Assessing Development of Clinical Reasoning in the Pre-clinical Period

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Background

While clinical reasoning (CR) curriculum is a vital component of medical education, it remains one of the most challenging skills to teach and assess. Studies have demonstrated the effectiveness of incorporating case-based CR courses into pre-clinical curriculum; however, there is no consensus on the most successful method of delivery. We aim to determine whether and to what extent our students' CR skills are improving throughout the pre-clinical period.

Program Description

We used a retrospective observational cohort design. 125 medical students enrolled in the pre-clinical curriculum in 2019 formed our cohort and engaged in six case-based learning (CBL) activities throughout the year. During each activity, students were presented with a virtual patient and instructed to complete the assessment and plan portion of a note. We used progression of these notes to assess improvement of CR. For assessment methodology, we used a modified version of a previously validated rubric coupled with scoring guides validated by expert faculty across various specialties.

Program Evaluation

In comparison to the initial CBL activity, scores for differential diagnosis, explained well, alternatives well considered, decision-making skills, and overall clinical reasoning fell significantly ($p<0.05$). The score for well-reasoned plan also fell but was not found to be significant ($p=0.09$). Scores for interpretive summary and diagnostic reasoning skills improved slightly, however, were not found to be significant ($p=0.052$ and $p=0.17$ respectively). Most frequent overall score in the initial and final CBL activities was 16 and 18, respectively. See table 1 for presentation of means with standard deviations for all scores. Comparison of overall scores can be found in figure 1.

Discussion

In contradiction to our hypothesis, our students' documentation did not exhibit improvement in CR skills throughout the pre-clinical curriculum. The following factors may have contributed to this result:
- Inopportune timing of the activity during finals week
- Low-stakes nature of the activity due to lack of grading component
- Need for improvement in instruction and communicated expectations for the CBL activity

Given that the goal of our CBL sessions are, in part, to improve early CR skills, this data serves as evidence that improvements are needed in our curriculum to meet our educational aims and grow students' CR skills. However, we do feel that we have found a fair and reproducible method of assessing early clinical reasoning as evidenced by students' clinical notes in these simulated cases.

Study Scoring Results

Rubric Category:	Initial Note Scores	Final Note Scores
Interpretive Summary	1.74±0.81	1.88±0.88
Differential Diagnoses*	2.78±0.42	2.57±0.53
Explained Well*	2.57±0.78	2.27±0.93
Alternatives*	2.1±0.82	1.89±0.9
Well-Reasoned Plan	2.5±0.64	2.35±0.85
Diagnostic Reasoning Skills	1.46±0.72	1.58±0.78
Decision Making Skills*	1.7±0.46	1.41±0.57
Total Score*	14.86±2.35	13.95±3.06

*Table 1: Study scoring results. Presented as mean ± SD. Statistical significance indicated with ***
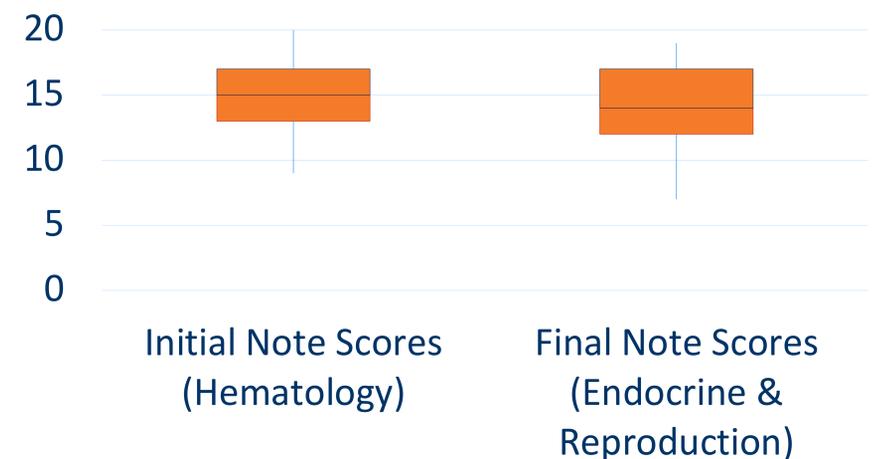
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Figure 1: Box plot representation of score distributions.

Conclusion

While fair assessment was achieved, further study is warranted to improve our CBL curriculum to accomplish the goal of effectively teaching CR during the pre-clinical period.