International Journal of Research in Medical Sciences
Sundar JS et al. Int J Res Med Sci. 2025 Jun;13(6):2483-2486
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20251639

Original Research Article

Framework for impact: evaluating research methodology workshop using CIPP model

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Received: 03 April 2025
Revised: 07 May 2025
Accepted: 12 May 2025

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ABSTRACT

Background: Research is an integral part of medical education, yet medical students often lack sufficient research skills, hindering evidence-based medicine. Research methodology workshop aim to enhance these competencies, but their effectiveness requires systematic evaluation. This study assessed the impact of an online research methodology and biostatistics workshop for final year undergraduate medical students using the content, input, process and product (CIPP) evaluation model.
Methods: A quasi-experimental study was conducted among 2,982 final-year Part-I undergraduate medical students from colleges affiliated with The Tamil Nadu Dr. M. G. R Medical University. The intervention involved periodic online workshops with interactive sessions led by expert facilitators. A 15-item semi-structured questionnaire was administered pre- and post-workshop to assess knowledge. The CIPP model guided evaluation.
Results: A significant improvement in research knowledge was observed following the workshop. The mean pre-test score increased from 7.67±3.22 to 9.37±2.20 post-test. The proportion of students scoring above the mean increased from 34.6% to 54.2%. Participants reported increased confidence in identifying study designs, formulating research questions, and interpreting statistical data. Qualitative feedback highlighted the workshop's relevance, engagement, and value in fostering a research-oriented mindset.
Conclusions: The online workshop effectively enhanced research knowledge and competencies among medical students. Using the CIPP model, demonstrated the workshop's role in fostering evidence-based practice and research culture. Early exposure to research methodology is vital for developing clinicians capable of contributing to medical advancements. Future studies should explore the long-term impact on research engagement and clinical practice.

Keywords: Biostatistics, CIPP model, Medical education, Online workshop, Research methodology, Undergraduate students

INTRODUCTION

Research plays a vital role in the medical profession, both in clinical practice and academic. Advancing patient care and management in medical science requires ongoing research, while continuous training is essential to stay updated with the latest knowledge and developments. However, among the crucial trio of medical education; teaching, patient care and research, research performance has been ranked the poorest, and the research outputs from our medical campuses have not been remarkable.[1] Healthcare organizations face considerable challenges in ensuring patient care as it is based on the best available scientific evidence. However, some studies continue to demonstrate the failure to implement interventions proven

to be both effective and cost-efficient in practice.[2] Bridging this gap between evidence and training is essential to ensure effective treatments and improved health outcomes. The researchers need to gain an understanding of the various techniques and criteria that can be employed to conduct research specific to the presenting problem and thus devise a feasible solution.[3] To facilitate evidence-based practice changes, clinicians must develop the skills to acquire, evaluate, and interpret health research. There is arguably a greater imperative for clinicians in developing country to possess these skills due to the increased health burden and limited resources.[4] Limited skills in accessing and applying research among clinicians have been identified as significant barriers to evidence-based practice. The National Medical Council (NMC) has also stressed the need for formal training in research methodology for healthcare professionals. Early undergraduate exposure to research helps in producing physicians who are better equipped to meet their professional needs especially the analytical skills. Also, the trainees who have an early research exposure are more likely to be involved with research in their career.

The objective of research methodology workshops is helpful not only for novice researchers, with minimum or no prior research experience, to formulate a research question but also for those conducting real-time research.[5] Evaluating the effectiveness and efficiency of workshops is crucial to determine whether the desired objectives have been fulfilled with a successful outcome.[6] There are many evaluation models for the evaluation of academic workshops. One such model is the CIPP model. This model consists of four evaluation levels which are interdependent, shown in Figure 1. It is one of the most widely used evaluation models for assessing initiatives and interactions, as well as identifying strengths and weaknesses in medical education research.[7,8] Moreover, this method is widely used not only evaluating programs in graduate medical education.[9] but also in continuous professional development.[10] This study aimed to evaluate the impact of an online series of workshop on research methodology in enhancing the understanding of quality research among final year part-1 undergraduate medical students.

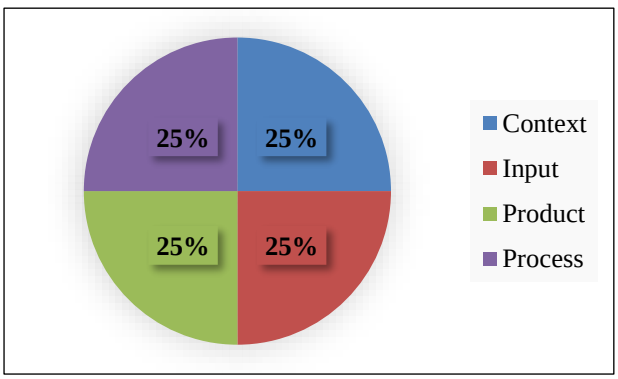

Figure 1: CIPP model.

METHODS

Periodic online workshops were conducted from March 2024 to September 2024 for 2,982 final year part-I undergraduate medical students from all medical college affiliated with The Tamil Nadu Dr. M.G.R medical university. A quasi-experimental study was employed, utilizing a semi structured 15-item questionnaire administered pre and post workshop to assess participants knowledge of research methodology and biostatistics.

The CIPP model, a validated framework for evaluating educational and academic intervention, was employed to assess the workshop. The model comprises four components: context, input, process and product.

CIPP model

Context

The aim of Research Methodology and Biostatistics workshop for undergraduate medical students is to provide them with foundational knowledge and practical skills to understand, conduct, and interpret research in the field of medicine and healthcare. The workshop seeks to familiarize students with the principles of research design, data collection, and ethical considerations, while introducing key biostatistical concepts for data analysis and evidence-based practice. It aims to cultivate critical thinking and the ability to evaluate medical literature, fostering a culture of research among students. Additionally, the workshop emphasizes skill development in framing research questions, conducting literature reviews, and preparing research proposals. Moreover, it highlights the importance of ethical research practices, ensuring students understand concepts like informed consent, plagiarism, and responsible conduct. Overall, the workshop aspires to inspire students to pursue research as a vital part of their medical education and future careers.

Input

The workshop was structured to cover key aspects of research methodology, ensuring a logical progression of topics to build a strong foundation of knowledge and skills. Sessions were designed to be interactive, blending theoretical concepts with practical applications. The slido interactive platform was utilized to engage participants through live polls, quizzes and Q&A sessions participants were provided with reference articles, and statistical software tutorials.

The sessions were conducted by experienced academicians and researchers specializing in public health, epidemiology, biostatistics, and research methodology. Facilitators offered expert guidance and real-world case examples to enhance participant comprehension. A diverse range of teaching approaches, including lectures, group discussions, and case study analyses, was employed to maximize engagement and learning.

Process

The workshop was executed over multiple online sessions, following a structured schedule that balanced theoretical inputs. The sessions began with an orientation on workshop objectives. Facilitators used a combination of PowerPoint presentations, real-life research examples, and interactive discussions to deliver core content. The facilitators actively monitored engagement by encouraging questions, moderating discussions, and providing real-time feedback. Additionally, technical support was available throughout to resolve connectivity or platform-related issues, ensuring minimal disruption. A key component of the process was the administration of a structured pre-test and post-test to assess knowledge improvement. Feedback was collected from participants after the post test, allowing facilitators to adapt the content delivery and address challenges promptly. Overall, the workshop process emphasized participant centered learning, interactivity, and adaptability to ensure the smooth delivery of the planned curriculum.

Product

The workshop achieved its intended outcomes, resulting in a marked improvement in participants knowledge and understanding of research methodology and biostatistics. A comparison of pre-test and post-test scores revealed a statistically significant enhancement in key competencies, including research design, hypothesis formulation, data interpretation, and ethical research practices. Participants reported increased confidence in applying research concepts to their academic projects and future clinical practice. Qualitative feedback indicated that students found the sessions relevant, engaging, and applicable to real-world research settings. Many expressed heightened interest in pursuing independent research and contributing to evidence-based medicine. Overall, the workshop successfully met its objectives by equipping undergraduate medical students with foundational research skills and fostering a positive attitude toward research as a core component of their medical education.

RESULTS

A total of 2982 undergraduate medical students from various medical colleges across Tamil Nadu participated in the online workshop. The mean pre-test score was 7.67±3.22, significantly increased to 9.37±2.20 in the post test ($p<0.05$), reflecting a substantial improvement in knowledge of research methodology and biostatistics (Table 1).

Furthermore, the proportion of students scoring above the mean increased from 34.6% in the pre-test to 50.2% in the post-test (Table 2). Participants showed significant improvement in key competencies such as identifying study designs, formulating research questions, understanding sampling techniques and interpreting basic statistical outputs. Post-workshop feedback further indicated that the majority of students found the sessions highly relevant and effective in enhancing their research competencies, while also fostering a positive attitude toward evidence-based medical practice.

Table 1: Mean score of pre-test and post-test.

Pre-test		Post-test		p value
Mean	**Standard deviation**	**Mean**	**Standard deviation**	0.001
7.67	3.22	9.37	2.20	

Table 2: Mean Pre- and post-test score

Variable	Proportion of students (%)	95% Confidence interval
Pre-test (above mean score)	34.6	33 - 36
Post-test (above mean score)	50.2	54 - 57

DISCUSSION

As evidence-based medicine becomes increasingly central to clinical practice, understanding research methodology enables physicians to make informed decisions, contribute to scientific advancements and improve patient outcomes. The inclusion of research methodology in undergraduate medical curriculum is recommended by NMC and several other international organizations and groups.[11] Trainings and workshops are the best ways to introduce the concept of research as they are very well received and enhance the knowledge as well as performances of the medical personnel.[12]

Our study evaluated the impact of research methodology and biostatistics workshop for undergraduate medical students, showing significant improvement in participants knowledge post intervention. The statistically significant rise in mean scores from 7.67 in the pre-test to 9.37 in the post-test aligns with earlier findings that educational interventions can effectively enhance research competencies among medical trainees.[13]

Similar findings were reported in a study evaluating structured workshops for medical undergraduates, which demonstrated improved research knowledge following the intervention.[14] Furthermore, the increased proportion of students scoring above the mean post-workshop reflects not only knowledge gain but also a broader achievement of competency thresholds, consistent with previous research showing improved statistical literacy among medical students after targeted intervention.[15]

These findings suggest that integrating research methodology workshops into medical education improves students' ability to engage with evidence-based medicine.

Future research could examine the long-term impact of these workshops on students' research involvement and clinical practice.

This study was limited by its focus on short-term knowledge gains, without assessing long term retention of research skills. Additionally, the online format of the workshop lacked opportunity for hands on training, which may have limited the practical application of learned skills.

CONCLUSION

The online research methodology and biostatistics workshop effectively improved undergraduate medical students' knowledge and skills. Using the CIPP model, the workshop demonstrated success in fostering a research culture and enhancing evidence-based practice. Early exposure to research methodology is crucial for developing competent physicians who can contribute to medical advancements and navigate the evolving healthcare landscape.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Sundar JS, Sivaranjani E, Valarmathi S, Kalpana S, Narayanasamy K, Srinivas G, et al. Framework for impact: evaluating research methodology workshop using CIPP model. Int J Res Med Sci 2025;13:2483-6.