Key Literature in Medical Education: keylimepodcast.royalcollege.ca
KeyLIME Abstract
Reviewer: **Linda Snell (@LindaSMedEd)**
EP # 123: Help… my brain is full! How much can you remember in a handoff??

Unpacking the Complexity of Patient Handoffs Through the Lens of Cognitive Load Theory

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Tags

Clinical domain	Educational domain	(Post)graduate
Medical Expert	Curriculum	(Residency training)
Communicator		
Collaborator		
Leader		

Background

Performing a handover (handoff) complex – one must simultaneously apply and integrate clinical, communication, and systems skills into a time-limited, constrained activity where mental models of each patient and their issues are shared.   The task demands can easily exceed the information-processing capacity, particularly for trainees whose knowledge, clinical problem solving and communications skills are still developing. Best practices include structured communication protocols, handoff training using multimodal methods (such as we discussed in KeyLIME 22 addressing learner, environment and systems issues.
Memory is divided into sensory memory (unlimited but short duration and not conscious), long term memory (limitless capacity and duration, needing a route map to retrieve) and working memory (packages info to store in LTM, finite- holds 4-7 $\pm$ 2 info units, processes 2-4 elements concurrently, lasts seconds). Cognitive Load theory (CLT) identifies three types of cognitive load that consume limited WM Resources (the sum of these 3):
1. Intrinsic load—associated with (intrinsic) to task to make sense of info.

2. Extraneous load—not essential (extrinsic) to task induced by the design of the task (e.g., how information is presented) or the environment (e.g., background noise).
3. Germane load—imposed by the learner's use of cognitive strategies to reorganize information in order to refine existing schemata and enhance storage in LTM.

WM can handle more information elements when it is distributed between auditory and visual information, and when it is automatized using schemata (e.g. illness scripts)

Purpose

To summarize CLT, use it to identify and categorize factors that affect cognitive load and learning and performance during a handoff, then explore implications of the analysis for future handoff research and instructional design.

Type of paper

'Observation' paper, theory building

Key Points on the Methods

The authors generated a list of factors affecting trainee's learning and performance of a handoff, based on CLT. The list was revised based on feedback from experts in medical education and in handoffs. By consensus, each factor was associated with the type of cognitive load it primarily affects. The authors used this analysis to build a conceptual model of handoffs through the lens of CLT.

Key Outcomes

Concept map of a patient handoff through the lens of cognitive load theory.
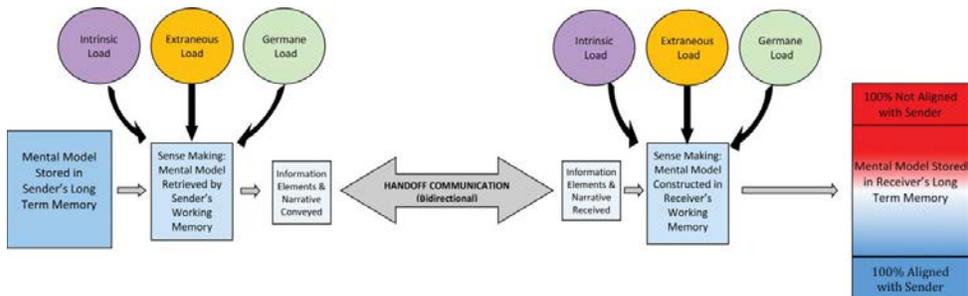
Intrinsic

  Number of information elements   Number of patients
                 Number of comorbidities per patient
                 Number of follow-up tasks
  Time   Rapid communication and decision-making
  Interactivity of the information elements   Uncertainties or contingencies:
                 Interactions: disease–disease, drug–drug, disease–drug
                 Maturity of the evidence base for the disease
  Knowledge level of the learner   Familiarity with the handoff procedure
                 Maturity of learner's relevant illness scripts

Extraneous

Information search	Sender does not identify anticipated events	
	Clinical information fragmented – in different places	
	Handoff process not clear	
Modality of information	Information not distributed between visual and auditory channels	
Distractions	Background noise	
	Interruptions	
	Gradients—authority, experience, specialty	
	Preoccupied with internal concern (e.g., how perceived by others)	
Physiology	Fatigue	
	Working memory capacity	

Germane

Strategies to enhance learning	Self-explanation	
	Concentration	
	Metacognition:	
	anticipatory planning, monitoring, adapting, generalizing	
	Interactive questioning	

An interesting 'extra' is the concept of 'gradients' of experience, expertise, authority between sender and receiver adds extrinsic load.

Key Conclusions

The authors conclude handoffs are complex and WM can be a bottleneck for learning. CLT helps identify factors that impose load unrelated to the task. CLT-related instructional interventions aim at regulating cognitive load using three basic strategies: (a) reduce extraneous load, (b) manage intrinsic load, and (c) optimize germane load.

Spare Keys – other take home points for clinician educators

1. A nice combination of education theory applied to clinical practice.
2. as meded designers, we need to be more mindful of cognitive load theory…It explains many phenomena (eg "Why do the residents take so long to do that task? I can do it in a minute!")
3. TLIM is perhaps a little brother in the pantheon of meded journals but often has great pubs. Eg the Pangaro RIME paper;