

Research Article

Assessing the awareness and practice of Hospital Acquired Infections (HAIs) among nursing staff of Civil Hospital, Rajkot, Gujarat, India

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ABSTRACT

Background: With advances in health care system, threat to Hospital Acquired Infections (HAIs) still remains. HAIs continue to affect hospitalized patients and results in morbidity, mortality and additional costs. Health care workers, especially nurses can play critical role in prevention and control of HAIs. The purpose was to study their awareness regarding HAIs and practice towards prevention and control measures.

Methods: It was a cross sectional study conducted in Civil Hospital, Rajkot from October 2014 to December 2014. Out of total 184 staff nurses, 92 (50% of the total following convenient sampling) were selected. A list of all staff nurse was made alphabetically and every alternate nurse was selected for interview. Of the 92 staff nurses approached, 83 consented and gave complete response. Interview was conducted using a pretested semi structured questionnaire and analysis was done using Excel 2007.

Results: 80 (93.02%) participants had heard about HAIs. More than half (60.4%) of the participants acknowledged that urinary and respiratory tract infections were the two most common HAIs. 52 (60.4%) of the participants acknowledged that direct skin to skin contact and improper handling of bio medical waste were the two most common modes of transmission of HAIs. 47 (56.6%) practiced hand washing before and after surgical procedures. 30 (36.1%) participants had 'good' knowledge regarding HAIs.

Conclusions: The present study showed that level of awareness and practice regarding HAIs among nursing staff was average. Considering the important role of nurses in HAIs, there is a need to develop a system of continuous education to increase nurses' awareness and hence adopt appropriate health behaviours and increase adherence to precautions.

Keywords: Hospital acquired infections, Nosocomial, Staff nurse, Universal precautions, Hand washing, Awareness

INTRODUCTION

Hospital-acquired infection (HAI) or nosocomial infection is an infection occurring in a patient in a hospital or other healthcare facility in whom the infection was not present or incubating at the time of admission. This includes infections acquired in the hospital but appearing after discharge, and also occupational infections among staff of the facility.¹ Hospital-acquired infections are considered as complications of patient care

in the hospital, which broke through for the first time in the fourteenth century following inauguration of the first hospitals in Europe.²

With advances in health care system, threat to HAIs still remains as they continue to affect hospitalized patients and results in morbidity, mortality and also additional costs.³ These nosocomial infections occur among 7-12% of the hospitalized patients globally with more than 1.4 million people suffering from the infectious

complications acquired in the hospital.⁴ The risk for infection escalates to 15-20% for those patients on intensive care units.⁵

HAI's not only affect patient health and safety, but also the health care system as a whole. It is estimated that HAI's increase the cost of health care between \$4.5 and \$5.7 billion in patient care. In addition to monetary resources, hospital acquired infections increase the number of days a patient spends in the hospital, requiring additional medical care and hours spent providing patient care. These costly infections divert funding and precious staff and nursing time from possible implementation of patient safety and infection control measures to protect patients.⁶

In a study conducted in United States in 1999 on 181,993 patients of ICU revealed that the prevalence of nosocomial infections is 18%. The most common infection was reported UTI in a rate of 31% and the most common microbial pathogenic agent was reported as aerobic Gram negative strains.⁷ In another study conducted in India on 422 patients, the prevalence of nosocomial infections was reported as 38.8%. The authors reported the ages more than 60 years as an important risk factor for nosocomial infections.⁸ Another study, again in India on 629 patients in ICU, revealed the rate of nosocomial infections 21%, and the most common infection was reported pneumonia (with a rate of 29.5%) and gram negative bacilli detected as the most common pathogenic microbial agents.⁹

It is well recognized that the risk of transmission of pathogens when providing medical care and the reduction in the rates of the incidence of HAI's can be kept low through appropriate standardized prevention procedures.¹⁰ However, it has been documented that the level of compliance with the use of proven HAI's measures by healthcare workers (HCW's) has been disappointing¹¹, despite the fact that evidence-based procedures promoting appropriate practices in HCW's settings are published.¹² Many such infections are caused by pathogens transmitted from one patient to another by way of HCW's who have not washed their hands between patients or HCW's who do not practice control measures such as use of hand disinfection, glove use etc.¹³ Although Semmelweis demonstrated more than a century ago that hand washing itself was sufficient in reducing the incidence of nosocomial infections,¹⁴ compliance of HCW's with the recommended hand washing practices remains low.¹⁵ Poor compliance is associated with lack of awareness among personnel.¹⁶

Strategies for controlling HAI's are of concern for health care policy makers worldwide. Center for Disease Prevention and Control (CDC) recommended that educating health-care workers regarding infection control measures is the highest priority to prevent and control nosocomial infections. Furthermore, CDC recommended that assessment of knowledge and adherence to infection

control guidelines periodically is also a high priority measure to reduce the incidence of nosocomial infections.

It is vital to understand that prevention and control strategies with demonstrated value must be implemented consistently and rigorously. Among the different strategies, the adherence to guidelines for disinfection is an essential ingredient for activities aimed at preventing the HAI's. Accordingly, among the HCW's, nurses have a critical role to play in prevention efforts and they are an important population to study their level of knowledge, attitudes, and behavior regarding disinfection.

Consequently, the purpose of present study was to delineate the level of knowledge regarding HAI's and practice towards its prevention among a sample of nursing staff from civil hospital, Rajkot.

METHODS

Setting

The study was carried out in PDU Medical College and Civil Hospital, Rajkot situated in the heart of Saurashtra region, in the state of Gujarat. The hospital is one of the six government hospitals associated with medical colleges. According to the 2011 census, Rajkot district had a population of 37,99,770.¹⁷ The study was conducted from October 2014 till December 2014.

Study design and sampling

The study utilized a cross-sectional descriptive design to explore the nursing staffs' knowledge and practices toward infection control guidelines. A list of all staff nurses working in civil hospital, Rajkot was taken from the Matron (n=184). The list of names was arranged alphabetically. A convenient sampling method was used to select 50 per cent of all the staff nurses. Thus every alternate nurse was selected for inclusion in the study. Of the 92 nurse approached, 83 (90.21%) consented and gave complete response.

Data collection

An anonymous, structured questionnaire was pre-tested and used as the data collection instrument. A face-to-face interview was conducted by trained interviewers, privacy was guaranteed in spite of the nature of the survey, and individual results were kept confidential. The permission to conduct the study was taken from Medical Superintendent of the civil hospital.

The questionnaire included a series of items divided in the following sections: (1) demographic and practice characteristics; (2) knowledge of infection control measures; (3) compliance with antisepsis/disinfection procedures; (4) practice of various ways to prevent hospital-acquired infections; and (5) sources most frequently used to receive up-to-date information about

disinfection procedures. The questionnaire also contained questions for data on number of years of hospital experience and the job cadre.

Adherence to guideline recommendations for disinfection was assessed among the respondents by taking into consideration the criteria in current use at the time of the survey. The feasibility of the study and the clarity, quality, and length of the questionnaire items were ensured by means of a pilot-test conducted on a volunteer sample of 10 nurses.

Data analysis

Each and every knowledge assessing question was given a score. In order to make a final qualitative assessment of the scores, the total scores were converted to a percentage and were then reclassified as follows: > 66% - good, 33-66% - average, less than 33% - poor. The data was entered into MS Excel 2007 and appropriate charts and tables were made. Appropriate statistical tests were applied using Epi Info 7 and online statistical tools.

RESULTS

A total of 83 nurses were included in the study. The analysis of the demographic characteristics of the study group showed that the mean age was 34 years (range 21-57), the mean number of years in practice was 7.7 years (range 6 months-26 years), and more than half worked in surgical wards (59.0%) (Table 1).

Overall, half of the nurses (50.6%) were sensitized towards HAIs as reported in Table 2. Of all the nurses who were sensitized, most common means of sensitization was seminar (39.7%) followed by guidelines and book (37.3%), doctors (21.6%), medical journals (12.0%) and CME (6.0%) (Figure 2).

As reported in Table 2, 18 (21.7%) nurses scored ‘poor’ grade in knowledge assessment, while 35 (42.2%) had ‘average’ and 30 (36.1%) had ‘good’ knowledge. Figure 2 depicts that 98.8% of the nurses unanimously acknowledged respiratory tract infection to be the most common HAI, followed by surgical wounds (83.1%), skin infection (65.0%), urinary tract infection (61.4%), sepsis (30.1%), infective endocarditis (10.9%) and encephalitis (10.9%). 60.4 percent of the nurses agreed that urinary and respiratory tract infections were the two most common HAIs.

Of the total 42 (50.6%) nurses who were sensitized regarding HAIs, 21 (50.0%) had ‘good’ knowledge, 5 (11.9%) had ‘poor’ knowledge whereas out of 41 (49.4%) nurses who were not sensitized regarding HAIs, 9 (22.0%) had ‘good’ and 13 (31.7%) scored ‘poor’ knowledge. The difference was statistically significant ($p < 0.05$) (Table 2).

Among the nurses with ‘good’ knowledge ($n=30$), 24 (80.0%) performed hand washing before and after procedures, whereas among the nurses with ‘average’ and ‘poor’ knowledge, 54.3% and 22.2% performed hand washing. The difference was statistically significant ($p < 0.05$) (Table 3).

Results of the multivariate logistic regression analysis (Table 4), with the outcome variable of performing appropriate hand washing before and after procedures, revealed that the odds of appropriate behavior were higher if the nurse had a higher knowledge level (OR = 1.89; 95% CI 1.39-3.23). An appropriate behavior was more likely in nurses with a higher perception of risk of transmitting an infectious disease while working (OR = 1.73; 95% CI 1.10-2.88).

91.6 percent of the nurses acknowledged that improper handling of infectious waste is the common mode of transmitting HAIs, while 26.5 percent responded with use of devices like ventilator. 88.0 % acknowledged airborne droplets, 85.5% told release of hospital dust, 81.9% told invasive procedures and 68.7% responded with direct skin to skin contact as the common modes of transmitting HAIs (Figure 3).

Table 1: Demographic characteristics of the participants (n = 83).

Characteristics	n (%)	Measures of central tendency and dispersion
Age group (years)		
<30	29 (34.9)	Mean age = 34 years (Range 21 - 57 years)
30 - 40	37 (44.6)	
41 - 50	13 (15.7)	
>50	04 (04.8)	
Work experience (years)		
<5	16 (19.3)	Mean work experience = 7.7 years (Range 6 months - 26 years)
5 - 10	34 (41.0)	
>10	33 (39.7)	
Wards		
Surgical	49 (59.0)	--
Medical	34 (41.0)	--

Table 2: Comparison between level of knowledge and sensitization received (n = 83).

Received any type of sensitization regarding HAIs	Level of knowledge			Total
	Poor (<33% score)	Average (33-66% score)	Good (>66% score)	
Yes	05 (11.9)	16 (38.1)	21 (50.0)	42 (100)
No	13 (31.7)	19 (46.3)	09 (22.0)	41 (100)
Total	18 (21.7)	35 (42.2)	30 (36.1)	83 (100)
$\chi^2 = 8.6, df = 2, p = 0.013$				

Table 3: Comparison between hand washing practice and level of knowledge (n = 83).

Level of knowledge	Hand-washing before and after procedured		Total
	Performed	Not performed	
Poor	04 (22.2)	14 (77.8)	18 (21.7)
Average	19 (54.3)	16 (45.7)	35 (42.2)
Good	24 (80.0)	06 (20.0)	30 (36.1)
Total	47 (56.6)	36 (43.4)	83 (100)

$\chi^2 = 15.4, df = 2, p = 0.004$

Table 4: Multivariate logistic regression model results for hand washing practice before and after surgical procedures.

Variable	OR	95% CI	p
<i>Washing hands before and after performing surgical procedures</i>			
• Knowledge (absolute score)	1.89	1.39 - 3.23	0.02
• Nurse with higher perception of risk of transmitting an infectious disease while working	1.73	1.10 - 2.88	0.03
• Nurse who need additional information about disinfection procedures	1.13	0.63 - 1.96	0.29
• Nurses who do not know that non appropriate disinfection increases their risk of transmitting infectious disease	0.80	0.56 - 1.43	0.34

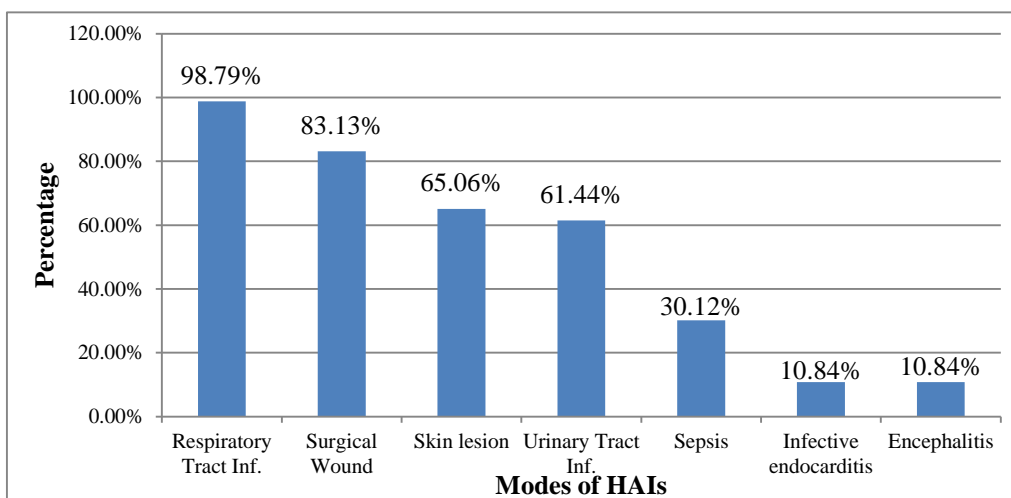


Figure 1: Knowledge about most common HAIs (n = 83).

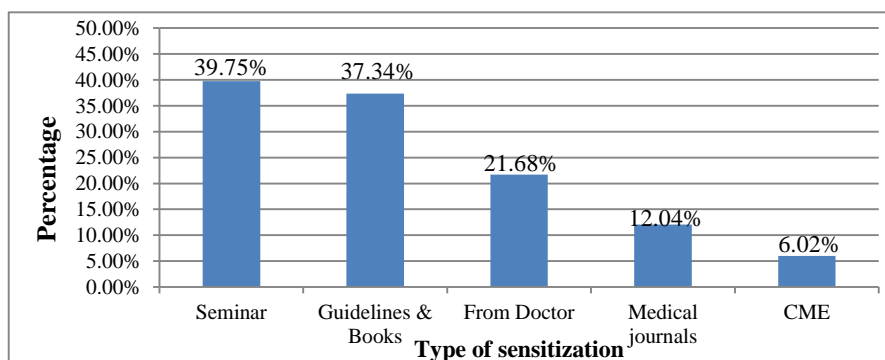


Figure 2: Type of sensitization received regarding HAIs and infection control practices (n = 83).

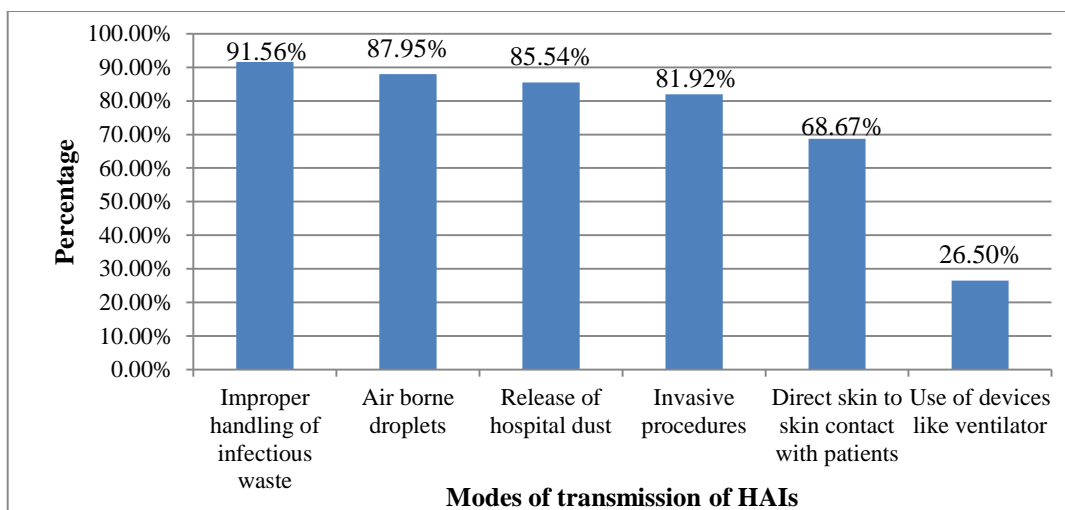


Figure 3: Knowledge about mode of transmission of HAIs (n = 83).

DISCUSSION

HAIs are still considered one of the most serious and complex health problems worldwide. This survey yielded interesting findings regarding knowledge and practices regarding HAIs among a random sample of nurses in Government hospital.

The data from this study indicated that the current state of nurses' knowledge related to HAIs was average, particularly worrying is that 60.4% of the respondents acknowledged in combination that urinary and respiratory tract infections were the two most common HAIs. This was combined with the fact that only half of the nurses were sensitized regarding HAIs by any means. A significant association was found between the level of knowledge of nurses and whether they had received any sensitization regarding HAIs or not. This shows the importance of continuous sensitization to increase the level of knowledge among nursing staff.

In our study, it was found that most common means of sensitization towards HAIs was seminar (39.7%) and least common was CME (6.0%). In a similar study by Sessa et al.¹⁸ regarding nurses' knowledge, attitude and practice in an Italian hospital, it was found that when presented with a list of various educational sources, the preferred method for acquiring information was stated to be workshops/seminars and continuing medical education (71.8%), followed by guidelines (26.9%), and medical journals (23.2%).

The above scenario suggests that, HAIs educational programs are not only needed, but also very likely to be welcomed. Workshops/seminars and continuous education programs could provide an accessible source in these topic areas.

Overall, 47 (56.1%) nurses performed hand washing procedures before and after performing any procedures.

A significant association was also found between the level of knowledge among nurses and their practice of performing hand washing before and after surgical procedures. This finding is of great concern since nurses' hands represent the principal route of transmission of nosocomial pathogens and hands must be decontaminated immediately before each and every episode of direct patient contact/care and after any activity or contact that potentially results in hands becoming contaminated.

Studies indicate that healthcare workers' hands are the main source of HAI transmission, and therefore, hand washing by caregivers is the most important procedure in preventing HAIs.¹⁹ Although standard precautions and guidelines have been established to decrease the transmission of HAIs, adherence to such policies is uncommon.²⁰ We found a similar result in our hospitals. Similar results have been observed in a study done in Baltimore, nurses scored significantly higher on knowledge but significantly lower on self-reported practices. Also, neither level of knowledge nor positive opinion about the value of hand-washing was associated with an increase in hand-washing practices.²¹

Hospital administrators should strive to create an organizational atmosphere in which adherence to recommended hand hygiene practices is considered an integral part of providing high-quality care. For such an approach to be successful, hospitals must provide visible support and sufficient resources in the form of continuous education programs. These programs should be innovative, educational and motivational and tailored to specific health care personnel.

Limitation of the study

In order to allow for the convenience of data collection, only half of the total staff nurse was included in the study. Direct observations for practice may have altered their actions.

CONCLUSION

The survey found that level of knowledge, particularly of the most common HAIs, was average and only half of the nurses had received sensitization of any type regarding HAIs. It was also observed that odds of appropriate hand washing practices was higher in nurses who were having higher knowledge and having higher perception of risk of transmitting infections.

A periodic education program on hospital acquired infections and its prevention will help in the retention of knowledge and practices among the nurses. This will help in better adherence to barrier protection such as hand washing, use of gloves and hand disinfection. We also recommend written guidelines in every institution for all health care workers. A regular system of monitoring infection rates as well as dissemination of the data will form a link between the management and the nurses and thus help in implementing and improving strategies for prevention of hospital acquired infections.

Also appropriate active surveillance for infection control measures is a simple tool which should be introduced during preoperative, intra-operative, and postoperative care to reduce infection rates.

Future directions

Although evidence-based research has been conducted on this topic and has illustrated that there is a definite link between the nurses' knowledge-attitude-practice and rate of hospital acquired infections, there are still questions left to be answered. Further research must be conducted to find the most efficient nurse-to-patient ratio, and detailed longitudinal studies must be carried out to find the optimal ratio for each hospital unit. Similarly, hospitals should investigate different staffing models for implementation.

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