

Editorial

Need of the Hour: Making Foundational Sciences Relevant to Gen Z Medical Students.

Anjana Silva^{1,2*}, Kosala Weerakoon^{1,2}

¹Co-editors-in-chief, Journal of Tropical Health

²Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka

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Corresponding author: Email: nkanjanasilva@gmail.com  <https://orcid.org/0000-0002-9968-3707>

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Clinical reasoning requires a delicate integration of various knowledge types: understanding clinical features of diseases, recognising case-based patterns, and grasping the biomedical mechanisms underlying human physiology [1,2]. Yet, the role of biomedical knowledge in everyday clinical decision-making remains debated among many, particularly clinicians [3]. The challenge facing medical educators is not whether foundational sciences matter—they do—but how to make their relevance explicit to learners who demand justification before engagement.

Each generation of learners possesses distinct characteristics that set them apart from earlier generations. Recognising this generational variation can assist educators in refining teaching strategies and improving engagement, rather than simply tailoring content to preference [4]. Consequently, curricula and teaching methods in medical schools are sometimes adjusted to align with these generational traits, as well. For instance, educators have adapted to the preferences of generation Y (“Millennials”) by reducing large-group lectures and integrating online resources such as videos, podcasts, and software tools [5,6], reflecting evidence that learners in this cohort favour flexible, technology-enabled, and interactive approaches over traditional lecture-based delivery.

Generation Z medical students, raised on instant information and visual learning, are often less

persuaded by authority-based assertions of importance and instead seek demonstrable relevance [7]. They tend to favour multimodal, interactive learning environments, are accustomed to rapid information retrieval, and invest effort where value is visible [8]. Adapting methods to improve engagement is reasonable; redefining professional standards is not.

The fundamental responsibility of medical schools is to form physicians capable of meeting the enduring demands of the doctor–patient relationship, irrespective of generational preference. Professional standards, intellectual rigour, disciplined reasoning, ethical responsibility, and sustained cognitive effort, must remain constant even as instructional methods evolve. Generational traits may influence how we teach, but they cannot determine what the profession requires.

This perspective is grounded in the historical continuity of medical ethics. Although social structures and medical training have evolved, patients’ core expectations of physicians have remained constant since Hippocrates [9]. Illness creates vulnerability and enduring moral demands: competence, trustworthiness, compassion, and a commitment to act in the patient’s best interest [9]. These principles, articulated in the Hippocratic Oath, continue to ground modern medical ethics, even as medicine has moved from humoral theory to evidence-based science and from paternalism to informed consent. The central expectation remains

unchanged, and physicians must relieve suffering without causing harm.

If this expectation endures, depth of understanding cannot be optional. Protocols cannot replace insight when cases are complex or atypical. Foundational knowledge is not academic excess, and it underpins competent and trustworthy practice [10]. Teaching for such depth is therefore not a preference, but a professional responsibility.

Then, how should relevance be made visible? Traditional teaching often begins with molecular details, expecting students to infer eventual clinical application. This reverses natural curiosity. Begin every foundational topic with a real patient story—the breathless grandmother, the febrile farmer. Present the clinical problem, then ask: "What do we need to understand to help this patient?" Let students generate questions that science will answer. The Krebs cycle is relevant because it helps explain lactic acidosis in sepsis. Renal physiology matters because it illuminates why a diabetic develops oedema. Mechanisms are learned not in abstraction, but in service of care.

The progression from clinical presentation to molecular mechanism must be explicitly taught. In every case discussion, the teacher should model this thinking aloud. A heart failure patient: oedema results from salt retention, which follows reduced renal perfusion, activating the renin-angiotensin system. Each step

illuminates why science matters. When students see this repeatedly, they internalise it.

Basic concepts should reappear repeatedly with increasing complexity. Renal physiology returns in hypertension, heart failure, and drug dosing. Each encounter deepens understanding and demonstrates new relevance [10].

When we start with patients, make mechanisms visible, integrate relentlessly, use technology for exploration, and assess reasoning, students discover clinical relevance for themselves. They stop asking "Why bother?" because the answer is embedded in every learning experience. Fundamentals become not hurdles to clear but tools to master—tools that will serve them when protocols fail, and patients need more than memory. In making clinical relevance visible, we are not simply adapting to generational preference, and we are preserving the enduring ethical foundation of medicine by ensuring that future physicians can meet expectations that have remained stable for over two millennia [9].

Indeed, the successful implementation of the above requires capable pre- and para-clinical teaching staff familiar with clinical scenarios, who are ready to adapt, which could be a limiting factor in some settings. However, all that is required is a small change in the teaching approach by a few capable individuals, and the rest will follow.

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