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Exploring barriers to and facilitators of infection prevention and control practices in the Pediatrics and Child Health Department of Tikur Anbessa Specialized Hospital, Ethiopia

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Abstract

Background Adherence to infection prevention and control (IPC) standards and guidelines by healthcare workers is essential for reducing the spread of healthcare-associated infections (HAIs). However, IPC practices among healthcare workers in low- and middle-income countries (LMICs), including Ethiopia, are generally inadequate. This research aims to identify the barriers to and facilitators of IPC practices in the Pediatrics and Child Health Department of Tikur Anbessa Specialized Hospital (TASH) in Ethiopia.

Methods We employed a rapid ethnographic assessment (REA) approach for this study, using focus group discussions (FGDs), in-depth interviews (IDIs), and observations to collect data. Participants were selected from the Pediatrics and Child Health Department of TASH, and data collection took place in March and April 2022. Two FGDs and eight IDIs were conducted in the participants' workplace within the department. Unstructured guides were used to facilitate the FGDs and IDIs. Nvivo version 10 software was used for data organization and analysis. The data were coded deductively through thematic analysis to identify similar ideas and concepts, based on the Systems Engineering Initiative for Patient Safety (SEIPS) model.

Result A total of 23 healthcare workers participated, with 15 in FGDs and 8 in IDIs. The study identified several barriers to IPC practices, including nonadherence to IPC practice protocols, lack of pre-employment training, space constraints, insufficient maintenance and repair of equipment, limited management engagement and support, shortage of resources and budget, incidents of needle stick injuries and infections, high workloads for healthcare workers, shortages of personal protective equipment and water supply, and inadequate waste management. We also identified some facilitators, including the existence of an IPC team and committee, a health education schedule for patients and visitors, morning sessions for healthcare providers, and the presence of television screens in waiting areas. By addressing the identified barriers and leveraging the facilitators, department heads, IPC team leaders, and decision-makers can develop targeted strategies and interventions to improve infection control, reduce the spread of HAIs, and ultimately enhance the quality of healthcare services.

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Conclusion This study explored several barriers that contribute to inappropriate and suboptimal IPC practices in the study area. These barriers create significant challenges for healthcare workers and hinder their ability to effectively implement IPC practices. The findings highlight the complex and multifaceted nature of the problems, which not only affect the current working environment but also compromise the overall quality of care. The hospital administrator should address these critical issues to improve IPC practices and ensure a safer healthcare environment.

Keywords Infection prevention and control, Healthcare workers, Barriers, And facilitators

Background

Infection prevention and control (IPC) practices are widely used to prevent the spread of healthcare-associated infections. An infection prevention practice is deemed effective if it results in a lower infection rate [1]. Healthcare workers' adherence to IPC standards and guidelines is essential to reduce the spread of healthcare-associated infections (HAIs) [2]. The World Health Organization defines IPC as "Scientific approaches and practical solutions designed to prevent harm caused by infection to patients and healthcare workers associated with the delivery of health care" [3]. Our systematic review and meta-analysis on Low and Middle-Income Countries (LMICs) revealed a pooled prevalence of low IPC practices among healthcare workers, though this prevalence varied across different countries [4]. Another systematic review and meta-analysis also identified Ethiopia as a country where IPC practices among healthcare workers are notably low [5].

HAIs can significantly impact health by leading to prolonged hospital stays, long-term disabilities, increased drug resistance, financial burdens on both the healthcare system and patients, and even death [6]. The prevalence of HAI is high in Ethiopia [7]. In efforts to control these infections and provide a higher standard of care, many hospitals are adopting infection control guidelines [3]. The absence of adequate facilities, knowledge, and resources significantly hinders the implementation of infection control measures, leading to delays or even neglect in practicing proper infection control [8].

Understanding the barriers and facilitators of the IPC implementation is essential for enhancing effective IPC practices. Improved IPC practices can lead to lower infection rates among patients and healthcare workers. However, there is currently limited evidence concerning the issues related with IPC practices in tertiary hospitals in Ethiopia. Additionally, the personal observation and experience of researchers on the IPC situation in the hospital motivate the initiation of this study. The current study aims to explore barriers and facilitators of IPC practices in the Pediatrics and Child Health Department of Tikur Anbessa Specialized Hospital (TASH) in Ethiopia.

Method

Study setting

TASH is the largest and one of the oldest teaching and referral hospitals in Ethiopia. It was established in 1972. TASH is a teaching hospital affiliated with Addis Ababa University that serves as a key training site for undergraduate and postgraduate medical education, including specialties and subspecialties. The hospital provides services to between 3.5 and 5 million people, acting as a tertiary referral center for complex cases that cannot be managed at lower levels of the healthcare system. Among its various departments, the Pediatrics and Child Health department stands out, providing care to approximately 1,000 inpatients and 4,000 outpatients each month. The hospital has an IPC unit responsible for coordinating the IPC program, which includes monitoring and surveillance, conducting risk assessments, and promoting hygiene and sanitation to prevent HAIs.

Design

We used rapid ethnographic assessment (REA) for this study. REA is a qualitative research method designed to quickly collect and analyze locally relevant data within an organization. It is useful to inform interventions and programs in the context of limited time and resources. REA employs data collection techniques, such as interviews, focus group discussions, and observations, for a comprehensive understanding of the setting under study [9].

Data collection techniques

In line with our study design, we utilized in-depth interviews (IDIs), focus group discussions (FGDs), and observations to explore the context of IPC practices among healthcare workers and within the environment. Observations were carried out on both the environmental setting and healthcare providers. Environmental observations focused on waste management, laundry services, disinfection, and sterilization practices. Observations of healthcare providers aimed to assess compliance with hand hygiene practices while they examined their patients.

Participant selection

The study participants were selected from the Pediatrics and Child Health Department of TASH with a non-probability purposive sampling technique. The two FGDs,

one with eight clinical staff and another with seven non-clinical staff, as well as eight in-depth interviews (IDIs), with three physicians, two nurses and three cleaners were conducted. Additionally, observations were carried out to identify barriers and facilitators related to environment, including waste handling and management, sanitation facilities, laundry services, sterilization, and disinfection processes.

A total of 25 observations were conducted to assess the hand hygiene practices of healthcare providers during patient examinations. These observations were performed on five physicians, each observed five times while examining patients. The aim of gathering insights from both clinical and non-clinical staff, as well as from the environmental context was to gain comprehensive understanding of IPC practices in the Pediatrics and Child Health Department at TASH.

Data collection

Two experienced public health professionals were recruited to collect the data for this study. Unstructured guides were used to facilitate discussions and interviews during the FGDs and IDIs, while a structured observation checklist was used to observe physicians’ hand hygiene practices during patient examinations. Environmental assessments were conducted using a semi-structured tool to collect data on sanitation and hygiene. All interviews were audio-recorded and then transcribed.

The data were collected in March and April 2022. The FGDs and IDIs were conducted with participants in Pediatrics and Child Health Departments in their workplace. Ethical clearance was obtained from the College of Health Sciences institutional review board (IRB) of Addis Ababa University. We obtained written informed consent from each participant prior to discussions, interviews, and observations.

Data analysis

The transcripts were coded via Nvivo version 10 for qualitative analysis. The data were coded deductively via thematic analysis [10]. First, we read the transcripts to understand and familiarize ourselves with the

participants’ perceptions and experiences regarding barriers to and facilitators of IPC practices in their working areas. Next, initial codes representing specific barriers or facilitators were identified throughout all the transcripts. These specific ideas were highlighted and tagged under specific themes. The initial codes were categorized into broad themes: barriers and facilitators. Similar ideas and concepts were coded deductively on the basis of the systems engineering initiative for patient safety (SEIPS) model [8] to synthesize the contexts and perspectives of IPC practices. The results from our environmental observations were synthesized descriptively and triangulated with the interview findings (Fig. 1).

Results

Participant characteristics

The total number of study participants, including those in FGDs and IDIs, were 23 that consisted of six physicians, seven nurses, one sanitation officer, one IPC officer, seven cleaners, and one security guard. Of these participants, 15 were female, and 8 were male. Majority of them had work experience of more than 5 years. (Table 1).

Barriers to infection prevention and control practices

The ideas and concepts were deductively coded on the basis of the SEIPS model, which organizes the data into five main themes: person, organization, tasks, tools and technology, and environment. These themes were further divided into various subthemes.

Person-level

Behavioral barriers

The participants reported that nonadherence of healthcare workers to IPC practices was one of the barriers hindering their ability to prevent the spread of infections. A physician noted, “I realize there are adherence problems regarding IPC, such as hand hygiene practices and the use of personal protective equipment. These poor behaviors occur due to a lack of water and hand hygiene facilities, as well as insufficient budgets and supplies to provide sufficient and appropriate personal protective equipment.” They also indicated that IPC implementation is

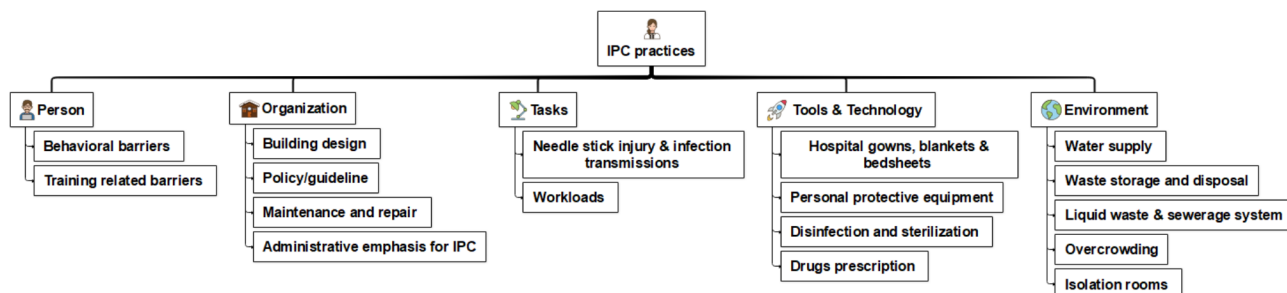


Fig. 1 Barriers of IPC practices in Pediatrics and Child Health Department of TASH based on the SEIPS model

Table 1 Characteristics of the study participants in Pediatrics and Child Health department, TASH, Addis Ababa, Ethiopia, 2022

Interview category	Participant's code	Gender	Year of work experience
FGD1 (clinical staff)	P1.1	Female	7
	P1.2	Male	11
	P1.3	Male	10
	P1.4	Male	9
	P1.5	Female	4
	P1.6	Female	5
	P1.7	Male	8
	P1.8	Female	7
FGD2 (non-clinical staff)	P2.1	Female	6
	P2.2	Male	10
	P2.3	Female	6
	P2.4	Female	5
	P2.5	Male	8
	P2.6	Female	7
	P2.7	Female	4
In-Depth interviews (IDIs)	I1	Female	6
	I2	Female	6
	I3	Female	4
	I4	Female	8
	I5	Female	9
	I6	Male	7
	I7	Female	3
	I8	Male	3

inconsistent and given less attention in terms of resource and budget allocation. A sanitarian expressed, “The IPC implementation is a neglected program because there are not enough resources and budget allocations for it. Once upon a time, the IPC practice was the hot issue, but currently it is ignored and covered by other agendas”. There was no reward or punishment system to promote IPC practices. An IPC officer mentioned, “There is also negligence from the workers’ side since there is no rewarding or punishment system”. There are also problems with the consistent use of personal protective equipment. A security guard remarked, “Individuals who entered the pediatric intensive care unit (ICU) didn’t wear protective clothing properly, and that was difficult for us to control”. Observations of physicians’ compliance with hand hygiene practices during patient examinations also revealed a very low rate. Physicians cleaned their hands before and after examining patients only 12% of the time (3 out of 25 instances).

Training-related barriers

The absence of pre-employment training and mentorship has been identified as a barrier to IPC practices among healthcare workers. A male physician described, “Previously, there was pre-employment training on IPC, but currently, this training is not given, so training and

continuous monitoring after training need to be provided to reduce the awareness gaps in IPC implementation.” The newly employed staff, residents, and interns were not oriented about the basics of IPC practices. A physician who participated in the FGD said, “There is no overall orientation and introduction on IPC practices for new staff members, residents and interns. There are knowledge gaps since they come from different backgrounds”. As IPC is teamwork, all healthcare workers, including cleaners, porters, guards and other administrative staff, are expected to have basic IPC knowledge and awareness. However, the participants indicated that knowledge and awareness gaps exist among these groups of healthcare workers. An IPC officer described “the first and the main problem of IPC starts from lack of awareness that some didn’t know what IPC means. As IPC should be teamwork, all staff from top to bottom should have knowledge and awareness of IPC”. The training also needs to be consistent and continuous to bring about behavioral changes to healthcare workers. A female physician said, “There should be periodic training on IPC and rational use of antibiotics. Since this is a teaching hospital, always there are new students who treat patients, so regular training every 3 or 6 months needs to be provided”.

Creating awareness for patients and their attendees on IPC is crucial to improve IPC practices. Health education should be provided for patients and attendants in a regular manner. A sanitarian said, “Patients and their attendants should receive health education on IPC at least in the morning, covering topics such as the importance of open ventilation, hand sanitizing, and more. With new and emerging infections appearing these days, it’s crucial to strengthen IPC measures.”

Organization

Building

The hospital was established 50 years ago. While its original design seemed adequate at that time, space has now become limited, entrance and exit layouts have been changed, the range of services provided has expanded, and it now serves as a teaching center for various health disciplines. These changes may significantly affect the implementation of the IPC program. An FGD participant female physician described the situation, “the actual design of the hospital was very good that each four wards have its own entrance but after time most gates are closed somewhere and currently most use in one gate”. A sanitarian also explained that “the hospital was constructed long ago, and it can be difficult to modify the design at this time. There is not enough space for waiting areas. There is no good ventilation.”

Policy/guidelines

The guidelines, rules and regulations are essential for governing the behavior and practices of healthcare workers within the healthcare system. The Ethiopian Ministry of Health adapted the World Health Organization (WHO) IPC guidelines, which aimed to minimize the risk of HAIs and reduce the spread of infections among patients, healthcare workers and the community. Healthcare facilities are expected to adapt and use guidelines on the basis of their context. However, the study participants reported that the guidelines were not available or the content not familiar to the healthcare workers in their department. A male physician said, *“There is no strict guide about how to use patients’ clothing in admission, what things are allowed in the admission room, the time limit for visitors, and the number of attendants per patient. These issues should involve consistently enforcing rules and regulations. Sometimes when we round in the admission ward, we find 4–5 visitors or attendants per patient.”* A physician also emphasized the policy concerning AMR: *“There were inappropriate prescriptions of drugs that may lead to drug resistance. This may create an additional burden for the hospital. There should be regulatory policy for AMR stewardship to reduce the drug resistance problem.”*

Maintenance and repair

The participants reported that sanitation facilities such as water pipes, handwashing basins, latrine fixtures, incinerators, laundry equipment, and sterilizers were not repaired properly or regularly. A sanitarian described *“there is no proper maintenance system when pipes and other sanitation facilities are broken and stopped working. For example, the incinerator had a monitoring board to regulate the temperature level but currently stops working owing to a lack of maintenance.”* One of the participants described *“We have many broken latrine fixtures; we report to our supervisor when the facilities get broken or stopped working. Mostly, we are reporting about the broken facilities in person for our supervisors and sometimes in written format when the situation is worse, but there are no quick responses to the problems.”*

Administrative emphasis for IPC

Managerial priority and follow-up for IPC activities are important measures for improving performance and ensuring sustainability. A sanitarian explained, *“The top management follow-up is very important to improve IPC activities. In my observation, the IPC activities may not be well performed when the top management follow-up stopped.”* An FGD participant physician shared his experience with the importance of administrative bodies’ focus in improving and consistently implementing IPC. He said, *“To solve the IPC problems consistently, the*

administrative bodies including the Ministry of Health should take the issues seriously. For example, in sensitive areas such as neonatal intensive care units (NICUs), survey cameras can be installed, audited and taken action accordingly if healthcare workers do not obey the rule of the unit. Previously, there was a clean and safe initiative implemented in hospitals; some hospitals adapted it as a culture, and they keep their hospitals clean and safe by planting trees, creating recreation places, and rewarding individuals who contributed most to clean and safe initiatives. This experience can be important for our facility.” Administrative engagement is also essential for budget and resource allocation, as well as for initiating collaboration and teamwork. The other physician explained, *“As IPC is teamwork, all health professionals, administrative staff and other concerned bodies should take part in its implementation. The team should be established from different departments, professions and administrative bodies to solve the root cause of the problems. The administrative unit should play a role in allocating budgets and fulfilling resources to improve IPC practice performance.”*

Allocating a domestic budget for the IPC program is crucial for enhancing IPC practices. However, this hospital has not allocated any budget for the IPC program. An IPC officer noted, *“No budget is allocated for IPC in the hospital. Many issues, such as the lack of water, hand washing facilities, and supplies such as soap and sanitizers, persist owing to financial constraints.”*

Tasks

Needle stick injury and infection transmission

The study participants reported that needle-stick injury was the most common task-related hazard faced by them and their colleagues while they were performing their duties. A nurse remarked, *“I remember that two of my fellow nurses experienced needle-stick injuries and went to the Antiretroviral Therapy (ART) room to start Human Immunodeficiency Virus (HIV) post-exposure prophylaxis.”* A cleaner stated her experience: *“I experienced a needle-stick injury and took HIV post-exposure prophylaxis. After three months, I was tested and confirmed to be free of HIV.”* An IDI interviewee cleaner explained, *“I personally experienced 3 to 4 needle-stick injuries while performing my duties, but I did not seek medical attention for any of them. Instead, I typically applied alcohol-soaked cotton to the affected area. Because I didn’t know what to do when these incidents happened.”*

Infections can be transmitted from patients to healthcare workers during the course of their duties. Therefore, prevention mechanisms such as post-exposure prophylaxis and vaccinations should be implemented to protect healthcare workers from various task-related infections. However, there is no scheduled vaccination program for healthcare workers for common infectious diseases such

as hepatitis B. A nurse noted, *“There is no regular vaccination service for healthcare professionals for major communicable diseases such as hepatitis B. I am serving in this hospital for 13 years, and I recall only one instance of vaccination for hepatitis B.”* Conducting regular health checkups for healthcare workers is essential for reducing infection transmission. A physician stated, *“Hospital staff need regular health checkups to minimize infection risk. For example, a guard with undiagnosed TB could spread the infection to others. There should be guidelines for regular health checkups and management plans, such as treatment and leave until recovery, if an infection is detected.”*

Workloads

All healthcare workers in the pediatric department face a high workload due to the large number of children served. A physician noted, *“Given that this is a teaching hospital and a busy facility, it is obvious that needle-stick injuries can commonly occur.”* A cleaner participating in the IDI remarked, *“The high patient flow creates a significant workload for us.”* A nurse added, *“Sometimes professionals may become very busy and skip procedures. However, I recommend that health professionals adhere to the procedures as prescribed in the guidelines.”*

Tools and technologies

Hospital gowns, blankets and bedsheets

In principle, all patients admitted to the hospital should have hospital gowns, blankets, and bedsheets that are regularly changed. However, the department does not have a sufficient supply of these items. As a result, patients are often required to wear their own clothes during their stay. Although these items are provided for some patients, they may not be changed regularly. A nurse remarked, *“I believe that hospital gowns should be supplied to all admitted patients. However, no gowns are provided, so patients have to use their own clothes during their stay. This could result in infectious pathogens being brought home with them.”* The other nurse mentioned, *“No hospital gowns, bed sheets, or blankets are provided for most patients, even though the standard requires that bed sheets and blankets be changed daily.”* A physician noted, *“Blankets and bedsheets are not replaced and washed regularly.”* These participants’ opinions align with our observation findings from the admission wards and laundry rooms. We noted that most admitted patients used their own clothes. Additionally, we observed many blankets and bedsheets stored in the laundry and unwashed due to a shortage of functioning washing machines, as some were out of order and awaiting maintenance. In the wards, the soiled linens were not properly segregated on the basis of their level of contamination before being sent to the laundry.

Personal protective equipment

Personal protective equipment was not supplied for clinicians or cleaners in a sufficient and regular manner. A nurse commented on the situation and said, *“There is no continuous supply of personal protective equipment such as gloves and face masks. Sometimes, patients are even asked to purchase gloves from outside.”* A security guard working at the pediatric ICU mentioned, *“Individuals and healthcare professionals entering the ICU do not properly wear protective clothing such as gowns and face masks, making it difficult for us to enforce these measures.”* Another nurse remarked, *“There is insufficient supply of personal protective equipment such as gloves, hair covers, and face masks. Recently, I wrote to the medical director outlining these issues, which enabled me to obtain some for myself.”* A cleaner noted, *“The safety shoes provided to us are only given once a year and are not durable and often tear shortly, so we end up using our regular shoes for our duties.”*

Disinfection and sterilization

Disinfection and sterilization are the most crucial issues in the hospital setting to prevent and control the spread of infections. The participants reported that there were problems with disinfection and sterilization in their work setting. An ICU nurse mentioned, *“The culture samples taken from the incubators and nasal prongs in the NICU detected bacteria. I have doubts about the quality of the chlorine solution purchased for disinfection.”* A physician remarked on the severity of the situation and said, *“Medical equipment sterilization and disinfection practices in our department are deplorable. There are several times when we use oxygen resuscitation equipment for the next patient without sterilizing it after the previous use. Cleaning, fumigating, disinfecting, and sterilizing supplies and equipment were not provided regularly and in sufficient quantities.”*

Our observation in the sterilization room revealed that the space was cramped, lacking cabinets for storing sterilized equipment, and the same trolley was used to transport both sterilized and unsterilized equipment. Additionally, the wards did not have separate, adequate, clearly delineated, and dedicated rooms for medical equipment inspection and preprocessing.

Drugs prescription

Some prescribed drugs may be unavailable at the hospital or too expensive to purchase externally. As a result, patients might not take the full dose or may not take the prescribed drugs at all. This situation can worsen a patient’s illness or lead to drug resistance. A nurse stated, *“Some prescribed drugs can be unaffordable for patients, leading them to not take the full dose. This can result in drug-resistant infections and the patient may*

not be cured.” A physician commented, “Antimicrobial resistance (AMR) is likely linked to healthcare providers’ practices. Inappropriate drug prescriptions can lead to drug resistance and increase the burden on hospitals. Implementing a regulatory policy for AMR stewardship is essential to mitigate this issue.” The other physician emphasized the problem and remarked, “There is no regular antibiogram testing to detect and identify the types of pathogens, despite this being a tertiary healthcare facility. Pathogens should be identified, and a list of effective drugs should be compiled so that patients can be treated on the basis of these results. However, this is not routinely done in our hospital.”

Environment

Water supply

All the participants identified the water supply issue as the most concerning and serious problem. Owing to old and malfunctioning pipelines, water cannot be pumped to the building, particularly to the upper floors. The following are some of the representative quotes by the participants. A physician noted, “There is a serious water shortage which is a known and important resource to maintain IPC practice.” A sanitarian noted, “As the pipelines are too old and not working properly, water cannot be pumped above 2nd floor.” A nurse explained the situation, stated, “There is no running water in the wards, even though the building’s design included essential facilities such as staff toilets, showers, and handwashing sinks, as well as patients’ toilets, showers, and handwashing sinks. All of these have stopped working due to old age.” A security guard witnessed the severity of the water problem from his observation and noted, “There is no water in the ICU, and mothers have gone up to a week without washing after delivery. Water is supplied in containers to clean rooms and latrines, but it often runs out before the day ends. Afternoon shift cleaners frequently face water shortages for cleaning the latrines and rooms.”

Waste storage and disposal

There is no regular and consistent supply of safety boxes for the disposal of needles and sharps in the hospital. A nurse remarked, “We are using empty cartons as safety boxes to dispose of needles and sharps because the hospital does not provide standard safety boxes most of the time.” This information is consistent with our observation that we observed that plastered empty cartons were used to dispose of needles and sharps as a safety box. We documented this situation by taking pictures.

There is no proper segregation of waste, despite the placement of color-coded containers in various locations of the wards. A cleaner stated, “We often find needles in the dry waste, even though the waste containers are

designed for segregation into general, infectious, pathological, and sharp wastes.”

Our observations also confirmed that the number and size of waste bins in the corridors and waiting areas were inadequate, as was the improper use of color-coded containers. Waste were scattered around the dust bins.

Liquid waste and sewerage system

There is no treatment system for the liquid waste generated by the hospital, which may contain harmful biohazards and toxic chemicals from laboratories, anesthesiologists, and surgical wards. All liquid waste is discharged into the common municipal sewerage line and sometimes spills onto the main road outside the compound when the sewer lines are blocked or broken. A sanitarian explained, “There is no liquid waste treatment system in the hospital. All hospital liquid waste is discharged into the common municipal sewerage line, potentially contaminating rivers such as Akaki and Aba Samuel.”

Our observations revealed critical water shortages, insufficient numbers of latrines, and handwashing basins for staff and patients.

Overcrowding

The hospital is experiencing high patient flow, especially in the pediatric emergency department, waiting areas, and corridors. A nurse remarked, “There is a significant crowd throughout the hospital. Even in the NICU, where only mothers are permitted to enter, we still encounter overcrowding. Consequently, we have seen a rise in neonatal infections and deaths in the unit.” Another nurse mentioned, “The pediatric emergency department is extremely crowded, with patients and their attendants spending long periods, eating their food there, and not washing their hands because there is no water available.” An IPC officer noted, “The overcrowding issue is exacerbated by the absence of proper movement management for health professionals and attendants. The problem is particularly severe in the mornings, especially during doctors’ rounds time. The hospital lacks traffic control measures, such as limiting visiting hours. Additionally, there is a high influx of people entering through the main gate.”

Our observations confirmed the same situation: the number of people and available spaces are not balanced. There are insufficient waiting areas around out-patient departments (OPDs), and the emergency room lacks a ventilation system despite being overcrowded.

Isolation rooms

There are no isolation rooms available to separate patients with contagious infections from others. An IPC officer remarked, “The pediatrics department lacks isolation rooms. For example, previously a *Klebsiella* infection

was occurred, it was challenging to fumigate the rooms because we could not evacuate the patients. There is no organized system in place to manage these issues.” A nurse also stated, “Currently, there is no isolation room in the department, previously there was one but now changed to pharmacy.”

Facilitators of infection prevention and control practices

Only a few factors were identified as facilitators of IPC practices, despite numerous barriers. The study participants highlighted some facilitators to improve IPC practices, including the presence of an IPC team with a reasonable number of staff and an IPC committee. An IPC officer remarked, “Our unit is responsible for disease surveillance and monitoring, risk assessment, outbreak investigation, and reporting to the hospital administration. We also develop action plans to address IPC issues within the hospital. However, the administration’s actions in response have been minimal and limited. The IPC team leader is also responsible for organizing IPC committee meetings and serving as the committee’s secretary.”

Our observations also highlighted existing activities that could serve as opportunities to improve IPC practices in the department. These include implementing scheduled health education sessions for patients, installing television screens in waiting areas, and conducting morning sessions for healthcare providers, all of which could be beneficial in strengthening IPC practices. (Table 2).

Discussions

The IPC program is vital and widely implemented to prevent the transmission of HAIs to patients, healthcare workers, and visitors. Despite its importance, several barriers impede the effective execution of IPC practices in healthcare facilities. These barriers include human factors, organizational challenges, inadequacies in tools and technology, task-related issues, and environmental attributes [8]. This study explored various barriers and some facilitators, categorizing them under the five main themes mentioned above.

Barriers to IPC practices

This study identified significant behavioral barriers in the current area, including healthcare workers’ non-adherence to IPC practices (such as improper use of personal protective equipment and poor hand hygiene), negligence (with inadequate attention to resource and budget allocation), and the lack of a recognition system (including rewards and penalties). These behavioral barriers greatly affect the effective implementation of IPC practices. Since human behavior is a critical component, achieving change is challenging even when other factors are addressed. Therefore, efforts to enhance IPC practices must prioritize understanding and modifying healthcare workers’ behavior. Without addressing these behavioral barriers, other improvements may have a limited impact. Similar findings were reported in a study conducted in Malawi, which highlighted that inadequate

Table 2 Summary of themes based on SEIPS components

SEIPS components	Description of themes
1. Person-level	<ul style="list-style-type: none"> • The non-adherence of healthcare workers to IPC practices (poor personal protective equipment use and poor hand hygiene practices), negligence (less attention given to resource and budget allocation), and the absence of a recognition system (rewards and punishments). • Shortage of pre-employment training, mentorship, orientation, and continuous on-the-job training
1.1. Behavioral barriers	
1.2. Training-related barriers	
2. Organization	<ul style="list-style-type: none"> • Misuse of the building design and shortage of workspace • Poor knowledge of guidelines • Inadequate maintenance of water pipes, handwashing basins, latrine fixtures, incinerators, laundry machines, and sterilizers • Insufficient support or no budget allocation for IPC programs from organizational leadership
2.1. Building	
2.2. Policy/guidelines	
2.3. Maintenance and repair	
2.4. Administrative emphasis	<ul style="list-style-type: none"> • High workload due to an overflow of patients in the department • Instances of task-related injuries and infections
3. Tasks	
3.1. Needle stick injury and infection transmission	<ul style="list-style-type: none"> • Negligence in proper implementing IPC protocols because of healthcare workers busyness • The absence of prescheduled vaccination services for common communicable diseases, such as hepatitis B
3.2. Workloads	
4. Tools and technologies	<ul style="list-style-type: none"> • Insufficient supply of essential items such as hospital gowns, blankets, and bedsheets. No regular changing and washing of these items • Shortage of personal protective equipment such as gloves, facemasks, and safety shoes • Interrupted supply of disinfection and sterilization supplies • Improper prescription and unaffordable drugs prices
4.1. Hospital gowns, blankets and bedsheets	
4.2. Personal protective equipment	
4.3. Disinfection and sterilization	
4.4. Drugs prescription	<ul style="list-style-type: none"> • Critical shortage of water supply for washing, latrine flashing, and cleaning of equipment and rooms • Improper waste storage, segregation and disposal, including absence of safety boxes for the disposal of needles and sharps • Absence of liquid waste treatment and sewerage systems • High crowding due to patient load especially in pediatrics emergency room • Absence of isolation rooms in the department of Pediatrics and Child Health
5. Environment	
5.1. Water supply	
5.2. Waste storage and disposal	
5.3. Liquid waste and sewerage system	
5.4. Overcrowding	
5.5. Isolation rooms	

access to handwashing stations and insufficient supplies of handwashing materials, such as soap and towels, are key barriers affecting hand hygiene behavior [8].

Most participants in this study indicated to training-related barriers as a major issue contributing to the poor performance of IPC practices. Effective implementation of IPC programs relies heavily on comprehensive training initiatives, which should include pre-employment training, orientation sessions, and continuous on-the-job training. Participants stressed that all healthcare workers, including residents, interns, cleaners, porters, security guards, and other administrative staff, need to have a basic knowledge and awareness of IPC practices. This inclusive approach ensures that every individual within the healthcare setting is equipped to follow standard precautions, as IPC is inherently a team effort. Effective IPC practice requires the cooperation of all stakeholders to prevent and control the transmission of infections among patients, healthcare workers, and visitors. Training programs must be tailored to address the specific roles and responsibilities of each group of staff members, ensuring that everyone is aware of the latest protocols and procedures. Moreover, regular updates and refresher courses are essential to keep all personnel informed about new IPC guidelines, emerging threats, and best practices. By focusing on continuous education and training, healthcare facilities can build a culture of safety and awareness that significantly enhances the effectiveness of IPC practices and reduces the risk of infection transmission. This study's findings align with those of previous research, which consistently highlight the lack of adequate and ongoing training for healthcare workers as a common barrier to effective IPC practices in healthcare facilities [8, 11–17].

In this research, participants identified several barriers affecting IPC practices in the study area, including a shortage of workspace, lack of familiarity with IPC guidelines among staff, and inadequate maintenance of critical infrastructure such as water pipes, handwashing basins, latrine fixtures, incinerators, laundry machines, and sterilizers. These infrastructural and administrative challenges significantly hinder the effectiveness of IPC practices. A lack of regular maintenance and repair can lead to the dysfunction of critical sanitation facilities, compromising the ability to maintain hygienic standards. Participants also reported that organizational leadership often provides insufficient support or no budget allocation for IPC programs, further limiting their effectiveness. This lack of financial and managerial commitment undermines the ability to establish and maintain robust IPC practices.

These barriers collectively highlight the need for stronger organizational commitment and investment in IPC infrastructure and programs. Addressing these challenges

requires a comprehensive approach that includes not only improving the physical infrastructure and administrative procedures but also ensuring that there is adequate funding, leadership support, and ongoing education to maintain high standards of infection prevention and control. Consistent with these findings, other studies have also noted similar issues, such as a lack of funding and inadequate support for dedicated IPC teams are significant barriers to effective IPC practices [11, 15, 18, 19]. A study conducted in Zimbabwe highlighted that the utilization of the IPC manual was poor [16].

According to the study participants, a high workload resulting from an overflow of patients in the department, along with task-related injuries and infections, are significant barriers to effective infection prevention and control. Healthcare providers noted that their busyness often lead to negligence in properly implementing IPC protocols, that can compromise the safety of both patients and healthcare staff. Additionally, participants highlighted the lack of prescheduled vaccination services for common communicable diseases, such as hepatitis B, as a critical gap in infection control efforts. The absence of routine vaccination programs leaves healthcare workers more vulnerable to contracting and spreading infections. Moreover, the lack of post-exposure prophylaxis further exacerbates this issue, as healthcare workers do not have adequate protection or follow-up care after potential exposure to infectious agents.

The constant high pressure and physical demands of healthcare work can lead to burnout, making it difficult for staff to consistently follow stringent IPC guidelines. Addressing these issues requires a multifaceted approach, including managing workloads, providing adequate staffing levels, implementing routine vaccination schedules, and ensuring access to post-exposure prophylaxis. By doing so, healthcare facilities can create an environment that supports and prioritizes infection prevention and control, ultimately enhancing the safety and well-being of both patients and healthcare workers. These findings are consistent with previous research, which has identified forgetfulness, lack of motivation, and heavy workloads as primary barriers to compliance with IPC practices [8, 20].

Our study participants indicated that a lack of essential supplies, including hospital gowns, blankets, bedsheets, personal protective equipment (PPE), disinfection and sterilization supplies, and medications, were common issues in the study area. While recent advancements in infection prevention and control (IPC) have introduced various tools and technologies to uphold the principle of “do no harm” in patient care [21]. The lack of essential supplies plays a major role in the transmission of infections. For instance, when patients are forced to use their own clothing, such as pajamas, bedsheets, and blankets that can bring infectious agents into their home. The

absence of adequate PPE leaves healthcare workers vulnerable to infections and other work-related hazards, compromising their safety and the safety of their patients. Additionally, shortages in disinfection and sterilization supplies can lead to inadequate cleaning practices, further facilitating the spread of infections.

Moreover, the use of under-dosed medications and improper prescriptions due to supply shortages can contribute to the emergence of drug-resistant infections, posing a significant threat to public health. Supporting these findings, a study conducted in Ethiopia reported that supply shortages led healthcare providers to reuse medical equipment without adhering to standard sterilization techniques [12]. Similarly, a study in Malawi highlighted the lack of functioning sterilization equipment and inadequate personal protective equipment were barriers for effective IPC practice [8].

Several critical issues related to IPC practices emerged under the environmental theme, including water shortages, improper waste storage and disposal, problems with liquid waste and sewerage systems, overcrowding, and the lack of isolation rooms. As a tertiary-level hospital serving to a large population, mainly consisting of critical and chronic cases, these environmental factors are particularly essential for reducing healthcare-associated infections (HAIs) and preventing their spread among patients, healthcare workers, and visitors. Participants highlighted that without a reliable and sufficient water supply, it becomes difficult to maintain the necessary hygiene standards required for effective infection control. Additionally, improper waste management practices, including inadequate segregation, storage, transportation, and disposal of waste, pose significant risks of infection transmission. Overcrowding and absence of isolation rooms were another major concerns identified by participants. By focusing on these environmental factors, healthcare facilities can create safer environments that significantly reduce the risk of HAIs and improve overall infection control outcomes. These findings are consistent with previous studies that have reported similar environmental barriers, such as shortage of water supply, poor waste management practices, and high patient volumes as significant barriers of IPC practices [8, 12, 19].

Facilitators of IPC practices

Some participants mentioned that facilitators for IPC practices included the presence of a fairly well staffed IPC team and an established IPC committee composed of various unit heads. The IPC team coordinates all IPC activities in the hospital, including surveillance, monitoring, risk assessment, outbreak investigation, and reporting. They also identify critical issues for discussion by the IPC committee and report these issues to the facility heads. The committee plays a crucial role in addressing

identified problems, thereby prioritizing, developing action plans, monitoring performance, and evaluating outcomes.

Our observations revealed the presence of a health education schedule, morning sessions, and television screens. These situations can be leveraged to provide IPC education for patients, facilitate discussions of critical IPC issues among healthcare providers during morning sessions, and disseminate IPC information to patients and visitors via television screens.

Implications of the study findings

Department heads, IPC team leaders, healthcare workers, and decision-makers can be informed about the IPC practice gaps identified as barriers and the opportunities identified as facilitators to enhance practice. They can use the evidence related to these barriers to develop targeted mitigation strategies and interventions based on the identified issues, and use the facilitators to strengthen IPC practices. This evidence can have significant implications for reducing the spread of HAIs in pediatrics and child health departments, where infections are particularly common among children and neonates. Since this study focused on the broad scope of issues observed in the department, it could initiate further research using a more robust qualitative approach to gain a deeper understanding of the specific problems and their root causes.

Limitations of the study

Since we employed a rapid ethnographic assessment as our qualitative approach, the study was able to quickly capture a wide range of barriers, providing a broad overview of the existing problems. However, this approach may have resulted in a lack of depth when it comes to exploring the root causes of each specific barrier.

Conclusions

This study identified several barriers contributing to inappropriate and suboptimal IPC practices in the study area, including factors related to person, organization, tasks, tools and technology, and the environment. The findings underscore the complex and multifaceted nature of these challenges, which impact both the current working conditions and the overall quality of care. Addressing these critical barriers is essential, as they significantly affect proper IPC practices and service quality. The IPC team, department head, and the hospital leaders should address these critical issues to improving IPC practices and ensuring a safer healthcare environment as well as reducing the spread of HAIs. Further studies using a robust qualitative approach may be necessary to gain a deeper understanding of specific issues separately.

Supplementary Information

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Supplementary Material 1

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Author contributions

MY: conceptualized, analyzed data, wrote the main manuscript text, and prepared Fig. 1. GT: supervised, validated, and edited. WA: Conceptualized Supervised, validated, and edited. MT: commented and edited. BT: commented and edited. AF: commented and edited. All authors reviewed the manuscript.

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Data availability

The manuscript includes partial data in the form of quotes from study participants' responses; the full dataset will be available upon reasonable request.

Declarations

Ethical approval

Ethical approval for this study was granted by the Institutional Review Board of the College of Health Sciences at Addis Ababa University, under protocol number 013/21/Pedi.

Consent for participation

Data from healthcare workers were collected after obtaining written informed consent.

Consent for publication

The authors have provided consent for publication.

Competing interests

The authors declare no competing interests.

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