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Operating Room Nurses' Knowledge and Practice of Sterile Technique

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Abstract

Introduction: Nurses play an important role in the prevention and control of surgical site infections or SSIs because they undertake a high proportion of the treatment and care of surgical patients. Sterile technique plays a vital role in the control and prevention of SSIs and surgical site contamination.

Aim: This investigation aimed to determine the knowledge and extent of practice of sterile technique among operating room nurses in four selected hospitals in Samar, Philippines.

Methodology: The investigator utilized the descriptive-correlational method of research. Total enumeration was utilized to recruit respondents from four identified hospitals in Samar, Philippines, namely; Calbayog Sanitarium and Hospital, Our lady of Porziuncola Hospital Inc., St. Camillus Hospital, and Samar Provincial Hospital. Knowledge and extent of practice of sterile technique were measured through an investigators formulated questionnaire and evaluation checklist based on the concepts of sterile technique.

Results: Nurses have "Excellent Knowledge" on the concepts/principles of sterile technique and applied it to a "Great Extent". No correlations were found between nurses' knowledge and extent of practice on sterile technique and their demographic variables such age, gender, length of clinical experience, and number of relevant trainings attended. However, significant relationship was found between knowledge and extent of practice of sterile technique.

Conclusion: Findings suggest positive association between knowledge on sterile technique and its application. Thus nurses' must continue to upgrade its knowledge to keep them abreast with the new trends and innovations on peri-operative nursing.

Keywords: Sterile technique, Operating room nurses, Knowledge, Practice

Introduction

Surgical site infections (SSIs) have been reported to be one of the most common causes of nosocomial infections; is accounting 20% to 25% of all nosocomial infections worldwide and that 2–5% of all patients who undergo an operation will develop an SSI and patients who suffer SSI are twice as likely to die as other postoperative patients [1]. As surgical site infection is the cause of significant mortality and morbidity in patients, strategies of decreasing their incidence such as compliance to sterile technique in the operating room complex is of considerable value.

According to Phillips, sterile technique is the basis of modern surgery and therefore strict adherence to the recommended practices of sterile technique is mandatory for the safety of the patient as well as for the personnel in the operating room complex [2]. Compliance with infection control and sterile technique principles in practice may prevent nosocomial infections in the operating room complex and will result in the patient's hospital stay being shorter and a reduced cost for the medical aids and hospitals, whereas infections result in an increased institutional cost due to an increased length and complexity of hospital admission [3].

Mangram et al [4] suggests that adherence to the sterile technique principles by the sterile surgical team members, as well as by the unsterile members such as the anesthetist, must be observed, as it is the foundation of the prevention of nosocomial infection and contamination of wounds by potentially pathogenic microorganism [5]. If there is non-compliance with any one of the above-mentioned principles it may lead to the surgical wound becoming contaminated. Furthermore, De Laune and Ladner [6] state that nosocomial infections may be transmitted to the patient by the nursing personnel who fail to practice or carry out the sterile technique principles.

Preventing surgical site contamination requires the efforts of all surgical team members to use their theoretical knowledge and experience in aseptic practices to provide their patients with optimal care resulting in positive surgical outcomes. Osman [7] reiterated that it is the responsibility of each member of the sterile surgical team to understand the meaning of principles and incorporate them into their everyday practice.

Fry and Fry [8] claimed that, peri-operative nurses play an important role as the patient's infection control advocate. Nurses in the operating room must be well-equipped and demonstrate sound knowledge and practice in maintaining a sterile field all times to minimize spread of potential pathogens to other sites, wounds or self and help patients in having a safe operation [9].

In a recent survey conducted in two major hospitals in Greece, nurses demonstrated a sound knowledge of the aseptic principle when questioned but 15.6% of nurses were found to have contaminated their hands during the procedure [10]. In the Philippines, particularly in Samar Province, there is a dearth of empirical data regarding nurses' knowledge and extent of practice of sterile technique. It is in light that the investigators were motivated to conduct this investigation.

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Research Problem

This investigation aimed to determine the knowledge and extent of practice of sterile technique among operating room nurses in four selected hospitals in Samar, Philippines.

Methodology

Design

The investigator utilized the descriptive-correlational method of research. Descriptive design because this investigation described the knowledge and extent of practice on sterile technique among nurses. Furthermore, correlational analysis was employed to determine relationship between and among selected variables.

Participants

Total enumeration was utilized to gather respondents in the investigation. Twenty one operating room nurses recruited from four identified hospitals in Samar, Philippines, namely; Calbayog Sanitarium and Hospital, Our lady of Porziuncola Hospital Inc., St. Camillus Hospital, and Samar Provincial Hospital. Inclusion criterions were set for study participation among nurses as follows: (1) nurses with permanent status, (2) nurses who consented to participate in the study, and (3) are presently working in the four identified hospitals. In data gathering, respondents were approached personally and professionally at the time convenient to them. After a given time, the test questionnaires were recollected. Furthermore, respondents were evaluated as to the extent of practice of sterile technique during their tour of duty in a period of one month.

Ethical Consideration

The investigator sought the approval of the Ethics Committee of Calbayog Sanitarium and Hospital, Our lady of Porziuncola Hospital Inc., St. Camillus Hospital, and Samar Provincial Hospital prior to the conduct of the investigation. Precautionary measures were taken into consideration to safeguard the study respondents' legal rights. Prior to the interview, consent forms were given to the respondents and have them read and signed it. Confidentiality and anonymity of the respondents were maintained by only a code number on the questionnaire.

Instrument

The investigators utilized three-part questionnaires in gathering necessary data. Part I was composed of the demographic profiles of the respondents. Part I is a 20 item test divided into two sections; 10 items multiple choice and 10 items alternate response; the maximum possible score is 20. It was designed to measure the knowledge of the respondents on the principles of sterile technique. The higher the score, the greater the knowledge about the sterile technique the participant has. Respondents were asked to indicate their answers by encircling appropriate option. Result of test was interpreted as follows; 17 – 20 as "Excellent", 14 – 16 as "Very Good", 11 – 13 as "Good", 8 – 10 as "Fair", and 0 – 7 as "Needs Improvement".

In order to evaluate the extent of practice of sterile technique, the investigators utilized Questionnaire III, an evaluation checklist which was rated by the respondents in a fixed five point likert scale. Scores assigned to each item are between 1 to 5 points as follows; (Greatly Done, Well done, done to a moderately extent, done to a limited extent, and Not done).

Both the questionnaire and the check list were drafted in a structured format and they were used in a pilot test before being applied to the respondents enrolled in this investigation. Refinement and re modifications were done on the basis of pretest results. Furthermore, questionnaires were validated through expert validation by five experts in the field of peri-operative nursing.

Characteristics		n	%
Age		21	100
	25 – 30 years old	9	42.86
	31 – 34 years old	2	9.52
	35 – 40 years old	7	33.33
	41 – 44 years old	2	9.52
	45 – 50 years old	1	4.76
Gender	Female	16	76.19
	Male	5	23.81
Length of Clinical Experience	1 – 5 years	8	38.09
	6 – 10 years	5	23.81
	11 – 15 years	5	23.81
	16 – 20 years	2	9.52
	21 – 25 years	1	4.76
Number of trainings attended	0 – 3	7	33.33
	4 – 6	5	23.81
	7 – 10	5	23.81
	11 – 14	2	9.52
	> 15	2	9.52

Table 1: Demographic Characteristics of the Nurse-Respondents.

Score Range	Frequency	%
17 – 20	12	57.14
14 – 16	8	38.09
11 – 13	1	4.76
Mean	**16.83**	
SD	**1.98**	

Table 2: Knowledge of Staff Nurses on Sterile Technique.

Data Analysis

Descriptive and inferential statistics were utilized to analyze the data. Descriptive statistics included frequency, percentage, mean and standard deviation. Pearson r coefficient correlation was utilized to determine correlation of selected variables. Data were analyzed using SPSS version 11.0.

Results

The respondents' age ranges from 24 to 49 years old with a mean age of 32.86 and standard deviation of 7.58. Majority of the respondents are female (76.19%) and within the age bracket of 25 to 30 years old (42.86%). As to length of clinical experience, most of the respondents have rendered 1 to 5 years of service (38.09%). Meanwhile, 33.33% of the respondents attended 1 to 3 relevant trainings (Table 1).

Table 2 presents the cumulative scores of the respondents on the two-part questionnaires on sterile technique.

Majority of the respondents (57.14%) scored within the score range of 17 to 20 which is interpreted as "Excellent", while 38.09% scored within the score range of 14 to 16 which is interpreted as "Very Good".

In general nurses possess "Excellent" knowledge on sterile technique with a weighted mean score of 16.83.

Table 3 discusses the information obtained from respondents regarding the extent of practice of sterile technique. Mean scores were

Indicators	Mean Score	Interpretation
Wears mask, head cover and proper OR suit/attire at all times	4.90	GE
Makes sure that instruments, supplies and linens obtained from stock room have been sterilized and wrapped of sterile package.	4.90	GE
Observes asepsis in preparation of sterile instruments and supplies; arranges instruments in the field to facilitate handling of instruments.	4.90	GE
Prepares sterile instruments and supplies and sterile field as close as possible to the time of use.	4.86	GE
Does skin preparation from the site of incision.	4.81	GE
Does surgical scrub from hands up to 2 inches above elbows, always keeping the hands higher than the elbows.	4.90	GE
Does gowning and gloving aseptically. Also assists in gowning and gloving by surgeon and his assistant/s observing sterile technique.	4.76	GE
In draping the patient, all skin area is covered except the incision site.	4.86	GE
Avoids touching the part hanging below the table level, when in scrub.	4.86	GE
Avoids touching the part hanging below the table level, when in scrub.	4.67	GE
When in scrub, avoids leaning on non sterile areas; if not (circulating) avoid switching over sterile field.	4.81	GE
Maintains cleanliness of the instruments throughout the procedure. Swipes the blood stained instruments with moistened gauze.	4.86	GE
Talking, sneezing, and coughing are always kept to a minimum.	4.52	GE
Movements within and around sterile area is kept to a minimum.	4.62	GE
Keeps contact to sterile items to a minimum	4.86	GE
Provides other supplies, materials and instruments if not in scrub (circulating nurse), careful not to touch unsterile areas.	4.81	GE
Does initial and final counting of instruments and supplies with a circulator.	4.86	GE
Keeps the room cool and conducive for the surgical team and patient.	4.81	GE
Segregates wastes as the operation progresses.	4.57	GE
Grand Mean	**4.78**	GE

4.51-5.00 Very Great Extent (VGE); 3.51-4.50 Great Extent (GE); 2.51-3.50 Moderately Extent (ME); 1.51-2.50 Limited Extent (LE); 1.00-1.50 Not at all (NA)

Table 3: Extent of Practice of Sterile Technique.

Knowledge on Sterile Technique	r-value	p-value
Age	-0.02	-0.09
Gender	0.31	1.40
Length of Clinical Experience	0.28	1.25
Number of Trainings Attended	0.01	0.05

**Significance level, a = 0.05; two-tailed; df = 19 tab. t-value 2.08*

Table 4: Correlation between Operating Room Staff Nurses' Demographic Profile and Knowledge on Sterile Technique.

computed for each of the indicators which ranged from 4.52 to 4.90. See Table 3.

Of 19 indicators, "Wears mask, head cover and proper OR suit/attire at all times", "Makes sure that instruments, supplies and linens obtained from stock room have been sterilized and wrapped of sterile package", "Observes asepsis in the preparation of sterile instruments and supplies; arranges instruments in the field to facilitate handling of instruments", and "Does surgical scrub from hands up to 2 inches above elbows, always keeping the hands higher than the elbows" were among the highest scored items. Meanwhile, "Segregates wastes as the operation progresses" and "Talking, sneezing, and coughing are always kept to a minimum" were the least scored items.

In general, sterile technique was done by the respondents a "Great Extent" with a grand mean of 4.78.

Table 4 discusses the relationship between staff nurses' demographic variables in terms of age, gender, length of clinical experience, number of trainings attended and their knowledge on the principles of sterile technique.

The computed r-value for the relationship between knowledge on sterile technique and respondents' age was -0.02, with computed p-value of -0.09, which was less than the critical t-value of 2.08 at significance level of 0.05. Similarly, gender, length of clinical experience, and number of relevant trainings attended posted a computed r-value of 0.31, 0.28, and 0.01 and computed t-value of 1.40, 1.25, and 0.05 respectively, which were less than the critical value of 2.08 at significance level of 0.05.

Table 5 presents the relationship between OR staff nurses' demographic variables in terms of: age, sex, length of clinical experience, number of trainings attended and their extent of practice on sterile technique.

The computed r-value for the relationship between extent of practice of sterile technique and respondents' age was -0.03, with computed t-value of -0.11, which was less than the critical t-value of 2.08 at significance level of 0.05. Similarly, gender, length of clinical experience, and number of relevant trainings attended posted a computed r-value of -0.25, -0.03, and 0.06 with computed t-value of -1.11, -0.13, and 0.27 respectively, which were less than the critical value of 2.08 at significance level of 0.05.

This section discusses the relationship between staff nurses' knowledge and extent of practice of sterile technique.

As seen reflected on Table 6, the relationship between staff nurses' knowledge and extent of practice of sterile technique posted an r-value of -0.45 with a computed t-value of -2.22 (absolute t-value) which was greater than its critical value of 2.08 at significance level of 0.05.

Discussion

This investigation determined the knowledge and extent of practice of sterile technique among operating room nurses. This contributed to the growing body of knowledge regarding sterile technique.

Findings indicated that operating room nurses hold excellent

Extent of Practice of Sterile Technique	r-value	p-value
Age	-0.03	-0.11
Sex	-0.25	-1.11
Length of clinical experience	-0.03	-0.13
No. of trainings attended	0.06	0.27

**Significance level, a = 0.05; two-tailed; df = 19 tab. t-value 2.08*

Table 5: Correlation between Operating Room Staff Nurses' Demographic Variables and Extent of Practice of Sterile Technique.

Variables	r-value	p-value
Knowledge on Sterile Technique and Extent of Practice of Sterile Technique	-0.45	-2.22

**Significance level, a = 0.05; two-tailed; df = 19 tab. t-value 2.08*

Table 6: Correlation between Knowledge and Extent of Practice on Sterile Technique.

theoretical knowledge on principles of sterile technique necessary to provide safe and effective nursing to their surgical client during the intra operative period. This result is worth noting since previous study conducted suggests that, one of the factors impacting compliance with the standard precautions in any hospital settings is sound knowledge on its concepts and principles [11]. However, result of this investigation disagrees with the previous studies conducted among nurses and other clinicians regarding knowledge on aseptic technique and standard precautions in hospital settings. Luo et al [11] investigated nurses in China and found out that only half had knowledge on the subject matter. Melo et al [12] investigated nurses in one hospital in Goiania, Brazil, and found that only 75.6% understood the standard precautions as protective measures.

Findings also revealed that the principles of sterile technique were applied to a greater extent by operating room nurses. This may be attributed to the rigid training these nurses underwent during the in-house training conducted regularly by their institutions to keep them updated with the different nursing skills including performance of sterile technique. This result is essential to note since failure to use the aseptic technique correctly could be responsible for problematic and intractable infections [13].

This investigation also shows that age, gender, length of clinical experience, and numbers of trainings attended are not determinants of the knowledge on the principles of sterile technique. This implies that nurses regardless of their age, gender, length of clinical experience, and numbers of trainings attended do not differ in knowledge on sterile technique. This finding disagrees with the previous studies conducted which identified staff nurses' years of experience as an indicator of better knowledge with regards to infection control measures [14,15].

Furthermore, nurses' demographic variables were also observed as not predictors of compliance and performance of the principles of sterile technique. This indicates that both male and female nurses regardless of their length of clinical experience and number of relevant trainings attended can perform sterile technique evenly well.

Central finding of this investigation was the positive association between knowledge and practice. This implicates that knowledge on sterile technique exerts a positive impact on the extent of practice and application of sterile technique. With improved knowledge comes improve practice. This result is supported by other authors [14-16]. Furthermore, result is also supported by the theory of Patricia Benner which says that expert nurses develop skills and understanding of patient care over time through a sound educational base and a multitude of experiences. The premise of this theory is that the development of knowledge on applied disciplines such as nursing is composed of the extension of practical knowledge through research and understanding the "know-how" of clinical experience [17]. It is clear that nurses involved in the investigation practiced sterile technique to the greater extent based on sound theoretical knowledge on the concepts of the principles of the technique. Findings further conforms to the suggestions made by Cave that the 'know-that' of nursing education needs to be translated into the know-how of nursing practice [18] and suggests further that there is no existing dichotomy between the theory and the practice.

Strengths and Limitations of the Study

One of the strengths of this study is the inclusion of the entire population of operating room nurses in four identified hospitals as respondents in the investigation. This ensures that there is no selection bias since respondents were not selected purposively. However, this investigation was conducted among hospital nurses from one province only. Exclusion of nurses from other provinces may limit the generalizability of this investigation. Another potential limitation of the investigation is the use of questionnaires and checklist to measure the practices which may affect to information bias.

Conclusion

Findings of this investigation revealed that knowledge and extent of practice of sterile technique has nothing to do with the age, gender, length of clinical experience, and number of relevant trainings attended. However, there is a clear association between knowledge and extent of practice of sterile technique. This is a clear indication that knowledge has a positive effect on the extent of practice of sterile technique.

Result shows that the more knowledgeable the nurses' are, the more skillful they are in the practice of sterile technique. This result reinforce the importance of continuing education among operating room staff nurses to keep them updated with the new trends and developments in infection control and sterile technique principles in order to become increasingly efficient and effective at preventing nosocomial infections.

The results generated from this investigation will provide insight to Nursing Administrators who are aiming to improve safe, complication free, and positive surgical outcome. Hospital programs for new nurses may likewise benefit from this investigation by providing information to newly hired nurses that will improve and enhance performance and provide quality nursing care to their surgical patients.

This study focuses on a small number of respondents, thus further study utilizing a bigger population maybe done. Furthermore, studies identifying other factors which may be related to knowledge and practice of sterile technique may be investigated.

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