# REVIEW



# Global surgery is stronger when infection prevention and control is incorporated: a commentary and review of the surgical infection landscape

Chandler Hinson<sup>1,2\*</sup>, Claire Kilpatrick<sup>1,3</sup>, Kemal Rasa<sup>1,4</sup>, Jianan Ren<sup>1,5</sup>, Peter Nthumba<sup>1,6</sup>, Robert Sawyer<sup>1,7</sup> and Emmanuel Ameh<sup>1,8</sup>

# Abstract

Incorporating infection prevention and control (IPC) is crucial for strengthening global surgery, particularly in lowand middle-income countries (LMICs). This review article highlights the critical role IPC plays in ensuring equitable and sustainable surgical care, aligning with the Sustainable Development Goals (SDG) 3 and 10, which aim to promote health and reduce inequalities. Surgical site infections (SSIs) and other healthcare-associated infections (HAIs) disproportionately affect LMICs, where IPC infrastructure is often underdeveloped. Without robust IPC measures, surgeries in these regions can result in higher morbidity, mortality, and healthcare costs, exacerbating disparities in healthcare access and outcomes. Despite global efforts, such as the World Health Organization (WHO) Guidelines on the Prevention of Surgical Site Infections, IPC integration in surgical practices remains inconsistent, particularly in resource-constrained settings. More widespread adoption and implementation are necessary. By embedding IPC within global surgery frameworks, health systems can improve surgical outcomes, reduce costs, and enhance the resilience of healthcare systems. Effective IPC reduces extended hospital stays, limits the spread of antimicrobial resistance, and increases trust in surgical services. Moreover, the cost savings from preventing SSIs are substantial, benefiting both healthcare systems and patients by reducing the need for prolonged care and antibiotic treatments. This review article calls for greater integration of IPC measures in global surgery initiatives to ensure that surgical interventions are both life-saving and equitable. Strengthening IPC is not optional but essential for achieving the broader goals of universal health coverage and improving public health outcomes globally.

**Keywords** Infection prevention and control, Global surgery, Surgical site infections, Healthcare-associated infections, Low- and middle-income countries, Antimicrobial resistance, Surgical outcomes, Health disparities

\*Correspondence: Chandler Hinson MBA MSc CPH CIC chinson@worldsis.org <sup>1</sup>World Surgical Infection Society, Mobile, USA <sup>2</sup>Frederick P. Whiddon College of Medicine, University of South Alabama, Mobile, AL, USA <sup>3</sup>KSHealthcare Consulting, Glasgow, UK <sup>4</sup>Department of Surgery, Anadolu Medical Center, Kocaali, Turkey <sup>5</sup> Jinling Hospital, Medical School of Nanjing University, Nanjing, Jiangsu, China

<sup>6</sup>Department of Plastic Surgery, AlC Kijabe Hospital, Kijabe, Kenya <sup>7</sup>Homer Stryker MD School of Medicine, University of Western Michigan, Kalamazoo, MI, USA

<sup>8</sup>Division of Paediatric Surgery, Department of Surgery, Federal Capital Territory, National Hospital, Central Business District, Abuja 900103, Nigeria



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# Introduction

The Sustainable Development Goals (SDGs) provide a global framework for addressing critical issues affecting health, well-being, and inequality. Among these, SDG 3—"Ensure healthy lives and promote well-being for all at all ages"—and SDG 10—"Reduce inequality within and among countries"—are pivotal in guiding efforts to improve health systems, particularly in low- and middle-income countries (LMICs) (Fig. 1) [1]. Both goals emphasize the need for equitable access to quality healthcare services, a vision that cannot be realized without a robust foundation of Infection prevention and control (IPC).

IPC is fundamental to achieving SDG 3's objective of reducing global mortality and morbidity rates, especially those related to infectious diseases, maternal and newborn mortality, and health emergencies. Without stringent IPC measures, healthcare facilities become breeding grounds for infections, undermining patient safety and widening health disparities—a core concern of SDG 10. The rise of antibiotic resistance, and the persistence of healthcare-associated infections (HAIs) further highlight the critical need for effective IPC measures in all healthcare settings.

Safe and timely global surgery is integral to achieving the SDGs, particularly within the broader context of universal health coverage (UHC) and reducing health inequalities [2]. Surgical care plays a key role in managing trauma, non-communicable diseases, and maternal complications, all of which contribute significantly to the global burden of disease. However, the success of surgical interventions is inextricably linked to effective IPC measures [3, 4]. In settings where IPC guidelines and their implementation are weak or absent, surgical outcomes worsen, infections spread, and health systems face additional strain [5]. In LMICs, where access to safe surgery is already limited, the lack of IPC further exacerbates inequities in healthcare access and outcomes [6, 7]. Over the past decade, several countries in LMICs have embarked on surgical plans to scale up access to safe and timely surgical care. While countries are increasing their surgical volumes by severalfold, these plans have not included IPC programs. If this gap is not addressed urgently, countries risk a blowout in surgical site infections (SSIs) and postoperative infections in the coming years, which could create the next unintended and unnecessary challenge in global health [8]. Without IPC, global surgery becomes unsustainable. Post-operative infections, including SSIs, are among the most common complications in LMICs, leading to increased mortality, prolonged hospital stays, and financial burdens on both patients and health systems [9–11]. The incorporation of IPC within global surgical frameworks ensures that surgical interventions not only save lives but do so in an equitable, and sustainable manner. Multiple studies across the different areas of IPC (hand hygiene, environmental services, antibiotic prac-

tices, etc.) have continually shown significant decreases



Fig. 1 Sustainable Development Goals from the United Nations

in infection rates if implemented and maintained [12–15]. Additionally depending on the severity of the SSI, preventing one infection can save the hospital and patients between hundreds to thousands of dollars [16, 17]. Therefore, strengthening IPC is not just an adjunct to global surgery—it is essential to its success and to the broader mission of achieving the SDGs.

This article provides a critical synthesis of the role of IPC in global surgery, emphasizing its integration as a fundamental pillar for achieving sustainable and equitable surgical care globally. By bridging IPC and surgical frameworks, particularly in LMIC, this commentary highlights actionable strategies and recommendations that have yet to be widely implemented. It aims to fill a critical gap in the current discourse by calling for unified efforts to embed IPC into global surgical initiatives, addressing disparities and contributing to the broader goals of universal health coverage and health equity.

# Calls to action and guidelines within global surgery and infection prevention and control

Since the start of the SDGs, there have been some important calls to action within the field of global surgery and IPC. Specific to the realm of IPC, there has been the approval of the *Global Strategy on infection prevention and control*, approved by all United Nation member states, along with the launch of a global action plan and monitoring framework [18, 19]. Although these documents are not specific to surgery, this can be implemented within the surgical space to ensure safe care.

Within global surgery, the *Lancet Commission on Global Surgery* was published in 2015. Equitable access to safe surgery is noted to include access to clean, well-equipped operating environments that adhere to IPC standards [6]. This is especially critical for rural or underserved regions where healthcare infrastructure may be minimal, such as in many LMICs. However, IPC programs remain limited at district level hospitals in these settings.

By ensuring that IPC is central to global surgery, we address not only the immediate health needs of surgical patients but also contribute to broader public health goals, such as combating antimicrobial resistance (AMR) and reducing the overall disease burden in communities.

# International and national action guidelines joining IPC and surgery

IPC in surgery has become a global priority as healthcare systems work to improve surgical safety and outcomes. A range of national and international guidelines have been developed to address this critical intersection, offering evidence-based practices to reduce infections and improve patient care. Below, we highlight key guidelines from major organizations that tackle both IPC and surgical safety.

World Health Organization (WHO) guidelines on the prevention of surgical site infection The WHO *Guidelines on the Prevention of Surgical Site Infection* (2016) is one of the most comprehensive international frameworks dedicated to reducing the incidence of SSIs [20]. These guidelines were developed in response to the high global burden of SSIs, especially in LMICs, and are based on a rigorous review of the best available evidence. They cover various aspects of surgical care, from preoperative practices to postoperative care. Key recommendations from the WHO guidelines include:

- *Preoperative bathing*: The guidelines recommend the use of antimicrobial soap or chlorhexidine before surgery to reduce microbial load on the skin.
- *Prophylactic antibiotic use*: The guidelines emphasize the importance of administering prophylactic antibiotics within 120 min before incision, which has been shown to reduce SSI rates.
- *Sterilization practices*: Proper sterilization of surgical instruments is highlighted as a cornerstone of IPC. The guidelines recommend autoclaving or other effective sterilization methods for reusable equipment.
- Surgical hand preparation: The WHO advocates for alcohol-based hand rubs for surgical hand preparation, as they are more effective and less timeconsuming than traditional handwashing with soap and water.

While the WHO guidelines aim for widespread adoption in global health initiatives to reduce post-operative infections, there is little data to suggest this is happening on a significant scale, particularly in resource-constrained settings. Implementation at the country level, especially in many sub-Saharan African countries, appears to have fallen short of expectations. The emphasis on practical, evidence-based measures has helped shape national guidelines in many countries [21, 22].

**Centers for Disease Control and Prevention (CDC) guidelines for the prevention of surgical site infection** The CDC *Guidelines for the Prevention of Surgical Site Infection* provide a detailed, evidence-based approach to reducing SSIs in the United States and globally [23]. Like the WHO, the CDC guidelines are based on extensive reviews of scientific literature and are widely respected in clinical practice. Key recommendations from the CDC include:

- *Antibiotic prophylaxis*: Similar to the WHO, the CDC emphasizes administering antibiotics within one hour before surgical incision and discontinuing them within 24 h after surgery to prevent the development of AMR.
- *Skin preparation*: The CDC advocates for the use of alcohol-based antiseptics, such as chlorhexidine-alcohol, for skin preparation before surgery.
- Operating room practices: Guidelines recommend maintaining strict sterility in the operating room, including environmental controls such as air filtration, room temperature management, and limiting personnel traffic.
- *Postoperative wound care*: The CDC provides recommendations for post-operative care, including maintaining sterile dressing techniques and educating patients about proper wound care to prevent infections after discharge.

The CDC guidelines are extensively used within the U.S. to reduce the burden of SSIs, improve patient outcomes, and promote consistent infection control practices in surgical settings. However in the global setting, there is little information about global adoption into clinical practice.

**Joint Commission International standards** Joint Commission International (JCI) provides accreditation and certification for healthcare organizations worldwide, offering guidelines that emphasize the importance of IPC in surgical care [24–26]. JCI's standards on IPC (updated regularly) are focused on creating safe environments in



**Fig. 2** Figure by Tartari et al. 2024 that shows the proportion of countries meeting all reported minimum requirements by core component, stratified by World Bank country income level (N = 106). Figure use and distribution is permitted under the terms of the Creative Commons CC-BY license

healthcare facilities, including operating rooms. JCI standards include:

- *Sterile surgical environments*: JCI requires hospitals to maintain strict control over the cleanliness of operating rooms, focusing on air quality, sterilization, and minimizing staff and equipment movement during surgery.
- *IPC training*: JCI places significant emphasis on training healthcare workers in IPC practices, including proper hand hygiene, use of personal protective equipment (PPE), and correct aseptic techniques.
- *Surveillance of infections*: Continuous monitoring and reporting of infection rates, especially SSIs, are mandated by JCI, helping healthcare facilities track their IPC performance and improve over time.

**National guidelines** Many countries have adapted WHO and CDC recommendations into their own national IPC guidelines for surgical care. For example:

- NICE Guidelines (UK): The National Institute for Health and Care Excellence (NICE) provides guidelines on reducing SSIs, emphasizing hand hygiene, skin preparation, and antibiotic use [27].
- India's National Guidelines for infection prevention and control in Healthcare Facilities (2019): These guidelines offer context-specific recommendations for Indian healthcare settings, with a focus on strengthening sterilization processes and preoperative antibiotic use [28].
- South African National infection prevention and control Strategic Framework (2020): This framework aims to align national practices with WHO standards, promoting surgical safety through IPC improvements in public healthcare facilities [29].

However, there is still minimal adaption in LMIC settings. In a cross-sectional study conducted by the WHO, only 4% of respondents (106 countries) met 100% of IPC program minimum requirements (Fig. 2) [30]. In contrast, 45% met 75% of criteria for minimum IPC requirements, and 76% met at least 50% of the criteria for minimum IPC requirements [30]. No lower-middleincome or low-income countries achieved 100%, while 3% of upper-middle-income and 9% of high-income countries did. 83% of countries in Africa (83%) met over 50% of the requirements [30].

**Global surgical safety checklists** The WHO *Surgical Safety Checklist* is a key internationally implemented tool that integrates IPC practices into surgical workflows [31].

It includes critical steps, such as confirming antibiotic prophylaxis before incision, ensuring sterility of instruments, and verifying the patient's postoperative care plan. Studies have demonstrated that the use of this checklist reduces SSIs, complications, and mortality, especially in LMICs where surgical capacity may be limited [32].

# Intertwining infection prevention and control and global surgery

Global surgery and IPC are inseparable components of a functional and equitable healthcare system and service delivery. The growing recognition of the need for universal access to safe surgical care has brought the importance of IPC to the forefront of global health discussions [33]. In LMICs, the risk of post-operative infections, particularly SSIs, is significantly higher. According to WHO, up to 20% of surgical patients in LMICs experience SSIs, compared to 2–5% in high-income countries (Fig. 3) [20, 34]. However it is important to note, this figure is likely to be an underestimation. Accurate data on SSI from LMICs is often lacking and the complications are often under-reported.

SSIs and other HAIs are largely preventable through IPC programs and practices such as proper sterilization of equipment, hand hygiene, as well as the appropriate use of antibiotics [20, 35]. Studies have shown that the implementation of comprehensive IPC measures can reduce SSIs by up to 60% [36, 37]. These improvements not only save lives but also contribute to the broader goal of building resilient health systems, particularly in resource-constrained settings. In fact, effective IPC reduces the need for extended post-operative care, free-ing up critical resources and increasing the efficiency of healthcare delivery [38].

The interdependency of global surgery and IPC reflects a deeper truth: to truly achieve the SDGs, especially SDG 3 and SDG 10, healthcare systems must be strengthened holistically. IPC is not an optional add-on to surgical care; it is a foundational component that determines the safety, equity, and sustainability of global surgery efforts. By prioritizing IPC in surgical planning and execution, we can improve patient outcomes, reduce health disparities, and ensure that global surgery initiatives deliver lasting, positive impacts on health systems worldwide.

# Cost savings of infection prevention and control in global surgery

A robust IPC program significantly reduces healthcare costs by minimizing SSIs and other HAIs, leading to substantial cost savings for both healthcare systems and patients. Cost-benefit analyses across various settings consistently show that the upfront investment in IPC measures yields significant financial returns [39]. For example, preventing an SSI can save a healthcare facility an average of \$20,785 per case [40, 41]. This includes the costs associated with extended hospital stays, readmissions, additional treatments, and, in some cases, intensive care unit admissions, which could be avoided with effective IPC protocols. Moreover, the indirect costs of SSIs, such as lost productivity and wages for patients, are also mitigated, contributing to broader societal savings [42]. WHO's systematic review on the global burden of HAIs found that effective IPC measures could reduce SSIs by up to 60% in some settings, which translates into billions in overall potential savings globally [37]. In LMICs, where healthcare budgeting is already limited, preventing infections can dramatically reduce strain on overburdened health systems, allowing for more efficient allocation of



Fig. 3 Figure by Fan et al. 2014 that demonstrates the range in incidence of SSIs in several countries. Blue bars stand for countries classified as 'developed' while green bars stand for incidences of countries often classified as 'developing'. CAF = Central African Republic. UK = United Kingdom. USA = United States of America. This work is licensed under Creative Commons Attribution-NonCommerical-NoDervis 4.0 International License. The images in the article are included in the article's Creative Commons license

resources. Hospitals that invest in IPC programs-such as improved sterilization processes, staff training, and the use of antiseptics-experience fewer complications and quicker patient discharges, freeing up hospital beds and reducing the demand for costly antibiotics or other treatments for post-surgical infections [43]. This, in turn, lowers the incidence of AMR, which can lead to even higher long-term costs if not managed [44, 45]. Studies have demonstrated that the cost of implementing comprehensive IPC measures-while requiring an initial investment-is far outweighed by the reduction in direct healthcare costs and indirect societal costs, making it one of the most cost-effective strategies for improving surgical outcomes and overall healthcare quality [46]. These cost savings also translate into a better public health impact, as fewer infections lead to more reliable surgical success rates, increased patient trust, and more efficient healthcare systems capable of treating larger populations [47].

# Decreasing mortality and morbidity through infection prevention and control

One of the most direct benefits of IPC in global surgery is the reduction of mortality and morbidity associated with infections. SSIs and HAIs are major contributors to postoperative complications and deaths in LMICs, where resource constraints and inadequate IPC measures often exacerbate these risks [48]. A report by WHO on surgical safety emphasized that basic IPC practices, such as sterile surgical techniques and hand hygiene, are associated with a significant reduction in post-operative infections and deaths [20]. Mortality rates due to preventable infections can be halved with the implementation of IPC measures, such as using proper sterilization techniques and adhering to antibiotic prophylaxis guidelines [11, 38].

# Decreased antimicrobial resistance through infection prevention and control

The improper use of antibiotics and the prevalence of HAIs have been key drivers of AMR, a global health crisis. IPC practices, particularly in surgical care, are critical in curbing the overuse of antibiotics and limiting the spread of resistant pathogens. Studies have outlined the growing threat of AMR and emphasized the importance of IPC in reducing the need for prolonged or inappropriate antibiotic use following surgical procedures [49]. When infection risks are minimized through proper hygiene, sterilization, and monitoring, the reliance on antibiotics decreases, helping to preserve their efficacy for future generations.

### Freeing up resources due to preventing infection

Post-operative infections significantly lengthen hospital stays, contributing to overcrowded facilities and increasing the strain on already limited healthcare resources. Effective IPC protocols, by preventing infections, allow patients to recover more quickly and be discharged sooner, thus freeing up hospital beds and medical staff for other patients. A study conducted by the Lancet Commission on Global Surgery (2015) highlighted that reducing the length of post-surgical hospital stays through IPC practices could alleviate the chronic shortage of hospital resources in LMICs, enabling health systems to serve more patients with the same resources [2, 6]. These savings are particularly important in environments with limited capacity, where quicker patient turnover directly translates to more lives saved.

# Increasing trust through safety

IPC programs and practices are also essential in building trust in the healthcare system, particularly in regions where healthcare facilities are often perceived as unsafe due to high infection rates. When patients experience fewer infections and better surgical outcomes, their confidence in the healthcare system increases. This, in turn, encourages higher utilization of surgical services and other medical interventions. Studies have demonstrated that the perceived safety and cleanliness of healthcare facilities are among the top factors influencing patients' decisions to seek surgical care, especially within in LMICs [7, 50]. By fostering trust through effective IPC, health systems can overcome barriers to care and ensure that more people receive life-saving surgeries.

# International organizations targeting infection prevention and control in global surgery

Numerous international organizations have taken the lead in developing standards, guidelines, and initiatives to ensure that surgical procedures are conducted safely and effectively, reducing the risk of SSIs and other HAIs. Below is an overview of the key organizations focused on IPC in global surgery. The organizations included in this paper are ones the authors have collaborated with or know extensively, given their expertise as subject matter experts in the field.

# World Health Organization

The WHO plays a pivotal role in setting global standards for IPC and safe surgery. Guideline development groups, consisting of global experts following guideline development standards, facilitate such important work. Additionally, the WHO facilitated Global IPC Network (GIPCN) brings together experts from around the world to support implementation and promotion strategies that aim to strengthen IPC practices, including in surgical care.

#### Centers for disease control and prevention

The CDC plays a vital role in improving IPC standards globally, including within the realm of surgical care. While primarily focused on domestic public health in the U.S., the CDC's influence extends internationally through collaborations with organizations like the WHO and various governmental health agencies. The CDC is involved in global surveillance efforts, contributing to the development and harmonization of infection definitions, including those for SSIs, which ensure consistent data collection and comparison across international settings. The CDC participates in initiatives aimed at improving IPC practices and healthcare safety on a global scale. They assist in the development of guidelines, provide technical assistance, and support capacity-building efforts to strengthen IPC systems in LMICs. The CDC's Global Health Security Agenda also focuses on preventing the spread of infections through improved public health and clinical practices, including in surgical settings. Through these efforts, the CDC contributes to reducing the global burden of SSIs and enhancing the overall safety and quality of surgical care worldwide.

# World surgical infection society

The World Surgical Infection Society (WSIS) is a global organization dedicated to the prevention, diagnosis, and management of surgical infections. It aims to promote research, education, and clinical practice improvements that reduce the burden of SSIs and related complications. WSIS places a special emphasis on supporting surgical teams in LMICs, where the incidence of SSIs is disproportionately high. Through workshops, conferences, collaborative research projects, and being part of WHO's GIPCN, WSIS works to spread best practices. WSIS also develops and disseminates guidelines for preventing and managing surgical infections, ensuring that healthcare providers worldwide have access to the latest evidencebased recommendations. The society fosters international collaboration among healthcare professionals to address the unique challenges of surgical infections in diverse clinical environments, from high-resource hospitals to rural clinics.

# Surgical infection society

The Surgical Infection Society (SIS) is a professional organization focused on improving the understanding, prevention, and treatment of surgical infections. The society conducts research, holds conferences, and develops clinical guidelines that serve as a global resource for healthcare providers. SIS publishes widely respected clinical guidelines on topics such as the use of antimicrobial agents, the management of SSIs, and strategies for reducing HAIs in surgical settings. These guidelines are regularly updated to reflect the latest research and advances in IPC. SIS's work is particularly important in bridging the gap between research and clinical practice, ensuring that surgeons and healthcare workers are equipped with the knowledge and tools necessary to minimize infection risks.

# Global alliance for infections in surgery

The Global Alliance for Infections in Surgery is an international organization that brings together surgeons, healthcare professionals, and researchers to improve outcomes in surgical patients through the prevention and management of infections. The alliance focuses on disseminating evidence-based practices, advocating for improved IPC protocols, and addressing challenges unique to surgical care. The alliance conducts training programs, workshops, and webinars to educate surgeons and healthcare providers about the latest IPC strategies. These initiatives are particularly beneficial for professionals in LMICs who may have limited access to formal IPC education. The organization places special emphasis on the growing threat of AMR in surgical infections. Through global awareness campaigns and advocacy, the Global Alliance for Infections in Surgery promotes responsible antibiotic use and highlights the importance of IPC in combating AMR. By uniting experts from various fields of surgery and infection control, the alliance facilitates the exchange of knowledge and resources, helping to create a safer surgical environment worldwide.

### International federation of infection control

The International Federation of Infection Control (IFIC) is a global network of infection control societies and associations, working to promote and improve IPC practices across all areas of healthcare, including surgery. Through its extensive network, IFIC supports the sharing of information, resources, and guidelines between regions and countries. IFIC offers a range of educational resources, including training modules and conferences, aimed at improving the skills of healthcare workers in IPC. Their focus is on capacity building, especially in countries with limited access to IPC expertise. IFIC collaborates with global organizations, such as WHO and the CDC, to develop and promote IPC guidelines that are both practical and adaptable to a wide range of healthcare environments. IFIC's work in creating an international platform for IPC collaboration is essential for addressing the global challenges of surgical infections, particularly in resourceconstrained settings.

# Infection control Africa network

The Infection Control Africa Network (ICAN) is an organization specifically focused on improving IPC in African healthcare systems, including in surgical environments. Recognizing the high burden of surgical infections in the region, ICAN works to strengthen IPC practices across African countries through training, advocacy, and research. ICAN's capacity-building programs target healthcare workers in Africa, providing them with the skills and knowledge needed to implement effective IPC measures. The network also works with national health authorities to integrate IPC into broader healthcare policies and systems. ICAN supports research initiatives aimed at understanding the specific challenges of IPC in African surgical settings. By collecting data on SSIs and HAIs, ICAN helps to identify key areas for improvement and guides the development of targeted interventions. ICAN's regional focus allows it to address the unique needs of African healthcare systems, where surgical infections remain a major cause of morbidity and mortality.

# Society for healthcare epidemiology of America

The Society for Healthcare Epidemiology of America (SHEA) is a leading organization dedicated to advancing the science and practice of healthcare epidemiology, including IPC, particularly in surgical settings. While SHEA's primary focus is on improving healthcare outcomes within the United States, its influence and contributions extend globally, impacting how surgical infections are prevented and managed in diverse healthcare environments. SHEA's involvement in these global efforts often includes technical support, educational outreach, and collaborative research aimed at strengthening IPC frameworks in LMICs, where surgical infections pose a significant public health challenge. SHEA provides leadership in healthcare epidemiology by promoting research, education, and the development of best practices in IPC, with an emphasis on preventing SSIs and other HAIs.

#### International society for infectious diseases

The International Society for Infectious Diseases (ISID) is a global organization focused on advancing the prevention, diagnosis, and treatment of infectious diseases, including those related to surgical care. ISID plays a significant role in addressing IPC on a global scale by promoting collaborative research, education, and the dissemination of knowledge on infectious disease management. Through its initiatives, ISID contributes to reducing the burden of SSIs and other HAIs, particularly in LMICs, where the healthcare infrastructure may be less developed, and infection control resources are limited.

ISID's global initiatives include capacity-building programs, educational outreach, and the provision of technical support to healthcare professionals worldwide. These initiatives are designed to strengthen IPC measures in surgical settings, promoting evidence-based practices that can be tailored to the local healthcare environment. By fostering international collaboration, ISID facilitates the sharing of knowledge and best practices between healthcare providers in diverse regions, helping to ensure that IPC standards, including those focused on surgical infections, are met in all types of healthcare systems.

### Conclusion

IPC is one cornerstone of global surgery, playing a critical role in improving surgical outcomes, including postoperative complications and reducing HAIs, as well as supporting the broader goals of global health equity, as outlined in the SDGs. By embedding IPC protocols within global surgical practices, healthcare systems, particularly in LMICs, can mitigate the devastating impacts of SSIs, reduce health disparities, and build more resilient and cost-effective healthcare infrastructures.

The evidence is clear: robust IPC measures can reduce SSIs by up to 60%, translating into substantial cost savings for both healthcare systems and patients, as well as improved surgical outcomes that directly decrease mortality, morbidity, and AMR. Preventing infections also alleviates strain on overcrowded healthcare systems, freeing up resources and enabling hospitals to serve more patients. In this way, IPC becomes not only a clinical imperative but also an economic and societal one, with far-reaching effects on public health and healthcare sustainability. While IPC practices should remain a core responsibility of healthcare organizations, increased governmental involvement is recommend and essential to bolster these efforts, given the potential for significantly reduced morbidity and mortality as well as decreased healthcare expenditures.

The integration of IPC into global surgery is not a mere adjunct but a critical necessity for achieving safe, equitable, and sustainable healthcare worldwide. As healthcare systems work toward UHC and the reduction of health inequalities, the emphasis on IPC will remain vital in driving progress, safeguarding patient safety, and ensuring that global surgery initiatives deliver lasting positive impacts. Through concerted international collaboration and local capacity-building efforts, the global health community can continue to make strides in improving surgical safety and, by extension, the overall quality and resilience of healthcare systems globally.

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#### Author contributions

CH: Topic, Manuscript Design, Literature Review, Manuscript Writing and Review. CK: Manuscript Design, Literature Review, Manuscript Writing and Review. KR: Literature Review, Manuscript Writing and Review. JR: Literature Review, Manuscript Writing and Review PN: RS: Literature Review, Manuscript Writing and Review. EA: Literature Review, Manuscript Writing and Review. All authors read and approved the final manuscript.

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# Declarations

### Ethics approval and consent to participate

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#### **Consent for publication**

#### Not applicable.

Clinical trial number

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#### **Competing interests**

The authors declare no competing interests.

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