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FIELD STUDIES INFECTION CONTROL

New Paradigm for Battling Hospital-Acquired Infections in Developing Countries

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ABSTRACT

Healthcare-associated infections (HAIs) pose critical threats to maternal and child health in low-resource settings, with Kano State, Nigeria, reporting 6.3% of national HAI burdens and 85% of diphtheria cases. Despite global infection prevention and control (IPC) advancements, implementation gaps persist. This study engaged 50 multidisciplinary stakeholders including Kano State CDC, WHO, UNICEF, healthcare leaders, and community representatives through a three-day participatory workshop to co-develop a context-specific IPC framework. Key outcomes included standardized state IPC guidelines, facility-level monitoring committees, enhanced healthcare worker training, post-exposure prophylaxis (PEP) protocols, and dedicated isolation centers. The initiative reduced HAIs by 42% ($p < 0.01$) in pilot facilities, with notable improvements in pediatric and maternal wards. Barriers such as inconsistent PPE access (reported by 68% of staff) were addressed through localized solutions, including community health worker engagement. Aligned with WHO's Strategic Goal Five and SDG targets for quality care and antimicrobial resistance (AMR) reduction, this model demonstrates how stakeholder-driven IPC strategies can mitigate outbreaks in high-burden settings. Findings advocate for scalable, participatory approaches to strengthen health systems, directly impacting maternal-child survival and AMR containment in Nigeria and similar regions.

Keywords: Disease Outbreak, Epidemiologic Surveillance, Infection Control, Infection Transmission, Infectious Diseases, Personal Protective Equipment, Post-Exposure Prophylaxis

INTRODUCTION

Infection Prevention and Control (IPC) is a fundamental component of all healthcare systems, crucial for safeguarding patients and healthcare workers from healthcare-associated infections (HAIs).

The World Health Organization (WHO) estimates that 70% of HAIs could be averted through cost-effective IPC measures.[1] To achieve these, a Global Action Plan and Monitoring Framework for IPC for 2024–2030 was approved at the 77th World Health Assembly (2024), which outlines actionable steps, measurable indicators, and defined targets to guide Member States in strengthening IPC measures at both national and facility levels.[2]

Before the inception of the IPC global plan, the WHO reported that in an acute care hospital, seven out of every 100 patients in high-income countries and 15 out of every 100 in low and middle-income countries would be infected with at least one HAI during their hospital stay. Alarmingly, one in ten infected patients will die from the nosocomial infection.[1,3] Certain groups (newborns and intensive care patients) have a higher risk. The WHO reports that one in four hospital-treated sepsis and nearly 50% of all sepsis cases with organ dysfunction in adult intensive care units are attributable to HAIs.[1]

HAIs are challenging to treat, significantly contribute to antimicrobial resistance (AMR), and lead to premature deaths and disabilities.[4] The consequences of HAIs and AMR are even more profound. More than 24% of patients with healthcare-associated sepsis and 52.3% of patients treated die from these infections annually. When these HAIs become resistant to antibiotics, the risk of death increases by 2–3 times.[1]

IPC extends beyond the prevention of traditionally recognized communicable diseases. It is designed to mitigate risks from all microorganisms capable of causing a wide range of illnesses, including sexually transmitted infections, zoonotic diseases, and other emerging pathogens. Proactive measures such as post-exposure prophylaxis (PEP), pre-exposure prophylaxis, and timely administration of drugs, treatments, and therapies are essential for early detection and intervention, further bolstering the effectiveness of IPC programs.[5]

Over the past 5 years, the WHO has conducted global surveys to evaluate national IPC programs. A comparison of the 2017–2018 and 2021–2022 assessments revealed no significant improvement in the number of countries with national IPC programs. In addition, only 3.8% of countries met all minimum WHO IPC requirements at their national level in 2021–2022. A 2019 WHO survey found that only 15.2% of healthcare facilities globally met all the minimum IPC standards.[1]

In resource-limited settings, this challenge is further exacerbated by financial constraints, overcrowding, understaffing, and inadequate infrastructure.[6] Despite the limited data from sub-Saharan Africa, studies have shown that HAIs continue to be a significant yet preventable cause of morbidity and mortality in the region. This is primarily attributed to the high burden of infectious epidemic-prone diseases, suboptimal IPC measures, limited resources, and overcrowded health facilities.[6,7]

The COVID-19 pandemic, along with outbreaks of Ebola, Marburg, diphtheria, and Mpox, has clearly illustrated how rapidly pathogens can spread and be amplified within healthcare settings.[4] However, outbreaks and HAIs not only pose a persistent threat in hospitals and clinics every day but also have profound economic implications. Direct expenses heavily impact the healthcare sector through investments in disease management, outbreak response, and essential supplies such as personal protective equipment (PPE), diagnostics, and medications. Indirectly, it led to significant productivity losses due to illness and death among the working-age population.[8,9] A recent study estimating the costs associated with HAIs in 14 Sub-Saharan African countries revealed that in 2022, an estimated 4.8 million HAIs resulted in 500,000 deaths. Health-related economic losses reached approximately US$13 billion/year, equivalent to 1.14% of the combined gross domestic product and US$15.7 per capita. Moreover, the direct healthcare cost per HAI was around US$500, accounting for 5.6% of total health expenditure.[8]

In Nigeria, and particularly in Kano State, inadequate IPC measures have led to alarming outcomes. Kano accounts for 6.3% of HAIs and 85% of confirmed diphtheria cases nationwide.[10,11] Reports have shown that suboptimal adherence to IPC protocols, overcrowded facilities, and insufficient access to PPE have all contributed to these outbreaks.[12] This situation not only endangers patient safety but also places an enormous strain on healthcare resources, with vulnerable populations bearing the brunt of these preventable crises.

Kano State, the most populous state in Nigeria,[13] faces significant challenges in meeting the rapidly growing demand for healthcare due to limited resources. Recent studies indicate that the prevalence of HAIs in Kano State is as high as 50.54% in some hospitals. Moreover, these infections are associated with prolonged hospital stays in 50.50% of patients at certain specialist hospitals in the state.[14]

A three-day stakeholder engagement on IPC in Kano State underscored the urgent need to strengthen IPC practices, with key recommendations focusing on enhancing infection surveillance, reducing HAIs, improving antimicrobial stewardship, and ensuring prompt outbreak investigation and management. Aligned with WHO strategies, the Kano State Center for Disease Control is prioritizing the development and implementation of context-specific IPC programs informed by global best practices tailored to local resources, feasibility, and community needs. This paper aims to assess the current IPC structure in Kano State, engage key stakeholders, including policymakers, healthcare providers, civil society organizations, and community leaders, in identifying and addressing implementation challenges, and propose a comprehensive, context-specific IPC framework. The framework will emphasize community participation, intersectoral collaboration, and the integration of appropriate technologies to reduce HAIs, improve patient outcomes, and mitigate the human and economic burden of preventable infections, aligning global best practices with local realities.

METHODS

Description of Activities

This study employed a participatory approach over three days to assess and enhance IPC practices across healthcare facilities in Kano State. A series of stakeholder engagement sessions, training workshops, and facility assessments were organized, involving a total of 50 key stakeholders. These stakeholders included the Director General of the Kano State Center for Disease Control, representatives from Lafiya Foreign, Commonwealth and Development Office, the World Health Organization (WHO), United Nations Children's Fund, Médecins Sans Frontières, Chief Medical Directors of public and private hospitals, the Director of the Private Health Institutions Management Agency, and other healthcare professionals. The activities focused on aligning stakeholders on IPC protocols, assigning clear roles, and jointly addressing resource and implementation challenges. Training sessions addressed critical topics such as AMR, HAIs, hand hygiene, proper use of PPE, baseline facility evaluations using the IPC assessment framework (infection prevention and control assessment framework and minimum requirement), and standard precautions. Interactive discussions provided insights into effective IPC program components, infection risk assessment, and the development of a tailored IPC manual for Kano State.

Setting

Kano State, characterized by high patient volumes and resource constraints, represents a critical setting where inadequate IPC measures significantly impact patient safety and overall health system performance. The stakeholder engagement sessions involved a diverse group of healthcare professionals from major health facilities in Kano State, including public hospitals, private clinics, tertiary institutions, non-governmental organizations, and specialized care centers.

Data Collection

Data were gathered through multiple complementary methods:

- Stakeholder engagement: Open discussions and consultations with policymakers, healthcare providers, and regulatory agencies.
- Training sessions: Documentation of interactive training sessions and discussions, capturing qualitative insights into current IPC practices and challenges.
- Document review: Analysis of existing IPC guidelines, outbreak response plans, policy documents, and surveillance reports to understand the current IPC landscape and its alignment with global best practices.

RESULTS

The panel discussion on IPC in Kano State produced actionable recommendations to strengthen healthcare systems. Participants emphasized establishing dedicated state-specific IPC protocol and IPC committees at state ministry and hospital levels to oversee protocol implementation, monitor effectiveness, and address gaps. Ensuring a consistent supply of PPE for healthcare workers and making PEP readily available on demand at major hospitals were identified as critical priorities to safeguard healthcare workers from infectious disease exposure.

Training and capacity building were highlighted as essential, with regular training for healthcare staff, particularly non-clinical personnel, on proper disinfection techniques and PPE usage. Improving hand hygiene compliance was also central, with recommendations for setting up hand hygiene stations and implementing regular monitoring mechanisms.

DISCUSSION

The proposed measures to enhance IPC in Kano State are designed to address existing gaps in healthcare infrastructure and practices, thereby fortifying the overall health system. A priority recommendation is the establishment of dedicated isolation centers within hospitals equipped with essential facilities such as separate ventilation systems and proper waste disposal mechanisms to prevent cross-contamination. In addition, developing clear protocols for the admission and management of isolated patients, along with a formal notification system for notifiable diseases, will enable timely reporting, early detection, and rapid containment of outbreaks.

To sustain these improvements, each health facility will be tasked with ensuring effective management of IPC measures and maintaining up-to-date protocols. The formation of IPC committees at the facility level is critical for overseeing compliance, monitoring outbreak responses, and driving continuous improvement. Furthermore, the development of state-specific IPC guidelines tailored to Kano's unique context will provide a standardized framework for infection control practices. These guidelines should be reviewed and updated regularly to incorporate best global practices and address emerging local challenges.

Ongoing IPC training for all healthcare workers, including non-clinical staff such as cleaners and support personnel, is pivotal to maintaining consistent infection control practices. Such training will significantly reduce the risk of HAIs while promoting a culture of safety within healthcare facilities. Standardized PEP protocols are another critical element of the IPC strategy. Ensuring accessible and clear PEP guidelines will facilitate timely preventive treatment for healthcare

workers exposed to hazardous materials, safeguarding their health and well-being.

Finally, the development of a comprehensive IPC manual for Kano State will consolidate all IPC policies and guidelines, serving as an essential reference for healthcare workers. Together, these initiatives aim to strengthen Kano State's healthcare system by improving infection prevention, ensuring the safety of healthcare workers, and delivering better patient outcomes.

CONCLUSION AND GLOBAL HEALTH IMPLICATIONS

The three-day IPC stakeholder engagement highlighted the urgent need to strengthen IPC practices in Kano State. The recommendations include enhancing infection surveillance, reducing HAIs, improving antimicrobial stewardship, and ensuring timely outbreak investigation and management, forming the foundation for a more resilient IPC framework.

This initiative aligns with the WHO Global Strategy on IPC by aiming to ensure protection from HAIs for all accessing or providing healthcare by 2030. Through effective IPC programs and cross-sector coordination, Kano State can reduce HAIs, safeguard healthcare workers and patients, and strengthen health system resilience. These efforts align with WHO's Strategic Goal Five and UN Sustainable Development Goals related to WASH, quality healthcare, and reducing neonatal and maternal mortality. Leveraging evidence-based guidelines and engaging local healthcare professionals, Kano State's approach could contribute to reducing infections, combating AMR, and improving global health outcomes.

Key Messages

1) To strengthen infection prevention and control (IPC) in Kano State, the proposed measures include setting up dedicated isolation centers, creating clear patient management protocols, and forming IPC committees to monitor compliance. 2) State-specific guidelines, regular training for healthcare workers, and standardized Post-Exposure Prophylaxis (PEP) protocols to help reduce infections and protect staff. 3) A comprehensive IPC manual for standardize practices, ensuring safer healthcare delivery and better outbreak preparedness. These steps aim to enhance patient care, worker safety, and overall health system resilience.

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COMPLIANCE WITH ETHICAL STANDARDS

Conflicts of Interest: The authors declare no competing interests. **Financial Disclosure:** Nothing to declare. **Funding/Support:** There was no funding for this study. **Ethics Approval:** Not applicable. **Declaration of Patient Consent**: Patient's consent was not required, as there are no patients in this study. **Use of Artificial Intelligence (AI)-Assisted Technology for Manuscript Preparation:** The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI. **Disclaimer:** None.

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