Teaching Cognitive Biases That Lead to Diagnostic Errors Using High-Fidelity Human Patient Simulation

The Next Level of Conversation with Learners at the Point of Care

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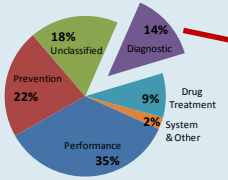
Motivation

- Human error is common in healthcare, is part of the human condition, and increases with complexity, lack of familiarity, and as task demands are added [1,2]
- Diagnostic decision-making is a common physician task that is susceptible to human error [3]

Error Categories of Adverse Events



Error Categories Judged Negligent

Error Category	% Negligent
Diagnostic	**75%**
System and other	66%
Prevention	60%
Drug treatment	53%
Unclassified	43%
Performance	29%

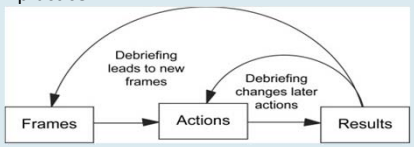
From: Leape et al., 1991

- Diagnostic errors are NOT the most prevalent in terms of contributing to adverse events but they are the error category most likely to be judged "due to negligence" [3]
- Diagnostic errors can be classified as "No fault", "System" or "Cognitive" errors [4] but there is no prevalence data in the literature
- Cognitive biases are a cause of cognitive error which is a patterned deviation in judgment due to information-processing limitations, decision making shortcuts, and emotional, moral or social influences [5]

Cognitive Debiasing Strategies (techniques applied in this project are in **bold**)		
Develop insight/awareness	Consider alternatives	Metacognition
Decrease reliance on memory	**Provide specific training**	**Use simulation**
Use cognitive forcing strategies	Make task easier	Minimize time pressure
Establish accountability	**Provide feedback**	

From: Croskerry, 2003

- Simulation is a form of experiential learning that offers a deliberate practice setting to teach patient safety at both the clinical and health system level [6,7,8,9]
- Advocacy Inquiry in debriefing enables learners to experience cognitive biases, observe the resulting consequences on patient safety, receive feedback on unhealthy frames, change learners frames and establish new healthy mental models to change actions in practice [10]



From: Rudolf et al., 2008

- The goal of this program of research is to design and implement a high-fidelity patient safety simulation curriculum for internal medicine residents to prevent diagnostic errors from occurring in clinical practice

Simulation Program

- The Rockyview General Hospital Internal Medicine residency program extends over multiple weekly simulation sessions including in-situ sessions on the inpatient care unit
- In-situ sessions conducted at point of care of inpatient service with scenarios based on actual patient data for the team
- Debriefing by trained simulation instructors through a process of exploration and inquiry combined with advocacy to change mental frames and actions
- We selected four cognitive biases based on discussion and consultation between human factors and simulation specialists taking into account practical considerations:

Estimated Prevalence ↔ Fit in Current Program ↔ Resonate with Learners ↔ Reproducible in Scenarios

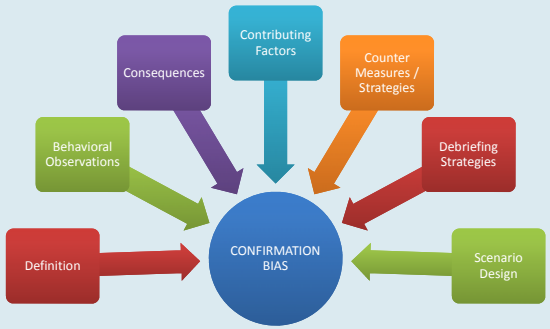
- Learning objectives related to cognitive error were integrated with the existing simulation curriculum

Bias	Working Definition
Momentum	Tendency for an initial diagnosis to become established without evidence; is usually started with an opinion that is passed from person to person.
Confirmation	Tendency to look for confirming evidence to support a hypothesis, rather than look for disconfirming evidence to refute it.
Order Effects	Tendency to remember more information transferred at the beginning and end of an exchange and missing information in the middle.
Playing the Odds	Tendency to form an opinion based on a *perceived* odds judgment rather than objective evidence that rules out a particular diagnosis.

Adapted From: Croskerry, 2003

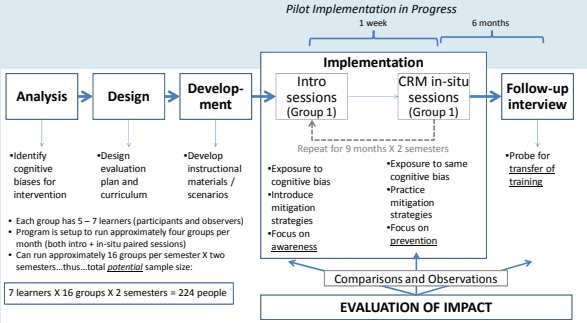
Integration Framework

- Due to the dynamic and adaptive nature of the simulation curriculum, a framework was developed to integrate learning objectives related to cognitive biases
- The framework allowed for both a structured and dynamic basis for teaching about cognitive biases as part of scripted and in-situ simulation sessions



Evaluation Plan

- Goal to quantify the positive effects of teaching about cognitive biases using patient simulation as a teaching modality [5]
- Currently pilot testing implemented curriculum, understanding metrics to assess, and fine tuning our debriefing approach



Pilot Results / Next Steps

- Current pilot testing is gauging the success of: (1) instructional materials, (2) fine-tuning scenarios, (3) understanding bias-resistant mental frames, (4) developing debriefing strategies, (5) gaining insights about learning, and (6) refining the evaluation plan
- We assessed a number of variables to gauge the potential benefits of the integrated curriculum on cognitive biases

Variable	Momentum	Confirmation	Order Effects	Playing the Odds	TOTAL
# of Sessions	4	4	3	3	14
Evidence of Bias ?	**25%** (1/4)	**25%** (1/4)	**33%** (1/3)	**67%** (2/3)	**36%** (5/14)
Use of Counter Measures or Strategies?	**50%** (2/4)	**25%** (1/4)	**67%** (2/3)	**33%** (1/3)	**43%** (6/14)
Successfully Explored Frames Related to Bias?	**100%** (4/4)	**25%** (1/4)	**67%** (2/3)	**67%** (2/3)	**64%** (9/14)
Evidence of Learning or Positive Change in Frames ?	**100%** (4/4)	**25%** (1/4)	**67%** (2/3)	**33%** (1/3)	**57%** (8/14)
Did Debrief Fit Naturally with Simulated Case ?	**100%** (4/4)	**25%** (1/4)	**67%** (2/3)	**33%** (1/3)	**57%** (8/14)

- **Next Step** = Refine framework for each bias, continue with data collection for pilot, consider other biases for pilot, scale up to full curriculum roll out and evaluation plan

References

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