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ORIGINAL ARTICLE

Pediatric Residents Knowledge of Evidence Based Medicine: A Pilot Study

Hasan Alshabanah[1], Bosco Paes[2], Rafat Mosalli[3]

Abstract:
Objective: The objective of this pilot study was to assess the baseline knowledge and skills of pediatric residents in Evidence-Based Medicine (EBM). **Methods:** Participants were pediatric residents in the postgraduate years (PGY) 1-4 in, a residency training program within a university setting. They were asked to complete the previously validated Fresno test to assess their knowledge in the four domains of EBM. **Results:** A total of 10 pediatric residents completed the test with a mean of (PGY 2.5) for the residency year. The scores achieved were highly variable with a mean of 46%. Results showed a decline in the mean score to 32% for questions related to critical appraisal of the evidence compared to the mean of 60% for conversion of information to an answerable question and tracking down the best evidence to answer the question. **Conclusion:** Residents showed some knowledge and expertise about formulating a clinical question and searching for evidence-based answers. However, they lack the skill of how to critically appraise the scientific literature and how to incorporate a new management strategy into clinical practice. A properly structured EBM educational prescription is necessary for trainees to improve their status as informed bedside clinicians.

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Introduction

A key element of continuing post graduate medical education is the ability to critically appraise the scientific literature and to apply this knowledge in a clinical setting. Evidence-Based Medicine (EBM) is now incorporated as an integral part of many medical schools and postgraduate medical education programs. The challenging questions and answers with regard to what is the ideal way to teach EBM to resident physicians and what is the evidence that teaching EBM to residents will impact their ability to utilize the fundamental principles in everyday practice remain uncertain.

The primary objective of our pilot study was to assess knowledge and skills in all the recognized domains of EBM described by Sackett et al [1] with the goal of achieving four basic competencies: (1) Converting information needed into a focused, answerable clinical question;(2) Tracking down the best evidence with which to answer a defined question;(3) Critically appraising the evidence with regard to

Hasan Alshabanah[1], Bosco Paes[2], Rafat Mosalli[3]

[1]Pediatric Emergency Consultant at King Faisal Specialist Hospital and Research Centre, King Saud University, Riyadh, Saudi Arabia
[2]Neonatal Division, McMaster University, Hamilton, Ontario, Canada
[3]School of Medicine, Umm Al-Qura University, Department of Pediatrics and Neonatal Intensive Care, IMC, Jeddah, Saudi Arabia

Corresponding Author: **Hasan Alshabanah, *MD***
King Faisal Specialist Hospital and Research Centre, Department of Pediatric Emergency MBC#84 PO BOX 3354, Riyadh 11211
Tel: 96614424425
Fax: 96614423429
e-mail: alshabanah@kfshrc.edu.sa

validity, impact, and applicability; and (4) Integrating the appraisal with clinicians' expertise and the patient's unique biology, values, and circumstances.

In this study, we assessed the baseline EBM knowledge and skills of pediatric residents using the validated Fresno Questionnaire [2].

Materials and Methods

Study participants

The participants were pediatric residents across all postgraduate trainee levels (PGY1-PGY4) of the pediatric residency program at McMaster Children's Hospital, McMaster University, Hamilton, Canada. They agreed to participate after reading the information sheet and signing the consent form

Description of the survey test

The Fresno test was designed on the domains of EBM and begins with the presentation of a scenario that suggests clinical uncertainty. There are 7 short answer questions, 2 questions that require a series of mathematical calculations, and three fill-in-the-blank questions. The questions start with a certain clinical scenario that assesses the resident's knowledge and skills in all 4 domains of EBM [1]. Question 1 tests the ability of the resident to formulate a focused clinical question ; questions 2-4 and 11-12 test the second domain which is tracking down the best evidence with which to answer a defined question by identifying the most appropriate research design for answering the question and demonstrates knowledge of electronic database searching. Questions 5-7 assess the third domain of critically appraising the evidence by identifying issues important for determining the relevance and validity of a given research article and finally questions 8-10 assess the last domain of EBM by discussing the magnitude and importance of the research findings and the ability to integrate the appraisal into clinical practice . In this study, we assessed the baseline EBM knowledge and skills of pediatric residents using the validated Fresno Questionnaire [2]. The main outcome measure was to assess the resident's baseline knowledge and skills in EBM.

Statistical analysis

Data were transferred manually to a Microsoft Excel spreadsheet (Microsoft Corporation, USA) for analysis. The point of each question as well as the sum of points for all the questions was calculated and entered into the spreadsheet. Results are reported as means.

Ethical approval

This research was approved by the Ethics Board Committees at Hamilton Health Sciences/ McMaster University.

Results

The test results are reported as mean score in Table 1. A total of 10 pediatric residents, with a mean PGY 2.5 level of postgraduate training, completed the test. Respective scores were highly variable with a mean of 46 %. Results showed a decline in mean scores to 32% for questions pertaining to critical appraisal of the evidence compared to a mean of 60% for those that related to conversion of the information to an answerable question and tracking down the best evidence with which to answer the question.

Table1. Distribution of Scores based on Performance

Questions	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mean %	56	56	65	67	58	46	41	46	20	35	0	40	46

Discussion

The results of this study show that a properly structured educational Module is necessary for trainees in order to achieve and apply the fundamental principles of EBM in their role as bedside clinicians.

In 2005, the Royal College of Physicians and Surgeons of Canada published the Canadian Medical Education Directions for Specialists (Can MEDS 2005 framework) [3], and one of the key competencies stipulated under the role of scholastic expertise is that "Physicians are able to critically evaluate information and its sources, and apply this appropriately to practice decisions by describing the principles of critical appraisal, critically appraising retrieved evidence in order to address a clinical question and integrating critical appraisal conclusions into clinical care". In response to this recommendation, most Canadian residency programs have included EBM education as part of the standard curriculum.

A recently conducted survey of chief residents in all North American pediatric residency programs examined how residents are taught and practice Evidence-Based Medicine. Most chief residents recognized that it was important to teach EBM, but did not feel confident in their program's ability to execute this task [4]. Studies have examined teaching critical appraisal skills to medical students and residents in medicine, family medicine, surgery and psychiatry [5-9]. Most measurements were based on writing multiple -choice questions or self reported satisfaction questionnaires. The outcomes reported indicate change in knowledge, behavior, skills and attitude. Norman and Shannon [10] also showed that teaching critical appraisal skills can increase students' but not residents' knowledge of epidemiology.

A previous commentary by Hatala and Guyatt [11] in the Journal of the American Medical Association, noted that the quality and quantity of the evidence for effectively teaching EBM is poor. Hatala and Guyatt identified that the most frequently reported outcomes are "subjective variables such as satisfaction or self-reported changes in attitude or knowledge, rather than the more important assessment of objectively measured clinical skills or improved patient outcomes". None of the published studies evaluated patient outcomes [12]. Moreover the authors highlighted that when validated instruments are not used to assess pertinent outcomes the results are difficult to interpret.

Unlike subjective reports, we employed a valid and reliable tool to measure our outcomes. Ramos et al were the first to publish the Fresno test as a standardized, objective measure of ability in evidence based medicine that requires learners to demonstrate knowledge and skill,asking focused questions, searching for

Practice points

- Practicing Evidence-Based Medicine is a key element of continuous post graduate medical education.
- Directors of residency training programs should assess the trainee's skills and knowledge of EBM to identify areas of strength and weakness.

What this study adds

- There is lack of skills on how to critically appraise the scientific literature.
- A properly structured EBM educational prescription is necessary for trainees to empower their clinical practice.
- Teaching EBM does not always translate into effective application of learned concepts unless it is thoroughly evaluated

good answers, critiquing literature, and applying conclusions in practice.

Our study demonstrates that pediatric residents acquire some knowledge about how to formulate a clinical question and search for evidence-based answers but they are limited in their ability to critically appraise the scientific literature and incorporate new strategies and findings into clinical practice. Although subgroup analyses were not possible in this small pilot study, the objective evaluation helped to enucleate areas of weaknesses which can be constructively utilized in future EBM education. This is the first study to formally assess EBM knowledge and skills of pediatric residents in our facility and to the best of our knowledge is the only conducted evaluation of its kind in pediatric residency programs across Canada. The results provided a constructive framework to modify our annual EBM course in order to meet residents' needs and concurrently improve the existing educational model. It would be interesting to do a follow-up study using the same questionnaire after integrating the identified areas of weakness into the new EBM module.

Conclusion

The broad heterogeneous test results of this pilot study demonstrate that a proper training module is necessary to improve core EBM knowledge and skills, perhaps with greater emphasis on critical appraisal and the clinical application of newly acquired medical information. Future research utilizing a large sample size, should objectively evaluate the effect of implementing an EBM curriculum in postgraduate academic programs and whether such a prescription will lead to an enhancement of residents' knowledge and bed side skills during residency training and subsequently influence the quality of patient care.

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