

RESEARCH ARTICLE

Effectiveness of a Course on Research Methodology in a Pediatric Residency Program

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ABSTRACT

Background: The lack of physician's training in research and conducting interdisciplinary/translational or clinical research has been discussed for more than a decade. Little is done to make research methodology a core curriculum for residency programs, especially in developing countries. The Department of Pediatrics at the Aga Khan University, Pakistan, started a course on child health research methods in 2010 and we report the improvement in knowledge of the residents as a result of introduction of this course.

Materials and methods: We conducted a 1-year course with fortnightly sessions to provide an overview of how to plan and conduct a research project. Major topics included identifying research questions, techniques of literature search, basic principles of epidemiology including types of study designs, measures of disease frequency and association, protocol and questionnaire development, basic biostatistics, ethical issues involved in human subject research, and data and bibliography management. For the assessment of impact, the pretest-posttest design was used.

Results: Thirty residents filled the pre- and posttest questionnaires. There was significant improvement in the knowledge of basic epidemiology and biostatistics ($p = 0.02$ and <0.01 respectively). Baseline knowledge of ethics was good and did not improve significantly in the posttest. There was a significant difference in the overall mean pre- and posttest scores [$p = 0.014$, confidence interval (CI) 1.05–1.7]

Conclusion: The research methodology course in the residency curriculum improves awareness and understanding of young postgraduate trainees in basic epidemiology.

Keywords: Pakistan, Research course, Residency training.

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BACKGROUND

The emphasis on practice of evidence-based medicine is immense but the emphasis on teaching research methodology and developing critical thinking skills to trainee physicians is limited.¹ Journal clubs have been used as one of the modalities for teaching research to undergraduate and postgraduate medical students but evidence shows that this predominantly helps in development of critical thinking ability.² Knowledge of research methods, basic biostatistics, and epidemiology cannot be mastered with journal club alone. However, little has been done to make research methodology a part of core curriculum for residency programs, especially in developing countries. Research courses for residents can have a long-term impact on creating good physicians with critical thinking ability, defining future interest in choosing a career tract as public health physicians or a researcher and in laying the foundation of excellent supervisors with understanding of research methodologies.³

Most residency training programs have clinical training as their main focus and there is usually no curriculum for research. To create "scientist physicians," it is important to bridge this gap. Understanding the need to train young physicians in research, the Department of Pediatrics at the Aga Khan University, Pakistan, started a course on child health research methods in 2010. Here we describe some of the challenges faced in initiating this course in a busy pediatric curriculum and the improvement in knowledge (impact) of the residents as a result of this course.

Structure of the Pediatric Residency Program at the Aga Khan University

The Aga Khan University is a 647 bed tertiary care hospital with 32 residency and 28 fellowship training programs. The Department of Pediatrics consists of 32 full-time faculty members and 20 nonfull-time faculty members. The total numbers of residents are 57. The pediatric residency training is a 4-year program, with 24 months of general pediatric rotation followed by mandatory rotations in other pediatric subspecialties like pediatric intensive care, emergency medicine, neonatology, pediatric surgery, cardiology, neurology, and hematology/oncology.

Challenges faced in the Implementation of a Research Methodology Course

To start a research course there was a need for dedicated research faculty, funding for the program, and protected time for faculty members for delivering the course contents and development of a research curriculum. The matrix of the department is divided into clinical and research faculty. So getting faculty members for teaching research seemed like a simple issue to resolve, but these faculty members had a busy schedule with divergent agendas and interests. These issues were resolved by the department chair, who formulated a committee to develop the curriculum of the research training course and facilitated cooperation between faculty members for time commitment toward this research course.

The other important requirement for the course was availability of computers and software programs for teaching and practicing of literature search and conducting hands-on sessions on biostatistics. For this we made use of the existing computer lab within the university.

A faculty member with research qualification was appointed as chair of this committee; for operational planning of the course, funding was approved from departmental funds.

The Outline of the Course

A 1-year course with fortnightly sessions of 1 hour each was designed to provide an overview of how to plan and conduct a research project. Major topics included identifying research questions, techniques of literature search, basic principles of research methods, types of study designs and their strengths and limitations, measures of disease frequency and association, protocol and questionnaire development, ethical issues involved in human subject research, and data and bibliography management. Other topics included critical appraisal of research papers, systematic reviews, and introduction to scientific writing. Introduction to analytical methods and softwares used in research was also included in the curriculum. Hands-on practice sessions for skills of data entry, analysis, and bibliography management were also included for the participants.

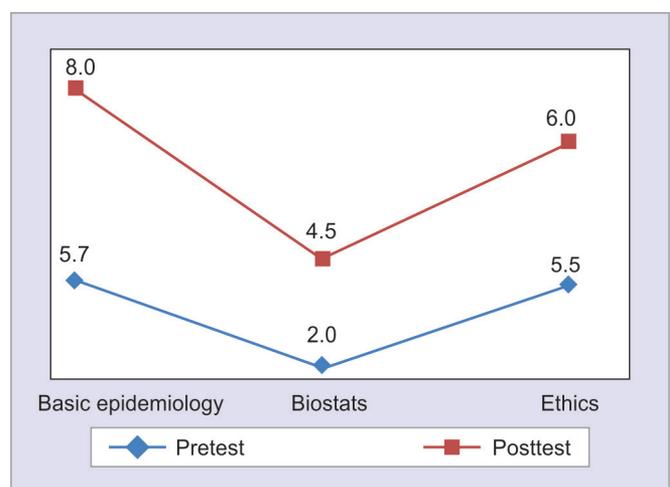
The course was based on interactive lectures, reading assignments, and hands-on computer sessions for bibliography management and data analysis. There were two, 1-hour class sessions per month. The course was made mandatory for residents in the Department of Pediatrics and Child Health. An end of course certificate was only issued to those who had more than 80% attendance in the course.

Pre- and Posttest

For the assessment of impact, the pretest–posttest design was used. The pretest was used for assessment of research knowledge of residents before attending the course and at the end of the course a posttest was administered. The same questionnaire was used for the pre- and posttest and contained questions related to application of research as in the course design. The data from the questionnaire were analyzed using Statistical Package for the Social Sciences version 17.0 and paired sample t-test was run and mean (\pm standard deviation) and significance were calculated, indicating the effectiveness of the program in improving the knowledge of research of the participants. The residents were informed regarding possible use of the collected information for research and return of filled questionnaires was taken as consent to participate. This study is approved by Institution's Ethical review Committee.

RESULTS

Thirty residents filled the pretest and 31 returned the filled posttest questionnaires; 36% residents were able to correctly identify the type of variable and 26% chose the correct study design for the given scenarios in the pre-intervention phase, which improved to 55 and 45% respectively; 41% of the residents answered questions related to bias correctly before intervention, which improved to 50% in the postintervention. There was significant improvement in knowledge of basic epidemiology and biostatistics ($p = 0.02$ and <0.01 respectively). Baseline knowledge of ethics was good and did not improve significantly in the posttest. There was a significant difference in the overall mean pre- and posttest scores ($p = 0.014$, CI 1.05–1.7). Graph 1 shows the mean difference between the pre- and posttest scores.



Graph 1: Mean difference between the pre- and posttest scores of the research methodology course for pediatric residents

DISCUSSION

Medical research leads to better clinical care⁴ and is vital to ensure continuing advances in health care. In developed countries research continues to be a cornerstone for improving medical care. In fact research during residency training is increasingly becoming a part of the residency curriculum at many established centers. But in a developing country like Pakistan, the field of research continues to fall behind. Doctors continue to find clinical work much more attractive than performing research to generate evidence.⁵ Although the notion of its importance continues to be discussed, little has been done to effectively develop a proper curriculum for research, through which residents can be trained in this field. This has resulted in the lack of residents' involvement in active clinical research both during training and after becoming practicing physicians. Another reason for research not being popular is the long working hours of the residents.⁵ Due to their already hectic routines they are unable to take time out for any other activities.

For ensuring proper implementation of this program, dedicated faculty was chosen and a proper program layout was established. The course was spread over an entire year, involved faculty with prior research experience attending to residents in the form of lectures and handouts. Topics chosen were those that could improve residents' ability to appreciate basic aspects of research and develop skills of literature review. Residents spent a minimal of 2 hours from their entire month attending these lectures, hence resolving the issue of time constraint.

The short-term impact of introducing course on research methodology was encouraging. Residents showed improvements in many facets of research including identifying research questions, techniques of literature search, basic principles of epidemiology including types of study designs, measures of disease frequency and association, protocol and questionnaire development, and basic biostatistics. The results for ethics remained largely unchanged as this component is taught as a separate

workshop by the Department of Postgraduate Medical Education at the university. However, different result can be expected at other hospitals.

The limitations are a single center study, small sample size, and the effect of possible bias due to other ongoing research activities taking place within the university. But despite this a positive impact was observed which is encouraging and these residents may be followed up after several years to determine their carrier choices in academic *vs* nonacademic settings.

CONCLUSION

A research methodology course in the residency curriculum improves awareness and understanding of young postgraduate trainees in basic epidemiology. The success of this program at a tertiary care hospital in the major metropolis of the country underscores the need and importance of introducing similar courses in other residency programs across the country. Whereas research has improved medical care and outcomes in many developed nations, we are yet to see its impact on medical practice in a developing nation like ours.

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