

U.K. Medical Students and Doctors Understanding of, and Views on Evidence-Based Methods

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Abstract

Introduction

In the absence of guidelines clinicians must make medical decisions using reliable evidence. This requires knowledge of research concepts and critical appraisal skills. Yet, it is recognized that training in this area is often lacking and widely varied. This paper's aim is to survey medical students and clinicians to identify attitudes towards research education and overall confidence.

Methods

A national cross-sectional study using a ten-point survey was distributed from February-March 2021. Eligible respondents were United Kingdom senior medical students in final or penultimate years and doctors pre-specialty training. Respondents were categorized into three groups: medical students, clinicians, and clinical academics.

Results

139 eligible respondents completed our survey of which 58 were senior medical students across 9 medical schools. All medical students were in penultimate or final years of their medical courses. Also 81 doctors responded, 20% (n=16) of whom were clinical academics. Only 48% of medical students, 60% of clinicians and 65% of clinical academics said they'd received formal educational teaching during medical school as part of the curriculum. This increased to 72% for students who had intercalated or studied degrees previously. Clinical academics consistently reported having received the most training. Clinical academics also had the most confidence in understanding research concepts; study types, PICOS, P-value, null hypothesis, types of error, and types of bias. Medical students who intercalated were more confident in critical appraisal concepts with the majority rating themselves as 'somewhat confident' in 5 of the 6 research concepts compared to students who did not intercalate who rated themselves as 'somewhat confident' in 3 of the 6 concepts.

Discussion

The results show there is a general lack of teaching and confidence in evidence-based methods. Medical schools must address this to develop doctors who can make well-informed clinical decisions. Further action is required to standardize a research curriculum.

Introduction

Often, in the absence of guidelines clinicians must make medical decisions using reliable evidence as part of evidence-based practices [1, 2, 3, 4, 5, 6]. However, for this to take place clinicians must have knowledge of research concepts (RC) and critical appraisal skills (CAS) as part of understanding evidence-based methods (EBM) [7, 8, 9]. This is further emphasized by the United Kingdom (UK) General Medical Council's postgraduate person specifications [10].

Training of EBM in medical students promotes development of evidence-based practitioners [1, 2, 3, 11]. Yet, it is recognized that training in this area is often lacking and widely varied with no standardized EBM curriculum [4, 12]. Consequently, the understanding of RC and CAS in junior clinicians is limited and disparate which may hinder further development and progression to decision-making roles.

Whilst studies on teaching techniques for teaching EBM have been widely explored, studies on the perceptions of medical students and recently qualified doctors towards RM and CAS are limited. Current evidence suggests that medical students often view EBM as 'boring' and 'unstimulating' [13, 14].

As EBM is a core skill that is required of all clinicians [10] and given the effects of the COVID-19 pandemic on medical education [15] it has become necessary to further explore the confidence and attitudes of medical students and junior doctors towards EBM and the need for increased attention to teaching in this field. Furthermore, as understanding of EBM is a core skill for scholarly research [16], it is essential to understand how this may have affected interest in medical academics which is reportedly declining [17, 18, 19].

From previous experiences in delivering EBM teaching and exploring academic interest in undergraduates we hypothesize that senior medical students and doctors not in specialty training would value understanding of EBM but lack confidence and prior training in this field. This study aims to bring attention to the widely explored, but still deficient, topic of EBM teaching and provide new perspectives on knowledge gaps where improvements are most needed, whilst also considering the clinical and academic implications.

Methods

This was a national cross-sectional study using a ten-question survey (Appendix A). The primary objective was to evaluate teaching and confidence in EBM. This was measured using self-reported confidence in research concepts. The secondary objective was to identify attitudes towards the teaching of EBM.

Eligible respondents were U.K. senior medical students in their final or penultimate years and doctors in pre-specialty training. Only senior medical students were included to accurately determine whether critical skills and research training had been taught at any point during medical school.

The survey was expanded from previous surveys evaluating research skills in medical students and professionals [13, 14, 20]. Questions using 'Yes or No' answers and five-point Likert rating scales with answers ranging from 'not at all confident' to 'very confident' were used. Some questions were exclusively given to medical students or doctors (Appendix A). Demographic data including grade and location of training were also collected for students and doctors.

The survey was virtually created and actively distributed from February 2021 to March 2021 to medical education coordinators at 42 U.K. universities teaching medicine or medically related courses, medical

education coordinators at 67 National Health Service hospital trusts, undergraduate medical societies, and social media groups dedicated to U.K. medical students.

Responses were collected using Microsoft Forms[®]. To prevent duplicate entries only submissions with official e-mail domains '@ac.uk' or '@nhs.uk' were processed for data analysis. After survey completion data was collected and results were tabulated using Microsoft Excel[®]. Respondents were categorized into three groups: medical students, clinicians, and clinical academics. Clinicians were doctors on the two-year foundation programme for recently qualified doctors or in core and specialty training. 'Clinical academics' were doctors on National Institute of Health Research funded academic programmes. Relative percentages were calculated from 'Yes or No' questions and means calculated from the responses to Likert scale questions. All participants were required to consent for anonymous responses to be analyzed and published prior to completing the survey.

Results

139 eligible respondents completed the survey of which 58 were senior medical students across nine medical schools. All medical students were in penultimate or final years of their medical courses (Table 1). Also 81 doctors responded, 20% (n = 16) of whom were clinical academics.

Table 1
Respondent demographics.

Stage of Training	Number (%)
Medical Student	58
Penultimate year	40 (69%)
Final year	18 (31%)
Doctor	81
Foundation Programme	37 (46%)
Academic Foundation Programme	6 (7%)
Core Trainee	28 (35%)
Academic Clinical Fellow*	10 (12%)

TEACHING AND CONFIDENCE IN EVIDENCE-BASED METHODS

Only 48% of medical students said they had received formal teaching in CAS during medical school as part of the curriculum, in comparison to 60% in clinicians and 65% in clinical academics (Table 2). This increased to 62% for students who had intercalated or studied previous degree(s). Only 17% of medical students and 15% of clinicians reported to have received training from external courses whereas this

increased to 40% for clinical academics. Clinical academics consistently reported having received the most training from all sources (Table 2).

Table 2
Sources of critical appraisal teaching in medical students and doctors.

Source of Critical Appraisal Teaching	Medical Students	Clinicians	Clinical Academics
Medical School Curriculum	48%	60%	65%
Intercalation/previous degree	62%	63%	66%
External courses	17%	15%	40%
Postgraduate training	-	25%	44%

In self-reported confidence in understanding research concepts; study types, Population, Intervention, Comparison, Outcome, Study Design (PICOS), P-value, null hypothesis, types of error, and types of bias, the clinical academic group was consistently the highest (Fig. 1). Sample sizes were not large enough to calculate substantial statistical significance. When combining the average Likert score across all concepts, clinical academics rated the highest with an average Likert score of 3.82 as opposed to medical students (3.46) and clinicians (3.48). In line with this, clinical academics were consistently the most confident group in understanding all concepts. On average, clinicians were more confident than medical students in all research concepts except when understanding the PICOS framework and null hypothesis. All respondent groups felt most confident in understanding study types and P-values as opposed to types of error and types of bias. P-values received an average Likert score of 3.95 (confident) across all groups whereas types of error received an average Likert score of 3.16 (neutral). Subgroup analysis on medical students who intercalated identified higher confidence in critical appraisal concepts with the majority rating themselves as 'somewhat confident' in five of the six research concepts. Types of errors was rated as 'neutral'. Students who did not intercalate or have a previous degree rated themselves as 'somewhat confident' in three of the six concepts, 'not confident' in PICOS framework and 'not at all confident' in types of error.

ATTITUDES TOWARDS TEACHING OF EVIDENCE-BASED METHODS

When identifying the value of CAS for practicing clinicians 89% of medical students thought it was 'important' (mean Likert rating of 4.22). Similarly, 91% of clinicians also rated it as 'important' (mean Likert rating of 4.31) and 100% of clinical academics rated it as 'important' (mean Likert rating of 4.69) (Fig. 2). 94% of clinicians and 100% of clinical academics agreed that formal training in CAS as medical students would have benefited their clinical career. 66% of medical students indicated they were interested in attending teaching sessions on critical appraisal. 87% of medical students who intercalated identified their interest in participating in research during their medical career. Whereas only 25% of those

who did not intercalate expressed interest. 66% of clinicians and 94% of clinical academics also identified their interest in participating in research during their medical career.

Discussion

This national survey cross-sectional study investigated the understanding and attitudes of medical students and doctors towards EBM, principally research concepts and critical appraisal. This is a necessary issue as adequate training in EBM is required for clinical decision making and good conduct of clinical research.

True to our initial hypothesis, only a limited majority of respondents claimed they received teaching in CAS as part of their medical curriculum. This was as low as 48% in medical students with an increase to 65% for clinical academics. As our results show that less than 50% of medical students received training it indicates a sizeable neglect in this area by the medical curricula. Furthermore, given the significance of CAS as a core skill for clinical academics [16] it is unsurprising to see that 40% of clinical academics attended extracurricular courses on CAS outside of formal learning, most likely to bridge the gap between limited medical school teaching and academic requirements. When this is compared to the 15% of clinicians who attended external courses on CAS this further highlights the necessity of CAS as an academic skill.

Given this, it is expected to see that the clinical academics were consistently the most confident in all the research concepts featured in the survey. Generally, clinicians were more confident than medical students in understanding concepts except for the PICOS framework and null hypothesis. A potential reason for these marginal differences in confidence could be due to certain concepts such as biases having more meaning in a practical setting, whereas PICOS and hypotheses are routed in theoretical learning which students may have familiarity towards. However, given the heterogeneity of results for these two groups a stronger study would be required to assess any statistically significant differences. Moreover, it is not unexpected that in the more ubiquitous concepts such as study types and P-values all three groups were 'confident' in these areas whereas, the more technical areas of error and bias type had a net score of 'neutral'. This shows that whilst some concepts in research are common knowledge, higher level areas which are seldom discussed but perhaps as equally important in critical appraisal require further education on.

Despite a widely varied education in EBM and differing levels of confidence in research concepts, all three groups agreed that CAS for practicing clinicians was an 'important' skill. The Likert score given to this was greater in the clinicians than medical students, perhaps due to the day-to-day relevance critical appraisal has in clinical practice.

The percentage of respondents in each group who agreed with this seemed to increase alongside their overall confidence of research concepts. This supports the idea that only through teaching of EBM does its importance to clinical practice become more apparent. Encouragingly, most respondents expressed interest in participating in research during their medical careers. As expected, this was highest in the

clinical academic group (94%) followed by 78% of medical students and 66% of clinicians. Students who intercalated or completed a previous degree were more likely to be interested in performing research. However, as the Foundation Programme no longer awards extra credit for students who have intercalated it may be less appealing for students to continue with intercalation [14]. As intercalation was the predominant source of CAS it can be expected that there will now be a decline in EBM knowledge of future medical students. 66% of medical students also expressed interest in attending extracurricular teaching of critical appraisal demonstrating the interest in learning in this field.

Our study benefited from a robust design by expanding on previously published surveys to evaluate our outcomes. Given the heterogeneity of utilized survey tools and blinding of participants (medical students and doctors) in-depth statistical analyses could not be performed. Despite the plausibility of our results and homogeneity with the conclusions of previous studies, the results of these surveys are subject to response and recall bias. Additionally due to the relatively small sample size and medical student responses from a limited number of medical schools there may be some institutional bias. Furthermore, respondent bias, is also likely present as those with some interest in EBM were most likely to have completed the survey. To mitigate for this, we incentivized as many eligible respondents from diverse backgrounds as possible with a £25 gift voucher. As one of the primary aims of this study was to establish confidence in research concepts the objective research knowledge of each group may be different and provide a stronger or different argument. Future studies in this field may consider evaluating knowledge using objective measures between groups.

Conclusion

This study has highlighted the issues of limited EBM education for medical students and low levels of confidence amongst clinicians concerning research concepts. The evident disparity in confidence in critical appraisal provided by intercalations as opposed to medical curriculums further demonstrates the need for structured EBM education in medical schools. This must be addressed to produce doctors who can make well-informed clinical decisions using the latest evidence. Advantages of EBM teaching at medical school will help bridge the gap between science and practice, improve critical thinking, and provide a solution to increase interest in a dwindling clinical academic workforce [5, 8, 13, 17, 18]. Forthcoming research will need to address the lack of a standardized curriculum for EBM learning and consider the best methods for facilitating this into a medical curriculum.

Declarations

Ethical Approval and Consent to Participate

Ethical approval was granted by the King's College London Research Ethics Office (MRSU-20/21-22081). All methods were performed in accordance with relevant guidelines and regulations. Written informed consent was obtained from all participants.

Consent for Publication

Not Applicable

Availability of Data and Materials

The datasets used and/or analysed during the current study available from the corresponding author on reasonable request

Competing Interests

The authors declare that they have no competing interests

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Author Contributions

MSA Amin and HV Pai wrote the main manuscript text, All authors reviewed the manuscript

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The authors have no conflict of interests to declare.

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Figures

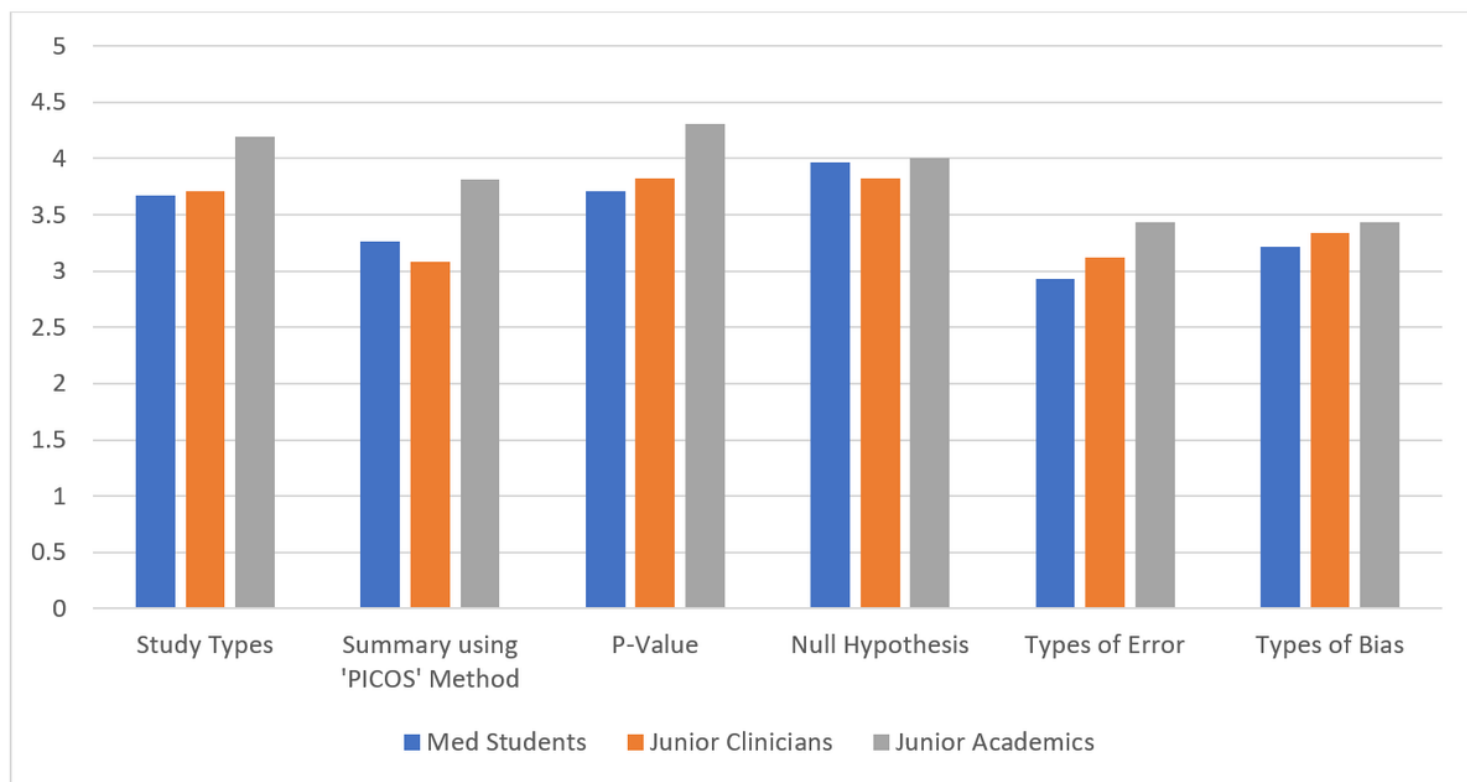


Figure 1

Self-reported confidence in understanding different research concepts

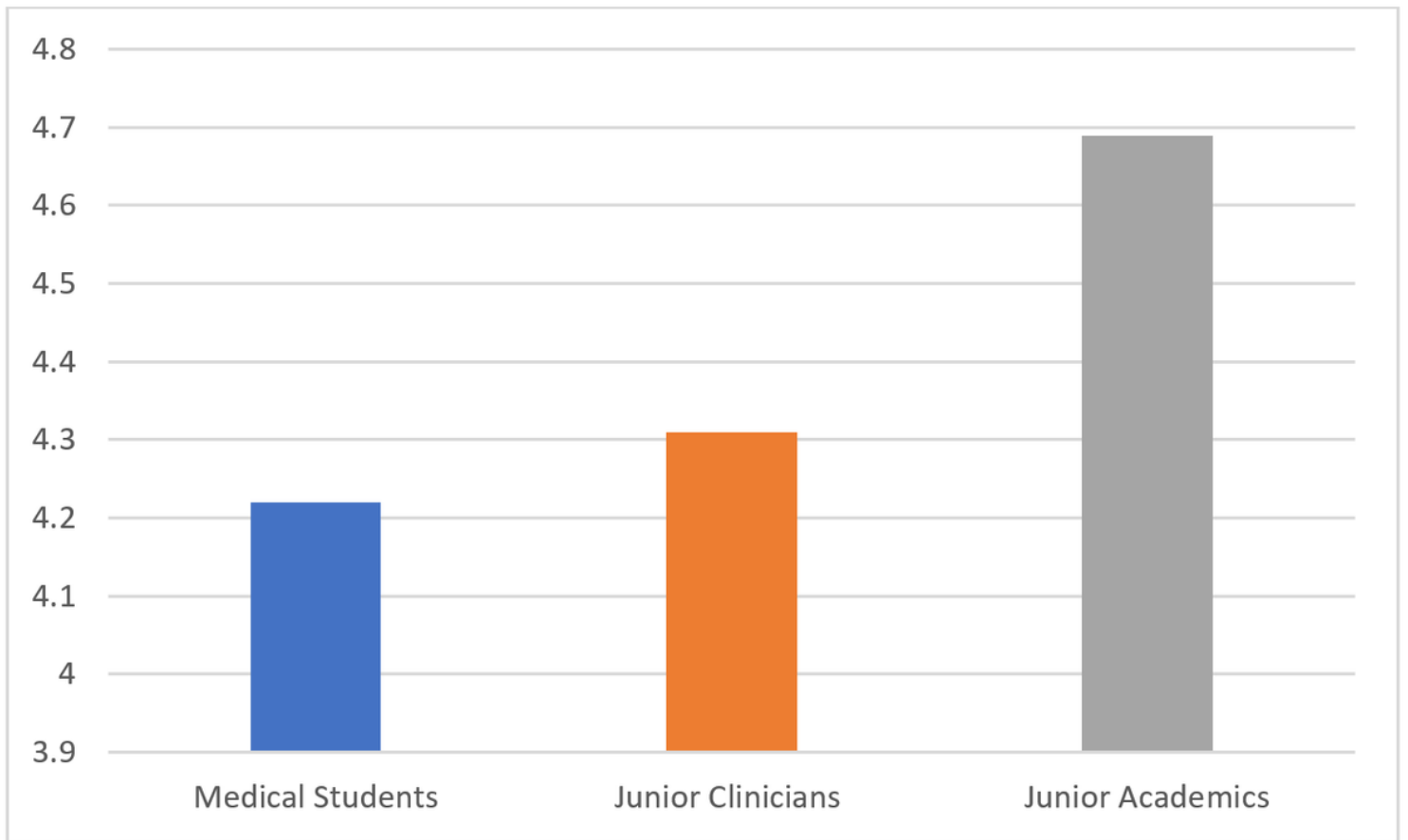


Figure 2

Ratings of the importance of critical appraisal skills for practicing clinicians

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [AppendixASurveyInstrument.docx](#)