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An experimental study to assess the effectiveness of simulation training on knowledge and skill regarding management of patient with central venous catheter among staff nurses working in selected hospital, Bangalore.

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Abstract

Background: Central venous catheter is now commonly used in critical units as most of these patients with central venous catheter can give rise to various complications like line embolism, thrombosis, infection sepsis, ischemia of involved limbs, cardiac perforation, pneumothorax, accidental puncture of an artery leading to bleeding catheter displacement etc. Today as technology is advancing at a rapid speed, nurses involved in patient care should up-to-date their knowledge and skill. Having mere knowledge is not adequate; they should apply these knowledges while providing care to patients to improve the health of patients and to prevent development of complications. Currently, in India there is need for establishment of knowledge, training and practice about central venous catheter and its complication.

Materials and methods: A pre experimental one group pre- test post- test study designed was employed to assess the knowledge and skill regarding management of patient with central venous catheter among staff nurses working in selected hospitals, Bangalore. Non probability convenient sampling technique was used,

and 60 ICU staff nurses were selected. Structured knowledge questionnaire and structured skill questionnaire were used to collect the data.

Result: In pre-test, the knowledge mean was 11.73 with standard deviation 3.091. The post-test scores revealed that staff nurses scored mean of 23.52 with standard deviation 1.864. The pre-test skill mean was 14.25 with standard deviation 3.443 and post skill mean 29.97 with standard deviation 0.758 which represented the effectiveness of simulation training programme. It was observed that there was a negligible correlation ($r = 0.167$, $p = 0.201$) between knowledge and skill. There was a significant association between knowledge and marital status whereas in skill there was significant association between skill and parent hospital and marital status of the nurse ($p = 0.001$) and parent hospital of the nurse ($p = 0.038$).

Conclusion: The study revealed that the simulation training program had increased the knowledge and skill among staff nurses. In regards to knowledge, the post-test mean score was 23.52 compared to pre-test mean score of 11.73 and in regards to skill; the post-test mean

score was 29.97 compared to pre-test mean score of 14.25.

Keywords: Effectiveness, central venous catheter, intensive care unit.

Introduction

Presence of intravascular devices is the common cause for the occurrence of infections. Central venous catheter (CVC) pose a greater risk of device-related infections than any other types of medical devices and these are major causes of morbidity and mortality. They are the main source of bacteraemia and septicaemia in hospitalized patients. The exit site of central venous line is a potential site of infection. As a potential source of infection, the exit site requires careful monitoring and scrupulous hygiene. Complications that can occur during or after placement of CVC access devices include cellulitis, pneumothorax, catheter related infection, venous thrombosis¹.

Most central venous catheter device related infections are preventable and different measures have been implemented to reduce the risk for catheter related infections including maximum barrier precautions during catheter insertion, catheter site maintenance and hub handling. Certain procedures should be followed by nurses to ensure that the exit site of all central lines is monitored and cared for meticulously and treated as necessary. Improper management of patients with central venous catheter can give rise to various complications like line embolism, thrombosis, infection sepsis, ischemia of involved limbs, cardiac perforation, pneumothorax, accidental puncture of an artery leading to bleeding catheter displacement etc. Nurses have major role in prevention of complications of central venous access devices and

she is responsible for her own actions and must exercise their own professional judgment at all times.²

Quality of care is an important topic in the health care setting. Assessment of clinical performance is obligatory for the evaluation of both the effectiveness and efficiency of nursing care. The goal of intensive care is to achieve the best outcome for critically ill patients and this is usually accompanied by the use of very complex care. All patients carry both an intrinsic and an extrinsic risk. Indicators to evaluate the quality of care are progressively being used and focused on patient's outcome³.

Role of nurses in care of patients with central venous catheter is tremendous. To prevent infection of central venous catheters, nurses have to practice strict aseptic techniques while giving care to patients. Today nursing is considered as a discipline of higher technology coupled with a wealth of complex information. Nurse's role is to apply this knowledge in an efficient and cost-effective manner. It is essential for nurses who are responsible for effective conduct of central venous catheter care, to have clear picture of its techniques, peculiarities, and above all its inherent dangers. They need to have knowledge and skill in care of patients with central venous catheter to prevent development of complications⁴.

Materials & Method

A. Study Design

The study used was pre experimental one group pre-test post-test design.

B. Variables

Study variables for the study includes age, gender, educational status, area of work, years of experience, monthly income, marital status, institute passed out,

parent hospital, attend any in-service education programme regarding CVAD.

C. Setting of the study

The study was carried out in a selected hospital, Bangalore.

D. Sample size: 60 ICU nurses.

E. Sampling technique: convenient sampling technique was used to select the samples.

F. Inclusion and exclusion criteria:

Inclusion criteria

Staff nurses working in ICU

- Staff nurses having 1 to 5 years of experience at intensive care unit.
- Nurses who are willing to participate.

Exclusion criteria

- Nurses who had undergone simulation training regarding management of central venous catheter within 1 year of period.
- Nurses who are not available during time of data collection.

G. Development of tool

After an extensive review of literature and discussion with experts, a structured knowledge questionnaire regarding management of patient with central venous catheter and structured observational checklist regarding management of patient with central venous catheter was developed by the researcher. The questionnaire included various items on safety guidelines for CVC insertion, central line dressing change, prevention of infection and complication whereas in skill checklist it consists of items where the student researcher observed the nurses on various aspects of change of dressing at central venous access site, blood withdrawal, giving medication and heparin flush.

H. Validity

Content validity of the tool was established by inviting suggestions from experts that included one ICU intensivist and nine nurse experts. There was 100% agreement between the experts on relevance of items included in the tool

I. Reliability

Knowledge questionnaire and observational checklist were tested for reliability using split half method and were found to be acceptable. Reliability ($r= 0.85$ and 0.76) respectively.

J. Ethical clearance

The ethical clearance for this study was obtained.

L. Data collection procedure

- The data were collected in selected hospital, Bangalore, after obtaining formal permission from the concerned authorities. Staff nurses who met the inclusion criteria were recruited from ICU In-charge of all the respective ICU. A total of 60 nurses were selected for the study. Subjects were given detailed information about the study and informed consent was obtained from all the subjects. Data were obtained by using structured knowledge questionnaire and structured checklist questionnaire. The time taken by each subject was about 30-40 minutes. Approximately 5-10 subjects were assessed per day. The pre-test knowledge and skill were assessed by using self-administered structured questionnaire and structured checklist. On the same day simulation training regarding management of patient with central venous catheter was conducted through lecture, demonstration method for the period of 1 hour. On 8th day, post-test knowledge was assessed by using the same structured knowledge questionnaire and skill will be assess by re-demonstration on mannequins in lab

with the help of checklist. The collected data were coded and entered in the master sheet.

M. Statistical method

The data analysis was done by using descriptive and inferential statistics. SPSS (version 20) was used to analyse the data.

Results

The collected data were analysed according to the objectives of study. The findings are presented below.

I: Socio demographic characteristics of the subjects.

Frequency and percentage distribution were computed for sociodemographic characteristics of the subjects. It is observed that majority of the subjects, 63.3 % belongs to the age groups of (29 – 33) year. Majority of the subjects 81.7 % were female. Majority of the subjects, 55 % had completed B.sc nursing. Majority of them work in MICU 40%. 43.3% had 4-5 years of experience. 48.3% of the subjects had monthly income of (26,000-30,000). Majority of the subjects, 65% were married. 40% completed their nursing course in private college/school. Most of the subject 60 % studied in college with attached parent hospital. 58.3% had attended in-service education programme related to CVAD in the last 1 year.

II. Frequency and percentage distribution of knowledge.

Majority of the subject 28.30 % had moderate adequate knowledge before simulation training programme, none of the subjects had adequate knowledge and 71.70 % of the subjects had inadequate knowledge whereas in post-test 26.70% of subject had adequate knowledge, 73.30% of the subjects had moderate knowledge and none of the subject had inadequate knowledge after simulation training regarding management of patient with central venous catheter among nurses.

III. Frequency and percentage distribution of skill.

Half of the subjects, 50% had poor practice, 50% of the subject had fair skill and none of the subjects had good skill before simulation training programme whereas in post-test 76.70% of the subject had good skill, 23.30% of the subject had fair skill and none of the subject had poor skill regarding management of patient with central venous catheter among nurses.

IV. Comparison of pre-test and post-test level of knowledge and skill.

The study revealed that simulation training programme has increased the knowledge among staff nurses in the post-test (23.52) scores as compared to pre-test (11.73) whereas the skill has increased in the post-test (29.97) scores as compared to pre-test (14.25).

V. Correlation between knowledge and skill regarding management of patient with central venous catheter.

It was observed that there was negligible correlation ($r = 0.167$, $p = 0.201$) between knowledge and skill regarding management of patient with central venous catheter among nurses.

VI. Association between knowledge regarding management of patient with central venous catheter and sociodemographic data.

Chi square was used to find the association between sociodemographic characteristics and knowledge of the nurses. It was observed that there was significant association between marital status ($p=0.035$) and knowledge regarding management of patient with central venous catheter among nurses.

VII. Association between Skill regarding management of patient with central venous catheter and sociodemographic data.

Chi square was used to find the association between sociodemographic characteristics and skill of the

nurses. It was observed that there was significant association between skill regarding management of patient with central venous catheter and marital status (**p = 0.001**) and parent hospital (**p = 0.038**). Other characteristics such as age, gender, educational status, area of work, years of experience, monthly income, type of institution, attached parent hospital, and in-service education did not show any association with skill of nurses.

Discussion

Based on the result of present study, in pre-test majority of the subjects, had inadequate knowledge and none of the subjects had adequate knowledge regarding management of patient with central venous catheter. A similar study conducted by Anne Joseph at Glasgow hospital, 2016 showed that (68%) nurses had inadequate knowledge and (32%) nurses had moderate knowledge. Whereas in post-test majority of the subject that is 73.3% had moderate knowledge and 26.7% of them had adequate knowledge and none of them had inadequate knowledge regarding management of patient with central venous catheter among nurses. The present study is supported by the study conducted by Verma Kumari in 2016 in selected oncology hospital, Bangalore on care of patient with central venous catheter among nurses and the result showed that in post-test 70% of them had moderate knowledge 30% of them had adequate knowledge and none of them had inadequate knowledge.⁵

The present study result showed that half of the subject had poor practice, half of the subjects had fair practice and none of the subjects had good practice regarding management of patient with central venous catheter. A similar study conducted by Kokila S in selected hospital, Dharmapuri, 2018 prevention of central line associated blood stream infection of patient and the

study results showed that in pre-test (30%) nurses had poor skill and (46.7%) nurses had fair skill. Whereas in post-test majority of the subject had good skill and 23.3% had fair skill and none of them had poor skill. The present study is supported by the study conducted by Kokila S in selected hospital, Dharmapuri, 2018 on prevention of central line associated blood stream infection of patient and the study results showed that in post-test (60%) nurses had good skill and (26.7%) nurses had poor skill.⁶

Study findings revealed that there is change in knowledge and skill of the nurses after post-test. 73.3% of the nurses were having adequate knowledge and 76.7% of nurses had good skill after simulation training. The statistical paired 't' test for pre-test and post-test knowledge was 23.739(p-value=0.000) and pre-test and post-test skill was 34.051(p-value=0.000) which emphasizes that the difference in pre-test and post-test was found to be statistically significant at 0.000 level. The study revealed that the study was effective. These studies are in line with the finding of the studies conducted by Binsy Daniel in 2013 in selected oncology hospital, Bangalore to assess the effectiveness of structured teaching programme on care of patient with central venous catheter among staff nurses. The statistical paired 't' test for overall knowledge was 8.5(p-value=0.0001) and skill 7.8(p-value=0.000) which emphasizes that the difference in pre-test and post-test was found to be statistically significant at 0.0001 level. This implies that the teaching programme on care of patients with central venous access device among staff nurses is effective.⁷

It was observed that there was moderate negligible correlation ($r = 0.167$, $p < 0.201$) between knowledge and skill regarding management of

patient with central venous catheter among nurses. The study finding was supported by a study conducted on “Assessment of the nurses’ knowledge and practice of caring patients with central venous catheter” at Celal Bayar University hospital, Turkey by Fathima in 2000. The 1st stage was to determine the knowledge of nurses about using central venous catheter, measurement, symptoms. The 2nd stage involved observation of patient with central venous catheter for signs and symptoms of infection and nursing intervention carried out for the same. The result revealed that nurses have high knowledge levels but their practices was not correlating with their knowledge which was evidenced by 42.75 of patients showing symptoms of infection.⁸

The findings of the study showed that there was significant association between knowledge regarding management of patient with central venous catheter and socio-demographic variables was rejected for age, gender, educational qualification, area of work, years of experience, monthly income, institute, parent hospital, in-service except marital status. The study findings supported by a study done on “A study of pre and post- test knowledge score of nurses on care of patient with central venous access devices in selected oncology hospitals of Bangalore by Ambika Narayan in 2016. This study revealed that there was statistical association between knowledge and socio demographic of staff nurses with years of experience, age and gender. The research accepts the null hypothesis which states that the area of experience and source of education exposure were not associated ($p\text{-value}>0.05$). This study indicates that there is no difference in education status, area of experience and education exposure.⁹

The present study revealed that there was significant association between skill regarding management of patient with central venous catheter and selected socio-demographic variables was rejected and accepted for marital status and parent hospital. The study findings are supported by a survey done on “Adherence of nurses on hand washing practice before giving medication for central venous catheter” in paediatric intensive care units of Sydney children’s hospital by Randwick in 2004. The study found an enormous level of variation among and between nurses reported practice and local policies. Intensive care units’ staffs have been identified as one of the least adherent group of health care professionals to practice hand antiseptic before invasive procedures. The study concluded that there is no association between practice and demographic variables such as age, gender, and years of experience etc.¹⁰

Limitations

- Authenticity of the information regarding socio-demographic variables is based on the response of the subjects.
- Limited sample size.

Conclusion

The present study findings indicated that the nurses had moderately adequate knowledge with relatively minimal practice rate. It clearly signifies that there is a gap in knowledge and skill regarding management of patient with central venous catheter among nurses. Periodical assessment and training sessions is needed to increase nurse’s knowledge and skill.

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