

Editorial



From Bench to Bedside: Translational research, innovation and implementation in Sri Lankan medicine

Anuji Upekshika Gamage

Chairperson, National Research Council, Sri Lanka & Professor in Public Health, General Sir John Kotalawela Defence University, Sri Lanka

Correspondence: anujigamage@kdu.ac.lk

 <https://orcid.org/0000-0002-4713-9283>

DOI: <https://doi.org/10.4038/jccpsl.v32i1.8925>

Received: 18 Mar 2025

Accepted: 23 Mar 2025

Abstract

Despite remarkable scientific progress, much biomedical research fails to translate into meaningful clinical or societal benefits. Accordingly, this paper explores critical gaps in translational research, innovation and implementation in Sri Lanka. It further highlights the structural and systemic barriers that contribute to research waste and then discusses the potential role of Health Technology Assessment and measures in ensuring value-based innovation. Ultimately, strengthening these pillars is essential for realizing "bench-to-bedside" transformation in Sri Lankan medicine.

Introduction

Carl Sagan once said, "Somewhere, something incredible is waiting to be known." This captures the spirit of scientific inquiry well. In health research, discovery alone does not suffice. The value of medical innovations lies in its translation from laboratories to clinics and then delivery to communities. Translational research ensures that scientific discoveries lead to better health outcomes, more efficient systems and equitable access. Globally, less than 25% of promising biomedical discoveries reach clinical trials. Fewer than 10% become routine practice within 20 years (1). Sri Lanka has a robust health system and a strong academic sector. It holds immense innovation potential but the "bench-to-bedside" pathway remains fragmented and dormant. This editorial explores and

discusses ways to address translational gaps through innovation ecosystems and impactful implementation.

The continuum of translation

Translational research is a continuum, encompassing fundamental scientific discovery, preclinical development, clinical validation, health systems integration and community-level implementation. It has been conceptualized as two main translational gaps:

T1 gap: Translating laboratory discoveries into human applications

T2 gap: Translating clinical research into policy, practice and population impact

In Sri Lanka, as in many other countries, the primary focus is on conducting and publishing scientific studies, with less emphasis on integrating this

evidence into systems, policies and ultimately implementation. These imbalances are enhanced due to "valleys of death" (Figure 1) that exist between ideation, discovery and implementation/delivery, as many research projects “perish” as researchers try to cross the rough terrain between basic discovery and useful therapy (1). Termination of studies in Valley 1

when a technology has shown efficacy yet is unable to obtain financing to take it to human trials. Termination of studies in Valley 2 is due to a rapid decline of funding and other regulatory barriers during the costly clinical evaluation and uptake of the new product.

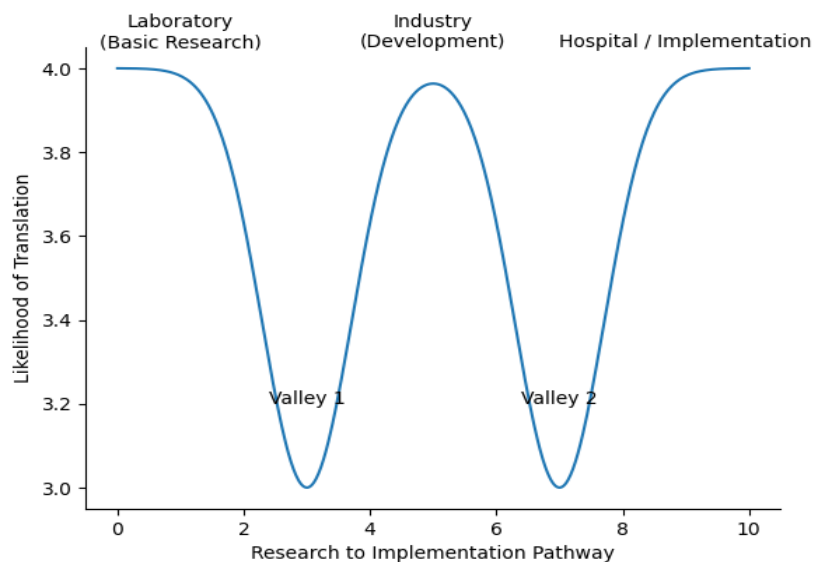


Figure 1: “Valleys of Death” in med tech innovations

The two dips represent critical transition points where promising innovations fail to progress—Valley 1 between preclinical and early clinical stages, and Valley 2 between clinical trials and implementation

Source: Fernandez-Moure J (2016) (9)

The scandal of research waste

The inefficiency of global medical research has long been acknowledged. Chalmers & Glasziou (2009) estimated that 85% of research investment is wasted due to poor design, inadequate prioritization, non-publication and weak dissemination (2). Similar concerns apply locally, where limited resources amplify the consequences. The reasons for "translation loss" are multifaceted: Translating animal research into human applications faces significant challenges. With only about 11% of studies proving applicable to human health, there is a need for better study design and methodology. Many

projects focus more on academic curiosity than on addressing urgent healthcare needs, stemming from weak prioritization and lack of attention to these issues. Regulatory hurdles further delay translational research, while negative results often go unpublished, and publication bias, as it is referred to, distorts the evidence. Additionally, valuable research frequently fails to reach clinicians and policymakers, hindering effective healthcare improvements in the country. As Sir Douglas Altman noted three decades ago, "Too much medical research is conducted but never published, never repeated, and probably never useful" (3). The statement remains tragically relevant today.

Translational challenges

The objective of translational research is to provide fundamental research to guide innovations to prevent diseases and promote health. Translational research should be tightly coupled with clinical observations (4). Globally, translational research has been productive for many reasons. Sri Lanka faces added layers of systemic constraints, resulting in a persistent disconnect between knowledge generation and health impact.

To ensure healthcare delivery, improvements in governance, science-informed policy decisions and the use of the best available evidence are essential. In Sri Lanka, it is observed that decisions on healthcare delivery are mostly driven by global recommendations, with less focus on local evidence. In the decision-making process, both global and local evidence should be considered. The evidence to policy dialogues and platforms should improve and supported to encourage research into practice.

Evidence-based medicine is closely related to health technology assessment (HTA), which is a multidisciplinary process that evaluates the medical, social, economic and ethical implications of health technologies (5-6). Globally, HTA bridges research and policy ensuring that only effective, safe and cost-efficient innovations are adopted. In Sri Lanka, HTA is still emerging. Embedding HTA into early research, not just post-development, ensures that innovations align with health system priorities and address resource limitations. Responsible institutions in research, innovation and implementation can institutionalize HTA units and connect them to national funding. This approach promotes public opinion, fairness, feasibility of implementation, affordability, sustainability and acceptability.

Scientists frequently highlight concerns about research bottlenecks, regulatory shifts, slow decision-making and inadequate support for research. Many bottlenecks are enhanced by the absence of integrated

digital platforms. This hinders approval coordination and reduces visibility into research assets, collectively creating significant bottlenecks across the research-to-implementation pathway. Red tapes in health research is often worsened by poor coordination and limited dialogue between key institutions. Without streamlined communication channels, researchers must navigate complex administrative and regulatory requirements independently addressing issues on a case-by-case basis. This fragmented approach leads to delays, duplication of effort and inefficiencies. Ultimately, it hinders timely research implementation and discourages innovation within the health system.

It is vital that science and technology play a role in a country's economic development. The government plays a key role in ensuring public trust in science and in sustaining investments in research funding, capacity building and infrastructure expansion. Sri Lanka invests approximately <1% of GDP in research and development, with only a fraction allocated to health (7). Universities rely heavily on competitive grants, whether local, international or donor-funded, while private-sector and philanthropic engagement remains minimal. Main funding agencies include the National Research Council (NRC), the National Science Foundation (NSF), the Ministry of Health and the Ministry of Education. However, coordination among these agencies is limited, and systematic monitoring and evaluation (M&E) of funded projects is essential. Countries' priorities should be identified and updated regularly and these should be considered when funding. Prioritization is an ongoing systematic process that involves identifying national needs, aligning these with research efforts and economic goals. Setting priorities for health research is as critical as conducting the research itself, which ensures a participatory and transparent process. Regular systematic updating of these priorities is needed to ensure relevance. While many national funding agencies may focus on country

needs, international donor agencies often align their funding with global priorities.

Like in many settings, Sri Lanka's research incentives prioritise publications over real-world impact. This output driven approach rewards short-term academic productivity and not long-term translation into policy and practice. As a result, health system benefits are limited. To improve the value of research investments, incentives must align with implementation, impact and population outcomes.

Research ideation to national impacts

Innovation and discoveries in medicine require more than scientific brilliance. They also demand time, multidisciplinary teams, links between industry and academia, institutional support and resources. Innovations and new technologies improve healthcare delivery efficiency and patient. In Sri Lanka, intellectual capacity and creative potential exist, but innovation ecosystems remain underdeveloped.

Implementation research guide scientists on how evidence-based interventions are adopted, modified and maintained in real-world settings. In Sri Lanka, many effective interventions demonstrated in pilot studies struggle to achieve national scale due to insufficient implementation strategies for the discoveries. Strong implementation or delivery frameworks connect research to practice by promoting stakeholder engagement, continuous feedback and adaptive learning. As Stewart Wolf noted, "The real gap between bench and bedside lies in our inability to integrate and understand." (1). In this context, implementation research (IR) studies the challenge of translating evidence-based interventions and policies into real-world practice within health systems to ensure the relevance and applicability of the evidence generated. IR examines the processes, contextual factors and outcomes associated with the adoption, implementation as well as sustainability of

health interventions, policies or programmes within specific systems or communities (8).

Impact assessment is central to translational success in resource-limited settings. It helps policymakers determine value for money, guiding decisions on adoption, scale-up, and disinvestment. Without adequate impact analyses, promising local innovations risk underutilization due to a lack of evidence on affordability and societal returns on investment. Conversely, interventions of low clinical benefit may continue to consume scarce resources. Strengthening capacity in impact assessment through training and integration into grant processes would enhance accountability and translation of research (6).

Way forward: A national translational research agenda

Sri Lanka currently faces significant systemic fragmentation within its scientific and health innovation landscape. Research and development activities are conducted across isolated institutions without a unified innovation roadmap, resulting in duplication of work and inefficient investments through discovery to delivery. Therefore, it's useful to establish hubs to coordinate the ecosystem to tackle challenges faced by researchers. Key components of a hub may include innovation incubation, prototyping and testing laboratories, regulatory facilitation support, IP and technology transfer services, clinical validation in partnership with the Ministry of Health, and dedicated commercialization acceleration units. For Sri Lanka to fully realize the promise of translational research, robust support for industry, cross-sector collaboration, and public-private partnerships is crucial. Embracing an ecosystem that recognizes the continuum from discovery to delivery and prioritizes investment in cost-effective, relevant technologies will enable the country to maximize the real-world impact of its innovations.

Conclusion

To reduce research waste and enhance the impact of health research, systemic reforms are necessary. These reforms include prioritizing research based on national health needs, establishing transparent funding mechanisms with built in monitoring and evaluation, and integrating HTA and impact assessment strategies into research design. Additionally, fostering collaboration among government, academia and industry is essential, as well as creating knowledge translation platforms to connect researchers with policymakers. Also, it is essential to reduce regulatory bottlenecks that delay research and improve execution. Promoting open access and data sharing can maximize the value of existing studies. The aim is not to conduct more research but to improve the quality of research done for the right reasons, ultimately generating measurable impacts on health and equity.

Sri Lanka stands at a pivotal juncture. With its strong public health infrastructure, rich academic tradition and emerging innovation ecosystem, the country can transform how research informs practice. However, this requires deliberate efforts to close translational gaps, institutionalize HTA, and foster an innovation culture that values.

References

1. Woolf SH. The meaning of translational research and why it matters. *JAMA* 2008; 299(2): 211-213. <https://doi.org/10.1001/jama.2007.26>.
2. Chalmers I & Glasziou P. Avoidable waste in the production and reporting of research evidence. *Lancet* 2009; 374(9683): 86-89. [https://doi.org/10.1016/s0140-6736\(09\)60329-9](https://doi.org/10.1016/s0140-6736(09)60329-9).
3. Altman DG. The scandal of poor medical research. *BMJ* 1994; 308(6924):283-284. <https://doi.org/10.1136/bmj.308.6924.283>.
4. Austin CP. Opportunities and challenges in translational science. *Clin Transl Sci* 2021; 14(5): 1629-1647. <https://doi.org/10.1111/cts.13055>.
5. WHO. *Health Technology Assessment of Medical Devices*. Second edition. Geneva: World health organization, 2025. Available from: <https://www.who.int/publications/i/item/9789240110878>.
6. Drummond MF, Sculpher MJ, Claxton K, Stoddart GL, Torrance GW. *Methods for the Economic Evaluation of Health Care Programmes*. United Kingdom: Oxford University Press, 2015. Available from: <https://nibmehub.com/opac-service/pdf>.
7. National Science Foundation of Sri Lanka. *Statistical Handbook on National Research and Development Survey - 2022*. Colombo: NSF; 2022. Available from: https://www.nsf.gov.lk/images/pdf/Handbook2022Final_v2.pdf.
8. Mash R, Nyasulu J, Malan Z, Hirschhorn L. Understanding implementation research. *Afr J Prim Health Care Fam Med* 2025; 17(2): e1-e7. <https://doi.org/10.4102/phcfm.v17i2.4934>.
9. Fernandez-Moure J. Lost in translation: the gap in scientific advancements and clinical application. *Front Bioeng Biotechnol* 2016; 4: 43. <https://doi.org/10.3389/fbioe.2016.00043>.