



The role of robotic telesurgery and telementoring in low- and middle-income countries

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Robotic surgery alone will not close the surgical gap in low- and middle-income countries. Telesurgery, in which a remote expert directly controls instruments on a local robotic platform, is technically possible but expensive, bandwidth heavy, and does little to strengthen local capacity. In contrast, telementoring uses relatively simple video and audio links to allow experienced surgeons to supervise and guide on site teams, supporting skill acquisition and autonomy using low cost, low bandwidth infrastructure that is already widely available. Its use is expanding across urology, gynaecology, thoracic, cardiac, head and neck, and general surgery. By enhancing accuracy, field of vision and ergonomics for locally based surgeons, and by raising minimally invasive rates beyond those achievable with laparoscopy alone, robotics combined with telementoring offers a more sustainable route to improving access to safe surgery than remote robotic operating¹.

Robotic assisted surgery improves access to minimally invasive procedures and is associated with reduced operating time and enhanced precision, hopefully leading to better postoperative recovery and quality of life for patients²⁻⁴. A substantial gap persists between high income countries, where adoption is accelerating across multiple specialties with an estimated 15% annual growth, and low- and middle-income countries, which are home to half of the world's population but only 19% of the global surgical workforce⁴. An analysis of 48 studies that showed 68.8% of studies on robotic surgery originated from high income countries². A systematic review and

meta-analysis of 250,000 patients conducted by Coco and colleagues in 2025, found that robotic surgery adoption increased more quickly in Western countries, from 2% to 16% of procedures between 2012 and 2018, whereas Eastern regions are subject to slower growth projections, rising from 1% to approximately 8-10% by 2021^{3,4}.

A practical lever to narrow this divide is robot assisted telementoring and, to a lesser extent, telesurgery. These are related but distinct: telesurgery involves a remotely based surgeon directly operating on a patient using a robotic platform, potentially overcoming geographical barriers and increasing surgical output, whereas telementoring uses the same technology for an experienced surgeon to guide colleagues in the operating room, demonstrating stepwise procedures and advising in real time while the local team retains hands-on control. Early evidence suggests that telementoring can be an effective educational tool. In a series of 15 robot assisted cases, Faris et al. reported that remote guidance supported safe delivery of surgery while disseminating procedural skills to on site teams⁵. Remote telementoring can guide stepwise procedures and accelerate skill transfer, which is a scalable route for LMIC services.

International collaborations should prioritise standards and safeguards for telementoring (e.g. credentialling, supervision ratios, consent and data protection) so partnerships can expand safely. While benefits are clear, risks include device malfunctions, complications, data privacy breaches, and conflict of interests. Hence, there



is a need for a rigorous ethical monitoring of this rapidly spreading surgeries⁶.

The availability of this technology is difficult in LMICs due to several reasons such as establishing the robotic platform, maintenance cost, and potential internet obstacles that may arise with the telementoring. Such gaps can be filled through research and education, and through what is called universal robotic technology licensing that can encourage these countries to produce their own.

A recent Memorandum of Understanding between the WHO and the Society of Robotic Surgery (SRS) aims to foster collaboration between high-income countries and LMICs to increase equality in surgical care between countries⁷. Several methods can be put in place that govern digital and robotic technologies, such as creating task forces, establishing remote mentoring, developing affordable models, and issuing guidelines for a safe telesurgery. The WHO aims to use the advancement in the medical field to fill the gap in healthcare services around the world⁷.

To narrow the gap now, the surgical community should prioritise telementoring over telesurgery and build affordable mentoring networks that strengthen local teams. The immediate priority is not remote operating, but remote teaching; scale tele-mentoring now, and the gap will narrow.

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