



# Strengthening rural surgical networks in India: Decoding the past, the present, and the future

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## *"Inequality is a fact, equality is a value" - Mason Cooley*

Societies worldwide are combating inequalities of various kinds. India is no different, with a mismatch in opportunities and responsibilities across urban and rural areas, public and private sectors, men and women, young and old people, different social groups, and several other dimensions of social public life. This gap is especially palpable in health and healthcare. The colloquial wisdom is that there are at least two Indias (India and Bharat): the urban elite with the *crème de la crème* of receiving the best of all worlds, including care at the hands of the finest surgeons at well-equipped corporate hospitals and the 'others' in densely-packed urban slums and rural and remote tribal areas struggling to get even essential and emergency surgeries when in need. All shades of disparity in access to surgery exist in this wide range from dream to dread.

Metropolitan urban India is fast becoming a medical tourism hub, especially for vascular and orthopedic surgeries. This can be partly explained by the quality and affordability of care by renowned specialists, short waiting times, and promotional governmental policies for medical tourism<sup>1</sup>. In contrast, over 90% of unmet

needs in rural India for surgical volumes<sup>2</sup>. Notably, most rural and tribal areas depend on government-run district hospitals and peripheral centers, often lacking adequate infrastructure, resources, and manpower<sup>3</sup>. Consequently, this forces people residing in rural and remote areas to travel farther distances in search of better-equipped public or private hospitals<sup>4</sup>, which can delay access to timely surgical intervention during emergencies and cause an increased out-of-pocket expenditure. Thus, ensuring surgical practice in rural areas is critical. Rural surgery is recognized as a field in its own right because rural surgeons' wide skill sets often need to factor in resource constraints.

Rural surgeons worldwide have developed innovative strategies to augment and improve surgical care provision. For example, the National Institute for Health and Care Research (NIHR) Global Health Research Group in Surgical Strategies collaborated with surgeons and manufacturing engineers from India to further develop an affordable and minimally invasive gasless laparoscopy technique, which became popular in rural northeastern India<sup>5</sup>. The Association of Rural Surgeons of India popularized mosquito nets instead of Prolene meshes, as both are made of similar materials, thus



dramatically reducing costs<sup>6</sup>. The Laptop Cystoscope, a plug-and-play device, could reduce the investment necessary for endoscopic management of lower urinary tract diseases to one-twentieth of the currently available devices<sup>5</sup>. The gasless laparoscopic device and the Laptop Cystoscope is now used in clinical settings across India, Kenya, Nigeria, and Uganda. It was also included in the 2019 and 2024 versions of the WHO Compendium of Innovative Health Technologies for Low Resource Settings<sup>7</sup>.

Value innovations in surgical care are important. Rural surgeons and allies in LMICs have developed viable solutions to complex logistical problems arising during surgeries, which have been adopted in high-income countries. One example is the Ilizarov technique developed in Serbia for femur bone fractures<sup>8</sup>. Posted in rural Serbia in the 1950s, Dr. Ilizarov treated war veterans suffering from debilitating physical injuries in the absence of standard equipment. As a creative alternative, he used an external fixator device consisting of screws and compression wires to keep fragmented bones in place, which ensured the natural re-growth of bones in their anatomical presentation. The technique gained global prominence for its simplicity and notable improvements in patient outcomes after Dr. Ilizarov treated Italian journalist Carlo Mauri for his distal tibial fracture<sup>9</sup>. The Ilizarov technique has become the preferred orthopaedic procedure worldwide for fracture fixations due to its cost-effectiveness for providers and patients. It is estimated that the modern-day external fixator screw costs only around US\$12, and re-using an external fixator reduces hospital costs by 25–34%<sup>8,9</sup>.

Innovations are also critical for training rural surgeons and surgery residents. For instance, under the Proctorship Program by NIHR, surgeons from urban medical colleges travel to rural areas to provide in-person training sessions to rural surgeons on the latest techniques<sup>12</sup>. Such programs also integrate skill training using simulators that resemble real-world OT situations and virtual reality (VR) video-based content. Virtual training modalities have been especially useful in learning techniques like gas insufflation-less laparoscopic surgeries and endoscopic urology<sup>11</sup>.

While India has tried to work towards strengthening rural surgical care by using surgical innovations and

training specialists, a sustained improvement in access to surgical care in rural India is lacking due to various factors. First, the lack of political engagement to recognize upcoming surgical innovations delays their scale-up to the industrial level from grassroots 5. Such a lack of high-level engagement can influence prioritization and resource (e.g., funds) allocation in a top-down fashion. Even in HICs such as Canada, health research funding for surgical innovations declined from 2008 to 2019<sup>10</sup>. Second, in most LMICs, regulatory norms and frameworks to evaluate the risks and benefits of using novel techniques/devices across health facilities are lacking, directly impacting patient safety<sup>8</sup>. The frameworks must incorporate monitoring and evaluating pre-, intra-, and post-op care outcomes of patients undergoing surgeries using innovative techniques/devices. This need for frameworks that can be shared across LMICs is particularly glaring given that new techniques and devices might often be used in surgeries involving patients who are from lower socio-economic strata. In the absence of rural surgeons' innovations, the patients' access to surgery will suffer. However, with innovations in place, safety concerns must be tackled with appropriate regulations. Third, human-centered policies must recognize that patients should fully understand the new surgical techniques incorporated in their pre-, intra-, and post-op care procedures and incorporate feedback as appropriate<sup>12</sup>.

Beyond innovations, strengthening rural surgical care delivery in India and other LMICs requires multi-sectoral coordination. The research agenda needs to prioritize rural health systems in development and evidence-based implementation of innovations. This would require focusing on the disease conditions and injuries that are more common in rural areas, conducting situational analyses of resources, including surgical skill sets of human resources, available in rural hospitals, and ensuring robust research-to-delivery pipelines that can bring out sustained change in local settings, beyond the research studies/trials.

Equitable and universal access to surgical care in rural areas can be achieved with a sustained commitment to rural surgeon-led innovations supported by the broader healthcare sector, the governments, and society.

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