

# Improving Clinical Reasoning

## with Multiple Choice Questions

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# Key Points

- What is Clinical Reasoning?
- Medical Knowledge
- Cognitive Ability
- Meta-Cognitive Skill
- Development of Clinical Reasoning
- Clinical Reasoning Strategies
- Confidence Ranking on Exams
- Student Generated MCQs

# What is Clinical Reasoning?

- Process used to solve a clinical problem
  - searching & finding necessary clues
  - hypothesis generation
  - testing hypotheses to diagnose
  - selection of an appropriate treatment method

# What is Clinical Reasoning?

- Core elements of clinical reasoning
  - Medical knowledge
  - Cognitive ability
  - Meta-cognitive skill

# Medical Knowledge

- Quantity of medical knowledge does not determine clinical reasoning competency
- Novices can be aware of textbook knowledge necessary to solve clinical problems, but lack utilization of knowledge due to rudimentary knowledge structure
- Textbook knowledge increases in residency training, stabilizes in early postgraduate years, peaks during house appointments and falls to the same level as first-year clinical students during consultant years.
  - Grant & Marsden, 1988

# Cognitive Ability

- Core element of the clinical reasoning process
- Determined by organization of knowledge
- Formed by encounters with clinical problems
- Develops continuously over the career of physician
- Experts' knowledge is organized into rich & tight knowledge network by encountering lots of clinical problems in the domain
  - Norman, 2005

# Meta-Cognitive Skills

- The monitoring of the thinking process
- Necessary for the management of cognitive skills
- During clinical reasoning, individual medical knowledge and cognitive abilities are integrated by observing the connects and inconsistencies between them.

# Development of Clinical Reasoning

- **Novices:** gather unnecessary detail, overemphasize rare pathologic situation and lack the awareness necessary to discern which information is pertinent to solving clinical problems
- **Intermediates:** seek explanation the current clinical situation, using a causal model of reasoning; lack of self-confidence results in seeking additional evidence and support, slowing their reasoning process
- **Experts:** reasoning process is unconscious and automatic resulting in a faster solution to the clinical problem



# Current Research Incorporating MCQs

- Clinical Reasoning Strategies (IM residents)
- Confidence Ranking (dental students)
- Student Generated MCQs (pharmacy students)

# Exploring Clinical Reasoning Strategies

- 6 clinical vignette style multiple choice questions
- 12 Internal Medicine interns
- Comparison based on Step 2 CK Score

<b>Strategies</b>	High CK Score	Moderate CK Score	Low CK Score
Reaching closure prematurely	0	6	25
Admitting knowledge deficits	58	22	13
Applying faulty knowledge	8	28	46
Ruling out alternatives	92	69	17

– Heist, Gonzalo, Durning, Torre & Elnicki, 2014

# Exploring Clinical Reasoning Strategies

- Findings (high score VS low score)
  - Ruled out alternatives: **92%** vs **17%** of questions
  - Admitted knowledge deficits **58%** vs **13%** of questions
  - Demonstrated premature closure **0%** vs **25%** of questions
  - Applied faulty knowledge **8%** vs **46%** of questions
- Conclusion
  - Authors hypothesized that premature closure & failure to admit knowledge deficits could relate to over confidence

# Including Confidence Ranking on Exams

- 104 3<sup>rd</sup> year dental students (implant dentistry)
- 20 MCQ exam based on clinical scenarios
- Faculty designated distractors as benign, inappropriate, or harmful
- Students selected best possible answer & indicated 'confident' or 'not confident'

<b>Incorrect Responses</b>	Benign	Inappropriate	Harmful
Incorrect & Confident (misinformed) <b>22%</b>	1%	17%	4%
Incorrect & Not Confident (uninformed) <b>8%</b>	1%	5%	2%

– Curtis, Lind, Boscardin & Dellenges, 2013

# Including Confidence Ranking on Exams

- Findings:

Student confidence did not decrease as the potential harm of answers increased

- Conclusion:

Important for learning potential & remediation strategies

- Uninformed students requires additional knowledge
- Misinformed students often strongly believe in incorrect information and may be resistant to change

# Employing Student Generated MCQs

- 165 2<sup>nd</sup> year Pharmacy students
- Develop patient case scenario; create 2 therapeutic based MCQ with 4 answer options with explanations
- Faculty assess structure & content
- Provide all questions to students as study aid

## Student perceptions of educational value

79% agree/strongly agree = Improved depth of understanding of curriculum content

86% agree/strongly agree = Assisted in analyzing concepts learned

74% agree/strongly agree = Assisted in understanding application to patient care

- Schullo-Feulner, Janke, Chapman, Stanke, Taylor, Brown & Straka, 2014

# References

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