

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

| Strategies | 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 3rd 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'

| Incorrect Responses | Benign | Inappropriate | Harmful |
|--|--------|---------------|---------|
| Incorrect & Confident (misinformed) 22% | 1% | 17% | 4% |
| Incorrect & Not Confident (uninformed) 8% | 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 2nd 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

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