International Journal of Community Medicine and Public Health
Korir RK et al. Int J Community Med Public Health. 2026 Jul;13(7):3409-3413
https://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20262231

Original Research Article

Assessment of infection prevention and control practices among students in Kenya Medical Training College

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Received: 16 May 2026
Revised: 16 June 2026
Accepted: 18 June 2026

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ABSTRACT

Background: Infection prevention and control (IPC) is a critical component of healthcare systems aimed at reducing the transmission of hospital-acquired infections (HAIs). Despite advances in medical practice, HAIs remain a significant global health challenge, particularly in resource-limited settings such as Kenya. Health professional students are at a heightened risk of exposure during clinical rotations.
Methods: A cross-sectional mixed-methods study design was employed across selected Kenya Medical Training College (KMTC) campuses, targeting second- and third-year students. A multistage sampling technique was used to select 420 participants. Data were collected using structured online questionnaires, observational checklists, and focus group discussion guides. Quantitative data were analyzed using SPSS version 25, while qualitative data were analyzed thematically using NVivo.
Results: The study included 406 respondents. The majority demonstrated adequate theoretical knowledge of IPC principles, including understanding of HAIs and preventive measures such as hand hygiene (88%) and use of personal protective equipment (PPE) (77%). Students exhibited generally positive attitudes, though 43% perceived PPE as uncomfortable. However, inconsistencies between knowledge and actual practice were observed, notably in consistent PPE use, sharps handling, and waste management. Key barriers included inadequate PPE supply, high workloads, and time constraints.
Conclusions: Although KMTC students possessed satisfactory knowledge and positive attitudes toward IPC, significant gaps existed in translating this knowledge into consistent practice. Addressing these gaps requires strengthening practical, experiential training and improving resource availability in clinical placement sites.

Keywords: Health professional students, Hospital-acquired infections, Infection prevention and control, Kenya medical training college

INTRODUCTION

Infection prevention and control (IPC) is a key intervention in the provision of health services as the rise of infections has imposed substantial burdens through escalated healthcare costs worldwide.[1] Among healthcare workers (HCWs) and health professional students (HPS), exposure to infectious diseases has emerged as a frequent occupational hazard with the burden escalating in light of the rising threat of antimicrobial resistance (AMR) linked to cross-contamination within hospitals.[2,3] Particularly in Sub-Saharan Africa (SSA), where nosocomial infections stand as a leading cause of deaths and illness, there is a pressing requirement for tailored infection prevention and surveillance strategies.[4]

IPC protocols play a pivotal part in mitigating the risks associated with nosocomial infections. However, local studies have revealed gaps in IPC implementation by HCWs. Bedoya et al observed IPC practices in 935 primary health facilities in three Kenyan counties and noted an average of 13 opportunities for infection transmission during outpatient visits.[5] They further reported that compliance with IPC interventions may be behaviorally driven, suggested by weak associations between compliance and factors such as the availability of supplies and healthcare workers' training. Similarly, Ibrahim and Elshafie postulated that having knowledge and an optimistic view of IPC measures does not necessarily ensure compliance.[6] This calls for a paradigm shift as HCWs are role models for HPS, tasked with the responsibility of modeling good IPC practices to cultivate and sustain compliance.

Interestingly, while assessing knowledge attitude and practice toward IPC among pharmacy undergraduate students in Zambia, Mudenda et al noted that even though some medical students felt adequately prepared to engage with infectious diseases, a significant portion expressed reservations about their safety when interacting with patients.[7] Perceived fear coupled with inexperience in hygiene and safety procedures further exacerbates the risk of HAIs. Maina and Bii found out that only a small proportion of HPS got prophylactic treatment following needle prick injuries.[8] This underscores the importance of ensuring compliance with established safety protocols among students in clinical rotations, who are at a heightened risk due to their exposure during training.

Health professional students at the Kenya Medical Training College (KMTC) form an integral part of the future healthcare workforce in Kenya. Despite their critical role, there is limited research on the IPC knowledge and practices among these students focusing on educational and curricula approaches. It remains unclear whether current training programs adequately prepare students to implement IPC measures effectively, potentially putting both the students and their patients at risk.[9]

The objective of this study was therefore to assess IPC practices among students in KMTC, evaluating their knowledge, attitudes, facilitators, barriers, and preferred learning strategies.

Limitation and delimitation

The study was conducted across multiple KMTC campuses nationwide, requiring substantial time to gather sufficient data. To address this challenge, the researchers employed research assistants to ensure comprehensive coverage of the target population. Additionally, the researchers scheduled appointments with the target population in advance to streamline the data collection process.

METHODS

Study area

The study was conducted across selected Kenya Medical Training College (KMTC) campuses in Kenya. KMTC is a public middle-level pre-service education institution providing training for more than 80% of Kenya's health workforce who deliver health services across the country.

Study design

The study utilized a cross-sectional mixed-methods design incorporating both quantitative and qualitative approaches. An explanatory sequential design was adopted, where quantitative data was collected and analyzed first, followed by qualitative data collection to explain the quantitative findings. This study was conducted from May 2025 to January 2026.

Sample size determination

The sample size was determined using the formula for finite populations:

$$n = [DEFF \times N \times p \times (1-p)] / [(d^2/Z^2_{1-\alpha/2} \times (N-1) + p \times (1-p)]$$

Where the population size (N) was 60,000, proportion (p) was 50%, confidence level (Z) was 1.96 (95%), and degree of error (d) was 5%. This yielded a sample size of 382. A 10% non-response adjustment was applied, resulting in a final target sample size of 420 students.

Inclusion and exclusion criteria

Inclusion criteria encompassed all consented second- and third-year registered students in the selected campuses who had covered requisite IPC modules. Exclusion criteria included first-year students, students who had completed final exams but not graduated, and students not present on campus during the study period.

Sampling techniques

A multistage sampling technique was employed. The 74 KMTC campuses were clustered into 8 geographical zones. Campuses were selected randomly from these zones, and proportionate sampling was used to apportion the 420 students across 8 selected campuses (Kilifi, Kitui, Meru, Murang'a, Lodwar, Mumias-Shianda, Homabay, and Kisii). Half of the active departments in the selected campuses were randomly selected. Stratified random sampling was then employed per department, followed by systematic random sampling using class lists.

Data collection procedure

Quantitative data was collected via self-administered online questionnaires delivered through the KOBO

Toolbox platform to students' smartphones. Concurrently, an observational checklist was utilized to evaluate students' IPC practices in clinical settings via non-participant observation to capture authentic behaviors. For the qualitative arm, focus group discussions (FGDs) were organized to explore patterns identified from the quantitative data.

Data collection tools

Primary data collection tools included semi-structured online questionnaires (measuring knowledge, attitudes, and practices), observational checklists covering hand hygiene and waste disposal, and FGD guides.

Data management and analysis

Comprehensive data cleaning was conducted prior to analysis. Quantitative data was coded and analyzed using the Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistics summarized the findings, while inferential statistics (regression, correlation, and Chi-square tests) explored variable relationships at a 5% level of significance. Qualitative data from FGDs was transcribed and imported into NVivo version 11 for thematic analysis using both pre-existing and emergent themes.

Ethical approval

Ethical clearance was obtained from the Moi University institutional research and ethics committee (MU-IREC) and a research permit from the National Commission for Science, Technology, and Innovation (NACOSTI). Anonymity was maintained by omitting names in questionnaires and using participant codes during FGDs.

RESULTS

Socio-demographic characteristics of the study participants

Data was collected from 406 respondents, yielding a response rate of 96.6%. Males formed a slight majority at 54%. The majority of respondents fell within the 20-30-year age bracket (72.9%), indicating young adults in active training. Academically, 88% were pursuing diploma-level programs, with less than 1% pursuing higher diplomas, and the rest in other certificate-level programs. Students were drawn from multidisciplinary departments including clinical medicine, nursing, medical laboratory sciences, and public health (Table 1).

Knowledge of infection prevention and control

The findings showed that a majority of students correctly identified hospital-acquired infections (HAIs) as infections acquired during healthcare delivery after admission. Most respondents recognized patients, healthcare workers, health professional students, and hospital waste as potential sources of HAIs. Furthermore, 59% acknowledged that healthcare staff are significantly at risk.

Table 1: Socio-demographic characteristics of the study participants.

Socio-demographic characteristics	N (%)
Gender	
Male	219 (54.0)
Female	187 (46.0)
Age (years)	
<20	61 (15.0)
20-30	296 (72.9)
>30	49 (12.1)
Level of training	
Diploma	357 (88.0)
Higher diploma	4 (1.0)
Other	45 (11.0)

Regarding transmission, 49% specifically identified contaminated surgical instruments as a transmission pathway, alongside direct contact and poor hand hygiene. Hand hygiene emerged as the most widely recognized IPC element (60%), followed by the use of PPE (57%). However, recognition was lower for systemic elements, with only 42% identifying hospital waste management and 39% acknowledging the role of IPC committees.

Attitudes towards infection prevention and control

Students generally exhibited positive attitudes toward IPC practices; 77% acknowledged the importance of hand hygiene before and after patient contact, and 79% recognized PPE as a necessary protective measure. However, negative perceptions were noted: 43% reported that wearing PPE is uncomfortable or time-consuming, and 21% felt IPC procedures interfere with workflow in busy clinical settings.

Facilitators and barriers influencing IPC practices

Key facilitators encouraging adherence included prior IPC training, availability of clear guidelines, supportive supervision from lecturers, positive peer influence, and personal motivation. Major barriers identified were insufficient availability of PPE, heavy workloads and time pressure during clinical rotations, inconsistent enforcement of guidelines, and limited access to hand hygiene facilities in certain clinical areas.

Learning strategies that promote IPC practices

Students expressed a strong preference for experiential learning over traditional didactic lectures. The most effective strategies identified were bedside clinical demonstrations with mentorship, problem-based and case-based learning, peer-to-peer learning, and simulation-based practical sessions. Respondents

indicated these methods enhanced understanding, confidence, and skill retention.

Practice of infection prevention and control

Regarding hand hygiene, 88% reported using running water with soap, and 83% reported always cleaning hands after touching contaminated objects. However, gaps in consistency were evident, with 29% performing hand hygiene only occasionally before and after wearing gloves, and 17% doing so inconsistently before medication preparation.

For PPE use, 77% always used gloves during procedures, and 79% wore face masks for suspected airborne infections. In contrast, consistent use of additional protective gear like gowns and aprons was considerably lower (48%), with 26% indicating they wore gowns only occasionally. Qualitative feedback linked this to limited PPE availability and discomfort.

Concerning sharps disposal, 63% correctly stated needles should not be recapped, and 82% understood needles should not be bent. Despite this, over one-third of students still believed recapping is safe, and 15% felt needle-stick injuries could be managed without formal reporting. Regarding hospital waste management, while most were aware of color-coded waste segregation, consistent practice varied due to the limited availability of appropriate waste containers in clinical settings.

DISCUSSION

The findings demonstrate that the majority of KMTC students possess an appreciable level of theoretical knowledge regarding IPC, comparable to studies conducted among health professional students in Uganda and Zambia.[10,11] The structured incorporation of IPC content within the KMTC curriculum appears to contribute meaningfully to students' conceptual competence.

However, the study revealed notable inconsistencies in the application of IPC principles within clinical environments. This divergence reinforces earlier assertions that knowledge acquisition alone does not automatically culminate in compliance with IPC protocols.[6] The observed disparity underscores the influence of behavioral dispositions, situational constraints, and institutional culture in shaping IPC-related conduct.

Students generally hold favorable attitudes toward IPC. Within the health belief model framework, such positive attitudes are widely regarded as precursors to preventive health behavior.[12] However, this orientation was tempered by perceptions of inconvenience and time burden, particularly in high-demand clinical settings. These attitudinal reservations mirror findings from studies among nurses in resource-limited contexts where IPC measures are perceived as secondary to immediate clinical demands.[13,14] The implication is that while students may intellectually endorse IPC, contextual pressures may attenuate consistent compliance.

Significant barriers were documented, including inconsistent PPE availability and excessive workloads. These constraints are characteristic of many healthcare settings in Kenya and have been widely reported in existing literature.[5] Beyond impeding compliance, these barriers risk normalizing unsafe practices, thereby entrenching suboptimal infection control behaviors that may persist into professional practice.

With respect to pedagogy, the study established that experiential learning strategies- simulations, bedside teaching, and problem-based learning- are particularly effective in fostering IPC competence. Students reported that these methods enhanced practical skills, strengthened confidence, and improved skill retention compared to traditional didactic lectures. This aligns with adult learning theories which emphasize the importance of practical application in skill acquisition.

CONCLUSION

Although KMTC students possessed satisfactory knowledge and positive attitudes toward IPC, significant gaps existed in translating this knowledge into consistent practice, particularly regarding PPE use and sharps management. Financial and logistical barriers, such as inadequate PPE supply and high workloads, heavily influenced compliance. Addressing these gaps requires a paradigm shift from theoretical instruction to experiential, simulation-based training, coupled with improved resource allocation in affiliated clinical facilities. Fostering strong adherence to IPC among these future professionals is essential for reducing HAIs and combating antimicrobial resistance in Kenya.

The study's cross-sectional design limits the ability to establish causality. Reliance on self-reported data may introduce social desirability bias, though this was mitigated by observational checklists. The findings may not be generalizable to all medical training institutions outside of Kenya.

ACKNOWLEDGEMENTS

Authors would like to thank all the students who participated in the study, the KMTC campus heads of departments for their logistical support, and the research assistants who aided in data collection.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee (MU-IREC) and National Commission for Science, Technology & Innovation (NACOSTI/P/25/415354)

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Cite this article as: Korir RK, Kipkemoi MJ, Ronoh GK. Assessment of infection prevention and control practices among students in Kenya Medical Training College. Int J Community Med Public Health 2026;13:3409-13.