Medical Student Responses in Critical Appraisal: A Qualitative Analysis

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Background

Medical librarians at the Indiana University School of Medicine (IUSM), Ruth Lilly Medical Library teach critical appraisal to undergraduate medical students. These students are in Phase One (first- and second year courses) and Phase Two (clerkship experiences) of their academic program. Critical appraisal sessions are fully integrated into curriculum and are taught throughout each phase of training at IUSM. For example, during the Internal Medicine clerkship, Phase Two students complete an evidence-based medicine (EBM) assignment. The assignment asks students to locate and critically appraise a research article that applies to a patient they have worked with during their rotation.

Traditionally, in their review of EBM assignments, medical librarians identified that many students used factors such as journal reputation or impact factor as proxies for authentic critical appraisal skills. These skills are essential to appropriately evaluating study methodology and results.
Our team of three librarians and an assessment and quality expert wanted to respond directly to these findings. As a result, we conducted a qualitative content analysis of one of the primary questions students responded to in the Internal Medicine EBM assignment described previously. The goal of our study was to identify specific EBM principles and best practices that students applied successfully in their answers.

Methods

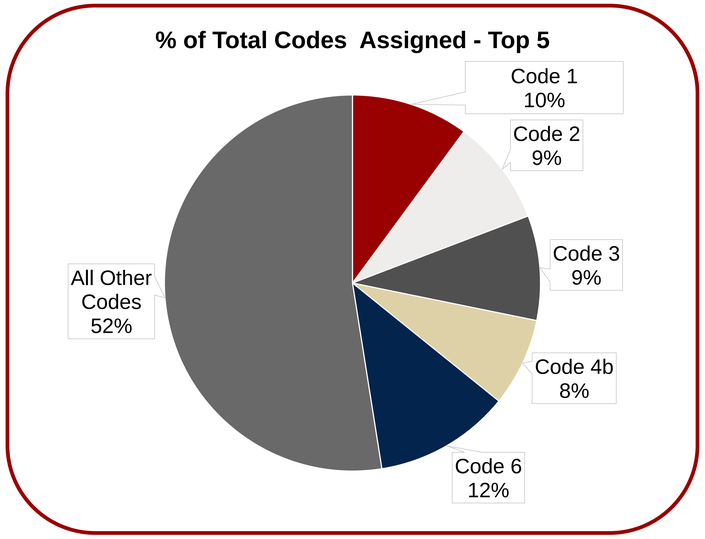
1) **Gathering Data**: 358 individual student responses to the assignment question: *Can you apply this information to your patient?* [You should provide a critical appraisal of the literature as part of your justification.]
2) **Qualitative Open Coding**: The three medical librarians each independently coded a subset of student responses in order to identify major themes.
3) **Code List Creation**: After open coding, the research team held several collaboration meetings which resulted in an agreed upon code list.
4) **Second-Cycle Coding**: Each medical librarian recoded their subset of student responses using the established code list (20 total codes).
5) **Inter-rater Reliability**: To ensure trustworthiness and accuracy, the three librarians independently re-coded 75 student responses from the other librarians' subset of student responses (e.g., blind review).
6) **Calculating Results**: The assessment and quality expert examined the total frequency (1664) for which the 20 codes were assigned. Descriptive statistics and Pearson correlations were also examined.

Summary: A content analysis was conducted on the identified sample of students' EBM responses. In order to identify what specific EBM principles and best practices that students applied in their answers, a qualitative coding process was conducted. In total – each of the three medical librarians coded 1/3 of the 358 responses independently. A code list was then created and used to better understand the data through a second-cycle coding process.

Results

#	Code Name	Responses with Code N	%
1	Comparing study sample to population/patient being treated	168	46.9%
2	Recommending a course of action based on study results to patient/population being treated	152	42.5%
2a	Applying a patient-focused risk/benefit analysis to the case	101	28.2%
3	Identifying study type	150	41.9%
3a	Identifying study type within hierarchy of evidence	27	7.5%
4	Discussing provenance of article(s)	24	6.7%
4a	Using database as an indicator of study quality	19	5.3%
4b	Using journal reputation/peer review status/h-index/impact factor/citation counts as an indicator of quality	126	35.2%
4c	Using author/institution reputation/credibility as an indicator of quality	11	3.1%
5	Giving a summary of methodology used in chosen study	90	25.1%
6	Providing a coherent summary of results of chosen study	195	54.5%
6a	Discussing statistical significance (or lack thereof)	66	18.4%
6b	Providing a point estimate for results of study	111	31.0%
6c	Stating precision of results and/or CI	40	11.2%
7	Attempting a critical appraisal of study methodology	61	17.0%
7a	Providing a discussion of potential sources of bias in the chosen article	57	15.9%
7b	Providing a discussion of possible confounding factors in the chosen study	44	12.3%
7c	Identifying limitations of chosen study or suggesting ways to improve quality of evidence gathered	89	24.9%
8	Discussing timeliness of article/study	110	30.7%
9	Neglecting to engage with or discuss methodology or results of article/study	23	6.4%

Additional Results



Discussion

This project is a continuation of our work *Integrating evidence-based medicine skills into a medical school curriculum: a quantitative outcomes assessment* (Menard et al., 2020). In this work, results showed "the implementation of a scaffolded, longitudinal EBM teaching intervention improves the students' ability to perform tasks related to the EBM skillsets taught in the pre-clinical years of medical school." In order to further this research, we identified specific EBM principles and best practices that students applied successfully in their answers to an EBM assignment.

In this study, it is notable that over half (54.5%) of student responses were tagged as Code 6 and provided a summary of the results of the chosen study. It is also positive that students' assignments were often assigned Code 1 in which they appropriately compared their patient to the article's study population (46.9%).

However, unfortunately a notable number of students (35.2%) incorrectly used journal reputation, peer review status, h-index, impact factor, or similar metric, as a proxy for critical appraisal as described in Code 4b. Finally, it is interesting that there is a moderate to high positive correlation ($r = .397$, $p < .001$) between Code 4b and Code 8 (discussing timelines of study) which may suggest that students are placing too much emphasis on external factors in their evaluation of study quality.

Taken together, these findings are important because they show what EBM principles and best practices students are applying in critical appraisal.

References

- Saldaña J. The Coding Manual for Qualitative Researchers. 4E [Fourth Edition]. SAGE; 2021.
- Krippendorff K. Content Analysis : An Introduction to Its Methodology. Fourth edition. SAGE; 2019
- Menard L, Blevins AE, Trujillo DJ, Lazarus KH. Integrating evidence-based medicine skills into a medical school curriculum: a quantitative outcomes assessment. *BMJ Evid Based Med*. 2021;26(5):249-250. doi:10.1136/bmjebm-2020-111391

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