



THE IMPACT OF SHORT-TERM TRAINING PROGRAM FOR NURSES IN OPERATION THEATRE REGARDING ENVIRONMENTAL SURVEILLANCE IN OPERATION THEATRE IN A TERTIARY CARE HOSPITAL IN CENTRAL INDIA.

Nursing

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KEYWORDS

INTRODUCTION

Postoperative infection remains a major cause of morbidity amongst patients undergoing surgery. Maintenance of strict asepsis is essential if postoperative infections and their consequences are to be minimized.¹ Operating room (OR) air is persistent source of postoperative infections. Postoperative infections can be caused by a contaminated surfaces, contaminated environment, unsterile equipment, infected personnel and contaminated disinfectants.²

Biological contaminants occur in the air as aerosols and may include bacteria, fungi & viruses.³ Factors which affect the contamination in air are number of persons present in theatre, type of ventilation, rate of air exchange, quality of air provided & types of organisms.^{4,6} Monitoring the environment by the microbiological testing of surfaces and equipment's is useful to detect types and counts of microbial flora⁷. Air contamination is usually expressed as Bacteria Carrying Particles per cubic meter (BCP/m3) or Colony Forming Units per cubic meter (CFU/m3) of air measured with an air sampler.⁷

OBJECTIVE

The study aims to identify the impact of a short term training of operation theatre nurses regarding environmental surveillance like settle plate and swab collection technique in operation theatre.

Material and Methods

A mixed-methods research design that incorporates both qualitative and quantitative research approaches to address issues in sterile processing was used for this study.⁷ The quantitative data (test results) were validated by qualitative data (hospital assessments, including observations and participant feedback) to strengthen study findings.⁷⁻⁸

For this training, approval from the Institutional Ethical Committee was taken. The study was explained to participants in English and local language (Marathi) and informed written consent was obtained in English. In each of the training sessions in June 2022, nursing staff working in operation theatre were invited to participate in the short term training program including theory and skills training; 12-15 of these individuals were invited to remain for training per course. The collected quantitative data were analysed using a paired t-test by SPSS software, whereas comparative analysis was employed for the qualitative data.

Nurses were sensitised about Settle agar plate methods and swab collection techniques in Operation theatre and ICUs (Intensive Care Units)

Procedure

Sheep blood agar plates after labelling with appropriate date and time should be exposed with lid opened for 30 -60 minutes at different areas in Operation theatre and ICUs(Intensive Care Units) before and after fumigation of OT.⁹ Plates must be closed and sealed, transported to the Diagnostic Microbiology Laboratory and incubated at 37°C for 48hrs. Growth is observed, colony forming units (CFU) are counted. The acceptable limit of CFU was calculated by using the formula based on the colony count, area of the plate exposed, and the duration of exposure and to certify the OT is safe for surgery.⁷

Microbiology report must be followed and appropriate steps must be

undertaken to ensure that if any unacceptable growth is reported.

Surface swab

Surface swabs should be collected from the high touch areas of that region eg. Operation theatre table at the head end, foot end, over head lamp, microscope, the wall, door knob, Anaesthesia machine, instrument trolley, etc. The swabs must be inoculated in Robertson's cooked meat broth (RCMB) for 7 days at 37°C.⁷ Swabs should be collected from filters of air-conditioning units also regularly and reports followed from the Microbiology laboratory.

Intervention description

Initial consultation of the Dean, Head of the Department, Microbiology, Matron Sister, Department of Surgery, Indira Gandhi Government Medical College and Hospital, Nagpur, was taken to conduct the training program. Data collected included pre- and post-training hospital assessments as well as pre- and post-training participant tests.

The training program was conducted in June 2022 in IGGMCH.

Hospital administrators were requested to send all nurses working in various Operation Theatres like Surgery, Orthopaedics, Ophthalmology, Obstetrics and Gynaecology, ENT, Emergency Operation theatre and various ICU's like MICU(Medical Intensive Care Unit), SICU(Surgical Intensive Care Unit), NICU(Neonatal Intensive Care Unit), PICU (Paediatric Intensive Care Unit) etc. for the training program. Inclusion criteria for the course consisted of those nurses involved in the OT practices or those who were responsible for overseeing the surveillance in OT.

Table 1. Demographic data.

S.NO	CONTENTS	NUMBER
1.	Pre-assessment date	June 2022
2.	Post-assessment date	July 2022
3.	Number of operating rooms	14
4.	OT Settle plate and surface Surveillance performed	Every Saturday of the week
5.	Number of staff members who received more than one hour of classroom training	50
6.	Number of staff members who received more than one hour of classroom training	50
7.	Number of staff members who received on-the-job training	60
8.	Number of staff members who received on-the-job training on training	60

Training program

Every training was done in English with support by a local speaking language as needed. Participants received three days of classroom training. Lecture topics included basic microbiology regarding culture media, infection prevention and control in Operation theatre and ICU, swab testing for surface surveillance in high touch area, cleaning and decontamination, disinfection, settle agar plate packaging and transportation, fogging, sterile storage of settle agar plate.

Data Analysis

Data were analyzed using a concurrent embedded mixed methods approach. Quantitative data from participant knowledge tests and hospital assessments were analyzed (in SPSS statistical software) using paired t-test to analyse to test the null hypothesis that there were no statistical differences in the variables under investigation after the training at 0.05 level of significance. The t-test was used to test the aggregate effect of the training on workers' SP knowledge and practices. In both tests, the improvements were considered significant if the p value ≤ 0.05 .

Knowledge test result

50 participants from IGGMH hospitals completed both the pre-course and post-course knowledge tests. Analysis of test scores show significant improvements in participants' knowledge acquisition. The mean pre-course test score was 3 and mean post course 9. The mean difference was 8.47 at t-value 10.574 ($p < 0.001$). A total of 10 questions were asked in pre and post test evaluation.

Pre test results out of 10 (n=50)

3,4,5,1,2,3,4,3,4,5,4,3,2,1,4,3,5,3,4,3,2,4,3,2,3,4,1,2,3,3,4,4,3,4,2,3,4,3,3,4,4,2,5,4,3,5,6,5,4,3

Post test results out of 10 (n=50)

8,9,7,7,8,9,7,8,8,8,9,10,6,8,9,10,9,7,6,10,10,9,8,7,10,9,8,7,8,10,9,9,10,10,10,7,8,9,9,9,8,7,8,8,8,9,10,10,10

Table no 1: Pre-test statistical analysis table(n=50)

S.No	Contents	Number
1	Mean	3.33
2	Standard Deviation	1.14
3	SEM(Standard Error of Mean)	0.16
4	90% Confidence Interval	3.05 to 3.60
5	95% Confidence Interval	3.00 to 3.66
6	99% Confidence Interval	2.89 to 3.76
7	Minimum Number	1
8	Median	3
9	Maximum	6
10	Mode	4

Table no 2: Frequency distribution table for Pre-Test

S.No	Element	Frequency	Cumulative frequency	Relative frequency	Cumulative relative frequency
1	1	3	3	0.06	0.06
2	2	7	10	0.14	0.2
3	3	17	27	0.34	0.54
4	4	16	43	0.32	0.86
5	5	6	49	0.12	0.98
6	6	1	50	0.02	1

Table no 3: Post-test statistical analysis table(n=50)

S.No	Contents	Numbers
1	Mean	8.42
2	Standard Deviation	1.15
3	SEM(Standard Error of Mean)	0.16
4	90% Confidence Interval	8.25 - 8.27
5	95% Confidence Interval	8.19-8.85
6	99% Confidence Interval	8.09-8.95
7	Minimum	6
8	Median	9
9	Maximum	10
10	Mode	8

Table no 4: Frequency distribution table for Post-Test

S.No	Element	Frequency	Cumulative frequency	Relative frequency	Cumulative relative frequency
1	6	2	2	0.04	0.04
2	7	8	10	0.16	0.2
3	8	14	24	0.28	0.48
4	9	14	38	0.28	0.76
5	10	12	50	0.24	1

Paired t test values

P value and statistical significance

The two tailed P value is less than 0.0001

By conventional criteria, this difference is considered to be extremely

statistically significant.

Confidence interval

The mean of Group One minus Group Two equals -5.60

95% Confidence Interval of this difference: From -5.81 to -5.39

Intermediate values used in calculations:

t=56.0000

Standard error of difference=0.100

Table 5. Hospital pre-post Assessment results (out of 10)

Variable	Pre-Assessment	Post-Assessment
Knowledge about agar settle plate	3(30%)	8(80%)
Knowledge about surface surveillance in OT	2(20%)	9(90%)
Information regarding transport of swabs and agar plates to Microbiology dept	3(30%)	8(80%)
Knowledge about receiving microbiology reports	4(40%)	7(70%)
Routine infection control guidelines in OT	3(30%)	8(80%)
Knowledge about Fogging in OT	3(30%)	8(80%)
What to do if report is not satisfactory	4(40%)	7(70%)

DISCUSSION

Nosocomial infection is a main hassle in any healthcare facility. Often nosocomial infections become apparent while the affected person continues to be inside the health facility but in some instances symptoms might not show up until after the affected person is discharged. About 30 % of sufferers admitted to hospitals & nursing houses in our country acquire nosocomial infections as in opposition to an impressive 5% in the west, in line with members of hospital contamination Society (HIS), India. Operation Theatres are the unit of hospitals in which surgical procedures are done on patients which can be admitted to hospitals. Surgical procedures are part of medical treatment that calls for very sterile ecosystem round there. 10

Infection control in Operation theatre and ICU by environmental monitoring plays a very important role in reducing the morbidity and mortality of patients who are victims of hospital associated infections. Many developing countries have reported high postoperative infection rate in their hospital, so regular monitoring of pathogens in the air sample is one of the preventive measure for post-operative infections. This study training was carried out with an interest to look for the knowledge of Operation Theatre Nurses and Intensive Care Unit (ICU) Nurses in our hospital regarding air and surface surveillance by settle plate agar method and surface sampling in Operation theatre and ICU.(patwardhan)¹¹

It was seen during the training that the nurses did not have enough knowledge about the settle plate agar methods and surface swab collection method. Their knowledge regarding infection control practices in operation theatre and ICU was also limited. The statistical analysis showed that the two tailed P value is less than 0.0001

By conventional criteria, this difference is considered to be extremely statistically significant.

This means such training programs should be included to improve the knowledge and skills of nurses. This improvement is very important for reducing the health care associated infections and improving environmental surveillance.

Statistical significance enables us to test the statistical hypothesis that there is a significant difference in sterile processing practices pre- and post-training; however, this does not imply clinical significance. We recorded statistically significant improvements on these variables.

This was a novel type of training given to Operation theatre nurses and ICU nurses regarding Microbiological knowledge in hospital infection control practices about surface and air surveillance monitoring.

CONCLUSION

Training of hospital Operation theatre nurses and ICU nurses is need of the day and mandatory to maintain the operation theatres, ICUs clean and sterile to avoid the post operative hospital acquired infections. Regular air and surface surveillance should also be done regularly.

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