

Supporting Clinicians' Cognitive Workload - Technology's Role

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PatientSafe Solutions - Chief Nursing Informatics Officer

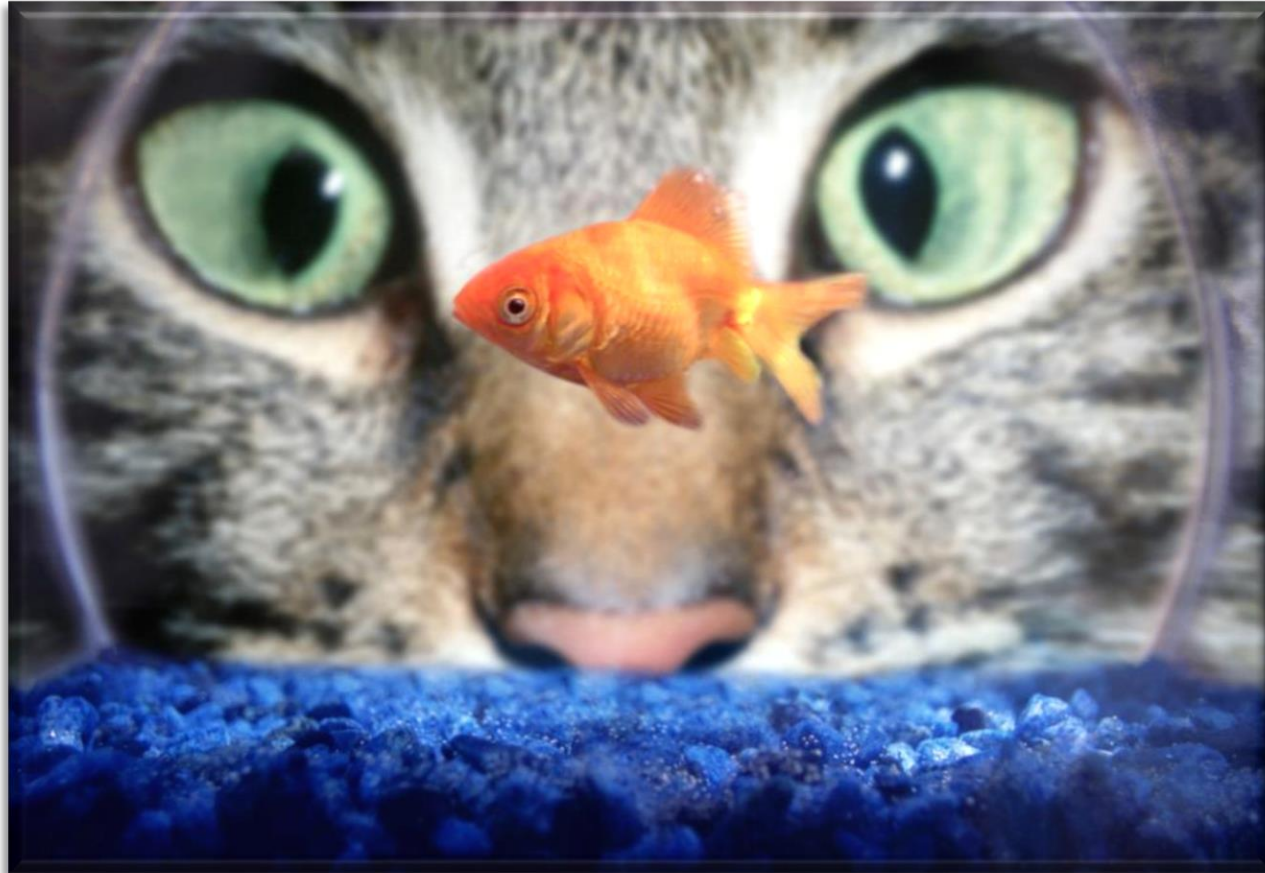
Contributing Faculty – Rutgers and Walden Universities

American Nursing Informatics Association – Board of Directors

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

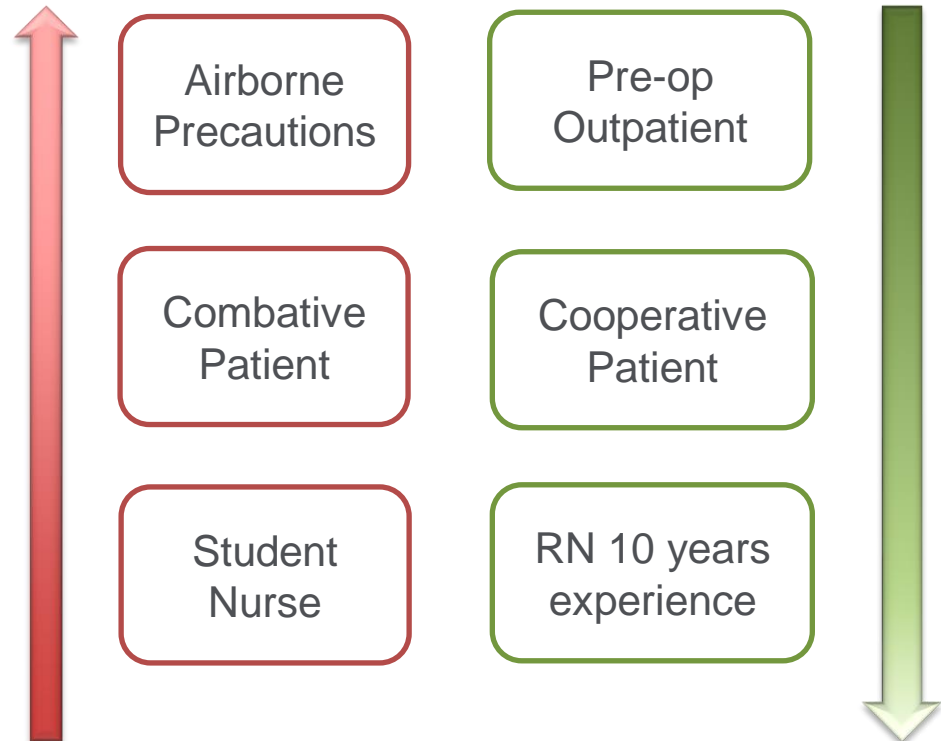


Hart, S.G. & Staveland, L.E. (1988). "Development of NASA-TLX (Task Load Index): Results of empirical and theoretical research," in Human Mental Workload, P.A. Hancock & N. Meshkati (Eds.), Elsevier.

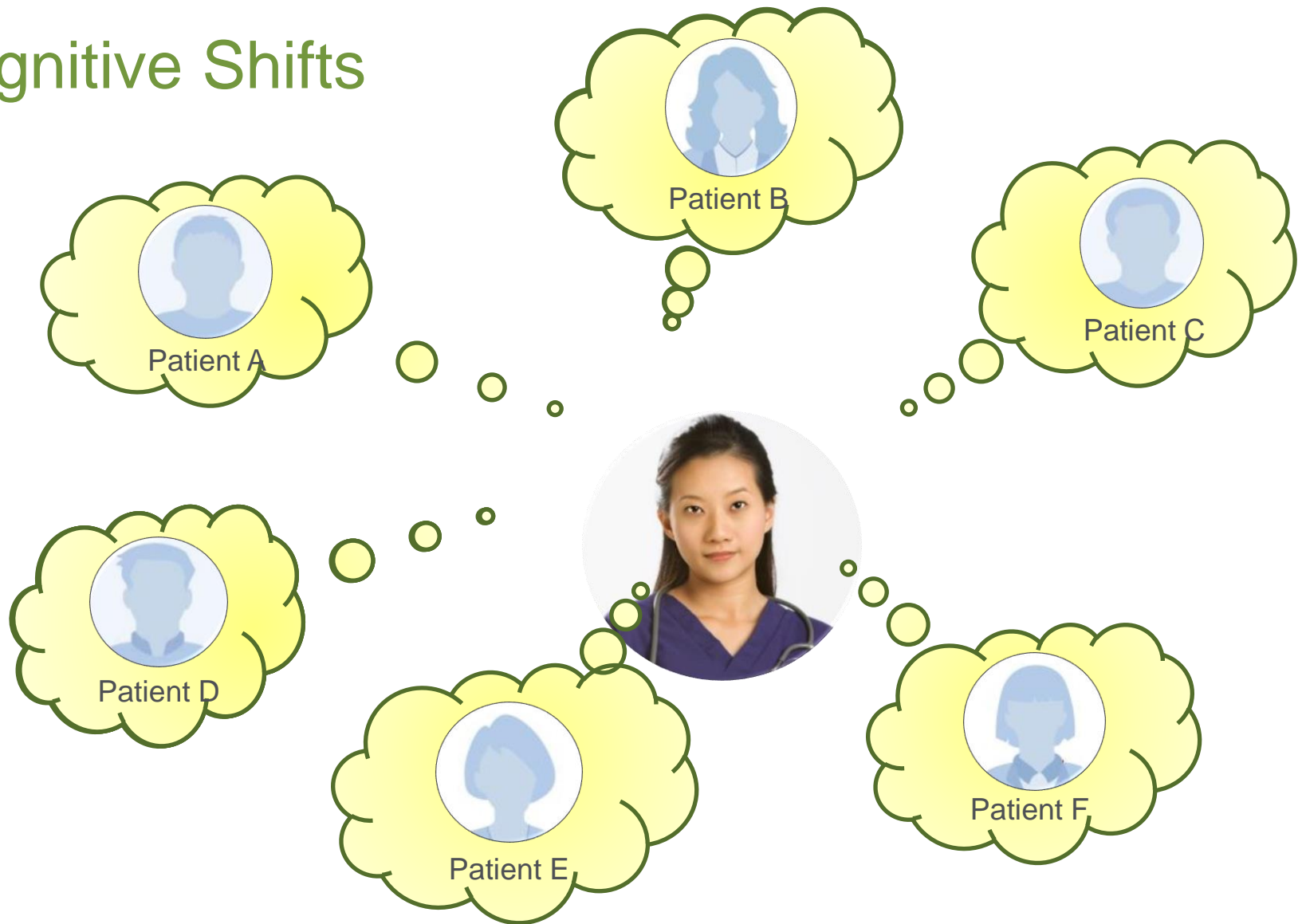
Cognitive Workload Variance



Task: Start an IV



Cognitive Shifts



Potter, P., Wolf, L., Boxerman, S., Grayson, D., Sledge, J., Dunagan, C., & Evanoff, B. (2005). An Analysis of Nurses' Cognitive Work: A New Perspective for Understanding Medical Errors. In J. B. Battles, E. O. Marks & D. Lewin (Eds.), *Advances in Patient Safety: From Research to Implementation* (AHRQ publication 05-0021-1 ed., Vol. 1). Rockville, MD: Agency for Healthcare Research and Quality Retrieved from <http://www.ncbi.nlm.nih.gov/books/NBK20475/?report=printable>.

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 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



Patient D

Remember to ask the provider
for...



Patient F

↓ Kidney Function? check her
Foley/I&O





Patient D

Remember to ask the provider for...



Patient F

↓ Kidney Function?
check her Foley/I&O

Put in Maintenance Request for 210-1 leaky faucet



More education needed on diabetic foot care



Patient C

My ACLS recert is tomorrow

Call her daughter at 1600 about Rx history



Patient B



Patient A

Reassess pain at 16:30

Call Robert to see if he can work AM shift

Cognitive Underspecification: Incomplete communication that creates a knowledge gap



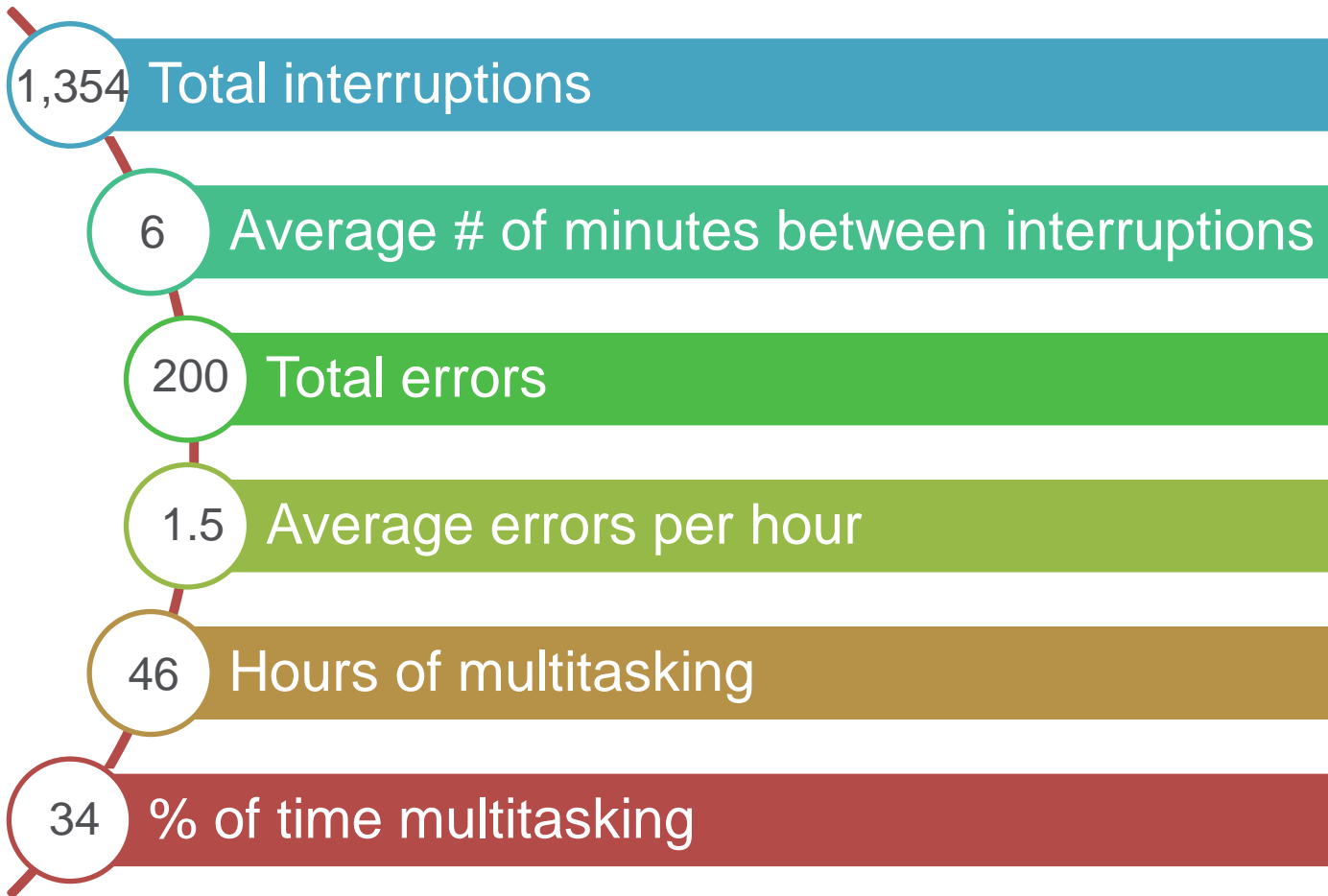
Duthie, E. A. (2014). Recognizing and managing errors of cognitive underspecification. *Journal Of Patient Safety*, 10(1), 1-5. doi: 10.1097/PTS.0b013e3182a5f6e



Research Findings

Nurses' Cognitive Workload: Study 1

Observational Study: 136 hours-Two

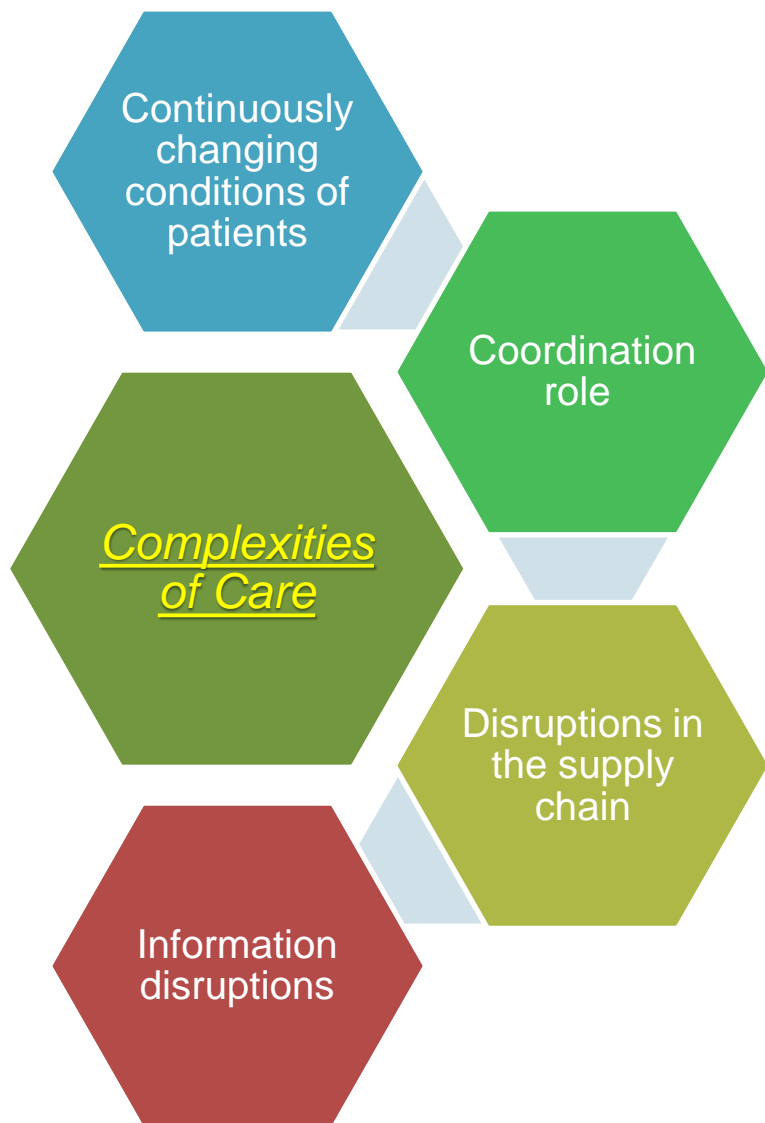


Nurses' Cognitive Workload: Study 2

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

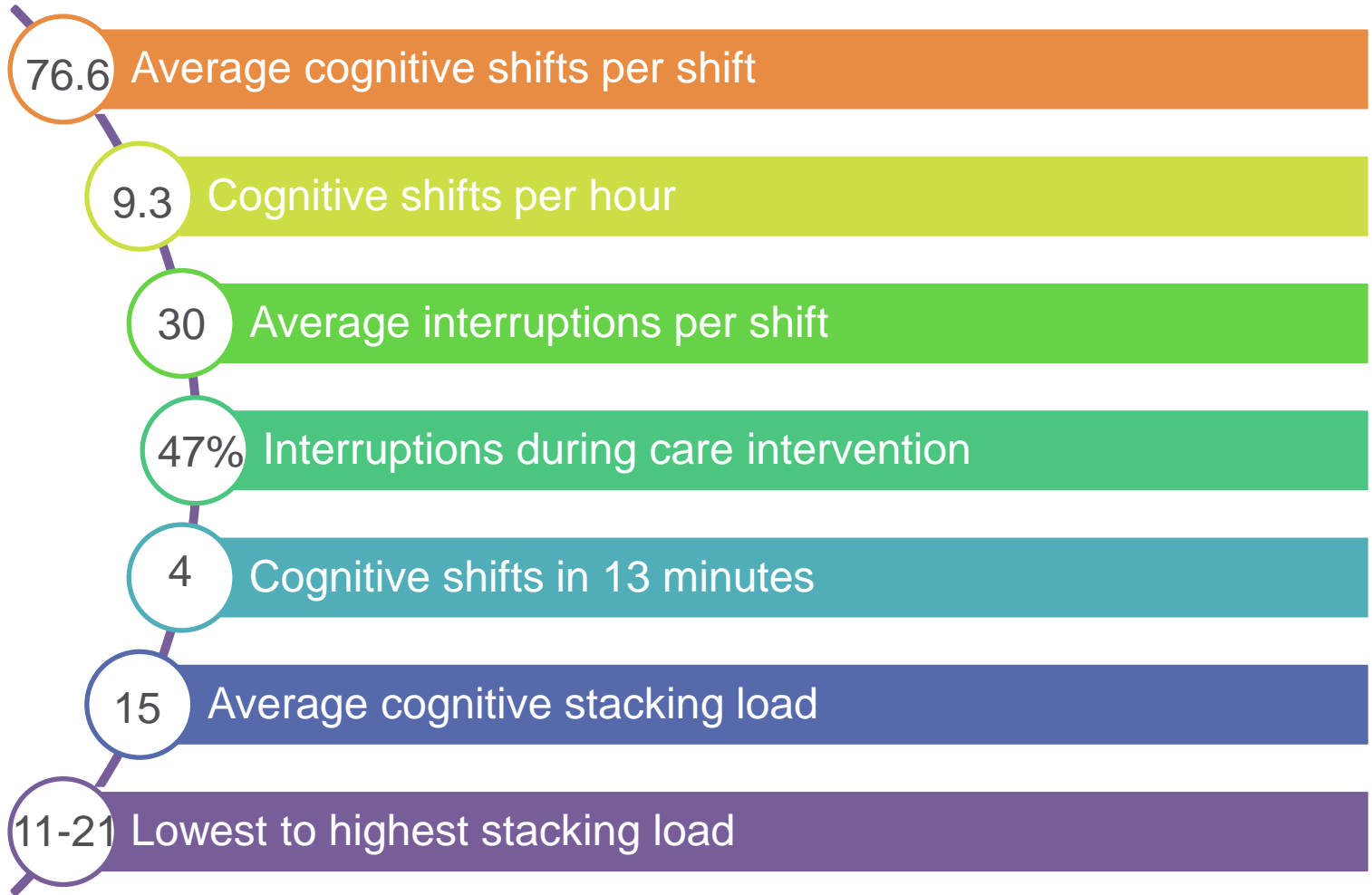
Average nurse -- 8 hr shift

- 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



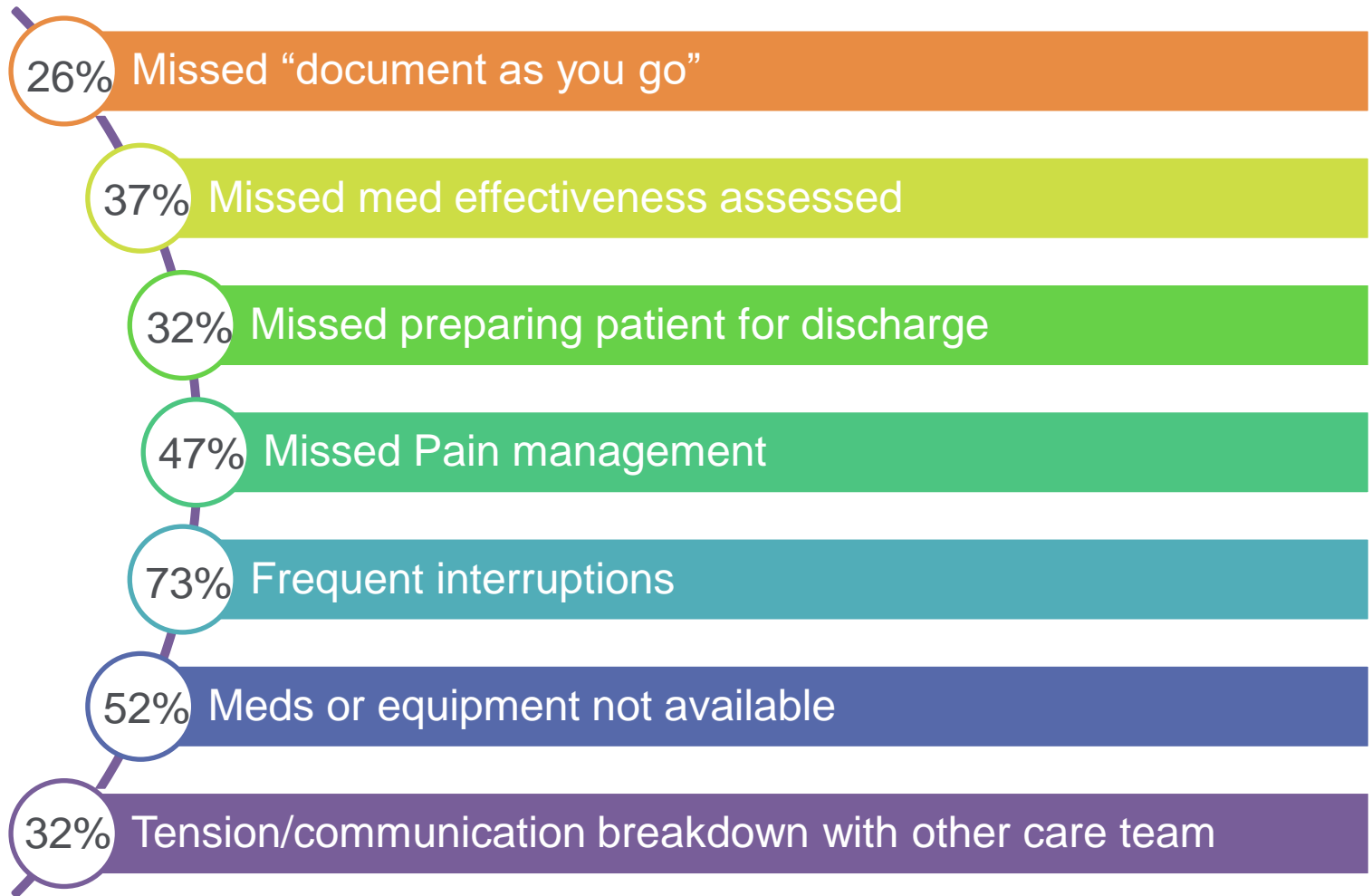
Nurses' Cognitive Workload: Study 3

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



Missed Care

Descriptive Study: Survey of 402 Certified NICU nurses



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

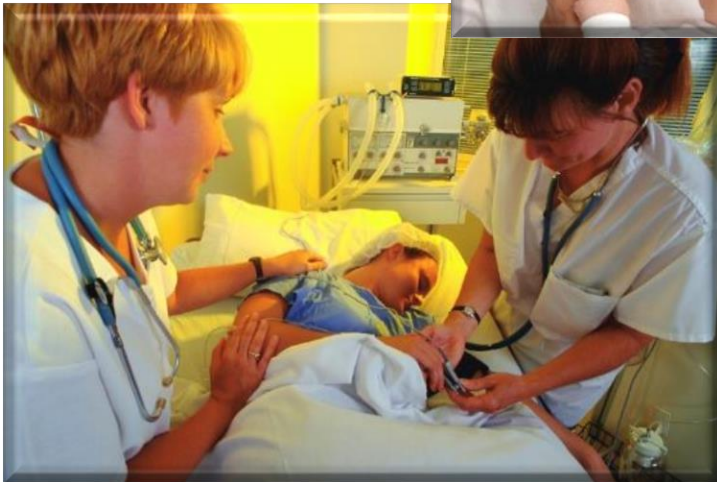


Technology Has Not Helped!

EHR & Technology Tools

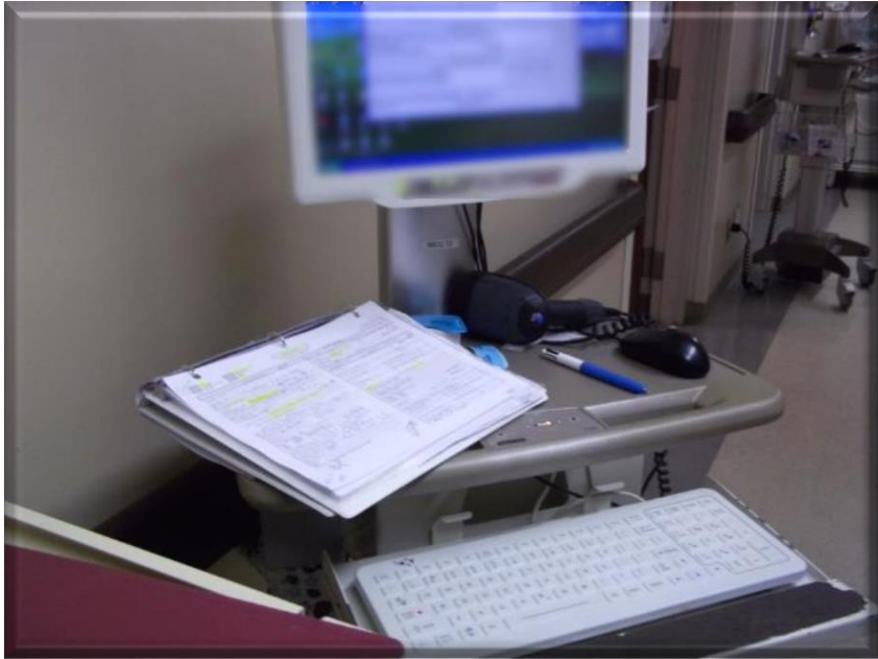
Incorporating Health Information Technology Into Workflow Redesign

"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

Room: 52 ²	Patient: Biwu	Code: Full	Allergies: NKDA
Age: 60	Gender: F	Doc: Va	Diet: Cardiac
Activity: 4x400ft 9 shifts	DX: MI 4/4 posterior - angio failed x2, 100% ock. / pacif		
History: 3 oppd smoker x 30 yrs	Cardiac: S1 S2 S3		
Lungs: Bilateral wheezes A/P		GI/GU: BTX4, voiding QS	
Skin/Other: w/d intact		Neuro: A/Ox3	
Tropoin 52 / cK 149		TODO: D/C planning	
Hgb 12	PT	BUN 17	BNP 55
HCT 37	PTT	Creat D. 1	INR
WBC Normal	R 14	BP 110/72	Shift summary done
Treatments:			
IV D5 1/2 NS 100 cc/hr		PCA: MS 2/5/10	
Report: 08 99'(6) 62 18		112/78 @ 114/70 @	
Meds at: 09 14		12 18	
Chem. Stick 12 @		14 @	



"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







Smartphones are
Everywhere....almost



Smartphones – The Sub-Rosa Tool

87% of
Hospitals

- That forbid personal smartphone usage at work

67% of RN

- Use their personal smartphones to support their work

91% of
Hospitals

- Aware of policy violations

11% of
Hospitals

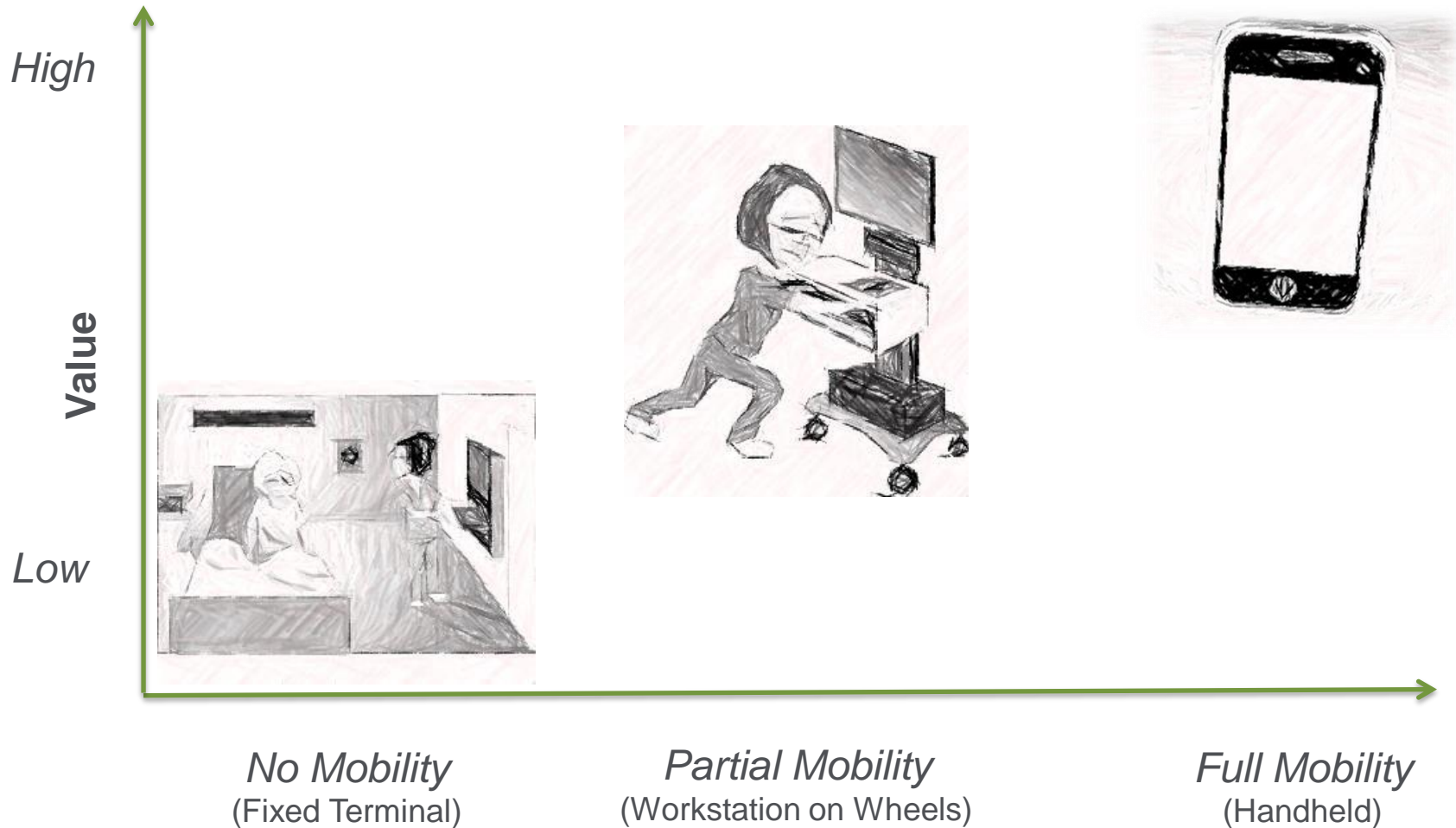
- Include RNs in BYOD programs

89% of
hospitals

- Expressed concerns r/t durability & disinfecting



Optimum EHR Deployment Requires Mobility Added to Mix



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

Tucker, A. & Spear, S. (2006) Operational Failures and Interruptions in Hospital Nursing, *Health Serv Res.* Jun 2006; 41(3 Pt 1): 643–662.

Stays with clinician

Timely EHR notifications

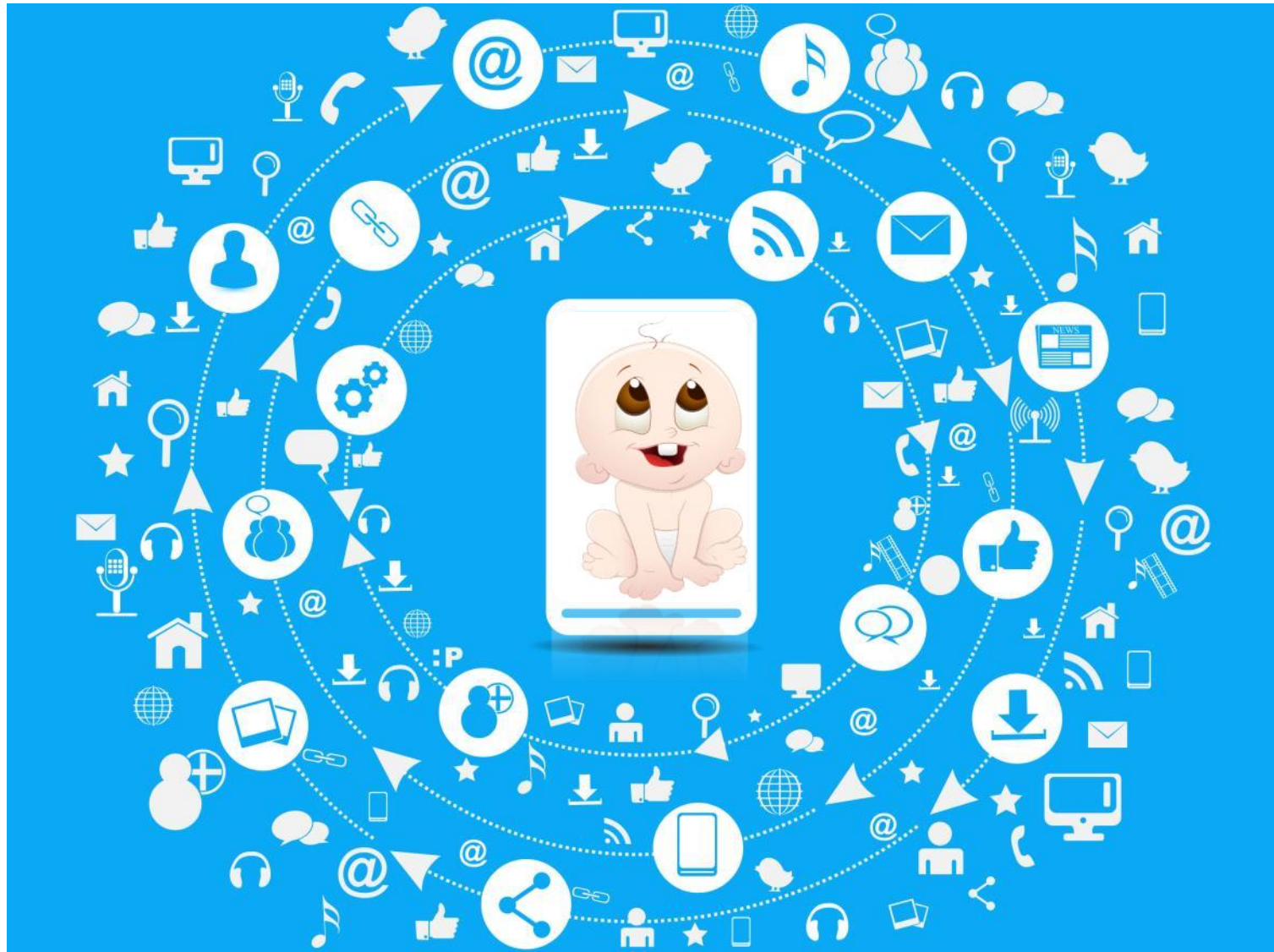
Workflow sensitive

Provide non-EHR reminders

Support mobility ecosystem

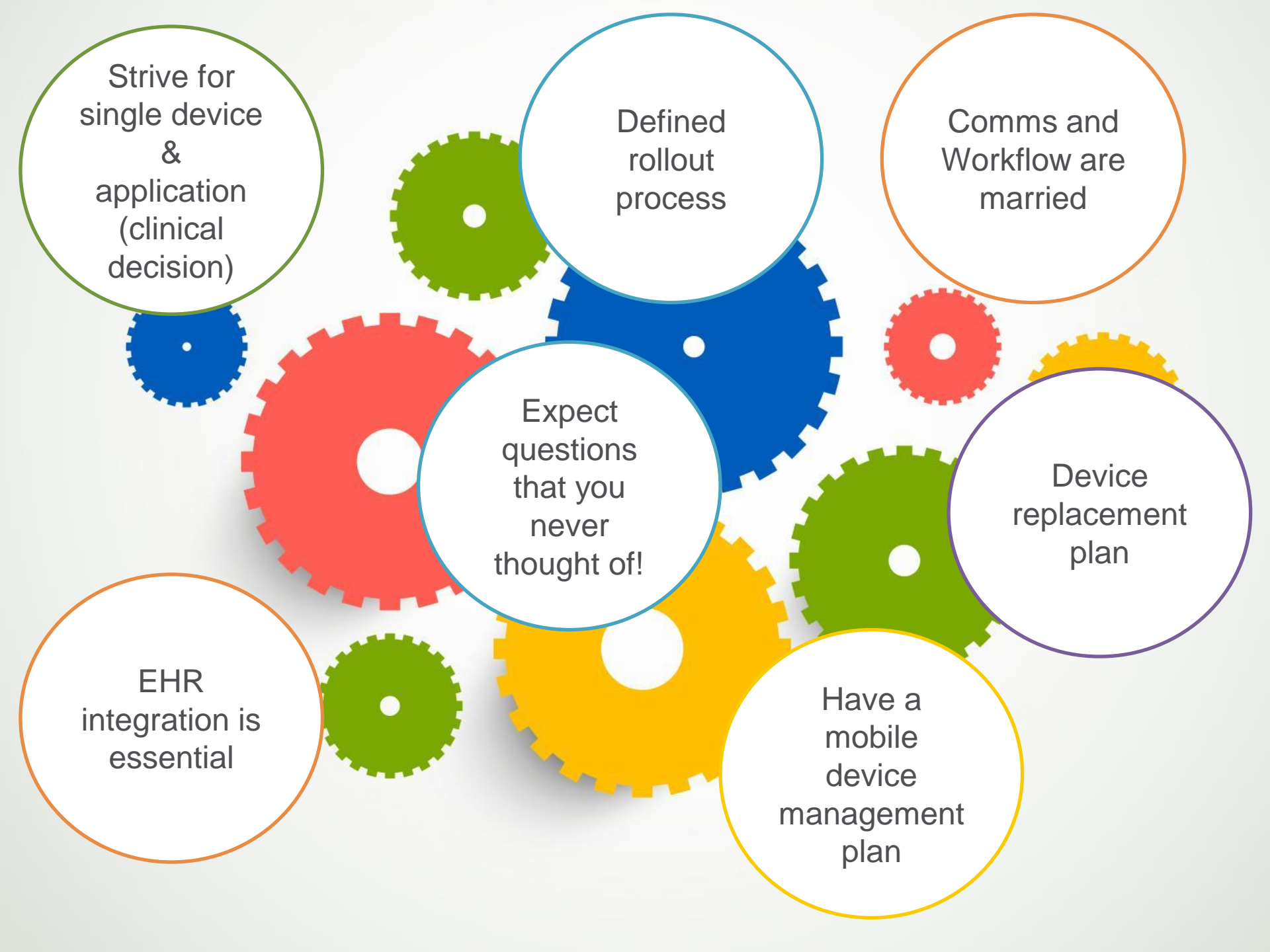
Lessons Learned

Wireless Networks Are Like Babies



Communication Strategy Has Changed!





Strive for
single device
&
application
(clinical
decision)

Defined
rollout
process

Comms and
Workflow are
married

Expect
questions
that you
never
thought of!

Device
replacement
plan

EHR
integration is
essential

Have a
mobile
device
management
plan

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!



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