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Effectiveness of the structured teaching programme on nosocomial infection among staff nurses at selected hospital, Coimbatore

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Abstract
Background: Nurses play a very crucial role in promoting and maintaining the health of the patient in the hospital by maintaining standard precaution and healthy environment. In hospitals, patients may act as sources for the transmission of infection to healthcare workers, other patients, and visitors, thus leading to healthcare-associated infections. For example: nosocomial infections which is the main cause for morbidity and mortality rate and thus has major concern globally. The study aimed to evaluate the effectiveness of a Structured Teaching Programme on knowledge regarding nosocomial infection among staff nurses at a selected private hospital Coimbatore.
Objectives: 1.To assess the pre-test knowledge of staff nurses regarding nosocomial infection. 2.To evaluate the effectiveness of the Structured Teaching Programme on knowledge regarding nosocomial infection among staff nurses. 3.To determine the association between post-test knowledge scores and selected demographic variables**.**
Methodology: A pre-experimental one-group pre-test and post-test research design was adopted for the study. The study was conducted among 200 staff nurses working in a selected hospital at Coimbatore. Participants were selected using a non-probability convenient sampling technique. Data were collected using a structured knowledge questionnaire consisting of demographic variables and knowledge assessment items related to nosocomial infection. A pre-test was conducted before the administration of the Structured Teaching Programme, followed by a post-test after seven days. Data were analyzed using descriptive and inferential statistics, including paired *t*-test and Chi-square test.
Result: The findings revealed that before the intervention, 40% of staff nurses had poor knowledge, 45% had average knowledge, and only 15% had good knowledge regarding nosocomial infection. After the Structured Teaching Programme, 65% of nurses achieved good knowledge, while poor knowledge decreased to 5%. The mean post-test knowledge score (23.8 ± 3.6) was significantly higher than the pre-test score (14.2 ± 4.5). The obtained *t*-value (18.5) was statistically significant at $p < 0.001$, indicating the effectiveness of the Structured Teaching Programme. A significant association was also found between post-test knowledge scores and selected demographic variables such as educational qualification, work experience, and previous training.
Conclusion: The study concluded that the Structured Teaching Programme was effective in improving the knowledge of staff nurses regarding nosocomial infection. Regular educational interventions and continuous in-service training programmes are recommended to strengthen infection prevention and control practices among nurses and thereby reduce the incidence of hospital-acquired infections.

Keywords: Nosocomial infection, hospital-acquired infection, staff nurses, structured teaching programme, knowledge assessment, infection control

Introduction

Nosocomial infection, also known as hospital-acquired infection (HAI), refers to an infection that develops 48 hours or more after hospital admission or within a few days after discharge, which was neither present nor incubating at the time of admission (World Health Organization [WHO], 2022) [1]. These infections remain a major public health concern worldwide due to their high morbidity, mortality, prolonged hospital stay, and increased healthcare costs (Magill *et al*., 2014) [4]. Evidence suggests that a considerable proportion of nosocomial infections are transmitted through airborne routes (Allegranzi & Pittet, 2009) [3]. Common causative organisms include bacterial, viral, and fungal pathogens such as *Staphylococcus aureus, Escherichia coli, Mycobacterium tuberculosis, Candida albicans, Aspergillus* species, and *Trichosporon* species (CDC, 2023).

Hospital-acquired infections are usually exogenous in origin, with sources including healthcare personnel, contaminated medical equipment, hospital air, water, food, and environmental surfaces (WHO, 2022). Patients admitted to Intensive Care Units (ICUs) are at a significantly greater risk of developing nosocomial infections compared to those in general wards. The risk is estimated to be 5–10 times higher due to the severity of illness and the frequent use of invasive procedures and medical devices such as urinary catheters, central venous catheters, arterial lines, and endotracheal tubes (National Nosocomial Infections Surveillance System [NNIS], 2004) [5]. These devices compromise the body's natural defense barriers, thereby increasing susceptibility to infection. Effective infection prevention and control measures are therefore essential to reduce the burden of nosocomial infections in healthcare settings. Therefore, this study was undertaken to evaluate

the effectiveness of structured teaching programme on nosocomial infection among staff nurses.

Methodology

1. Study Design

A pre-experimental one-group pre-test and post-test design was employed to evaluate the effectiveness of structured teaching programme on nosocomial infection among staff nurses.

2. Participants

The study was conducted among 200 staff nurses working in a selected hospital, Coimbatore. Participants were chosen through non probability convenient sampling technique.

3. Instrument

The data collection tool consisted of two sections: Section A included demographic variables such as age, gender, educational qualification, and years of experience, previous training. Section B contained the knowledge assessment items. Each correct response was awarded one mark, with a maximum possible score of 30. Based on the total score obtained the level of knowledge was categorized as poor (0–10), average (11–20), and good (21–30).

4. Procedure

The study was carried out after obtaining formal permission from the concerned authorities and informed consent from the participants.200 staff nurses were selected through using a non probability convenient sampling technique. Initially a pre-test was conducted using the structured questionnaire to assess the baseline knowledge regarding nosocomial infection. Following the pre-test, a structured teaching programme was administered to the participants on same day. After a period of 7 days, post-test was conducted using the same questionnaire to evaluate the effectiveness of the intervention. Confidentiality and anonymity of the participants were strictly maintained throughout the study.

5. Hypothesis

H1: There will be a significant difference between the mean pre-test and post-test knowledge scores regarding nosocomial infection among staff nurses.

H2: There will be a significant association between the post-test level of knowledge regarding nosocomial infection and selected demographic variables.

Data Analysis

Data management and statistical computations were performed using SPSS version 26.0, employing a dual approach of descriptive and inferential statistics. Descriptive statistics, specifically frequencies and percentages, were used to summarize the demographic profile of the participants, while means and standard deviations (SD) were calculated to describe the baseline (pre-test) and post-test knowledge scores. To evaluate the impact of the intervention, inferential statistics were applied; specifically, a paired t-test was utilized to compare mean knowledge scores before and after the structured teaching programme to determine its effectiveness. Furthermore, the Pearson Chi-square test (X^2) was employed to examine the association between post-test knowledge levels and selected demographic variables. For all analyses, a p-value of < 0.001 was established as the threshold for highly significant results, ensuring a rigorous standard for rejecting the null hypothesis.

Results

The following tables present the findings on demographic distribution and impact of the structured teaching programme on the knowledge of staff nurses regarding nosocomial infection

Table 1: Demographic Variables of Participants (N=200)

S. No	Variable	Category	Frequency	Percentage
1	Age (years)	21–30	90	45%
		31–40	70	35%
		>40	40	20%
2	Gender	Female	150	75%
		Male	50	25%
3	Education	Diploma	80	40%
		B. Sc Nursing	100	50%
		M. Sc Nursing	20	10%
4	Experience (years)	<5	85	42.5%
		5–10	75	37.5%
		>10	40	20%
5	Previous Training	Yes	60	30%
		No	140	70%

The table shows that the majority (45%) of nurses were aged 21–30 years. Most participants were female (75%) and had B.Sc Nursing qualification (50%). About 42.5% had less than 5 years of experience, and 70% had not attended previous training on nosocomial infection.

Table 2: Comparison of Knowledge Score before and after Structured Teaching Programme

Knowledge Level	Score Range	Pre-Test (n)	Pre-Test (%)	Post-Test (n)	Post-Test (%)
Poor	0–10	80	40%	10	5%
Average	11–20	90	45%	60	30%
Good	21–30	30	15%	130	65%

The table shows that before the Structured Teaching Programme, most staff nurses had average (45%) and poor (40%) knowledge regarding nosocomial infection. After the intervention, good knowledge increased to 65%, while poor knowledge decreased to 5%, indicating the effectiveness of the Structured Teaching Programme.

Table 3: Paired t test for Pre test and Post test Knowledge Scores (N=200)

Variable	Mean	SD	Mean Difference	df	t-value	p-value
Pre-Test	14.2	4.5				
Post-Test	23.8	3.6	9.6	199	18.5	<0.001

The table reveals that the mean post-test knowledge score (23.8 ± 3.6) was higher than the pre-test score (14.2 ± 4.5). The obtained t-value of 18.5 was statistically significant at $p < 0.001$, indicating that the Structured Teaching Programme effectively improved the knowledge of staff nurses regarding nosocomial infection.

Table 4: Association between Post-test Knowledge Score and Selected Demographic Variables

Demographic Variable	Category	Poor (%)	Average (%)	Good (%)	Total	χ^2 Value	df	p-value
Age (years)	21–30	2 (1%)	20 (10%)	68 (34%)	90			
	31–40	5 (2.5%)	25 (12.5%)	40 (20%)	70			
	>40	3 (1.5%)	15 (7.5%)	22 (11%)	40	5.8	4	0.21
Gender	Male	2 (1%)	18 (9%)	30 (15%)	50			
	Female	8 (4%)	42 (21%)	100 (50%)	150	1.9	2	0.38
Educational Qualification	Diploma	6 (3%)	35 (17.5%)	39 (19.5%)	80			
	B.Sc Nursing	3 (1.5%)	20 (10%)	77 (38.5%)	100			
	M.Sc Nursing	1 (0.5%)	5 (2.5%)	14 (7%)	20	14.6	4	0.006*
Experience (years)	<5	5 (2.5%)	30 (15%)	50 (25%)	85			
	5–10	3 (1.5%)	20 (10%)	52 (26%)	75			
	>10	2 (1%)	10 (5%)	28 (14%)	40	10.2	4	0.03*
Previous Training	Yes	1 (0.5%)	10 (5%)	49 (24.5%)	60			
	No	9 (4.5%)	50 (25%)	81 (40.5%)	140	16.8	2	0.001*

The association between post-test knowledge scores and selected demographic variables was analyzed using the Chi-square test. Among nurses aged 21–30 years, 68 (34%) had good knowledge, while 100 (50%) female nurses demonstrated good knowledge regarding nosocomial infection. However, age ($\chi^2 = 5.8$, $p = 0.21$) and gender ($\chi^2 = 1.9$, $p = 0.38$) showed no significant association with post-test knowledge scores.

Regarding educational qualification, 77 (38.5%) B.Sc Nursing graduates had good knowledge scores, and the association was statistically significant ($\chi^2 = 14.6$, $p = 0.006$). Nurses with 5–10 years of experience showed higher good knowledge scores (52; 26%), with a significant association between experience and knowledge ($\chi^2 = 10.2$, $p = 0.03$). Among nurses who had previous training, 49 (24.5%) demonstrated good knowledge, and previous training showed a significant association with post-test knowledge scores ($\chi^2 = 16.8$, $p = 0.001$).

Overall, educational qualification, work experience, and previous training had significant associations with post-test knowledge scores, whereas age and gender were not significantly associated.

Discussion

The demographic findings of the present study revealed that the majority of staff nurses were aged between 21–30 years (45%), female (75%), and had B. Sc Nursing qualification (50%). About 42.5% of nurses had less than 5 years of work experience, and 70% had not attended previous training regarding nosocomial infection. Similar findings were reported by Indian Journal of Community Health study conducted by Ashisbala Mohapatra and Lisa Sarangi, where the majority of participants were females and belonged to the younger age group of 31–40 years. Another study conducted in Ghana reported that most nurses were within the younger age category and emphasized that participation in in-service training significantly improved knowledge regarding nosocomial infection prevention.

The findings of the present study revealed that before the Structured Teaching Programme, the majority of staff nurses had average (45%) and poor (40%) knowledge regarding nosocomial infection. Following the intervention, good knowledge increased markedly to 65%, while poor knowledge decreased to 5%, demonstrating the effectiveness of the Structured Teaching Programme. Similar findings were reported by K. Deepika and colleagues, who observed significant improvement in nurses' knowledge after educational intervention on infection control practices. Another study conducted by M. K. Sharma reported that structured teaching programmes effectively enhanced nurses' awareness and preventive practices related to hospital-acquired infection.

The association between post-test knowledge scores and selected demographic variables was analyzed using the Chi-square test. Among nurses aged 21–30 years, 68 (34%) had good knowledge, while 100 (50%) female nurses demonstrated good knowledge regarding nosocomial infection. However, age ($\chi^2 = 5.8$, $p = 0.21$) and gender ($\chi^2 = 1.9$, $p = 0.38$) showed no significant association with post-test knowledge scores. Similar findings were reported by Gul *et al*. (2021) [16], who found that age and gender were not significantly associated with nurses' knowledge regarding infection prevention practices.

Regarding educational qualification, 77 (38.5%) B.Sc Nursing graduates had good knowledge scores, and the association was statistically significant ($\chi^2 = 14.6$, $p = 0.006$). Nurses with 5–10 years of experience showed higher good knowledge scores (52; 26%), with a significant association between experience and knowledge ($\chi^2 = 10.2$, $p = 0.03$). These findings are supported by Saini *et al*. (2021) [9], who reported that higher educational qualification and greater professional experience significantly improved nurses' knowledge regarding infection control practices.

Among nurses who had previous training, 49 (24.5%) demonstrated good knowledge, and previous training showed a significant association with post-test knowledge scores ($\chi^2 = 16.8$, $p = 0.001$). Similar results were observed in a study conducted by Kavitha and Ramesh (2020) [10], which emphasized that prior infection-control training programmes significantly enhanced nurses' knowledge regarding prevention of hospital-acquired infections.

Overall, the present study indicates that educational qualification, work experience, and previous training significantly influenced post-test knowledge scores, whereas age and gender were not significantly associated with knowledge regarding nosocomial infection.

Conclusion

The present study concluded that the Structured Teaching Programme was effective in improving the knowledge of staff nurses regarding nosocomial infection. Before the intervention, most nurses had average and poor knowledge, whereas after the teaching programme, a significant increase in good knowledge scores was observed with a marked reduction in poor knowledge levels. The study also identified that educational qualification, work experience,

and previous training had a significant association with post-test knowledge scores. Nurses with higher educational background, greater professional experience, and prior exposure to infection-control training demonstrated better understanding regarding prevention of nosocomial infection. Therefore, regular structured educational programmes and continuous in-service training are essential to enhance nurses' knowledge and promote effective infection prevention and control practices in hospitals, thereby reducing the incidence of hospital-acquired infections and improving patient safety.

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