

Frugal Surgical Innovations are the Need of the Hour

Background

Innovation is defined by the dictionaries as “a new idea, device, or method; or the act or process of introducing new ideas, devices, or methods.” However, Surgical Innovation (SI) is more difficult to define. Common narratives include why-where-how-what-who as well as novelty, degree of change, safety, ethical standards, level of impact and peer acceptance. [1, 2] We have proposed a simpler, more egalitarian and ‘inclusive’ definition: “a SI is ‘any’ new surgical idea which improves patient welfare by solving an existing problem; and which like a three-legged stool is balanced by the three legs which represent surgical-precision, surgical-wisdom and patient-safety”. [3]

Frugal Surgical Innovations (FSIs) are low-cost surgical innovations which are designed for economic reasons. These are all about ‘doing more and better with less for more people’. [4] FSIs make up for their lack in sophistication or complexity in affordability, without scrimping on safety or effectiveness.

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The three constructs of FSIs are: affordability, adaptability and accessibility. [5] The philosophy of FSIs originates from grassroots, resource-constrained settings (RCS), where most abundant of all-natural resources — human ingenuity — is used to optimize limited resources to solve problems. [6] Clinically meaningful inclusive research can be performed ‘only’ by surgeons working in RCS;

as ‘only’ they understand the difficulties and nuances of various problems and can provide simple affordable solutions for their patients. [7]

Characteristics of FSIs can be easily remembered by a simple mnemonic – ‘CHANGES’; as seen in Table 1.

Table 1 Characteristics of FSIs [3]

	Criteria	What does it imply
C	Contemporary	It should sync with present-day scientific practices
H	Handy	It should be easy and affordable to use
A	Accessible	It should be freely usable/ scalable across RCSs
N	Novel	It should be a new and better alternative to an existing solution
G	Geographical	It should sync with geographical factors and their solutions
E	Estimable	It should be adequately measurable and validated by peers*
S	Safe	It should be safe and ethical

*Peer reviewed and published

The key to FSIs in RCSs lies in: ‘simplifying the idea/ technique/ device’ to find patients’

needs-driven low-cost innovative surgical solutions which can be used on a wider scale to achieve health equity for underserved populations. This has shaped our motto of: ‘modify-simplify-apply’. Use of ‘glocal’ philosophy, i.e. global wisdom tailored to local technology and resources, ensures incorporating the best of both the worlds in any FSI. It involves wisely choosing the need-based appropriate technology which is locally available, affordable (cost-effective), easy to maintain at the local level, ‘transparent’ (understood by locals) and if created new;

involves the locals in its ‘co-creation’ (skills transfer).

Successful FSIs bring many advantages with them. These include: attaining global health equity; allowing capacity building in grass-root surgeons; improving indigenous research capacity; increases the global knowledge base; minimizing the health expenditure; minimizing the dependence on international support/ collaboration; the potential to reduce the ‘brain drain’ and encouraging reverse brain drain; positively affecting the researchers’ career and success stories can result in

increased institutional support for basic and clinical science research. [7]

SI, *per se*, is a complex process and it gets further complicated in case of a FSI as it is an unconventional solution. As reporting of an innovation differs materially to the reporting of research, many FSIs lacking a structured template are therefore frequently published as informal communications; thus ending up under the radar. This prevents their proper evaluation and recognition by reviewers, editors and readers. This has prompted us to propose guidelines for scientifically unambiguous, unequivocal and transparent 'structured' reporting of SFIs. [8] It includes a 30 point checklist which encompasses the whole process of SFI from ideation, to development, to its possible usage and diffusion.

IDEAL (Idea, Development, Exploration, Assessment and Long-term monitoring) framework based on a five-stage description of a new surgical idea's development process ensures rigorous and scientific evaluation so that introduction and adoption of SIs, including FSIs, are governed by evidence-based principles. [9] However, compliance with this framework is far from consistent and it requires more support from the surgical practice leaders and editors of journals. [10, 11]

Ethical principles demand that the right balance is found between encouraging creativity and innovation while maintaining ethical awareness and responsibility to patients. [12] This can be done by making

patients a partner in the transparent process of FSIs for their informed consent. [13] The old adage "*if the passionate (evangelists) do the surgery, then the dispassionate (skeptics) have to evaluate the ethics*" holds true and Institutional Ethical Review Boards have to set the bar very high. The four core principles of modern bioethics: autonomy, beneficence, non-maleficence and justice are available to guide such decisions.

Unfortunately many FSIs face challenges with their dissemination and wider adoption; and their benefits are often confined to few 'pockets of excellence' or 'improvement islands' even after their successful publication in peer-reviewed journals. [14, 15] This confirms the old adage that 'In health care, innovation is hard, but dissemination is even harder'. [16] In RCSs where the disparities in surgical care are immense, the opportunities are correspondingly abundant and their widespread adoption can multiply their benefits. [17] FSIs provide low-cost, affordable, local-evidence-based customized solutions for their patients; and deserve better than being unsung-unrecognized ideas after clearing the process of a rigorous peer review and publication. The innovators job is not complete with its publication but they have to take another step of its effective dissemination to ensure its wide-spread adoption. As there is no such framework, we developed a conceptual framework '*DISSEMINATE*' for their effective and structured dissemination and adoption by the end-users in RCSs. [18]

FSIs are the need of the hour for the progress of rapidly developing field of Global surgery

which aims to provide equitable surgical care to underserved populations of low- and middle-income countries. [19, 20] Surgical ecosystems all over the world have finally started recognizing FSIs and are successfully promoting this culture of finding ‘simple’, ‘scientifically proven’, ‘ethical’, ‘safe’ and ‘better’ solutions for their patients’ needs. [21] FSIs can assist in providing equitable health for all, which is the unfinished agenda of democracy. In a true sense, FSIs represent philanthropic altruism performed with a Scalpel; and sync with the philosophy of *Noblesse oblige*, which is the obligation of those with a special talent to be helpful and generous towards the underprivileged. [3]

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