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ASSESSMENT OF KNOWLEDGE AND PRACTICES REGARDING INFECTION CONTROL MEASURES: A CROSS-SECTIONAL STUDY IN TWO TERTIARY CARE HOSPITALS OF PESHAWAR KP, PAKISTAN

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ABSTRACT

Introduction: Infection related to health care especially in hospitals has been pointed as a risk that threatens patient safety. It is among the leading cause of morbidity and mortality representing an important public health problem. Healthcare-related infections have a considerable impact on the morbidity and mortality rates in the intra- and extra-hospital environment, resulting in an increase in the time spent and costs of hospitalization, and are thus recognized as a serious world public health problem. Health care providers are constantly exposed to microorganism. Many of which can cause serious or even lethal infections. Nurses in particular are often exposed to microorganisms when carrying out nursing interventions. Knowledge and Practice regarding infection control measures in different countries vary and depends upon various factors.

Objective: To assess Knowledge and Practices Regarding Infection Control Measures

Methodology: This cross-sectional descriptive study was conducted in two tertiary care hospitals in Peshawar, KP, Pakistan, to explore Knowledge and Practices about Infection Control measures. A sample of 158 participants, including staff nurses, student nurses, and head nurses, was selected using convenience sampling technique. Data was collected via a 20-item questionnaire including questions from infection control measures, personal protective equipment, and biomedical waste management. Statistical analysis was performed using SPSS version 22, calculating means and standard deviations for continuous data and frequencies and percentages for categorical data.

Results: The demographic data showed that 73.08% of participants were staff nurses, 14.74% were student nurses, and 12.18% were head nurses. Key findings revealed that 35.14% of participants examined patients bare-handed, 29.73% varied their approach, and 40% practiced correct hand-washing techniques in operating theaters. Additionally, 43% rated their hygiene knowledge as satisfactory. Awareness of WHO hand-washing techniques was high at 95.83%, with varying awareness of the proper use of medical masks, gloves, gowns, and aprons/eye protection. Regarding biomedical waste management, 75% of participants understood the hazards and legislation, and 81% followed color-coding practices. Needle-stick injuries were a concern for 72% of respondents, with

58% reporting such injuries in the past year. Overall, there was strong awareness and adherence to infection control measures and PPE guidelines, though variability existed in practices and satisfaction with hygiene knowledge and waste management.
Conclusion: Infection in healthcare facilities remains a major concern in developing countries. Our study identified key barriers to effective infection control, particularly the improper use of PPE such as gowns and eye protection. Despite availability, healthcare workers often misuse these items, increasing infection risk. Enhanced training, stricter PPE protocol enforcement, and continuous monitoring are urgently needed to improve infection control and safeguard health.

Keywords: Infection Control, knowledge, practice, Nurses, Hygiene

Introduction

When a foreign microorganism enters the body of a host and multiply its existence which than causes different diseases are called as infection. These microorganisms includes viruses, bacteria, fungi, and parasites (1). The acquiring of infection occurred in many different ways, i.e. either with direct contact with the infectious person, secondly through contaminated food and water or through exposure with the microorganisms directly or indirectly (2). Pathogens like viruses and bacteria challenges the immune system by making person sick through killing and destructing normal cell function (3). Worldwide 7.1 million cases of nosocomial infection occur every year with the mortality rate of 99,000. 7.6% to 10.1% is the prevalence rate of both developing and developed countries. One of the reasons of hospital acquired infections is lack of knowledge regarding infection control and poor practices of health care workers (4). Hospital acquired infection can have several consequences including longer hospital stay, increased cost, lost wages and also sometimes death. 15% of hospitalized patients in developed countries, 37% of cases reported in ICU, in contrast ratio is high in developing countries i.e. 19% (5).

Health care professionals are constantly exposed to microorganisms. Many of which can cause serious or even lethal infections (6) . Nurses in particular are often exposed to various infections during the course of carrying out their nursing activities. Workers such as physicians, dentists and nurses are implicated in the transmission of nosocomial infections (7). Literature has explored the knowledge and practices of nurses is limited regarding infection control measures (8). Therefore, it is important to further investigate the impact of knowledge and practices of nurses with regard to the degree of the infection control (9).In hospitals, infected patients are a source of infection transmission to other patients, health care workers, and visitors (10). Healthcare-related infections have a considerable impact on the morbidity and mortality rates in the intra- and extra-hospital environment, resulting in an increase in the time spent and costs of hospitalization, and are thus recognized as a serious world public health problem. For example, Nosocomial infection is one of the leading causes of death (11). The prevention and control of infections are critical for a well-functioning health system.Infection related to health care especially in-hospital infections has been pointed as a risk that threatens patient safety and it is among the leading causes of mortality and morbidity, representing an important public health problem. Globally, The knowledge based practice in different countries varies, i.e in Palestine the rate regarding infection control knowledge among nurses was >80%. In Ethiopia,the nurse's knowledge about infection control was about 83.8%, and from Cairo University out of 50 nurses, only 10% have satisfactory knowledge about infection control, in mayo hospital Lahore) nurses had poor knowledge, and a study from Nepal reported 48.2% nurses had good knowledge regarding infection control (11).
Nurses play a crucial role in preventing and controlling transmission of an infection through the application of standard precautions and maintenance of the health care environment (12). All, nurses, in all roles and settings, can demonstrate leadership in infection prevention and control by using their Knowledge, skills, and judgment to initiate appropriate and immediate infection control procedures (10).Thus the objective of this study is to identify the knowledge of health professionals about the

recommendation to prevent and control health care related infection (3). For infection controls methods to apply in hospitals, an extensive experience of work in hospitals is required as compare to training in educational institutions. One of the national research paper claimed that in different types of surgical wards the medical professionals do not follow the universal rules for infection controls in these wards; patient that presenting the negligence of medical staff which needs strict observation and training to professionals for control of infection to patient(6).

Objective of the Study

To assess Knowledge and Practices Regarding Infection Control Measures

Methodology

This cross-sectional descriptive study was conducted in two tertiary care hospitals of Peshawar, Pakistan KP to explore the knowledge and practice Infection Control Measures. Convenient sampling technique was used for the selection of the study participants. Convenient sampling is a non-probability sampling technique where subjects are selected because of their easy availability and proximity to the researcher. The sample size was calculated by Raosoft Software having a margin error of 5% and a confidence interval of 95%, and the calculated sample size was 158. All staff nurses, student nurses and head nurses working in hospital wards were included to be the part of a study. While non-medical staff, such as doctors, ward boys, and technicians were excluded from the study. To determine knowledge and practice about Infection control measures the questionnaire has a total of 20 questions and has 3 categories : 1)Assessment of staff towards infection control measures 2) Personal Protective Equipment and 3) Biomedical waste management Data was analyzed through SPSS version 22, means and standard deviations were calculated for continuous data whereas frequencies and percentages were calculated for categorical data. For this research project, an ethical approval was taken from the respective college and Institutional review board. Eligible participants were given written information outlining the purpose of the study. The participation was made voluntary through a well explained informed consent. Confidentiality and anonymity of the information they provided was assured and can only be disclosed with their permission if needed. Approval for data collection was obtained from hospitals concerned.

Results

Demographic details of Participants

The demographic data of the study participants are shown in the Table 1.1. In terms of **designation**, the majority were Staff Nurses, comprising 73.08% (114 out of 156) of the total sample. Student Nurses made up 14.74% (23 out of 156) of the participants, while Head Nurses accounted for 12.18% (19 out of 156). **Regarding education**, a significant portion of the participants had completed their F.A (Higher Secondary School Certificate), representing 47.44% (74 out of 156). Matriculate (Secondary School Certificate) participants constituted 33.33% (52 out of 156). Those with a B.A (Bachelor of Arts) degree made up 12.82% (20 out of 156), and participants with an M.A (Master of Arts) degree were 6.41% (10 out of 156) of the total sample. **In terms of experience**, a majority of the participants had 1-10 years of experience, which comprised 58.97% (92 out of 156). Participants with 10-20 years of experience accounted for 25.64% (40 out of 156), while those with 20-30 years of experience made up 10.26% (16 out of 156). Participants with 30-40 years of experience were 3.85% (6 out of 156), and only 1.28% (2 out of 156) of the participants had 0 years of experience.

Table:1.1

Demographic	Category	Frequency	Percentage (%)
Designation	Student Nurse	23	14.74
	Staff Nurse	114	73.08
	Head Nurse	19	12.18
Education	Matriculate	52	33.33
	F.A passed	74	47.44
	B.A passed	20	12.82
	M.A passed	10	6.41
Experience	0 years	2	1.28
	1-10 years	92	58.97
	10-20 years	40	25.64
	20-30 years	16	10.26
	30-40 years	6	3.85

Responses of the participants in Questionnaire

The responses of the participants regarding the questions in questionnaire has been shown in Table 1.2. The questionnaire has three categories namely, **Infection control measures, personal protective equipment (PPE), and biomedical waste management**. Regarding infection control, a significant portion of respondents (35.14%) reported that they touch or examine patients with gloves at times but generally do so bare-handed, while 29.73% indicated that their approach varies depending on the case. Additionally, 40% of participants nearly always practice the correct hand-washing technique in an operating theater, though 25% do so quite often, and a small fraction (1%) never adheres to the technique. When assessing satisfaction with hygiene knowledge, 43% of respondents considered their knowledge satisfactory, while 22% felt it was adequate to some extent, and a combined 9% either were not satisfied or felt they needed to know more. In non-hospital settings, 66% of respondents consistently wash their hands before eating and after using the toilet. Regarding PPE, a large majority (95.83%) are aware of the WHO's recommended hand-washing techniques, with 79% knowledgeable about the proper use of medical masks, 59% about gowns, 70% about gloves, and 43% about aprons and eye protection. Furthermore, 78% of respondents are diligent in performing proper hand hygiene. Concerning biomedical waste management, 75% of respondents recognize the importance of understanding BM waste generation hazards and legislation, and the same percentage are familiar with the color-coding for waste segregation. A notable 81% follow color-coding practices for BM waste, and 79% believe that waste disposal practices at their hospital are correct. Moreover, 72% of respondents view needle-stick injuries as a concern, with 76% recapping used needles, 80% discarding them immediately, and 81% being aware of the consequences of such injuries. Despite these precautions, 58% of respondents reported experiencing a needle-stick injury in the past year. Overall, these findings indicate a strong general awareness and adherence to infection control measures and PPE guidelines, though there is some variability in practices and satisfaction related to hygiene knowledge and biomedical waste management.

Table 1.2

Questionnaire Category	Question	Responses	Frequency	Percentage (%)
Infection Control Measures	How do you prefer to touch/examine the patient?	At times with gloves but usually bare handed	26	35.14%
		Depends on the case	22	29.73%
		Gloves	20	27.03%
		Bare handed	6	8.11%

	In an operation theater setting, how often do you practice the right technique for wash up?	Almost every time	40	40%
		Quite often	25	25%
		Always	8	8%
		Never	1	1%
	Are you satisfied with your knowledge about hygiene?	Satisfactory	43	43%
		To some extent	22	22%
		Yes	4	4%
		No	3	3%
		Need to know more	2	2%
	How often do you wash your hands in a non-hospital setting?	Before eating	66	66%
		Before and after eating	1	1%
		Rarely	7	7%
		Before and after eating after using the toilet	66	66%
Personal Protective Equipment (PPE)	Are you aware of the proper techniques required for hand washing proposed by the WHO?	Yes	69	95.83%
		No	3	4.17%
	Proper use of medical mask	Yes	79	79%
		No	21	21%
	Proper use of gown	Yes	59	59%
		No	41	41%
	Proper use of gloves	Yes	70	70%
		No	30	30%
	Proper use of aprons and eye protection	Yes	43	43%
		No	57	57%
	Properly perform hand hygiene	Yes	78	78%
		No	22	22%
Biomedical Waste Management	Do you think it is important to know about BM waste generation hazards and legislation?	Yes	75	75%
		No	25	25%
	Do you know about color-coding segregation of BM waste?	Yes	75	75%
		No	25	25%
	Do you follow color-coding for BM waste?	Yes	81	81%
		No	19	19%
	Is the waste disposal practice correct in your hospital?	Yes	79	79%
		No	21	21%
	Is needle-stick injury a concern?	Yes	72	72%
		No	28	28%

	Do you recap the used needle?	Yes	76	76%
		No	24	24%
	Do you discard the used needle immediately?	Yes	80	80%
		No	20	20%
	Are you aware of the consequences of needle-stick injury?	Yes	81	81%
		No	19	19%
	Have you sustained a needle-stick injury during the last 12 months?	Yes	58	58%
		No	42	42%

DISCUSSION

The present study provides a comprehensive analysis of infection control practices, personal protective equipment (PPE) usage, and biomedical waste management among healthcare professionals in developing countries.The demographic data reveal that the majority of participants were Staff Nurses (73.08%), followed by Student Nurses (14.74%) and Head Nurses (12.18%). This distribution highlights the significant role of Staff Nurses in frontline patient care, making their practices and perceptions crucial for effective infection control. The educational background of participant's shows a dominance of those with Higher Secondary School Certificates (47.44%), indicating a potential gap in advanced training that might influence adherence to infection control protocols. This is consistent with other studies that have noted similar educational backgrounds among healthcare workers in developing regions, suggesting a widespread need for advanced training (13).Our findings reveal variability in infection control practices, which is a critical concern. While 40% of respondents nearly always practice the correct hand-washing technique in operating theaters, a notable 25% do so only quite often, and 1% never adheres to it. This irregularity is concerning given the well-documented importance of hand hygiene in preventing healthcare-associated infections (HAIs) (14). Comparatively, studies in developed countries have shown higher adherence rates to hand hygiene protocols, indicating that local interventions could significantly improve practices in population (15).These practices not only increase the risk of infection transmission but also reflect a potential lack of strict enforcement of PPE usage guidelines. This aligns with previous research indicating that proper glove use is often overlooked, despite its critical role in infection prevention (16). Awareness of WHO-recommended hand-washing techniques is commendably high at 95.83%, and knowledge about the use of medical masks (79%), gloves (70%), and gowns (59%) is substantial. However, the lower awareness regarding aprons and eye protection (43%) indicates specific areas for targeted education. While 78% of participants are diligent in performing proper hand hygiene, this contrasts with the lower consistency in hand-washing practices observed in operating theaters, suggesting a disconnect between knowledge and practice (17).Biomedical waste management practices appears greater, with 81% of respondents adhering to color-coding for waste segregation and 79% confident in their hospital's disposal practices. However, the high incidence of needle-stick injuries (58% in the past year) is alarming. Despite 80% discarding needles immediately and 81% being aware of the consequences, the prevalence of injuries suggests gaps in safe handling practices or possibly the need for better protective equipment. Studies in other developing regions have reported similar challenges, emphasizing the need for enhanced training and resources in biomedical waste management (18).When comparing these findings with other similar studies, it becomes evident that the challenges faced by healthcare professionals in developing countries are multifaceted. For instance, a study conducted in a similar setting reported comparable issues with PPE compliance and hand hygiene but noted lower rates of biomedical waste management adherence (19). Conversely, research from developed countries often indicates higher compliance with infection control practices, attributed to better resources and more rigorous training programs (20).

CONCLUSION

Infection in healthcare facilities remains a major concern in developing countries. Our study identified key barriers to effective infection control, particularly the improper use of PPE such as gowns and eye protection. Despite availability, healthcare workers often misuse these items, increasing infection risk. Enhanced training, stricter PPE protocol enforcement, and continuous monitoring are urgently needed to improve infection control and safeguard health.

RECOMMENDATION

The study found gaps in specific aspect of knowledge and practice that should be focused in future educational and awareness campaigns regarding infection control. The findings also demonstrated that health care workers using less authentic sources for information. This should be addressed immediately, as it ultimately affect knowledge and is reflected in attitude and practice. The study recommends that health care ministries should provide comprehensive training programme relating infection control measures and biomedical waste management. The differences between knowledge and practice, especially in PPE usage and hand hygiene, highlight the need for enhanced training programs focusing on practical adherence. Continuous monitoring and reinforcement of infection control protocols are essential. Educational programs such as regular workshops, practical demonstrations, and could bridge the gap between awareness and practice.

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