Supporting Clinicians' Cognitive Workload - Technology's Role

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Today’s Focus

• Discuss concepts of cognitive workload, variance, shifts and stacking and how they apply to clinicians
• Review research finding (quickly – not too much academic stuff 😊)
• Examine how technology has impacted clinicians’ cognitive function
• Explore the ways mobile technology is improving cognitive support and patient care
Clinicians: First Line of Patient Surveillance
Cognitive Workload, Shifts & Stacking
Cognitive Workload

Workload emerges from the interaction between the:

- Requirements of a task
- Circumstances under which it is performed
- Skills, behaviors, and perceptions of the worker

Level of mental resources required of a person at any one time


http://www.humanreliability.com/mca.html
Task: Start an IV

Cognitive Workload Variance

- Airborne Precautions
- Pre-op Outpatient
- Combative Patient
- Cooperative Patient
- Student Nurse
- RN 10 years experience
Cognitive Shifts

Patient A

Patient B

Patient C

Patient D

Patient E

Patient F

Cognitive Stacking

Invisible, decision-making work of RNs

What, How, and When of delivering nursing care

Number of activities still needing completion

Technology should be designed with:
• An understanding of the data & information
• Most helpful manner to present—how & when
• Various disciplines

Patient F
Kidney Function? check her Foley/I&O

Patient D
Remember to ask the provider for...

Patient C
More education needed on diabetic foot care

Patient A
Reassess pain at 16:30

Patient B
Call her daughter at 1600 about Rx history

Call Robert to see if he can work AM shift

Put in Maintenance Request for 210-1 leaky faucet

My ACLS recert is tomorrow
Cognitive Underspecification: Incomplete communication that creates a knowledge gap

Research Findings
Nurses’ Cognitive Workload: Study 1

Observational Study: 136 hours - Two facilities

1,354 Total interruptions
6 Average # of minutes between interruptions
200 Total errors
1.5 Average errors per hour
46 Hours of multitasking
34 % of time multitasking

Primary observation, semi structured interviews, and surveys of hospital nurses found:

Average nurse -- 8 hr shift

- Average task time 3.1 minutes
  - interrupted mid-task eight times per shift
- Completed average 100 tasks
- Cognitive Shift: between patients, on average, every 11 minutes
- 8.4 operational failures
  1. Medication problems
  2. Medical orders
  3. Supply issues
  4. Staffing issues, such as nurses having to do aides’ or housecleaning’s work
  5. Broken or missing equipment

Nurses’ Cognitive Workload: Study 3

Observational Study: 3 RNs 8-10 hours of 12 hour shift by both RN Research and Human Factors Engineer

- 76.6 Average cognitive shifts per shift
- 9.3 Cognitive shifts per hour
- 30 Average interruptions per shift
- 47% Interruptions during care intervention
- 4 Cognitive shifts in 13 minutes
- 15 Average cognitive stacking load
- 11-21 Lowest to highest stacking load

Missed Care

Descriptive Study: Survey of 402 Certified NICU nurses

- 26% Missed “document as you go”
- 37% Missed med effectiveness assessed
- 32% Missed preparing patient for discharge
- 47% Missed Pain management
- 73% Frequent interruptions
- 52% Meds or equipment not available
- 32% Tension/communication breakdown with other care team

Could EHRs help?

- Small study (n=30) examined cognitive workload needed to complete printed nursing process versus computerized nursing process from In
- Computerized nursing process contributes to lower cognitive workload of nurses
  - Support system for decision making
  - Can enhance nurse safe decision making

EHR & Technology Tools

Technology Has Not Helped!
"Evaluations of the impact of health IT on quality and safety show mixed results, however. The main reasons seems to be a lack of integration of health IT into clinical workflow in a way that supports the cognitive work of the clinician and the workflows among organizations"
No reminders, updates or evidence….
unless we are in front of computer & logged in
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<td>98.2</td>
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Treatments: IV 25% NS 100 cc/hr PCA IV 25% NS 214/10
"Documentation does affect the timeliness of care. When a nurse is ready to give a premeal insulin dose but has to track down the nursing assistant first to find the patient's glucose level, care is compromised."

Dr. Angela Kohle-Ersher

http://www.medscape.com/medline/abstract/22024972
Smartphones are Everywhere....almost
# Smartphones – The Sub-Rosa Tool

<table>
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<tr>
<th>87% of Hospitals</th>
<th>67% of RN</th>
<th>91% of Hospitals</th>
<th>11% of Hospitals</th>
<th>89% of hospitals</th>
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<td>• That forbid personal smartphone usage at work</td>
<td>• Use their personal smartphones to support their work</td>
<td>• Aware of policy violations</td>
<td>• Include RNs in BYOD programs</td>
<td>• Expressed concerns r/t durability &amp; disinfecting</td>
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</table>

Spyglass Consulting Group (2014) Healthcare without Bounds Point of Care Communications for Nursing
Optimum EHR Deployment Requires Mobility Added to Mix

- **No Mobility** (Fixed Terminal)
- **Partial Mobility** (Workstation on Wheels)
- **Full Mobility** (Handheld)
Adding Mobility to Optimize your EHR
Clinical Mobility with a Single Pocketsize Device is Finally Practical & Available!

- Single device strategy with modular approach
  - Communication
    - Secure clinical texting
    - VoIP
  - Flowsheet documentation
  - BCMA/PPID
  - Specimen collection
  - EHR integration

- Utilize existing smartphone apps
  - Voice memos
  - Timers
  - Reminders
  - Translations
  - References
Design to make it more difficult for people to commit errors even if they are interrupted and their chain of thought is broken.

Lessons Learned
Wireless Networks Are Like Babies
Communication Strategy Has Changed!
Strive for single device & application (clinical decision)

Defined rollout process

Comms and Workflow are married

Device replacement plan

Expect questions that you never thought of!

Have a mobile device management plan

EHR integration is essential
Vision /vi-zhun/

1. The ability to see.
2. The image or insight of how something could or should be in the future.
Thank you for the gift of your time today!

Questions?

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