Knowledge and Practice of Infection Prevention and Control Among Healthcare Workers in Bomet County, Kenya: A Systematic Review.

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ABSTRACT:

Introduction: Good care is possible only through the infection prevention and control (IPC). Evidence-based practices, good programs, education, surveillance, monitoring, adequate staffing, and reliable supplies can all contribute to reducing healthcare-associated infections. This study aims to gather information about the knowledge and practice of IPC among healthcare professionals, to understand what impacts adherence to recommendations, and to form evidence-based strategies in the context of Ndanai Sub-County Hospital in Bomet County, Kenya.

Methods: The evidence-synthesis methodology was based on the principles of PRISMA 2020. Hand hygiene, PPE, injection and sharps safety, waste management, environmental cleaning and disinfection, training, supply, monitoring, and organizational factors were the categories of results.

Results: The 2026 East African systematic review studied IPC practices and knowledge in the region and found significant gaps between the studies (East African IPC review, 2026). According to a survey of Kenyan health facilities, the staff was almost completely aware of WHO guidelines; however, supply shortages, breakdowns in the supply chain, and practical solutions impacted the practice (PLOS Global Public Health, 2025.

Conclusion: Improving IPC at such hospitals in Bomet County requires continuous training, reliable infrastructure and equipment, constant monitoring with feedback, promoting supervision, clear guidelines, and the implementation of IPC. The above report does not provide any particular number at the Ndanai hospital because primary information is required.

Keywords: Infection Prevention And Control; Health Care Workers; Knowledge; Practice; Hand Hygiene.

INTRODUCTION

One of the most frequent adverse occurrences in healthcare is infection (Dansero & Gon, 2025). They can be fatal, increase expenses, lengthen hospital stays, and promote antibiotic resistance. Effective IPC reduces preventable transmission and safeguards both employees and patients.

IPC is viewed by WHO as a system rather than a single action. Eight categories comprise its 2016 core components: an IPC program, guidelines, teaching and training, surveillance, multimodal techniques, monitoring and feedback, workload and personnel, and an appropriate built environment with materials (Nafula & Richard, 2024). Strengthening IPC at a facility like Ndanai Sub-County Hospital necessitates continual training, reliable equipment and supplies, frequent observation with feedback, and encouraging supervision, unambiguous policies, and an active IPC program. This report does not include a facility-specific figure for Ndanai; primary

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data collection is necessary and equipment (WHO, 2016). These parts depend on one another — training without supplies will not change practice.

Healthcare workers are central because most IPC measures happen during routine care: the five moments for hand hygiene, correct use of personal protective equipment, safe injections, sharps safety, aseptic technique, environmental cleaning, waste segregation, disinfection and sterilization, respiratory hygiene and transmission-based precautions (WHO, 2009).

But performance depends on more than knowledge. Kenyan evidence keeps showing the same pattern. A recent study of Kenyan health facilities found staff were almost universally aware of WHO guidelines, yet practice was shaped by shortages of basic materials, supply-chain failures and practical workarounds(McKnight et al., 2026) It described handwashing stations where soap was sometimes there and sometimes not, cleaning equipment shared between toilets and kitchens, and staff using gloves in place of other PPE (PLOS Global Public Health, 2025)Hand hygiene makes the point sharply. A study of birth attendants in Kenya, Malawi and Nepal observed 1,565 deliveries and 3,919 hand hygiene opportunities. Kenya had the lowest compliance of the three, especially before aseptic procedures. Supportive communication with patients was strongly linked to better compliance — Kenyan birth attendants were roughly six times more likely to clean their hands before vaginal examination when communication was good (Dansero & Gon, 2025).

More recent Kenyan work confirms that IPC problems are shaped by infrastructure, supply chains and working conditions, including where hand-hygiene supplies are placed and whether cleaning equipment is available (PLOS Global Public Health, 2025)

The knowledge of IPC refers to the understanding that a healthcare worker possesses regarding the principles and practices required to prevent the spread of infection(Alhumaid et al., 2021). The practice of IPC refers to the application of those principles. The knowledge refers to the indications for hand hygiene, personal protective equipment usage, safe injections, proper disposal of sharps, waste segregation, decontamination, sterilization, and transmission-based precautions *(WHO, 2016)*. In East Africa, a systematic review conducted in 2026 summarized the research conducted concerning the IPC knowledge and practices of healthcare workers. There was significant variation in those studies *(East African IPC review, 2026)*.

Effective IPC strategies are needed in healthcare institutions for the protection of patients, health personnel, caregivers and the community against preventable infections (East African IPC review, 2026). From the evidence found in Kenya and related environments, it is evident that there are instances whereby healthcare personnel report high levels of knowledge yet there is low adherence when observed on site. Such discrepancies are mainly due to lack of training, supply problems, heavy work loads, poor locations of hand hygiene stations, poor supervision and organization-related constraints *(PLOS Global Public Health, 2025).*

It becomes very critical to take such observations into consideration, considering that healthcare professionals operate from different service points within limited resources and heavy loads of work. The setting of this study is in Bomet County. There is no published literature providing validated estimates for knowledge and practices of Bomet. This calls for primary research to provide these estimates. This review provides the evidence needed in this endeavor *(WHO, 2016):*

1. IPC failures expose patients and staff to preventable infectious risks (WHO, 2016).
2. Knowledge alone does not reliably predict observed compliance, so both must be measured (PLOS Global Public Health, 2025).
3. Kenyan evidence shows wide variation between IPC domains and between reported and observed behavior (Dansero & Gon, 2025).
4. Facility-level factors — supplies, infrastructure, staffing, training, monitoring and feedback — all shape implementation (PLOS Global Public Health, 2025).
5. A structured assessment at Ndanai Sub-County Hospital can identify local gaps and guide targeted improvement (WHO, 2016).

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1.1 Objectives

Broad objective:

To evaluate the knowledge and practice of infection prevention and control by healthcare workers and the factors that influence adherence to IPC recommendations.

Specific Objectives

1. To assess healthcare workers' knowledge of infection prevention and control principles.
2. To determine the level of adherence to recommended IPC practices among healthcare workers.
3. To assess healthcare workers' knowledge and practice of hand hygiene, PPE use, injection safety, sharps safety and healthcare waste management.

1.2 Research Questions

1. What is the level of knowledge of IPC among healthcare workers?
2. What is the level of adherence to recommended IPC practices?
3. Which IPC domains show the largest gaps between knowledge and practice?

MATERIALS AND METHODS

2.1 Study Design

The review element adopts a systematic evidence synthesis methodology through PRISMA 2020 reporting guidelines (Page et al, 2021). The facility element proposed is a descriptive cross-sectional survey of IPC knowledge and practices among health workers. The two components are distinct in that the evidence synthesis is an overview of literature while facility-based estimations are meant to come from data collection at the study location.

2.2 Study Location

The study location for the facility-based assessment will be Ndanai Sub-County Hospital in Bomet County of Kenya. The hospital setting forms the backdrop for developing research questions and recommendations. Facility-based outcome percentages are not included in this document because no primary dataset has been provided from Ndanai.

2.3 Target Population

The target population for the facility assessment is the group of health workers involved in providing health services that include IPC practices in the hospital. The category includes nurses, clinical officers, laboratory officers, pharmacy officers, medical officers, support workers and others based on final protocol.

2.4 Eligibility Criteria

Inclusion criteria

1. Healthcare workers working within the selected facility during the study period.
2. Healthcare workers who provide direct patient care or perform duties with IPC implications.
3. Eligible participants who provide informed consent.

Exclusion criteria

1. Healthcare workers absent during the data-collection period.
2. Workers who decline participation.
3. Individuals who do not meet the study's predefined eligibility criteria.

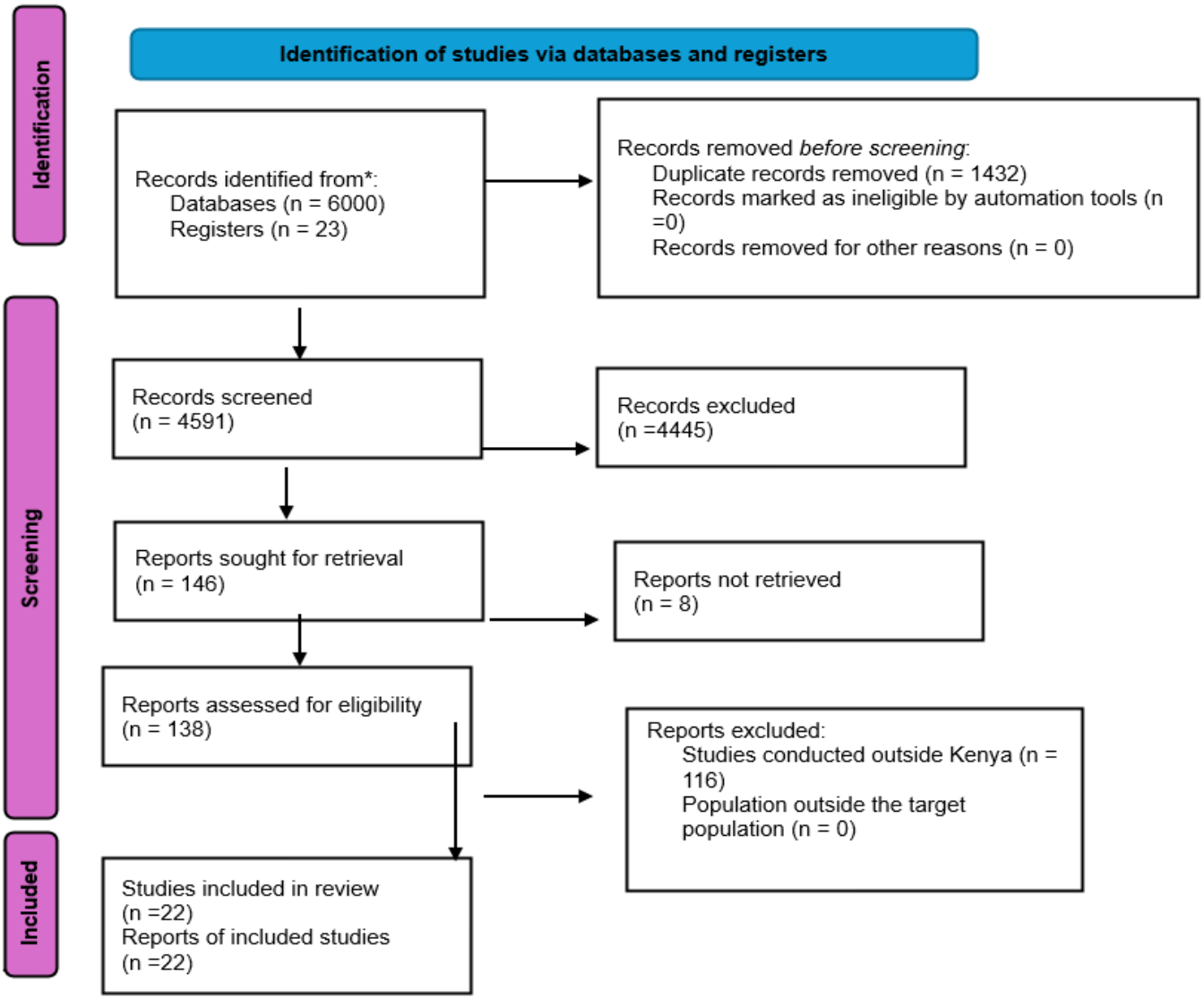
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2.5 Literature Search Strategy

The search focused on peer-reviewed literature and authoritative IPC guidance. Core concepts were healthcare workers, infection prevention and control, knowledge, practice, compliance, hand hygiene, PPE, healthcare-associated infection, Kenya and East Africa. Boolean combinations were used to link related terms.

Concept	Search terms	Boolean combination
Healthcare workers	Healthcare workers; nurses; clinicians; health personnel	OR
IPC	infection prevention and control; infection prevention; infection control	OR
Knowledge	knowledge; awareness; competency; understanding	OR
Practice	practice; compliance; adherence; observed practice	OR
Hand hygiene	hand hygiene; handwashing; alcohol-based handrub	OR
Setting	Kenya; East Africa; sub-Saharan Africa	OR

2.6 Study Selection and PRISMA Reporting



2.7 Data Extraction

For the literature review, the extracted information includes author, year, country, design, HCW population, sample size, IPC topic, measurement technique, knowledge results, practice results, barriers, facilitators, and main conclusions. For the facility assessment, a survey questionnaire and observation checklist can be used to measure knowledge and practice in selected IPC topics.

2.8 Quality Appraisal

The included studies should be critically appraised using a relevant tool for each type of study design. A systematic review, for instance, will require a pre-existing quality appraisal framework, while a cross-sectional study will be appraised using an existing checklist. Appraisal should occur prior to data analysis.

2.9 Data Analysis

For the literature findings, data is reported descriptively because of the use of varied instruments, cut-offs, and observation techniques in the publications. In case of homogeneous numeric results, the pooled results of previous meta-analyses will be presented without reanalysis. For the planned facility assessment, survey data can be reported by frequencies, percentages, and central tendency measures, and associations can be tested statistically after assumption checks.

RESULTS

3.1 Overall East African Evidence

The most appropriate recent regional literature on the topic of interest is a 2026 systematic review assessing the knowledge and practice of infection prevention in hospitals by healthcare workers in East Africa (East African IPC review, 2026). There was a notable amount of heterogeneity in the findings of the included studies indicating that results were highly variable from one setting/country to another. Thus, the IPC knowledge and practice cannot be considered uniform in facilities and across countries.

3.2 Kenyan Evidence

In a study conducted among birth attendants in Kenya, Malawi and Nepal, 3,919 hand hygiene opportunities during 1,565 deliveries were analyzed. Compliance with hand hygiene was found to be lowest in Kenya, especially before aseptic procedures. Ineffective and poor communication with pregnant women was significantly associated with high compliance with hand hygiene. In Kenya, the odds ratio for hand hygiene before vaginal examination was 5.94 (95% CI 1.68–21.0), while the odds ratio before aseptic procedures was 4.03 (95% CI 1.81-8.96). Effective communication, IPC training and facility structure were significant predictors of high compliance (Dansero & Gon, 2025)

Another study conducted in Busia County Referral Hospital examined the knowledge, practice and adherence to IPC among healthcare providers in the labor ward. The study revealed that 90% of the providers had undergone IPC training, while 60% of them exhibited good knowledge of IPC. However, adherence to IPC practices was marginal. Regular IPC training, enough resources, supervision and feedback mechanisms were recommended by the authors (Nafula & Richard, 2024)

The multidisciplinary study on healthcare facilities in Kenya provided specific observational data on reasons behind poor IPC implementation regardless of high awareness level. The researchers noted nearly complete awareness of WHO guidelines among workers; however, their practice was determined by availability issues. Soap was always present at hand washing points, but there were some gaps in its availability. Gloves were always available, while the rest of the personal protective equipment, including gowns and masks, was often lacking. Cleaning was one more issue – cleaners did not receive proper education and tools for work. One cleaner cleaned room, toilets, and the kitchen with a single brush. Another cleaner wringed mops with gloves. Bloodstained sheets were carried barehanded. The researchers came to a conclusion that behavioral change of HCWs will need not only education but also actions related to solving availability problems (PLOS Global Public Health, 2025).

3.3 Factors Associated with IPC Practice

Factor	Evidence pattern	Implication for facility assessment
Knowledge and training	High awareness of guidelines is common, but knowledge alone does not ensure adherence (PLOS Global Public Health, 2025).	Assess both knowledge and observed practice; document recent training.

Supplies and infrastructure	Supply shortages and inconsistent availability of basic materials shape practice (PLOS Global Public Health, 2025)	Audit handwashing points, water, soap, ABHR, PPE and waste containers.
Monitoring and feedback	Continuous observation and feedback can support improvement (WHO, 2016).	Establish routine IPC audits with feedback to staff.
Workload and staffing	WHO identifies workload/staffing as a core facility-level IPC component (WHO, 2016)	Assess staffing patterns and workload during observation.
Organizational support	IPC committees, guidelines, supervision and local ownership support implementation (WHO, 2016)	Assess presence and activity of IPC structures and guidelines.
Communication with patients	Supportive communication was strongly associated with better hand hygiene compliance (Dansero & Gon, 2025).	Include communication observation in facility assessment.

3.4 Facility-Specific Evidence Gap

The literature reviewed failed to establish any verified numerical estimates for either IPC knowledge or practice among health workers at Ndanai Sub-County Hospital(Brown et al., 2025a). For this reason, no percentages, sample size, compliance score or facility deficiency will be assigned to Ndanai without first-hand evidence(Brown et al., 2025a). The suggested facility assessment exercise will give the required estimates through the use of questionnaire, observation checklist and resource audit discussed above.

DISCUSSION

4.1 Knowledge–Practice Gap

From the review, it can be concluded that knowledge and practice are related but not necessarily equivalent. In the study conducted in Busia County, 60% was found good knowledge but borderline satisfactory compliance (Nafula & Richard, 2024). In the study conducted in Kenya which involved an interdisciplinary approach, almost universal awareness of guidelines was noted yet major gaps in practice were identified, mostly because of shortage of supplies and improvisations (PLOS Global Public Health, 2025). Therefore, a facility assessment based on questionnaires alone will likely overestimate the level of compliance.

4.2 Importance of Direct Observation

Direct observation is quite useful in assessing such practices as hand hygiene, use of PPE, safe injection, segregation of waste and decontamination of equipment(Bredin et al., 2022). This method enables assessment of the behavior at the point of care and identification of the very instances where the recommended practice fails. The study conducted among birth attendants in several countries confirmed that direct observation is quite feasible after thousands of opportunities (Dansero & Gon, 2025). This method helped the study in Kenya to identify cleaning practices which would not come out from questionnaires (PLOS Global Public Health, 2025).

4.3 Role of Training

It should be continuous and practical. For instance, in the Busia County study, the compliance level was still only at a borderline level despite all the providers being 90% formally trained (Nafula & Richard, 2024). According to the WHO's IPC Education and Training Framework, competency-based approaches should be used that are supplemented by supervision, observation, and feedback rather than one-off sessions (WHO, 2016).

4.4 Resources and the Working Environment

It is impossible to ensure consistent adherence to IPC practices without having the necessary resources available, accessible, and properly allocated(Brown et al., 2025b). In particular, in the Kenyan interdisciplinary study, the lack of resources led to nurses resorting to gloves instead of personal protective equipment (PPE), cleaners

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sharing a single broom throughout several different areas, and handwashing facilities that were supplied with no soap from time to time (PLOS Global Public Health, 2025). This is another reason why WHO's framework includes materials and supplies, equipment, staffing, and the physical environment among the elements of IPC (WHO, 2016).

4.5 Monitoring, Feedback, and Quality Improvement

Monitoring allows finding out how the things look in reality and which problems recur. Feedback provides an opportunity to use monitoring to make improvements. Therefore, according to the Kenyan interdisciplinary study, the sustainability of improvements will require solving the problems related to supply shortages and workarounds created by healthcare workers (PLOS Global Public Health, 2025).

4.6 Implications for Ndanai Sub-County Hospital

Given the available evidence, the assessment should focus on the following five broad categories in the context of Ndanai:

1. Knowledge and competency of healthcare workers;
2. Adherence to IPC practices;
3. Availability and accessibility of supplies and infrastructure.
4. Training, supervision, and feedback.
5. Organization of IPC in facilities and workload. Given the available evidence regarding communication and hand hygiene (Dansero & Gon, 2025), patient communication might also be considered a determinant of IPC performance.

CONCLUSION

The analyzed evidence suggests that knowledge and practice of IPC of healthcare workers are two distinct dimensions of infection prevention. While knowledge might be relatively good among healthcare workers in Kenya, according to observations the compliance with practices, particularly hand hygiene, is low. Training, mentoring, monitoring, feedback, appropriate supplies, infrastructure, workforce, and organizational support are the key factors that allow healthcare workers to translate their knowledge into practice.

In the case of the Ndanai Sub-County Hospital study, an assessment should involve a knowledge questionnaire along with observation and audit of IPC resources. Such a comprehensive approach provides more reliable data than self-reports only. Percentages and conclusions in the context of the facility should be based only on the primary data gathered from it.

RECOMMENDATIONS

1. **To the Hospital Management** Ensure availability and accessibility of critical IPC resources such as soap, alcohol-based hand rub, appropriate personal protective equipment, sharps container, waste segregation and disposal materials, cleaning materials. Ensure that hand hygiene facilities are adequately positioned and functioning. Facilitate IPC audit, feedback, and corrective action plans. Improve staffing and work load management where service pressure is affecting IPC program performance. Establish an active facility IPC committee/focal system with defined responsibilities. Ensure that cleaning staff is adequately trained and provided with adequate equipment.
2. **To Healthcare Worker** Attend IPC refresher trainings and competency assessments regularly. Adhere to WHO five moments of hand hygiene. Use personal protective equipment based on exposure level. Maintain safe injection and sharps handling practices in all situations. Ensure segregation of healthcare waste at point of generation. Promptly report any issues in terms of IPC resources, infrastructure or safety concerns.
3. **To County Health Management** Offer supportive supervision and technical support to IPC programs in health facilities. Ensure efficient procurement and distribution of essential IPC

commodities. Offer continuous professional development and practical IPC training. Utilize IPC routine data for quality improvement priorities.

4. **To Future Researchers** Carry out observational studies at facility level to quantify actual IPC practice. Use standardized tools aligned with WHO guidelines wherever possible to facilitate comparison. Carry out barrier analysis using qualitative interviews or focus group methodology. Assess interventions by means of repeated measurements before and after implementation.

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Authors' Contributions

The authors are listed as the research group members. For the final submitted version, the authors should specify their individual contributions, such as conceptualization, literature search, data extraction, analysis, writing, editing and the final manuscript approval.

Ethical Considerations

In case of conducting primary data collection with healthcare workers from the studied facility, all the necessary ethical and administrative approvals need to be acquired. Participation should be voluntary and based on the informed consent. The confidentiality of data needs to be ensured. The results need to be reported in aggregate form, in order to protect the anonymity of individual healthcare workers. Clinical practice observation needs to be conducted in a non-invasive manner.

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