10	104
Inpatient stay	3	4
System level factors	1	5
Lost or missing or locatin	5	19
Organizational	1	3
Teamwork or care coordi	11	46
Workflow	8	41

Nodes

Name	Source	Referenc	C
Discharge	10	104	1
Inpatient stay	3	4	1
System level factors	1	5	1
Lost or missing or locati	5	19	4
Organizational	1	3	1
Teamwork or care coordi	11	46	1
Workflow	8	41	1
Technology	3	6	1
Bar code scanner	5	32	1
Computers	8	192	1
Medical devices	6	40	1
Voalte or pager or cell p	6	58	1
Temporal demand	1	7	4
Tools	4	5	1
Clipboard	2	4	1
Other tools	6	20	4
Paper tools	10	74	4
Whiteboard	3	12	1

Hierarchical Structures

- Cognitive factors:
  - Adjusting care/reprioritizing
    - Stacking
    - Workflow blocks
  - Direct patient care
    - Direct patient care for pain
  - Phases of care
    - Admission
    - Discharge
- System level factors:
  - Workflow blocks
  - Paperwork/charting
  - Facility layout
  - Computer technology
- Pain practices
  - Priority for patient care

Themes for Pain Practices

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- Starting at the Beginning: Pain assessment
- No Simple Formula for Pain Management
- Patient Knows Best: Incorporating Patient experiences and characteristics
- Nurses are a safety net
- Warning: Stay Ahead or Chase Pain
- A Balancing Act to Avoid Unintended Sedation
- Coordination interferes with nurses' work flow
- Stay Alert for Pain
- Refer to the Expert While Still Being an Advocate
- Education, Support and Comfort Care
- Endless Juggling and Reprioritizing

Drill Down Example: Staying on Top of Pain

- **Nurses try to stay ahead of pain to avoid having to catch-up which helps avoid complications.**

- **Focus Group example:**

Interviewer: So why do you not want them to have a bed pan?
Nurse 1: Just ‘cause they can get up and start moving. It’s better for ‘em.
Nurse 2: The whole purpose is to progress to get out of
Nurse 1: Get ‘em back home.
Nurse 2: here. Get them home.
Nurse 3: It’s good rehab too.
Nurse 2: Plus all the other benefits of skin and lung and everything else that it effects to get them up and get them moving.

Drill Down Example: Patient Perceptions

Patients are often well versed in pain medications

- Focus Group example:
- “You’d be amazed…it amazes me how many people are narcotic cognitive, or they know what works for them, they’ve taken them tons and tons of times and, you know, … they told them also preoperatively sometimes [the patients do], I don’t take that. It either makes me sick or it doesn’t work...”

Drill Down Example: Workflow Block

Nurses experience workflow blocks associated with medication administration.

- Nurses workflow is blocked during several steps of the medication administration process, including getting orders verified by pharmacists and double-check verification of safe opioid disposal.

- **Focus group example:**

J: Sometimes it's every hour.
L2: Sometimes if we have like a…sometimes if we have like medicines primary for an ortho person, they don't do PCAs but they'll put it on for every 2 hours. So every 2 hours you're taking IV stuff in there so every 2 hours you're waiting for someone to come…waste…
J: Another RN to come waste with you.

Drill Down Example: Workflow Block (Cont.)

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- **Shadowing example:**

  - ***1319 Observer A***

P5N stops on the way to talk to PT and NA 60. Then checks phone and texting the pharmacy has not verified yet, but I am going to go ahead because he was here in the morning and then goes to 63 med room.

  - ***1320 Observer B***

RN pauses to talk with physical therapy at 3060. Pauses at 3063 for Voalte text to the pharmacist for Vistaril not verified and patient needs so will override – have (brown top) RN verify it at main desk. Note: so patient doesn't have to wait

Drill Down Example: Coordination

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Nurses provide essential coordination for pain management.

- Nurses function as the safety net which requires coordinating care to meet patient pain needs by assessing pre-operative medication and recreational drug use and obtaining adjustments in pain medication orders.

- **Focus group example**:
  - "And so that's one of our questions too. Usually I'll ask them besides what are you on at home, are you doing anything else besides … most of the time they'll offer it up …"
  - "And I even ask, if it looks like they didn't take any narcotics before, I'm like "Have you taken narcotics before? How do you react to the narcotics?" just in case these elderly people, Do you get snowed?, Do you get confused? …"

Drill Down Example: Vigilance

- Nurses prioritize pain management and are constantly vigilant for patient's pain, monitoring when patients need pain interventions.
- Monitoring integrates nurses' activities:
  - Routine surveillance,
  - Formal and informal pain assessments,
  - Understanding of the need for individualized medication variations (e.g., effectiveness, timing for peak and nadir), and
  - Coordination with activity to stay on-top of pain

Drill Down Example: Adjusting Care

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- Nurses pain practices are a balancing act requiring monitoring, adjustment to avoid over sedation and balancing patient preferences

- **Observation example**:

Nurse: Um, give them pain meds before therapy and then reassess and then I just keep offering every 4 hours as he needed ‘em.
Nurse: And he was fine without them. I also had to monitor because his blood pressure was low so we had to make sure that we didn’t drop his blood pressure.
1121 Observer B
Blue top RN asks RN about her time off/schedule
Hand foam, walking to 3095 quietly reassessing pain, patient asleep and hand signals with husband Note: stays quiet

Drill Down Example: Endless Juggling

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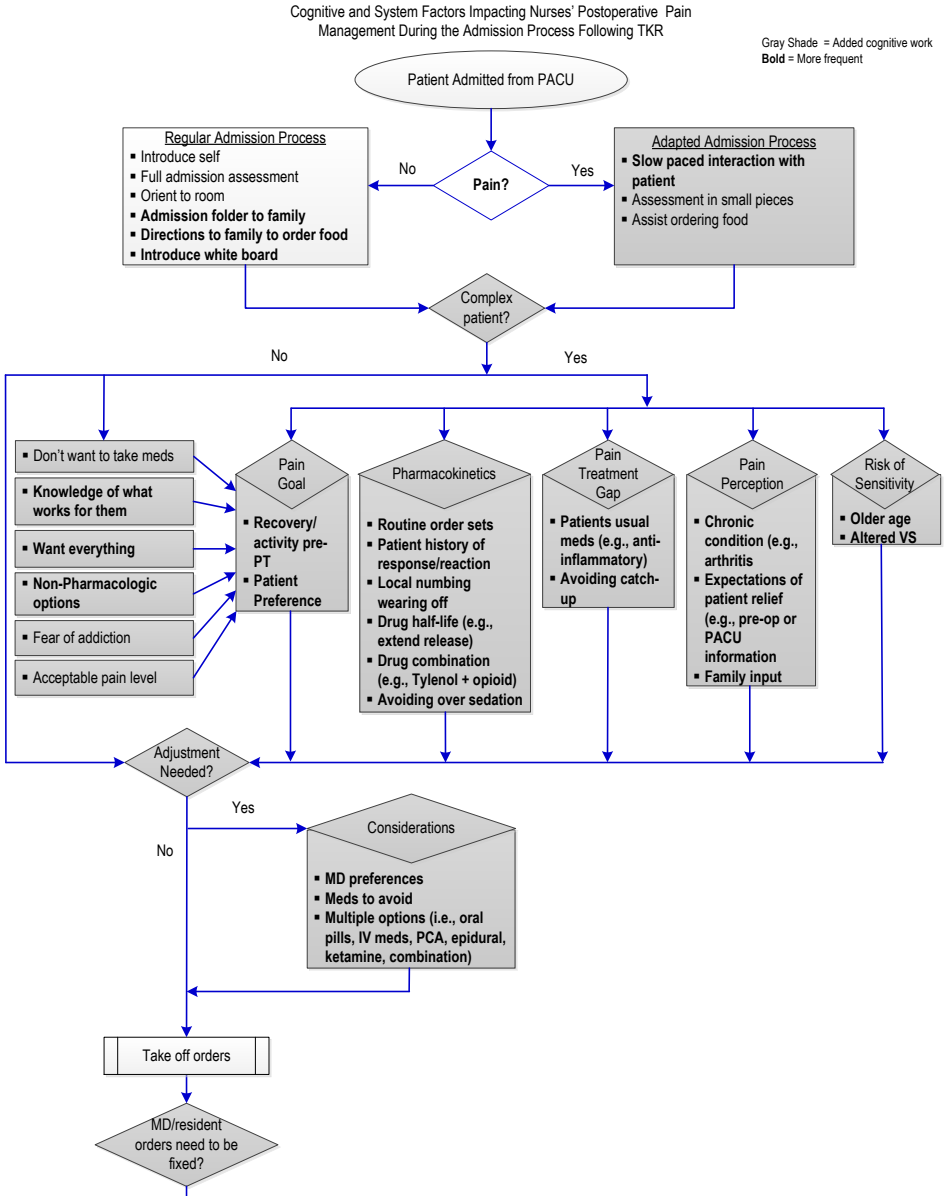
- Nurses' have a preliminary plan but quickly adapt. Attention is given to pain and diverted from other activities (e.g., documentation).
- **Interview example:**

"I started out planning to just start with my three patients over here and then do these two. Well I had gotten two done over here and then one over here wanted something for pain so I went and did him next because the other one over here wasn't complaining of pain and so I wanted to take care of the pain first".

Pain Practices during Admission



- **Endless juggling**
- **Staying on top of pain**
- **Patient perceptions**
- **Workflow block**
- **Coordination**
- **Adjusting care**
- **Vigilance**

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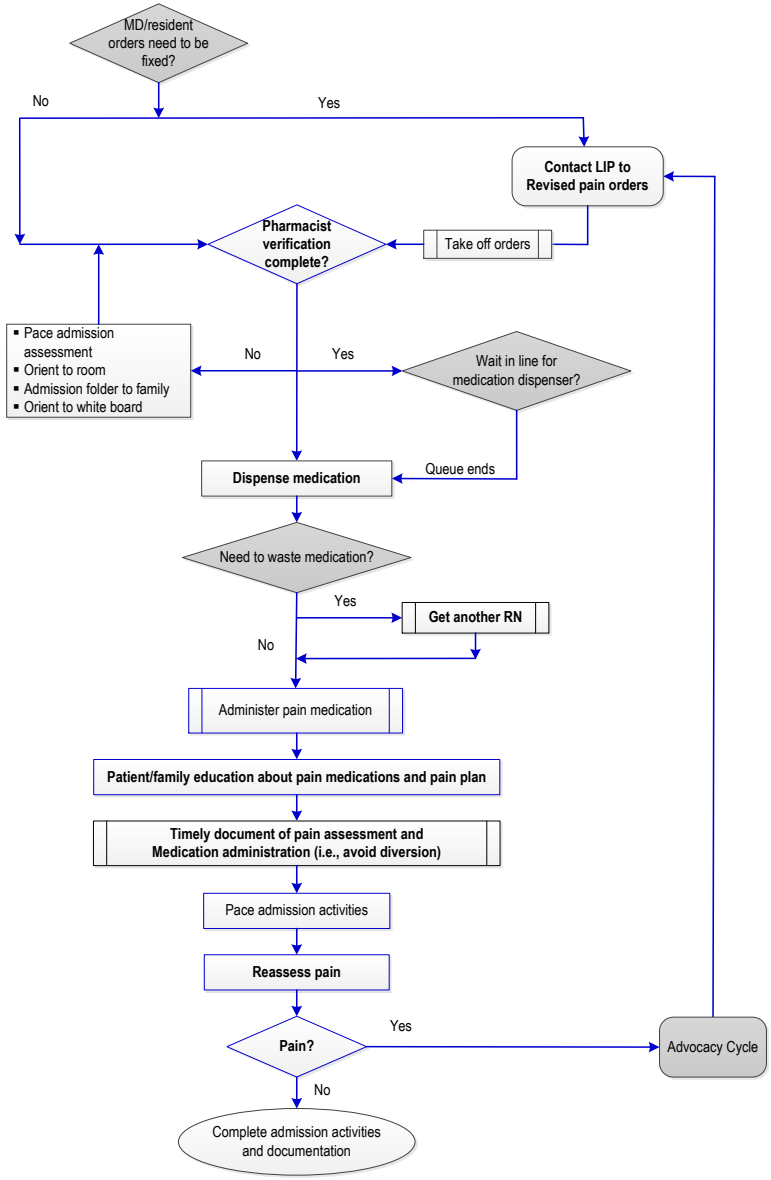
Pain Practices (continued)



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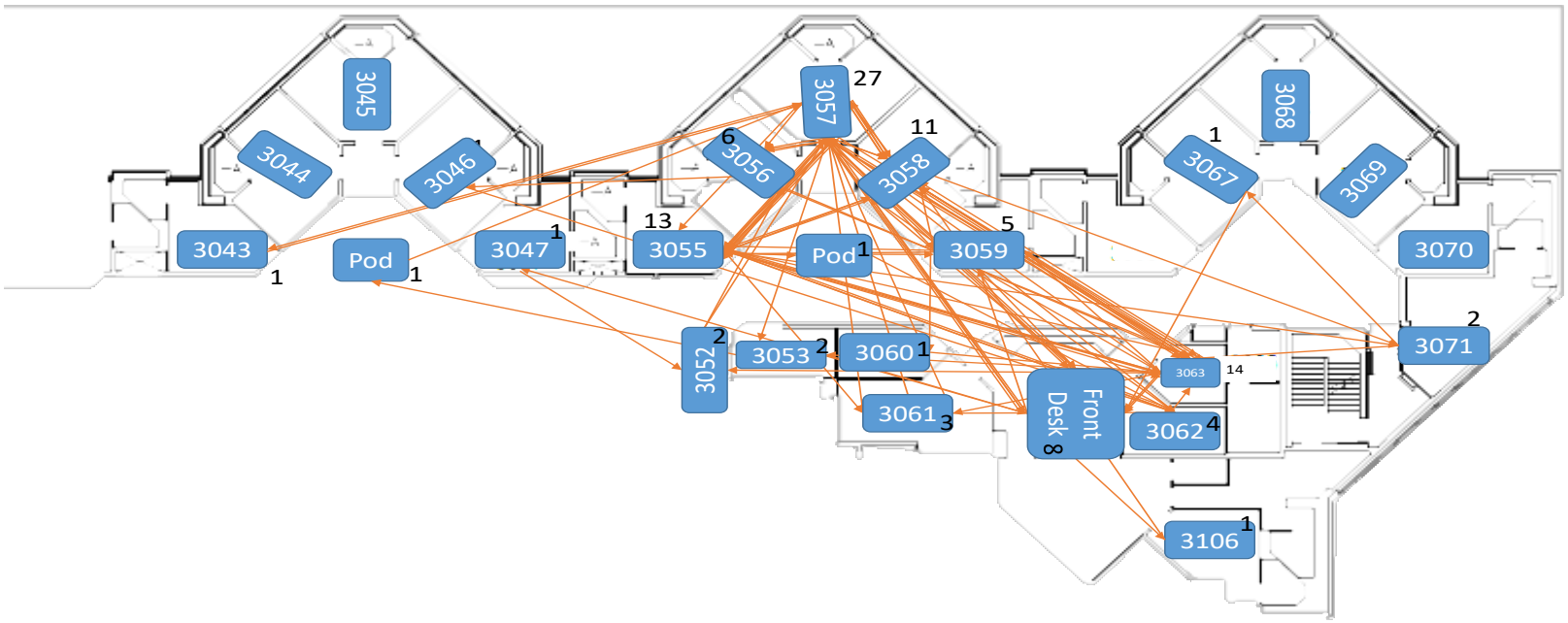
Movement Analysis: Four Hours



Nurse	Count of Movements	# of Patients	# of Discharges	Movements for primary patient	High Frequency Movement
1	45	4	2	4	10 (Discharge, secondary)
2	106	4	1	15	19 (Discharge, secondary)
3	78	5	3	12	9 (Discharge, secondary)
4	64	4	2	14	11 (Discharge, secondary)
5	101	6	1	23	14 (Med Room)

Results

- Nurses' experienced a large number of episodes requiring them to alter or adjust care
  - Antecedents:
    - Patient related factors were most common contributor:
      - Health status or complexity; Preferences and expectations
    - System level factors were also a common contributor:
      - Locating missing items (e.g., discharge prescriptions)
    - Families were a less common contributor to care adjustments
  - Consequences:
    - Contribute to nurses' workflow blocks and stacking
  - Adaptation:
    - Nurses adapted by delaying care, pacing care, or altering patient care activities

Conclusions

- Nurses caring for post-operative patients prioritize pain management.
- Nurses' work is highly complex and influenced by cognitive work and system factors.
- Redesign of tools (e.g., electronic health record) and processes using human factors principles offer considerable opportunity to improve provision of pain practices.
- Interesting details will be reported in publications

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Evidence-Based Pain Management Solutions

Michele Farrington, BSN, RN, CPHON

Objectives & Disclosures

The University of Iowa

- Objectives:
  - Discuss evidence-based pain management solutions.
  - Describe application of evidence-based pain management recommendations through evidence-based practice exemplars.
- M. Farrington does not have any conflicts of interest or disclosures to report.
- No sponsorship or commercial support received.

Background

- EBP – global priority but inconsistently provided
- Complex recommendations & clinician workload
- Pain – global health concern & one of most common reasons people seek healthcare
- Ineffectively treated pain – negative impact on healthcare costs & patient suffering

(Fishman et al., 2013; Gaskin & Richard, 2012; Institute of Medicine, 2011; St. Marie & Arnstein, 2016)

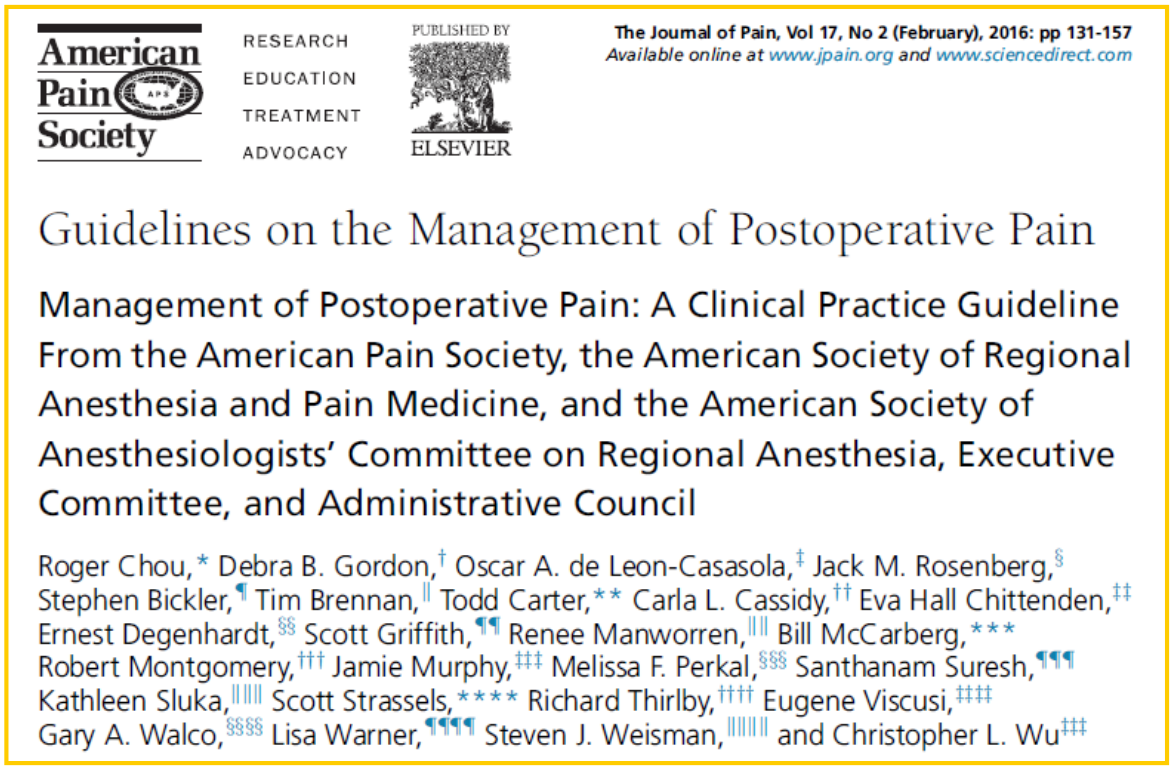
Background *(cont.)*

- Assessment and treatment of pain is complex
- Numerous evidence-based guidelines and solutions developed:
  - Pain types (e.g., acute, chronic, procedural)
  - Clinician groups (e.g., anesthesiologists, primary care clinicians)
  - Pain components (e.g., assessment, treatment, monitoring)

(DeRuddere & Craig, 2016; Schreiber et al., 2014)

Background *(cont.)*

- Postoperative pain management clinical practice guideline – published in 2016
  - 32 recommendations



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Guidelines on the Management of Postoperative Pain

Management of Postoperative Pain: A Clinical Practice Guideline From the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists' Committee on Regional Anesthesia, Executive Committee, and Administrative Council

Roger Chou,* Debra B. Gordon,† Oscar A. de Leon-Casasola,‡ Jack M. Rosenberg,§ Stephen Bickler,¶ Tim Brennan,‖ Todd Carter,** Carla L. Cassidy,†† Eva Hall Chittenden,‡‡ Ernest Degenhardt,§§ Scott Griffith,¶¶ Renee Manworren,‖‖ Bill McCarberg,*** Robert Montgomery,††† Jamie Murphy,‡‡‡ Melissa F. Perkal,§§§ Santhanam Suresh,¶¶¶ Kathleen Sluka,‖‖‖ Scott Strassels,**** Richard Thirlby,†††† Eugene Viscusi,‡‡‡‡ Gary A. Walco,§§§§ Lisa Warner,¶¶¶¶ Steven J. Weisman,‖‖‖‖ and Christopher L. Wu‡‡‡

(Chou et al., 2016)

EBP Topics & Exemplars

- Pain Assessment – Patient Preferred Pain Scale
- Pain Treatment – Low-Dose Ketamine Infusions
- Patient Monitoring – Monitoring for Unintended Sedation with Opioid Administration

Pain Assessment – Evidence

- Essential first step for effective pain management
- Pain management on medical-surgical units is complex
- Acute care nurses use pain assessment scales inconsistently

(DeRuddere & Craig, 2016; Gregory, 2015; Schreiber et al., 2014)

Pain Assessment – EBP Project

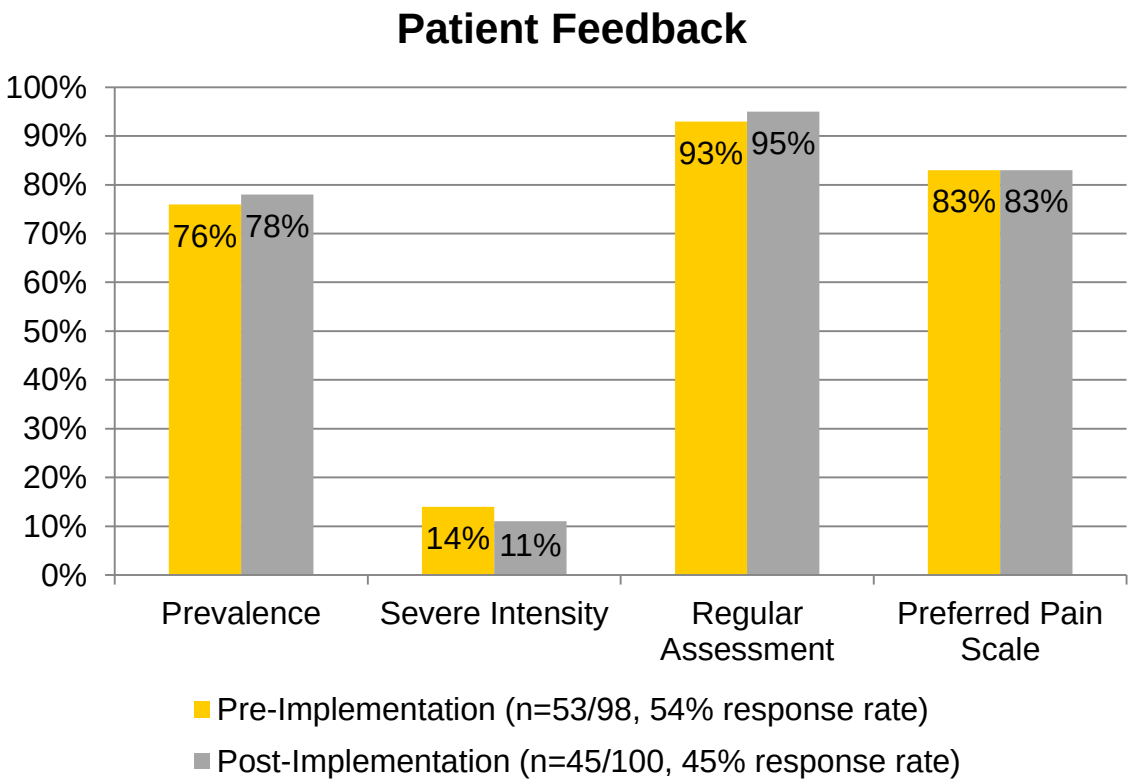
- Purpose – offer reliable and valid pain assessment scales to hospitalized adult cardiothoracic patients on a medical-surgical step-down unit
- Aligns with recommendation #5 –
- Patients pick preferred pain assessment scale
  - Improves accuracy, trending, and evaluation of pain treatment effectiveness

Use of a validated pain assessment tool by clinicians to reassess postoperative pain and determine effectiveness of treatment interventions

(Chou et al., 2016 ; Cullen, 2013)

Pain Assessment – Results

- Improved nurses' care processes and patient satisfaction



(Cullen, 2013)

Pain Treatment – Evidence

- Opioid-tolerant patients have complex pain management needs
- Untreated acute pain may lead to development of persistent pain
- Potential benefits of using ketamine in low doses include:
  - Resetting opioid receptors
  - Need for less opioid postoperatively
  - Decrease opioid side effects

(Dunwoody et al., 2008; Dykstra, 2012; Loftus et al., 2010)

Pain Treatment – EBP Project

THE UNIVERSITY OF IOWA

- Purpose – improve postoperative pain for opioid-tolerant orthopedic spine surgery patients through expanded use of low-dose ketamine infusions

EBP: EVIDENCE TO PRACTICE

Low-Dose Ketamine Infusions for Postoperative Pain in Opioid-Tolerant Orthopaedic Spine Patients

Michele Farrington, BSN, RN, CPHON, Allison Hanson, BSN, RN, Trudy Laffoon, MA, RN-BC, Laura Cullen, DNP, RN, FAAN

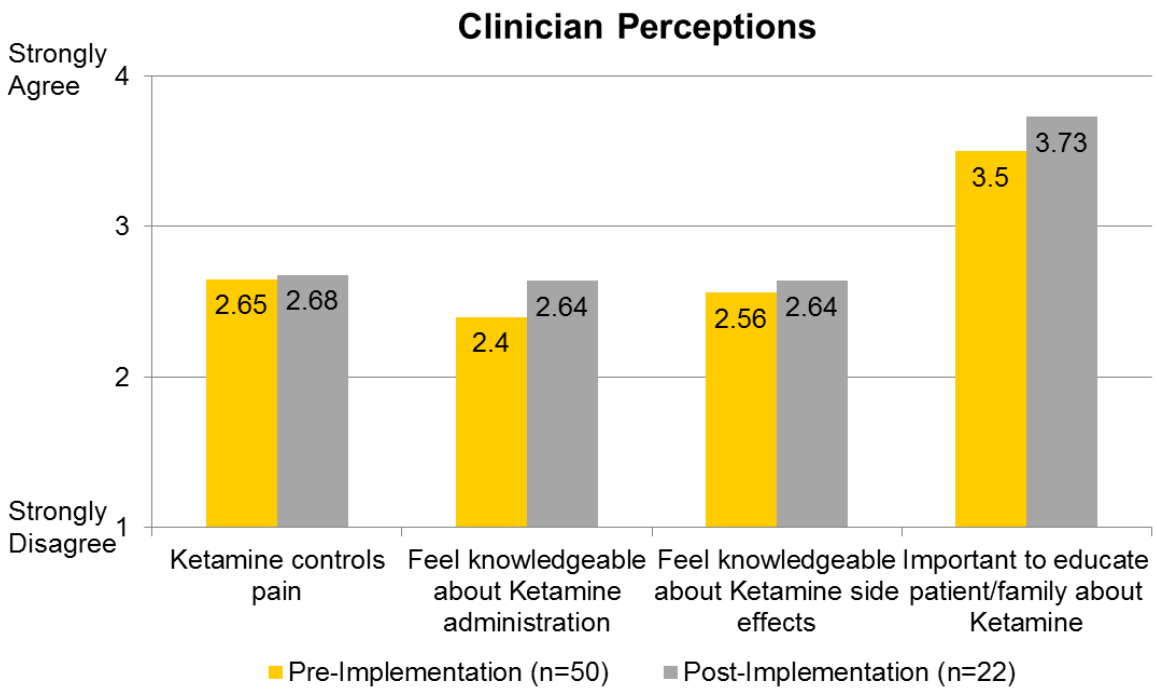
- Aligns with recommendation #18 –

Consider IV ketamine as a component of multimodal analgesia in adults

(Chou et al., 2016; Farrington, Hanson, Laffoon, & Cullen, 2015)

Pain Treatment – Results

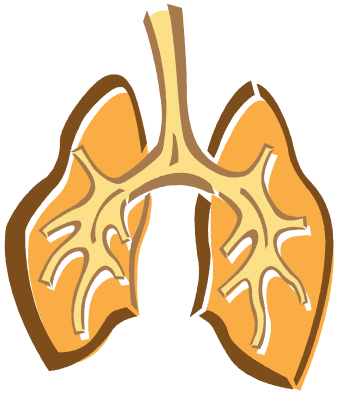
- Proactive identification of opioid-tolerant orthopedic spine surgery patients who may benefit from ketamine infusions



(Farrington, Hanson, Laffoon, & Cullen, 2015)

Patient Monitoring – Evidence

- Needs to occur after systemic opioid medications administered
- Monitoring components include:
  - Sedation
  - Respiratory status
  - Other adverse events



(Jarzyna et al., 2011)

Patient Monitoring – EBP Project

- Purpose – standardize monitoring of sedation in adult and pediatric patients receiving opioid analgesia in general care areas

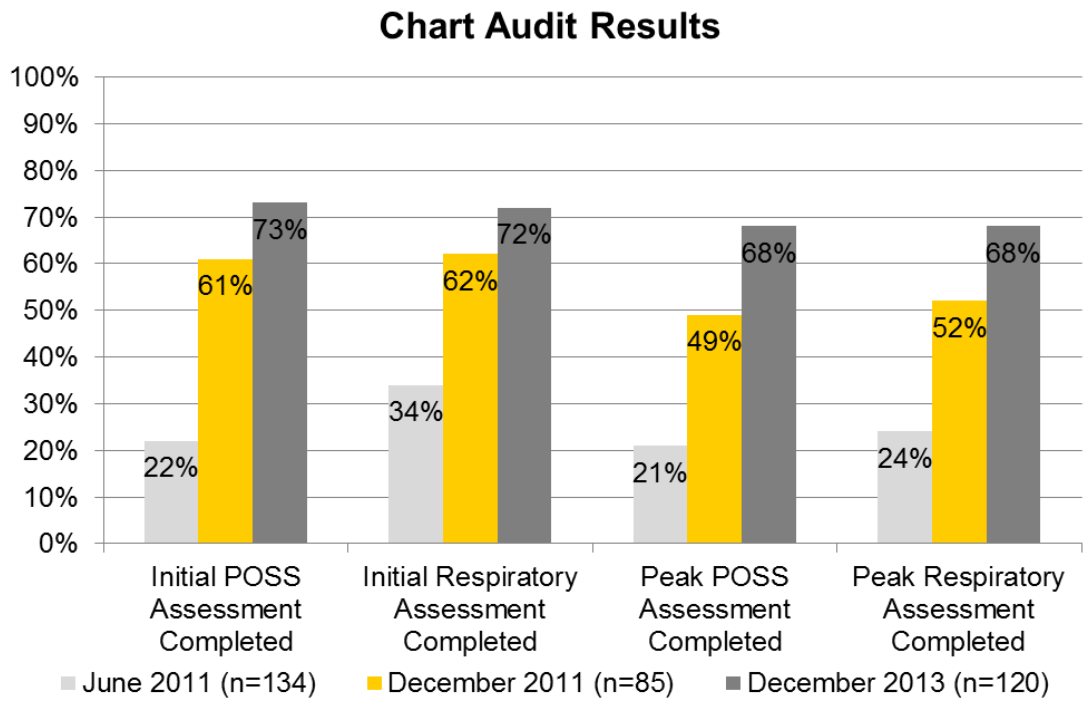
- Aligns with recommendation #14 –

Provide appropriate monitoring of sedation, respiratory status, and other adverse events in patients who receive systemic opioids for postoperative analgesia

(Chou et al., 2016 ; Smith, Farrington, & Matthews, 2014)

Patient Monitoring – Results

- Bedside nurses reported providing safer care to patients as a result of the new sedation and respiratory monitoring policy



(Smith, Farrington, & Matthews, 2014)

Conclusions

- Application of evidence-based recommendations through these select exemplars provides some direction and solutions for addressing important clinical issues related to pain management

- Continued research is needed to address gaps that remain regarding effective, efficient ways to integrate practice change recommendations into complex care environments

(Gordon et al., 2016)

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Questions/Comments

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