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"COMPARISON OF KNOWLEDGE AND ADHERENCE TO PRACTICES ABOUT HEALTH CARE ASSOCIATED INFECTIONS AMONG HEALTH CARE PROFESSIONALS IN GUJRAT& WAZIRABAD"

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ABSTRACT

Background: Hospital acquired infections (HAIs) also known as health-care associated infections (HCAIs) pose a significant public health concern worldwide. They might raise morbidity, mortality rates, and medical expenses. Patients are most likely to become infected while receiving medical care in hospitals. Little information available about impact of HAIs in developing countries. **Objective:** To assess the knowledge and adherence to practice about HAIs among HCPs. **Methodology:** A cross-sectional survey was conducted in public and private health sector including ABSH Gujrat, THQ Wazirabad, AL Raee Hospital and WIC from October 2023- January 2024. Prior approval was obtained from Institutional In charges of all mentioned hospitals. Hospital staff was briefed about the survey before questioning. Informed written consent was signed from staff. A field-tested questionnaire was utilized to assess the knowledge and practices regarding nosocomial infections (HAIs). Students of Advanced Clinical Pharmacy II collected data via direct interview of HCPs under supervision of Clinical supervisor. Responses were recorded, spending 15-25 minutes on each HCP. **Statistical analysis**: One-way ANOVA was applied. **Results**: 44.7% were males and 55.3% females respectively. Majority of HCPs 113 (75.3%) depicted adequate level of knowledge and (95%) adherence to practice according to national guidelines. **Conclusion:** HCPs were well aware about HAIs. Depicted positive attitude towards infection control. Hospital experience was found to be one variable that impact the understanding of infection control procedures. In the practice of infection control, knowledge levels and adherence to practice guidelines of technicians, nurses and GPs was correlated.

Key words: HAIs, HCPs, HCAIs, CDC

1. Introduction:

Hospital acquired infections (HAIs), also known as nosocomial infections, are any infections that appears 48 hours after being admitted to the hospital or 72hrs after discharge from hospital or 30 days after an operation (Ducel et al., 2002). HAIs were highlighted when Ignaz Semmelweis presented evidence that childbed fever was spread from person to person on the unclean hands of health-care workers (Edwards et al., 2012). These are the most common type of healthcare-associated adverse event (EAE) and can impact the standard of care provided to patients in both endemic and epidemic settings. Hundreds of millions of patients in both high resource and LMICs might be affected annually (Allegranzi et al., 2011). The CDC defines (HAIs) as infections either localized or systemic in nature, and they occur an adverse reaction to the presence of an infectious agent or its toxins in hospital settings(Horan et al., 2008) and it was not incubating or symptomatic when a patient was admitted to the healthcare facility. These infections may pose a serious risk to patient safety and are associated with higher rates of illness, death, and healthcare expenditures (Rosenthal et al., 2016). HAIs may imply prolonged hospital stays, resistance to antimicrobials, can affect adults, children, and senior citizens. As children are more likely to get RTIs than adults are to get UTIs.(Ducel et al., 2002)
According to WHO, (HAIs) affect around 1 in 10 hospitalized patients Worldwide (Islam et al., 2014) most notably, 10–15 in every 100 patients in Low and Middle Income Countries (LMICs) with limited resources, and 7 in every 100 patients in high-resource countries. In well-developed countries with proper data collection Overall, prevalence of (HAIs) is 7.6% ranges from 3.5% to 12% (Hassan et al., 2018). Contrarily, less information regarding HAIs available in low-resource countries but some researches showed it to be over 25% (Zaman, 2006). (CDC) also reported that HAIs are responsible for about 99,000 deaths annually (Klevens et al., 2007; Suetens et al., 2018). There is a huge gap between the developed world's and LMIC approaches in prevention and control of HAIs. The biggest challenge for governments in LMIC is lack of resources (Lynch et al., 2007). That's why, LMICs often deal with high rates of HAIs and outbreaks because and prevalence of infection in such countries varies 5.7% to 19.1% according to WHO.(Ogwang et al., 2013), (Shahab et al., 2020). Most likely reasons of HAIs spread in LMICs like in Pakistan might be inadequate health facilities and resources such as inadequate infection control protocols, congestion, and hospital staff with less training and significant underreporting (Ali et al., 2018; Damani, 2007; Nejad et al., 2011; Sastry et al., 2017; Shahab et al., 2020). Among nosocomial infections, surgical site infections developed in 2 to 5% of those underwent surgeries which represent roughly 24% of all infections picked up in hospitals. (Agarwal & Punnamma, 2003; Ahmed, 2012). HAIs may increase Length of stay (LOS), incidence of long-term disability, MDR to antibiotics adding financial burden on health care systems, patients, and their families, and may causes a spike in mortality (Sastry et al., 2017; Shahab et al., 2020) .(Maki & Zervos, 2021). Most prevalent HAIs which were reported by searchers may include surgical site infections (SSI), hospital acquired urinary tract infections (HA-UTI), and hospital acquired bloodstream infections. Prevalence of catheter-associated UTIs, central line-associated bloodstream infections, local vascular catheter-associated pneumonia, and ventilator-associated pneumonia was 3.9%, 3.1%, 3.8%, and 11.6%, respectively (Efstathiou et al., 2011), (Erasmus et al., 2009). Current study was aimed to access the awareness of Nosocomial infections among HCPs and to assess risk factors associated with HAIs, role of HCPs regarding practices to prevent infection in hospitals establishing null hypothesis that HCPs didn't show any interest towards infection control practices nor rated their knowledge very well and hypothesis that respondents depicted keen interest towards infection control practices and have rated their knowledge very well.

2. Methodology

A cross sectional survey was conducted in different hospitals from 3rd Oct 2023- 20th Jan 2024. Prior approval was obtained from Hospital Incharge and written consent was taken from Health care professionals (HCPs) who showed interest to answer the questions of survey voluntarily after objective of study was explained to them. 150 HCPs including physicians, pharmacists and nurses were selected by calculating the sample size using WHO sample size calculator for cross sectional

survey. Survey was conducted in DHQ Gujrat, Al Raee hospital Wazirabad, THQ Wazirabad, WIC. Among 150, 75 HCPs were from DHQ Gujrat, 30 from Al Raee hospital Wazirabad, 18 belonged to THQ Wazirabad and 27 from WIC. A self-structured questionnaire containing all relevant information regarding hospital acquired infections with close ended questions included in it to access the knowledge about causes and preventive measures of nosocomial infections. The questionnaire was pilot tested. Students of Advanced Clinical collected data under supervision of their clinical supervisor. HCPs were interviewed the participants and recorded the responses and observations, spending approximately 20 minutes on each. HCPs Questionnaire was divided into sections. First section was about demographics including age, gender, position in hospital, professional experience, types of organization and names of hospitals where survey was conducted. 2nd section comprised of awarenesses of hospital professionals about occurrence, causes, spread of nosocomial infections in hospitals. 3rd section contains questions regarding general information hygiene condition and post-operative measures to cope with HAIs. Convenient sampling technique was used All participants were hospital employee and health care professionals aged above 19yrs. While employees outside hospitals were not included. Data was analyzed on GRAPHPAD version 10.2. Descriptive statistics and One way ANOVA was applied.

3. Results:

3.1. Demographic and social credentials of partcipants health care professionals (HCPs):

Demographic and social credentials of partcipants health care professionals (HCPs) was recorded in Table:1.

Table:1. Demographic and social credentials of Partcipants health care professionals n=150:

Age(yr.)	***n***	**Mean & SD**
30-39	46	26.5±16.12
40-49	38	
50-59	16	
>6o	6	
Gender	***n***	**%**
Female	83	55.3
Male	67	44.7
Designation of all participant HCPs		
Technician	40	26.67
Female Nurse	45	30.00
Male Nurses	5	3.33
Physician	28	8.67
Surgeon	19	18.67
Pharmacist	13	12.67
Professional experience(yrs.) of HCPs(%)	***n***	**Mean&SD**
1-5	45	26.9±16.19
6-10	51	
10-15	27	
15-20	9	
21-25	16	
Type of organizations		
Public	127	85
Private	23	15
Number of Participants in specific hospital	***n***	***%***
WIC	27	18
THQ	18	12
Al Raee	30	20
DHQ	75	50

3.2. Comparison of Adequate and inadequate Knowledge between HCPs

Awareness of HCPs regarding causes, spread and overall effect of HAIs on patient hygiene was interviewed and measured as adequate and inadequate knowledge among HCPs. Data was plotted w.r.t to questions answered in "yes" by HCPs as adequate knowledge and questions answered as "No" as inadequate knowledge, tabulated in Table:2 with Mean&SD. Current survey depicted fair level of knowledge among HCPs about HAIs, their causes and transmission. Comparison of adequate and inadequate knowledge between HCPs showed significant difference (*p=0.0001*). Pharmacist showed 100% adequate knowledge about all 7 questions. Inadequate knowledge of HCPs was mainly related to hand washing techniques and recommended washing time.

Table: 2. Comparison of Adequate and inadequate Knowledge between HCPs regarding impact of (HCAIs) on patients

	Technician		Female Nurse		male Nurse		Pharmacist		General Physician		General Surgeon		F	*P*
	Adequate Knowledge	Inadequate Knowledge	Adequate Knowledge	Inadequate Knowledge	Adequate Knowledge	Inadequate Knowledge	Adequate Knowledge	Inadequate Knowledge	Adequate Knowledge	Inadequate Knowledge	Adequate Knowledge	Inadequate Knowledge		
Do you know about Nosocomial infection?	22	18	28	17	5	0	13	0	28	0	18	1		
Do you know about common causes of Nosocomial infection?	23	17	29	16	5	0	13	0	28	0	19	0		
Do you know about how Nosocomial infection spread?	28	12	26	19	4	1	13	0	28	0	17	2		
Can short stay of patient in hospital prevent such infection?	25	15	30	15	4	1	13	0	28	0	18	1	**47**	**0.0001**
Can these infections become life threatening if left untreated?	28	12	26	19	3	2	13	0	28	0	16	3		
Do you know about what is hand hygiene?	25	15	23	22	2	1	13	0	26	2	15	4		
Do you know about what is correct recommendation of hand washing time?	23	17	23	22	2	3	13	0	23	5	13	6		
Mean&SD	**25±2.4**	**15±2.4**	**26±2.8**	**19±2.8**	**3.6±1.3**	**1.1±1.1**	**13**	**0**	**27±1.9**	**1.0±1.9**	**17±2.1**	**2.4±2.1**		

3.3. Sources of Knowledge about nosocomial infections among HCPs

Sources of Knowledge about HAIs among HCPs depicted in Table:3. 45.3% HCPs got information and knowledge about HAIs from textbooks following 40% internet.

Table: 3. Source of Knowledge regarding nosocomial infections among HCPs

Variable	**Respondents (n)**	%
Textbooks	68	45.3
Internet	60	40
Scientic data	10	6.7
Conference or Worshop	12	8

3.4. Comparison of Practices of HCPs in hospitals to prevent HAIs

Adherence to good practices by HCPs in hospitals to prevent HAIs tabulated in **Table 4&5.**
Female nurses (24±4.2) responded positively to all 12 regarding adherence to practice to cope with HAIs by reducing spread of nosocomial infection within hospital followed by general physician

(23±5.7) and technicians (21±3.2) (*p=0.0001*). Male& female nurses answered maximum questions (82&80%) regarding adherence to good practice in hospitals according to guidelines.

Table:3. Comparison of adherence to practicing and non-practicing behavior among HCPs

	Technician		Female Nurse		Male Nurse		Pharmacist		General Physcian		General Surgeon		F	*P*
	Adherence to Practise	Not practicing as per guidelines	Adherence to Practise	Not practicing as per guidelines	Adherence to Practise	Not practicing as per guidelines	Adherence to Practise	Not practicing as per guidelines	Adherence to Practise	Not practicing as per guidelines	Adherence to Practise	Not practicing as per guidelines		
Do you wash your hands after removing the gloves?	**21**	**19**	**26**	**19**	**5**	**0**	**10**	**3**	**28**	**0**	**17**	**2**		
Do you take any preventive measure before any invasive procedure?	**21**	**19**	**25**	**20**	**5**	**0**	**11**	**2**	**28**	**0**	**17**	**2**		
Do you use the pre-sterilized instrument?	**24**	**16**	**32**	**13**	**5**	**0**	**11**	**2**	**28**	**0**	**19**	**0**		
Do you cover your mouth and Nose during sneezing?	**21**	**19**	**28**	**17**	**5**	**0**	**10**	**3**	**28**	**0**	**18**	**1**	**5 8**	**<0.0 001**
Do you use the mask before approaching the patient?	**28**	**12**	**28**	**17**	**5**	**0**	**11**	**2**	**28**	**0**	**16**	**3**		
Do you wash your hands after handling every patient?	**17**	**23**	**19**	**26**	**5**	**0**	**8**	**5**	**18**	**10**	**7**	**12**		
Do you touch your eyes, Nose and mouth while	**18**	**22**	**19**	**26**	**5**	**0**	**8**	**5**	**18**	**10**	**10**	**19**		

handling every patient?														
Do you wash your white coat or nursing uniform regularly after hospital duty?	**19**	**21**	**22**	**23**	**2**	**3**	**7**	**6**	**24**	**4**	**12**	**7**		
Do you have exposure to patient blood, Vomit or other fluid?	**21**	**19**	**27**	**18**	**5**	**0**	**10**	**3**	**28**	**0**	**17**	**2**		
Do you have exposure to patient blood, Vomit or other fluid?	**16**	**24**	**22**	**23**	**4**	**1**	**7**	**6**	**23**	**5**	**14**	**3**		
Is there any national guideline for infection control?	**19**	**21**	**20**	**25**	**2**	**3**	**5**	**8**	**11**	**17**	**11**	**8**		
Is there any infection control committee in your hospital?	**22**	**18**	**21**	**24**	**4**	**1**	**9**	**4**	**19**	**9**	**14**	**5**		
Mean& SD	**21±3.2**	**19±3.2**	**24±4.2**	**21±4.2**	**4.3±1.2**	**0.67±1.2**	**8.9±1.9**	**4.1±1.9**	**23±5.7**	**4.6±5.7**	**14±3.7**	**5.3±5.5**		

Table: 5. Comparison of adherence and non-adherence of HCPs to infection control Practices in hospitals

HCPs	**Adherence**	**Non adherence**
Technician	21±3.2	19±3.2
Female Nurse	24±4.2	21±4.2
Male Nurse	4.3±1.2	0.67±1.2
Pharmacist	8.9±1.9	4.1±1.9
General Physician	23±5.7	4.6±5.7
General Surgeon	14±3.7	5.3±5.5

3.5. Reasons of non-adherence to good practices by HCPs

Mostly HCPs showed their strong concerns towards executing standard hygiene practices in hospitals to cope with HAIs. However, they denied to comply some conditions regarding maintenance of hand hygiene as per WHO recommendations and effective control of HAIs. Mostly un-answered or negatively replied questions by different HCPs tabulated in Table: 6.

Table:6. Reasons of non-adherence to good practices by HCPs

	Technician		Female Nurse		Male Nurse		Pharmacist		GP		General Surgeon	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Do you have exposure to patient blood, Vomit or other fluid?	24	60	23	51.1								
Is there any national guideline for infection control?	21	52.5	25	62.5	17	60.7			17	60.7		
Is there any infection control committee in your hospital?	18	45	24	53.3	4	30.7	5	38.46				
Do you wash your hands after handling every patient?							5	38.46			19	100

Discussion:

The term "infection control" encompasses all the measures taken by healthcare institutions to either completely eliminate or significantly reduce the likelihood of the spread of infectious diseases. The necessity of effective infection control programmes across all healthcare facilities and the enhancement of HCPs' capacity to prevent the transmission of pathogens has been brought to light by numerous life-threatening infections (Zaidi et al., 2016).

Current research aimed to examine knowledge and practices of healthcare workers about HAIs in different hospitals of district Gujrat. The majority of respondents (nearly 76%) are familiar with the term "nosocomial infection" and its meaning. This is in accordance with another study (Fortunka et al., 2024). Half among nurses (both male (3.6±1.3 & female (26±2.8) have adequate knowledge of HAIs. This is necessary because nurses are more likely to get infections themselves and to spread them to their patients and the general public and they should use appropriate control measures and have their practices evaluated than it is others HAIs. Findings of survey suggested that HCPs like pharmacists, General physicians had a high level of adequate knowledge regarding nosocomial infections, causes, spread and severity of such infections. Hand hygiene has been highly focused by many researchers (Challenge, 2009) ,(Eng et al., 2021).Moreover, Clean Care is Safer Care campaign by WHO highlighted improvement strategies regarding hand hygiene (Pittet & Donaldson, 2005). Clinically hand washing time was explained to be 10-15 seconds (McCredie et al., 2020). HAIs (technicians, nurses) had inadequate knowledge about hand hygiene and washing hand time. These results are contrary to studies done in Nigeria.(Ekwere & Okafor, 2013). In current study, GPs (82%) & Surgeons exhibited highest level of adherence to practices applied to prevent HAIs

Among HCPs technician (48%), female nurses (42%) showed non-adherence to good practices (in hospital to prevent HAIs) regarding wearing gloves, removing gloves after surgical procedure and similar findings were observed by (Ferguson et al., 2004). Similarly they have also depicted non-adherence to take precautionary measure before invasive procedure, use of pre-sterilized instruments and this is contrary to research (Aliyu et al., 2020) where 80-90% HCPs showed adherence to above practices. HCPs specially technician (60%) and female nurses (51%) have not answered about exposure of patient to blood, vomit or other fluids. While nearly 60% don't have information about proper guidelines available at national level to cope with HAIs however ministry of health issued national guidelines regarding prevention of nosocomial infection by ministry of health, Pakistan (Zafar et al., 2009).

Conclusion:
Nosocomial infection prevalence survey has shown higher rates among technicians, female nurses. In order to prevent the spread of infection, it is advised to wash one's hands before and after coming into contact with patients, maintain gloves wearing time, use of pre-sterilized instruments, exercising precautionary measures to protect patients and themselves. Moreover, HCPs especially lower rank staff should consult national guidelines about prevention of HAIs.

Limitations:
One major contributing factor in rise of healthcare-associated infections (HCAIs) is the income gap between primary and secondary healthcare, which leaves little or no money to treat potentially avoidable diseases. In the setting of poor nations, where healthcare facilities often lack the means to adequately treat and manage a wide range of

Recommendations:
In order to raise awareness of HCPs workshops should be held where participants could put these principles into practice and participate in training sessions on HAI prevention and control.

Abbreviations:

Abbreviations	Full Form
HAIs	Hospital Acquired Infections
HCPs	Health care professionals
CDC	Centre of disease control and prevention
(EAE)	Healthcare-associated adverse event
LMIC	Low- and middle-income countries

Supporting information:
Patients consent forms
Permission was obtained from the appropriate authorities of institute.
Ethical Approval (IRB letter)

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