

Assessing Awareness Levels of Standard Infection Control Procedures Among Healthcare Workers at Tripoli University Hospital

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تقييم مستوى الوعي بالإجراءات القياسية لمكافحة العدوى في المرافق الصحية بين العاملين في مستشفى جامعة طرابلس

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Abstract

Globally, Infection Control (IC) is a crucial dilemma in healthcare systems. Patients, medical staff, visitors, and communities are affected by this enigma. Hospitals and clinics are examples where illnesses can spread quickly in the absence of rigged programs of IC inside healthcare institutions. Prioritizing patients' safety lowers the rate of infectious diseases and the incidence of mortality. Data for this study were gathered through a cross-sectional survey method. Out of 150 questionnaires prepared, 100 healthcare professionals answered a survey exclusively spread at Tripoli University Hospital. SPSS software version 26 was used for statistical analysis. Results revealed that 87% of healthcare workers inside the hospital follow the IC protocols and change their gloves between patients, and 53% of respondents acknowledged not wearing safety masks during work. Approximately 43% of individuals had illnesses connected to their jobs, and 67% of workers have limited access to IC education courses. Noticeably, 66% of workers agreed that additional training is required for appropriate personal protective equipment (PPE) Nevertheless, 69% of participants assured the existence of an IPC committee. According to hospital reports, 69% of health workers received hepatitis B vaccine, and 73% of the workers had sophisticated sterilization and disinfection equipment, 66% of them reported that disinfectants were always available inside the workplaces, and 84% of them demonstrated the knowledge of medical waste disposal protocols. However, 43% of workers had at least one infection while working. The results finding necessitate an intensive IC training for health care employees.

Keywords: Awareness level, Infection control, Healthcare.

المخلص

تعد مكافحة العدوى أمراً بالغ الأهمية في الرعاية الصحية الحديثة لحماية المرضى والعاملين في مجال الرعاية الصحية والمجتمع. تعتبر مرافق الرعاية الصحية مثل المستشفيات والعيادات أماكن يمكن أن تنتشر فيها العدوى بسهولة. تعد الوقاية من العدوى المرتبطة بالرعاية الصحية وإدارتها أمراً ضرورياً لسلامة المرضى وتقليل معدلات المرض والوفاة والسيطرة

عليها. استخدمت هذه الدراسة منهج المسح المقطعي لجمع البيانات. تم إجراء البحث على وجه التحديد في مستشفى طرابلس الجامعي وشمل 100 من العاملين في مجال الرعاية الصحية الذين استجابوا وأجابوا على الاستبيان من أصل 150 استبيان تم توزيعه. تم إجراء التحليل الإحصائي باستخدام برنامج SPSS، الإصدار 26.0. حيث امتثل 87% من المشاركين لإجراءات مكافحة العدوى عن طريق تغيير القفازات بين المرضى. واعترف 53% بعدم استخدام إجراءات السلامة مثل ارتداء الأقنعة الواقية والقفازات. حوالي 43% من المشاركين تعرضوا للعدوى المرتبطة بالعمل. أوضح 67% من المشاركين ان إمكانية الوصول إلى الدورات التعليمية لمكافحة العدوى محدودة جداً وأن 66% من المتخصصين في الرعاية الصحية يحتاجون إلى تدريب أكثر على كيفية تطبيق إجراءات السيطرة على العدوى واستعمال معدات الوقاية الشخصية المناسبة. أما من ناحية التطعيمات فقد أوضح المشاركون ان نسبة التغطية بالتطعيم ضد فيروس التهاب الكبد البائي بلغ 69%. وعلى الرغم من تدني مستوى الوعي إلا ان 69% من المشاركين أكدوا على وجود لجنة لمكافحة العدوى وشخص مشرف في كل مرفق صحي، ونسبة 73% اقروا بأنه تم توفير معدات التعقيم والتطهير المتطورة في المرافق الصحية. وكانت المعرفة بإجراءات التخلص من النفايات الطبية واضحة (84%)، وقر 66% من الموظفين توفر المطهرات في أماكن عملهم. ومن خلال نتائج الدراسة وجدنا أن 43% من المشاركين بالدراسة قد أصيبوا أثناء العمل مرة واحدة على الأقل وذلك نتيجة إلى التنفيذ الخاطئ لإجراءات السلامة المهنية ومكافحة العدوى. إلا أن 87% منهم أجابوا بأنهم ملتزمون بإجراءات مكافحة العدوى أثناء العمل، ولذلك نوصي بشدة بالتدريب المكثف والعملي للتدريب على رفع مستوى الوعي في مجال مكافحة العدوى، السلامة المهنية، والرعاية الصحية.

الكلمات المفتاحية: مستوى الوعي، مكافحة العدوى، الرعاية الصحية.

Introduction

Healthcare-associated infections develop during medical treatment, whether in a hospital or another healthcare facility, by cross-contamination of pathogenic bio-contaminants, causing illness and health complications. These infections usually appear within a month of obtaining medical care or a few days after being admitted to the hospital [1]. They are acknowledged as the most prevalent Healthcare-associated problems affecting healthcare delivery. Healthcare-associated infections are common in conflict-affected areas, especially in surgical settings [2]. According to current estimates from the World Health Organization (WHO), 7 out of 100 patients in high-income countries and 15 out of 100 patients in low- and middle-income countries will get at least one healthcare-related infection during their residency in the hospital. Furthermore, 1 in 10 infected patients die due to these infections [3]. According to recorded data, standard infection control procedures can effectively prevent these diseases, saving lives, reducing morbidity, and lowering healthcare expenses [1].

With the primary goal of lowering infection rates, IC refers to the collection of guidelines and procedures implemented to control and restrict the spread of infections in hospitals and other healthcare settings. In the middle of the 20th century, the formal idea of IC was first presented in the US. A few hospitals then began to recognize infections linked to healthcare in the late 1950s and early 1960s and began implementing specific guidelines in their operations [4]. Teams of specialized healthcare experts known as IC teams oversee and carry out procedures in healthcare institutions. These teams are essential in managing the spread of diseases and preventing their occurrence, protecting the health and safety of patients, healthcare professionals, visitors, and the general public [5]. The team also performs crucial tasks in a variety of infection control-related areas, including creating and disseminating guidelines and policies, organizing ongoing education and training, establishing systems for tracking infections linked to healthcare, conducting audits of practice and care standards, and building strong relationships with other team members and departments [6].

In developed nations, healthcare-associated infections (HAI) pose a significant burden, impacting around 5% to 15% of hospitalized patients in standard wards and even higher rates, reaching 50% or more, in intensive care units. However, in low-income and developing countries, the situation is exacerbated due to overcrowding and understaffing in hospitals, leading to insufficient IC practices. Additionally, the absence of policies, guidelines, and adequately trained professionals further contributes to the severity of the issue [7]. Although data on healthcare-associated infections in sub-Saharan Africa are limited, it is evident that the region faces a considerable burden of such infectious diseases. While some progress has been made in infection prevention and control, there is a significant lack of comprehensive surveillance data. Generally, resources and measures related to infection prevention and occupational safety were limited in this region [8].

In Libya, the issue of healthcare-associated infections is pronounced, primarily attributed to the absence of effective IC policies and adequately trained professionals within IC teams. Based on the 2015 study conducted by Zorgani, A. in Libya to assess the prevalence of healthcare-associated infections caused by devices, it was observed that there were elevated rates of device-associated nosocomial infections. Moreover, the emergence of drug-resistant organisms posed a significant risk to

patients. As a result, the study concluded that reinforcing measures within the ICU setting, introducing surveillance systems, and adopting evidence-based preventive strategies are imperative to address these challenges effectively [9]. To promote compliance with standard precautions among healthcare workers and minimize occupational exposure, it is essential to understand the factors influencing their behavior. This understanding can aid in designing effective programs and preventive protocols to lower the risk of occupational hazards [10]. In addition, enforcing IC protocols in high-risk settings, including blood banks, is crucial to safeguard medical staff and patients from blood-borne infections [11].

The WHO Guidelines on Hand Hygiene in Health Care provide health-care workers (HCWs), hospital administrators, and health authorities with a thorough review of evidence on hand hygiene in health care and specific recommendations to improve practices and reduce transmission of pathogenic microorganisms to patients and HCWs. The present guidelines are intended to be implemented in health-care centers and hospitals. This concept should be implemented in all places where birth attendants permanently or occasionally perform health care, such as home care. These guidelines and the associated WHO Multimodal Hand Hygiene Improvement Strategy and an Implementation Toolkit are designed to offer healthcare facilities in all WHO member states a conceptual framework and practical tools for applying recommendations in practice at the bedside. While ensuring consistency with the Guidelines' recommendations, individual adaptation according to local regulations, settings, needs, and resources is desirable [12].

To lower infection rates among patients, healthcare professionals set comprehensive techniques and protocols known as infection prevention and control (IPC) strategies used inside all healthcare settings. By reducing the chance of contracting and spreading illnesses, these tactics protect patients and improve the community's general health. Hand hygiene, personal protective equipment, environmental cleaning and disinfection, surveillance, and monitoring are some crucial IPC tactics. These strategies are regularly updated and modified to address new infectious risks and difficulties in healthcare settings, enhancing patient safety and the standard of care in the process [13].

The Centers for Disease Control and Prevention (CDC) refers to measures as actions aimed at preventing or stopping the spread of infections within a healthcare setting. IC and Prevention measures help ensure the hospital environment is as safe as possible for both patients and staff. These measures include an assessment of how infections can be spread and how they can be stopped as well as more detailed recommendations for known pathogens [14].

It is unclear how an illness spread. Although healthcare professionals typically utilize transmission-based precautions to stop the spread of organisms in hospital settings, it is unclear if visitors can also benefit from these measures. The organism of concern, the mechanisms of transmission, as well as aspects relating to the visitors and the healthcare environment, should all be taken into consideration when deciding whether to undertake transmission-based measures among visitors. The potential advantages and drawbacks of visitor adherence to transmission-based measures, as well as the function of visitors as vectors for organism transmission in the healthcare context, are crucial areas for research methods with the main objective of decreasing infection rates that are used to manage and stop the spread of diseases [15].

The United States created an official body for IC at the beginning of the 1950s [16]. This document concisely describes a core set of infection prevention and control practices that are required in all healthcare settings, regardless of the type of healthcare provided. The practices were selected from among existing CDC recommendations and are the subset that represent fundamental standards of care that are not expected to change based on emerging evidence or to be regularly altered by changes in technology or practices and are applicable across the continuum of healthcare settings.[17] An increase in the incidence of hospital-acquired infections (HAI) has made it more and more crucial in recent years. According to the WHO, at least 1 case of HAI will be contracted by 7% of all patients admitted to medical facilities [1]. During the initial wave of the COVID-19 pandemic, studies said that 1 out of 8 COVID-19 cases hospitalized were due to illnesses acquired in the hospital, and in January 2021, NHS England assessed that 18% of COVID-19 cases were indeed hospital-acquired [18].

Infection management in healthcare organizations is necessary to prevent healthcare-associated infections (HCAIs). A healthcare-associated infection is a disease that strikes a patient when they are seeking treatment in a hospital or other healthcare facility but wasn't present or incubating before they were admitted. Infection prevention and control (IPC) is a scientific approach and practical solution that the World Health Organization (WHO) describes as being aimed to lessen the risk of infection-related harm to patients and medical professionals. Although it is a branch of epidemiology, social sciences, global health, and infectious diseases all greatly depend on it. (HCAI) [19]. PC (infection prevention and control) is a scientific strategy and workable solution described by the World Health Organization (WHO) as meant to reduce the risk of infection-related damage to patients and medical personnel. It is a subfield

of epidemiology, but it also has a significant impact on social sciences, global health, and infectious diseases [20].

The knowledge of HCWs should cover topics like hand washing, wearing personal protective equipment (PPE), immunization for the prevention of communicable diseases, modes of infection transmission, spotting infections in patients, decontaminating medical equipment, handling medical waste, and needle stick and sharp safety regulations. To apply HAIs in healthcare settings, HCWs should adhere to certain IPC precautions, procedures, and strategies [21]. For instance, despite being aware of recognized recommendations for the prevention of HAIs, HCWs have been reported to have low compliance with hand hygiene procedures. There are additional factors that affect excellent IPC practice besides knowledge and experience [22].

In healthcare settings, health professionals are exposed to a variety of occupational dangers, such as biological, chemical, ergonomic, physical, stress, and violence. In particular, HCWs who are exposed to blood and bodily fluids through sharps or needlestick injuries (NSIs) during the care of the patients are at a high risk of contracting blood-borne pathogens like hepatitis B, hepatitis C, and HIV [23]. A realistic, evidence-based strategy for preventing preventable infections from harming patients and healthcare professionals is infection prevention and control (IPC). Effective IPC necessitates ongoing action by decision-makers, facility management, healthcare providers, and patients at all levels of the health system. IPC is exceptional in the area of patient safety and care quality since it applies to every patient and healthcare professional at every point in time. It is difficult to give high-quality healthcare without an effective IPC. Hand hygiene, surgical site infections, injection safety, antibiotic resistance, and hospital operations both during and outside of crises are all impacted by infection prevention and control [12].

Aim of Study

This ongoing study aims to assess the knowledge level of healthcare workers at Tripoli University Hospital regarding standard IC procedures.

Hypothesis

The implementation of targeted and multidimensional IC procedures in healthcare facilities significantly reduces the incidence of healthcare-associated infections (HAIs) and enhances compliance among healthcare personnel.

Materials and Methods

Study design and population

This study employed a cross-sectional survey methodology to examine the present state of IC protocols within healthcare facilities. The research was conducted at Tripoli University Hospital, a prominent tertiary care institution in Tripoli, Libya. One hundred healthcare professionals, spanning two departments (Department of Internal Medicine and Department of Pediatrics) within the hospital, were enlisted to participate in the survey. The participant pool encompassed medical doctors, nurses, and support personnel directly engaged in patient care activities. To collect information about the participants, a structured questionnaire was employed. The questionnaire encompassed the following segments:

- Utilization and proper disposal of personal protective equipment (PPE).
- Familiarity with isolation precautions and associated procedures.
- Understanding of IC protocols and guidelines.
- Perception of the hospital's initiative.
- Immunization status.

Research Ethics

Before data collection, we received ethical authorization (in appendixes) from the Institutional Review Board of Tripoli University Hospital to conduct this study inside Tripoli University Hospital.

Data Collection

The participants were chosen using a random selection technique, encompassing a variety of departments within the hospital. The questionnaire was personally administered by research personnel, engaging in direct interviews to the participants. Moreover, these research assistants were available to explain and resolve any inquiries the participants had while responding to the survey.

Statistical Analysis

Data collected in this study were entered into Microsoft Excel spreadsheets to facilitate organization and preparation for analysis. Statistical analysis was performed using SPSS software, version 26.0. Descriptive statistics, including averages and percentages, were used to summarize the responses to survey questions. One sample non-parametric test was conducted to identify associations between demographic variables and practices. The significance level was set at $p < 0.05$.

Results

A total of 100 participants were included in the study. The participants comprised a diverse group of healthcare professionals, including doctors, nurses, and support staff, from various departments within the healthcare facility. When utilizing a one-sample non-parametric test to evaluate the significance and correlation among survey answers, a statistically notable distinction was detected, except for questions 2 and 5 ($p > 0.05$) as illustrated in Table 1.

Table 1. Displays the significance of the responses of survey participants.

Question	Response		P-value	
	Yes	No		
1	Personal protective equipment (PPE) and all single-use tools availability	62 (62%)	38 (38%)	0.021*
2	Wearing a protective mask while working	47 (47%)	53 (53%)	0.617
3	Changing gloves between patients	87 (87%)	13 (13%)	0.000*
4	Vaccinated against hepatitis B	69 (69%)	31 (31%)	0.000*
5	Having infection during work	43 (43%)	57 (57%)	0.194
6	IC training courses provided	33 (33%)	67 (67%)	0.001*
7	Specialized training on how to properly wear and remove personal protective equipment	34 (34%)	66 (66%)	0.002*
8	IC committee at the hospital	69 (69%)	31 (31%)	0.000*
9	A person responsible for IC procedures in the department	69 (69%)	31 (31%)	0.000*
10	modern sterilization and disinfection equipment and devices availability	73 (73%)	27 (27%)	0.000*
11	Acknowledge of proper dispose of medical waste	84 (84%)	16 (16%)	0.000*
12	Color-coded sharps disposal system for disposing of waste	90 (90%)	10 (10%)	0.000*
13	Disinfectants consistent availability and accessibility for all staff	66 (66%)	34 (34%)	0.002*

*This symbol means statistically significant different

The findings from Table 1 reflect varying degrees of awareness and adherence to infection control (IC) protocols among the surveyed respondents. The availability of personal protective equipment (PPE) and single-use tools (62%) was statistically significant ($p = 0.021$), suggesting a moderately supported IC infrastructure in the workplace. However, despite PPE availability, the practice of consistently wearing protective masks while working was not prevalent (47%), and the p-value (0.617) indicates that this result is not statistically significant, possibly highlighting a gap between resource availability and utilization.

Encouragingly, a high percentage of participants reported proper glove-changing practices between patients (87%) and acknowledgment of correct medical waste disposal (84%), both with highly significant p-values ($p = 0.000$). Similarly, the availability of a color-coded sharps disposal system (90%) and modern sterilization equipment (73%) further supports effective IC practices at an institutional level. Nevertheless, some critical gaps were identified. Only 33% reported receiving IC training courses, and just 34% had specialized training in donning and doffing PPE, both of which showed statistically significant p-values ($p = 0.001$ and $p = 0.002$, respectively). These findings suggest an urgent need for enhanced education and continuous training programs to bridge the knowledge-to-practice gap in IC.

In terms of structural support, the presence of IC committees and designated personnel responsible for IC protocols in departments was affirmed by 69% of respondents, again with statistically significant results ($p = 0.000$). This indicates that while some foundational structures are in place, their effectiveness might be undermined by limited training and inconsistent practice adoption.

The survey also revealed that 43% of respondents had experienced an infection during work, a non-significant finding ($p = 0.194$) that may point to underreporting or variability in exposure risk and safety compliance.

Overall, while there are signs of progress in IC infrastructure and practices, particularly in waste disposal and glove-changing habits, the lack of comprehensive training remains a notable concern. Addressing these training deficiencies could significantly enhance infection control outcomes in clinical environments.

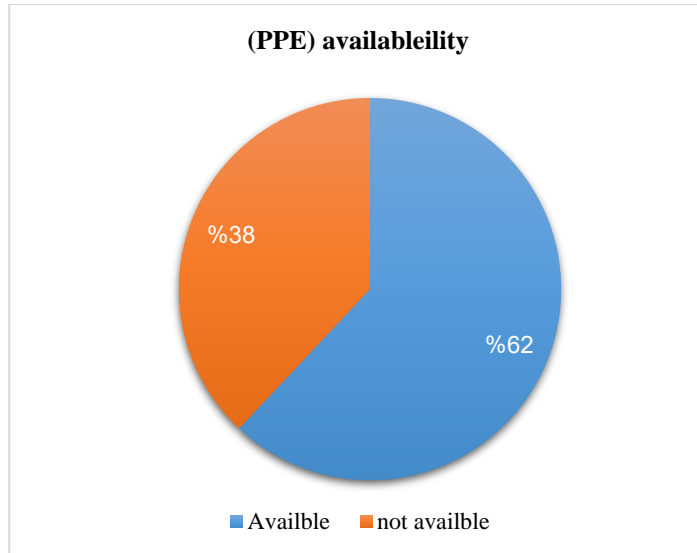


Figure 1. Personal protective equipment (PPE) available.

The main problem in healthcare places in Libya is that they don't have access to Personal protective equipment (PPE) the problem stated in Figure 1 is that 62% of the participants confirmed the nonavailability of this equipment during their work at hospitals. That may explain their attitude toward wearing or not wearing the mask, as in Figure 2. Maybe the loss of access to Personal protective equipment (PPE) caused the decrease in the number (47%) of workers who were wearing masks, or as in Figure 3, where 13% didn't change gloves between patients or their need for regular training about IC procedures. Figure 4 shows that just 33% of all workers got training courses in IC and PPE. Despite that, 72% of participants revealed that disinfectants were consistently available in the hospital and accessible to all staff, and unfortunately, according to this study's results, 43% of medical-care workers got an infection once or more than one time during their work life.

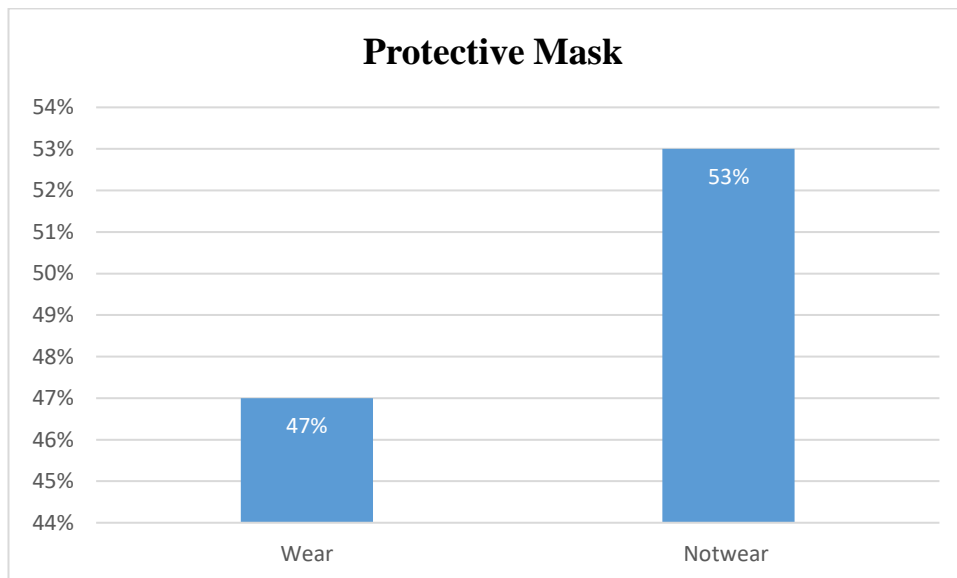
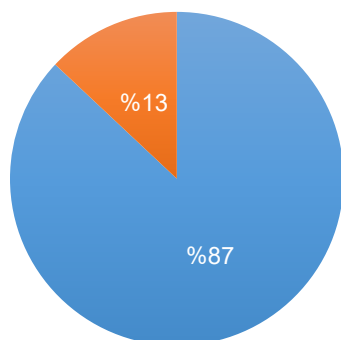


Figure 2. Wearing a protective mask while working.

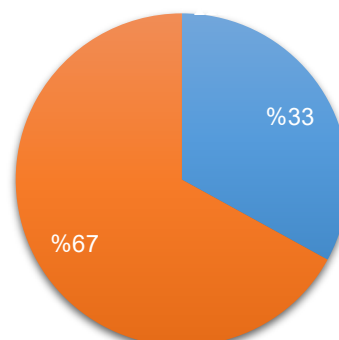
Changing Gloves



■ Changing gloves from one patient to another.

Figure 3. Changing gloves from one patient to another.

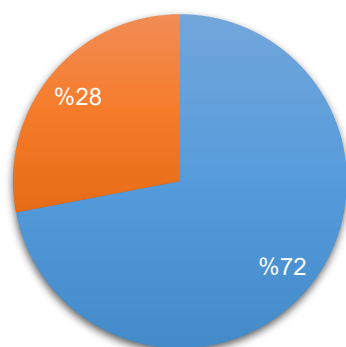
Training on Infection Control



■ Trained ■ not trained

Figure 4. Training of infection control.

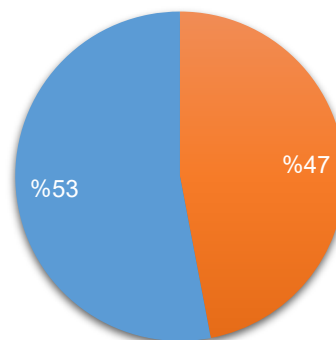
Disinfectants Availbilty



■ Available ■ Not available

Figure 5. Disinfectants were consistently available in the hospital and accessible to all staff.

Infection in Work Place



■ Infected ■ Dosen't infected

Figure 6. Infection during work.

Discussion

This study showed that 87% of respondents complied with IC procedures. On the other hand, in the same study, we found that 43% of respondents may get at least one type of infection while working. Based on these results, we know that they are most likely applying IC procedures incorrectly. Knowledge and practice regarding hospital-acquired infection prevention and associated factors among nurses working at university referral hospitals in Southern Ethiopia [24]. They found that 64.8% of health workers have good knowledge and practices regarding hospital-acquired infections. In contrast, our study found that 86% of the health workers have good knowledge and practices. This indicates that our health workers have better knowledge and practices of procedures [25].

In our study results, we found that 69% of workers were vaccinated with the Hep B vaccine while in another study published in 2022 by the Libyan Journal of Dentistry, they found that only about 60.2% of dental laboratory technicians were vaccinated with Hep B vaccine, these results lead us to the conclusion that there is an improvement in the level of awareness of the importance of taking the recommended vaccines for health workers [26]. 33% of health workers who participated in this study had never attended a skills training program, while in the study of a tertiary hospital in Nigeria (March 2018), only 18.4% had attended a training program. The percentages in both studies are considered weak, which leads us to the need to intensify training programs for health workers in the field of IC within hospitals [27].

The results of this study highlight both areas of commendable compliance and potential concerns regarding practices among healthcare workers at Tripoli University Hospital. The relatively high percentage of healthcare workers with access to PPE and adherence to glove-changing protocols is promising. However, the lower percentages in consistent mask usage and specific training reveal opportunities for targeted interventions to bolster knowledge and practices among the healthcare workforce. Additionally, the findings emphasize the importance of improving accessibility to education and the role of the committee within the hospital setting. Further research and interventions are warranted to enhance awareness and implementation in healthcare settings [28].

Conclusion

This study clarifies the strengths and areas that need improvement in the knowledge of healthcare workers at Tripoli University Hospital concerning standard infection control procedures. Notably, the adherence to essential practices such as consistently wearing protective masks, changing gloves between patients, and utilizing appropriate protective equipment was alarmingly low at 47%, 13%, and 38%, respectively. This inconsistency in practice highlights a critical need for ongoing training and educational initiatives specifically designed to address these knowledge gaps. By enhancing healthcare workers' understanding of infection control procedures, we can significantly reduce the incidence of healthcare-associated infections, bolster patient safety, and ultimately improve the overall quality of healthcare delivery.

Recommendations

According to this study's findings, it is essential to:

- Providing IC training courses is important for the meticulous monitoring of individuals to ascertain their level of commitment.
- Conducting further research in specialized departments, particularly in emergency settings and ICUs, where the demand for comprehensive studies is pronounced.
- Following HCW attitudes and practical and monitoring their commitment to IPC measures.

Limitations

It is important to acknowledge the limitations of this study. The research was conducted within the confines of Tripoli University Hospital and might not fully represent the knowledge level of healthcare workers in other settings. Additionally, the study relied on self-reported data, which might introduce response bias. Future studies could consider more objective measures of knowledge assessment.

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Conflicts of Interest

All authors declare that they have no conflicts of interest.

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