

Impact Of Training On Knowledge And Practices Of Nurses Regarding Hospital Infection Control In A Tertiary Care Centre

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Abstract: Background and objective: Nurses provide the first-hand bedside care to the patients in a hospital thus have a direct role in hospital infection control. Thus to improve hygiene behaviour of staff, training sessions on hospital infection control is necessary. The objective of this study was to assess the impact of training on knowledge and practices regarding hospital infection control amongst nursing staff working in tertiary care centre. Method: The study included 89 nurses from different wards and I.C.U. A pre-test and a post-test was conducted with a set of 20 self designed multiple choice questions in three days session of training covering important aspects of hospital infection control. Improvement in pre-test and post test for individual candidate was assessed and statistical data analysis was done. Results: Response rate of the questionnaire was 100%.The mean pre-test score was 9(S.D 3.06) while mean post-test score was 14(S.D 6.34). The difference in pre-test and post-test was statistically significant($P < 0.00001$) taking 95% confidence interval. Interpretation and conclusion: Training sessions and workshops for healthcare workers conducted regularly will help curbing nosocomial infections and providing a better patient care. [Jyoti C NJIRM 2016; 7(4):39-43]

Key Words: hospital infection, nurses, training, knowledge and practices

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Introduction: The CDC healthcare-associated infection (HAI) prevalence survey found that on any given day, about 1 in 25 hospital patients has at least one healthcare-associated infection¹. The issue of healthcare-associated infections has always been one of the most important public health problems in many countries throughout the world, contributing to morbidity, mortality and additional cost². Consistent and strict adherence to standard precautions guidelines by the healthcare workers (HCW) plays a major role in controlling such infections. However, compliance rate with the use of such measures by the HCW has been seen to be non-satisfactory. Among the HCW, it is the professional nurse who provides first-hand bedside care and her actions has a direct role in positive patient outcome which can be imparted by control and prevention of infection. To improve hygiene behaviour of nursing staff training sessions and increasing the educational facilities for recognition and control of infection has been recommended³. Different studies have been conducted in different regions of the world showing either poor knowledge in infection control practices or lack of implementation of such knowledge into day-to-day practices, which can be improved by continual education and regular training³⁻⁷.

Therefore, the present study was conducted to assess the impact of training on knowledge and practices regarding hospital infection control amongst nursing staff working in tertiary care centre.

Methods: The study was conducted in the department of Microbiology, Gobind Ballabh Pant Institute of Post Graduation and Medical Research (G.I.P.M.E.R), New Delhi. 89 nurses from different wards and I.C.U were included in the study. Consent was taken from the participants and the study was approved by institutional review board.

Demographic profile of the participants was taken: gender, education, years of experience, area of clinical posting. A Three day training course was conducted which included lectures on important topics of hospital infection control, such as concept of standard precautions, practical application of this knowledge, needle stick injuries, sterilization and disinfection in wards and Operation Theatre (OT), concept of Central line associated blood stream infection (CLABSI), Catheter associated urinary tract infection (CAUTI). A pre-test was conducted on the first day of the session consisting of a set of 20 self designed multiple choice questions with four responses for each item, to be answered individually within 15 minutes. Every item had only single correct answer. Questions covered important broad categories of infection control, namely, standard precautions, hand hygiene, safe injection practices, sterilization and disinfection, spill management and PEP, OT sterilization and microbiological sample collection and transport. A post-test was then conducted on the last day of the session using the same performa. The total score was calculated by adding all correct answers and ranged

from 0 to 20. The test questions were then assessed and score was given.

Improvement in pre-test and post-test for individual participant was assessed and statistical data analysis was done using S.P.S.S.

Result: Out of 89 participants, 12(13%) were male while 87% were female. 89.9% participants were diploma holders while the rest were graduate. None of the participants were post-graduate. The pre-test mean score for diploma holder participants and graduate participants did not differ much as shown in Table 1.

Table 1. Pre-test score in relation to professional qualification

Education	Participants (%)	Average score (pre-test)
Diploma	80(89.9)	9
Diploma and graduation	9(10.1)	10

35.9% had up to 5 years of experience, 49.4% of had 6-10 years of nursing experience, 10.1% had 11-15 years of work experience while only 2.2% had 16-20 years and 2.2% had more than 20 years of experience. Prior exposure to any training/workshop was not taken. Taking into consideration the years of experience, it was seen that participants with 11-20 years of experience showed a better level of knowledge in pre-test than less than that of 10 and more than 20 years of experience as shown in Table 2.

Table 2. Pre-test score in relation to work experience

Response rate of the questionnaire was 100%. The mean pre-test score was 9(S.D 3.06) while mean post-test score was 14(S.D 6.34). The difference in pre-test and post-test was statistically significant ($P < 0.00001$) taking 95% CI.

Concept of standard precautions: The knowledge of standard precautions in prevention of HAI was quite low, only 34% gave correct answers. Least awareness in this group of question was seen for infectious body fluid. Only 8.9% had responded correctly. Post-test correct response rate for standard precautions increased to 70%.

Hand hygiene: The overall correct response rate in pre-test and post-test was 25% and 61% respectively. Recommended time of hand wash and hand rub was known to 28% and 48% participants respectively. Only 28% participants correctly knew the “five moments” of hand hygiene while 42% knew the importance of hand hygiene in prevention and control of HAI.

Safe injection practices: The pre-test knowledge was 40% for the participants. 49% correctly responded to the correct use of single-use medication vials, correct methods of administering fluids and injections to patients, while only 39% knew the correct methods of cleaning site before invasive procedures. In post-test 80% responded correctly to the questions pertaining to safe injection practices.

Sterilization and disinfection: 58.4% had a correct knowledge of definition of sterilization while 23.5% were aware of commonly used disinfectants and 47.1% correctly knew the various methods of sterilization. The overall correct response rate increased from 35% in pre-test to approximately 69% in post-test.

O.T sterilization: The correct response rate in pre-test was low (29%). Very few participants (17.9%) were aware of acceptable bacterial load in major operation theatres and 39.3% knew the correct method of disposal and pre-cleaning of equipments. After attending the training 65% correctly responded to O.T sterilization methods.

Microbiological sample collection and transfer:

Before training only 30% correctly knew the types and method of various microbiological sample collection and transport which improved to 76% correct response in post-test.

Work experience (years)	Participants (%)	Average score (pre-test)
0-5	32(35.9)	8.7
6-10	44(49.4)	8.7
11-15	9(10.1)	10.2
16-20	2(2.2)	12
above 20	2(2.2)	8.5

PEP and spill management: Knowledge regarding spill management and barrier methods was quite good (66% and 85% respectively) in the pre-test. Very few

(13.4%) showed good knowledge regarding correct use of gowns and masks. Overall correct response rate was 53% and 82% in the pre-test and post-test respectively.

Table 3. Scores in relation to different aspects of Infection control

Serial number	Questions category	Pre-test(%)	Post-test(%)
	Concept of standard precautions	39	79
	Hand hygiene	27	67
	Safe injection practices	45	80
	Sterilization and disinfection	35	68.5
	Spill management and PEP	53	82
	OT sterilization	29	65
	Microbiological sample collection and transport	30	76

Discussion: Our results highlighted some facts on the knowledge and practices regarding knowledge and practices of hospital infection control amongst the participants who represented the nursing staff of a tertiary care centre. In the pre-test we could assess the basic knowledge and attitude of the nurses on the topic prior to training which was utilized further during lectures as a focusing tool. The post-test served as a double-edged sword. It was a self-assessment for the participants so that any query could be discussed and it helped the trainers too to gauge the level of improvement amongst the participants.

The pre-test mean score for diploma holder participants and graduate participants did not differ much. There was no statistical difference in level of knowledge amongst male/female nurses. This finding was inconsistent with earlier study where knowledge difference was affected by gender where male participants were found to be less aware than female⁵.

Statistical difference was not found amongst diploma holder and graduates in our study (p value 0.33), while

improved level of knowledge with higher level of education was seen in some studies^{2,8}.

In our study, participants with an experience of 16-20 years were seen to score maximum while above 20 years the least. Asadollahi M et al⁴ reported in their study, improved knowledge amongst the more experienced staff. In our study, confounding factors like prior training or workshop may be a reason of no significant difference in education level and gender.

The data from our study indicates that the current state of nurses' knowledge related to HAI is poor, particularly in concepts of hand hygiene and OT sterilization and disinfection.

Of the different domains assessed in the pre-test, the participants showed least knowledge in concept of hand hygiene.

Hand hygiene is the simplest and the most important but seems to be the most neglected step in prevention of hospital infection. During discussion with the participants, it was found that frequency of hand washing per shift was not acceptable and there was very low level of compliance with hand, particularly before patient contact and in between two patients. Some of the factors mentioned leading to non-compliance with hand hygiene were hectic duty schedules, inadequate hand washing facilities in or near the patient care area, non-availability of soap or disinfectants, busy working hours, Understaffing/overcrowding, patient care being priority, wearing of gloves, low risk of acquiring infection from patients Pittet D⁹ also reported similar factors of non-compliance. It was seen that there was limited knowledge on correct method and timing of hand wash, hand rub and surgical hand scrub. Many other studies conducted showed similar findings. Sessa A et al² reported that only 57.5% participants in their study followed proper hand hygiene before invasive procedure or surgical dressings. Low level of knowledge in hand hygiene has been reported in earlier studies too^{2,10} and low level of compliance with hand hygiene amongst HCW has also been reported in some studies^{5,6,11,12,13}. However, a good hand hygiene knowledge was seen in some studies^{4,14,15,16}.

Knowledge about needle stick injuries and PEP was also found to be optimum, though compliance with the steps to be followed in case of NSI was

inadequate. All of them were immunized against HBV, though testing of titre level at regular intervals was not done by some due to lack of knowledge of importance of monitoring the titre level. The general concept of taking extra precautions only when dealing with known positive patients and maintaining lenient attitude with other patients was also seen in our study, similar to another study¹⁴.

Knowledge in sterilization and disinfection procedure was quite low. Though the participants were aware of the difference between sterilization and disinfection, commonly used hospital disinfectants, pre-cleaning procedures, storage of sterile items, but knowledge regarding correct application of disinfectants on equipments, various methods of OT sterilization was poor. There was a lack of concept of correct use of disinfectants on instruments. Jain M et al¹⁴ and Sadeghi N et al¹⁷ also showed findings on similar lines.

A lack of awareness of the appropriate microbiological samples and the correct method of their collection was seen. Nurses showed a poor knowledge in collecting and transport of crucial samples like blood, central line tip. This finding in our study is important because knowledge of type of sample collection for a given microbiological test with appropriate transport to the laboratory is very vital for correct and timely investigation of critically ill patients. So it is crucial for the nursing staff to understand and implement the correct procedures. Post-test however showed an improvement in their understanding of this concept.

In safe injection practices, participants reported faulty practices in handling multi dose vials, intravenous fluids, insulin vials and syringes, recapping of needles, disposal of syringes. Findings on similar lines were seen in other studies^{8,10,13,15,18}. Bhargava A et al⁸ showed that HCW with a better knowledge, attitude and practices suffered less needle stick injuries.

Participants though well versed with spill management techniques and reportedly followed acceptable practices in this regard. They showed a low understanding for the appropriate use of PPE. Compliance with barrier nursing techniques was found to be optimal except, the use of eye goggles, change of gowns in I.C.U and before exit from the operation theatre was not satisfied. Similar findings were reported by McGaw C.D et al¹⁵ and Avachat S

et al¹⁸. Mythri H et al⁶ and Phukan P¹³ however showed an acceptable knowledge and compliance of use of PPE.

We have seen in our study that knowledge of the participants in prevention of hospital acquired infections improved significantly after three days training session. We had explored the knowledge of nurses in concept of sample collection and transport, which has not been done in any other study. The participants showed an improved understanding of importance of this concept in the post-test. Therefore, discussing such an untouched topic during training of HCW will help bridge the gap between patient bed and laboratory, which will ultimately go a long way in better patient care from both sides.

Conclusion: As seen in our study and many other studies, training sessions and workshops conducted at regular intervals of time and updating HCW with newer concepts in patient care, along with induction courses of newly joined staff, will help the control the spread of nosocomial infections and providing a better patient care^{3,10,11,14,18}.

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