KANSAS JOURNAL of MEDICINE

Commentary

The Importance of Basic Research Knowledge in Undergraduate Medical Education

Samuel Ofei-Dodoo, Ph.D., MPA, M.A., CPH
The University of Kansas School of Medicine-Wichita, Wichita, Kansas, Department of Internal Medicine, Academic and Student Affairs

Received Aug. 6, 2024; Accepted for publication Nov. 1, 2024; Published online Feb. 17, 2025
Kans J Med 2025 Jan-Feb; 18:28-30. https://doi.org/10.17161/kjm.vol18.22599

With the United States Medical Licensing Examination® Step 1 going pass-fail, many medical students are seeking new ways to distinguish themselves and enhance their competitiveness during the residency application process. One effective approach is engaging in research or scholarly activities, which has led some medical schools to incorporate these activities into their curricula. For instance, many institutions, such as The University of Kansas School of Medicine, offer programs like Honors in Research or Certificate of Distinction in Research, which enable students to excel in research.[1-7] Those who complete these program requirements receive a diploma and recognition in their Medical Student's Performance Evaluation (Dean's) letter. However, despite these opportunities, many students lack foundational research skills, and some medical schools lack courses to address this gap. This underscores the importance of basic research knowledge, not only for meeting program requirements but also for fostering well-rounded physicians.

With this shift in emphasis, the need to integrate basic research knowledge into medical education has become more important than ever. Future health care professionals must not only develop strong clinical skills but also cultivate a foundational understanding of research principles. This dual focus ensures that medical students are equipped to contribute to evidence-based practice, keep pace with scientific advancements, and ultimately improve patient outcomes.[8-10]

Moreover, integrating research into medical education plays a key role in developing physicians who are both skilled clinicians and critical evaluators of medical literature. Research involvement enhances career prospects,[11,12] deepens the understanding of evidence-based medicine,[13] and builds essential analytical skills.[14] A strong foundation in research methods and validity measures enables physicians to critically appraise studies, apply findings to patient care, and contribute to medical advancements.[11,15,16] Strengthening research competencies among medical students thus is essential in shaping the future of healthcare.

Additionally, the medical field is one of continuous innovation and discovery, requiring health care professionals to maintain a commitment to lifelong learning.[11,17] Research knowledge encourages medical students to stay updated with the latest scientific developments,[14] a commitment that is fundamental for adapting to emerging diagnostic tools, treatment approaches, and preventive measures.[13] By fostering research literacy early in their careers, medical students are better prepared to navigate the evolving landscape of medicine.[12]

Alongside lifelong learning, a basic knowledge of research is essential for assessing study designs and evaluating the validity of their conclusions. This foundational understanding enables medical students to analyze a study's methodology and data,[15] identify strengths and weaknesses,[16,18] and examine the credibility of its results.[14,15] Recognizing the value of this knowledge is key to ensuring that clinical decisions are based on sound evidence,[15] a practice that helps uphold the integrity of scientific findings and ultimately benefits patient care.

In addition, basic research knowledge helps medical students to distinguish between clinical and statistical significance, an important skill for making informed patient care decisions. Statistical significance, often shown through a p-value, indicates the likelihood that findings are not due to chance.[17] However, this does not always mean the effect is meaningful in a clinical setting.[17,19] Clinical significance assesses the practical impact on patient outcomes, which is important for determining the true applicability of findings to patient care.[17]

With evidence-based practice at the heart of modern medicine,[13,16] medical students need a strong grounding in research methodology, critical appraisal, and statistical analysis. Learning to interpret and apply research findings empowers future physicians to make well-informed clinical decisions, customize treatments to individual patients, and advocate for the most effective interventions.[14,15,20]

Consider, for example, a study examining how anxiety and body weight predict systolic blood pressure. If the results show a positive slope of 0.23 for weight, indicating a 0.23 mmHg increase in blood pressure per pound gained, this suggests that weight management could play a crucial role in blood pressure control. Insights like these enable health care professionals, including medical students, to make informed decisions that positively impact patient care.

Ultimately, integrating research knowledge into medical education directly improves patient outcomes.[8-10] Physicians skilled in evaluating clinical evidence can deliver high-quality, personalized care informed by the latest insights,[14,15] enhancing treatment efficacy and building trust with patients who are increasingly engaged in their healthcare decisions.[21-28]

Medical research drives clinical innovation,[29,30] and medical students trained in research principles are more likely to engage in investigative work that contributes to new therapies, technologies, and protocols.[30] Encouraging research participation during medical training nurtures critical thinking and problem-solving abilities,[16,18,20,31,32] paving the way for breakthroughs that can transform patient care.[13-15]

Finally, the COVID-19 pandemic has underscored the importance of research in addressing global health challenges.[33] Medical students with a solid research foundation are better equipped to understand disease epidemiology, assess public health interventions, and support effective policies.[26] This readiness is needed in responding to future health crises, positioning medical professionals as essential contributors to public health.[34-36]

Recommendations

Given the value of research in medical education, medical schools should increase student involvement by offering early exposure to research opportunities, incorporating basic research methodology into the curriculum, and creating mentorship programs that connect medical students with experienced, compensated faculty. Schools also should establish flexible research pathways to accommodate diverse interests and career goals, ensuring that all medical students have the support and resources needed to pursue meaningful research. Recognizing and rewarding medical student research through awards, publications, and conference opportunities further can encourage participation and underscore the importance of research in medical education.

Access to free biostatistics and statistical resources is essential for medical students conducting research. These tools allow students to design rigorous studies, analyze data accurately, and draw valid conclusions, which are critical to producing high-quality research. By providing these resources, medical schools empower students to engage in evidence-based inquiry, develop critical thinking skills, and contribute meaningfully to medical knowledge. This support fosters a culture of research excellence and prepares future physicians to critically appraise scientific literature and apply findings to patient care.

Finally, requiring a basic understanding of research as a prerequisite for medical school admission could better prepare medical students to engage in scholarly activities and critically evaluate medical literature, aligning them with the demands of a research-driven medical field.

CONCLUSIONS

Incorporating basic research knowledge into undergraduate medical education is not just an academic pursuit; it is essential to preparing competent, innovative, and adaptable physicians. As the medical field continues to evolve, the ability to critically appraise research, stay current with scientific advancements, and contribute to clinical innovation will be indispensable. By prioritizing research literacy, medical schools equip future health care professionals to meet the challenges of tomorrow and deliver the highest standard of care to their patients.

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Keywords: Research, medical education, medical students

Disclosure: Samuel Ofei-Dodoo is the Editor-in-Chief of the *Kansas Journal of Medicine*.