Effectiveness of Timeout Procedure Protocol on Knowledge and Skill regarding Patient Safety in Operating Room Nurses

Emily JD*, 2SasikalaS, 3Jolly R, 4Kanchana S, 5Celina D
1 - PG Scholar, Omayal Achi College of Nursing affiliated to The Tamil Nadu Dr. MGR Medical University, Chennai, Tamil Nadu, India.
2 - Assoc. Professor, Omayal Achi College of Nursing affiliated to The Tamil Nadu Dr. MGR Medical University, Chennai, Tamil Nadu, India.
3 - Professor, Omayal Achi College of Nursing affiliated to The Tamil Nadu Dr. MGR Medical University, Chennai, Tamil Nadu, India.
4 - Principal, Omayal Achi College of Nursing affiliated to The Tamil Nadu Dr. MGR Medical University, Chennai, Tamil Nadu, India.
5 - Vice Principal, Omayal Achi College of Nursing affiliated to The Tamil Nadu Dr. MGR Medical University, Chennai, Tamil Nadu, India.

Abstract
Background: Patient safety is a discipline that emphasizes safety culture in healthcare through the prevention, reduction, reporting and analyzing of medical and surgical errors that often lead to adverse effects. Aim and Objective: To assess and compare the effectiveness of Timeout procedure protocol on knowledge and skill regarding patient safety among operating room nurses. Methodology: A Pre-experimental post-test only design and a Quantitative approach was adopted to assess the effectiveness of Timeout procedure protocol on knowledge and skill regarding patient safety among 60 operating room (OR) nurses (30 each in study and control group) who were working as OR nurses and having >6 months of working experience at SIMS Hospital, Vadapalani and Nungambakkam, Chennai. Lottery method was used to divide the settings (study and control). Need assessment was performed and OR nurses who scored ≥ 3/6 and who fulfilled the inclusion and exclusion criteria using non-probability purposive sampling technique were selected as samples. Timeout procedure protocol was administered and the level of knowledge and skill was assessed by using a structured knowledge questionnaire and observational checklist respectively. Results: The study findings revealed that the post-test knowledge mean score was 14.60 with SD of 2.66 in study group and 9.40 with SD of 1.93 in control group, and their post-test skill mean score was 9.77 with SD of 3.67 in the study group and 4.63 with SD 1.82 in the control group. The calculated student independent 't' value was 8.66 and 12.96 for knowledge and skill respectively. This indicated that there was a very high statistical significance at p<0.001. Conclusion: The result unfolds that the Timeout Procedure Protocol was effective in improving the knowledge and skill regarding timeout procedure in OR and can be utilized as a tool to evaluate the knowledge and skill of OR nurses.

Keywords: Timeout procedure protocol, patient safety, operating room, surgical safety checklist, knowledge and skill.

I Introduction

Patient safety is a discipline that emphasizes safety culture in healthcare through the prevention, reduction, reporting and analyzing of medical and surgical errors that often lead to adverse effects. \[^1\] Patient safety is a fundamental principle of the healthcare delivery system. Every point in the process of care-giving contains a certain degree of inherent lack of safety. Organizations should bring up a patient safety environment with clear policies, leadership training, safety improvement through quality markers, skilled healthcare professionals and their effective involvement in patient care. All these ingredients are needed to ensure sustainable and significant improvements in patient safety and healthcare. Patient safety helps doctors, nurses and all other healthcare professionals’ practice safe and better healthcare. Therefore, it is good not only for patients but for everyone in the healthcare team. \[^2,3\]

The World Health Organization calls patient safety as an endemic concern as there is an impact of healthcare errors at 1:10 patients around the world. Despite many advances in the surgical environment, there is still a lot of work to do to improve patient safety in operating rooms and throughout pre and post-operative care, death and illness still arise as a result of surgical site infections, patient misidentification, wrong site surgery, mistakes and omissions. \[^4\]

The major purpose of the research study is to create a patient safety environment in the operating room and to update the operating room nurse’s knowledge and skill in accurately performing timeout procedure and following the Surgical safety checklist, recommended by WHO.

Statement of the problem

A pre-experimental study to assess the effectiveness of Timeout Procedure Protocol on knowledge and skill regarding patient safety among operating room nurses at selected hospitals, Chennai.

Objectives of the study
1. To assess the level of need for Timeout Procedure Protocol regarding patient safety among operating room nurses in study and control groups.
2. To assess the effectiveness of Timeout Procedure Protocol on knowledge and skill regarding patient safety among operating room nurses between the study and control group.
3. To correlate the post-test knowledge mean score with skill score regarding Timeout Procedure Protocol among operating room nurses in the study group and control group.
4. To associate the selected demographic variables with post-test mean of knowledge and skill score regarding Timeout Procedure Protocol among operating room nurses in the study group and control group.

Null Hypotheses

\(NH_1\): There is no significant difference in the post-test level of knowledge and skill regarding Timeout Procedure Protocol on patient safety among operating room nurses between study and control group.

\(NH_2\): There is no significant correlation between the post-test level of knowledge with skill regarding Timeout Procedure Protocol among operating room nurses in the study group and control group.
NH₃: There is no significant association of the selected demographic variables with post-test mean score of knowledge and skill regarding Timeout Procedure Protocol among operating room nurses in the study group and control group.

II Materials and methods
A pre-experimental post-test only research design and a quantitative approach were adopted for this study. The independent variable was Timeout Procedure Protocol and the dependent variables were knowledge and skill of OR nurse regarding patient safety in the OR. The tool constructed for the study had two parts: data collection tool and intervention tool. After a comprehensive critical review of the literature and scrutiny with experts in the field of Medical Surgical Nursing, surgeons and anesthetists, and based on WHO Surgical Safety Checklist, the recommended steps were incorporated in the tool. Based on this, the structured knowledge questionnaire for assessment of knowledge and the observational checklist for the assessment of skill were devised as the tools for data collection procedure.

Part A: Data collection tool
Section A
• Assessment of demographic variables
  The Structured knowledge questionnaire was used to assess the demographic data. It includes demographic variables and professional variables.
  Demographic variables: Age (in years), gender, marital status.
  Professional variables: Professional educational status, total years of experience, previous in-service education or education obtained from private or government sector.

Section B
• Assessment of knowledge
  This part consisted of a structured knowledge questionnaire to assess the level of knowledge regarding Timeout Procedure Protocol regarding patient safety in operating rooms. It consisted of 20 multiple choice questions with one correct answer and three alternatives.

It was categorized as follows:
  • Meaning of timeout procedure
  • General information regarding timeout procedure
  • Importance of timeout procedure
  • Knowledge on surgical safety checklist
  • Components of surgical safety checklist

• Assessment of skill
  This part consisted of a structured checklist based on WHO Surgical Safety Checklist regarding patient safety in operating rooms. This checklist was constructed with 12 steps of the timeout procedure.

PART B - The intervention tool prepared by the investigator was Timeout Procedure Protocol, consisting of the resource material organized as follows:
• Lecture cum discussion on definition, purpose of performing timeout, members involved, do’s and don’ts, National timeout day, errors related to misuse of timeouts, steps involved in timeout and use of WHO surgical safety checklist and advantages of performing timeout procedure. This was administered with the aid of power point presentation to OR nurses in groups of 4-5 members for about 30 mins.
• Demonstration of timeout procedure protocol was done through role play for 10 mins.
• Return demonstration of timeout procedure was done by the OR nurses for 5 mins.

The total duration of the intervention was 45 minutes.

Data collection procedure

The experts in the nursing and medical field validated the tool. The pilot study was conducted at Sir Ivan Stedeford hospital, Ambattur and St.Antony’s Hospital, Madavaram. Pilot study analysis proved the practicability and feasibility of the research study. Hence, it was found to be feasible to apply the same tools in the main study. Reliability of the tool was assessed by using Test-retest method for knowledge and inter-rater method for skill and the calculated correlation coefficient r-values were found to be of high statistical significance.

The main study was conducted at SIMS Hospital, Vadapalani branch (study group) and Nungambakkam branch (control group). The Lottery method was used to decide the study and control group settings. Need assessment for Timeout procedure protocol was performed on the OR nurses to screen for study samples. Those who scored ≥ 3/6 and fulfilled the inclusion criteria were selected as samples using non-probability purposive sampling technique. A total of 60 OR nurses (30 each in study and control group) were chosen.

The investigator administered the Timeout Procedure Protocol, as described earlier, to the study group while the usual hospital routine protocol was followed for the control group. On the seventh day, the post-test level of knowledge and skill was assessed using the structured knowledge questionnaire and observational checklist for both the groups. After completion of the post-test, on the same day, the Timeout procedure protocol was administered to the control group also. Similarly, OR nurses from both the groups were given reinforcement regarding the intervention, with help of a booklet and poster prepared by the investigator. Reminders regarding the same were also sent to the samples daily through WhatsApp technology.

Ethical Consideration

Ethical approval was obtained from the Institutional Ethics Review Board and formal approval was obtained from the Medical Director of SIMS hospitals. The researcher followed fundamental ethical principles like the right to freedom from harm and discomfort, respect for human dignity. The researcher gave full freedom to the participants to decide voluntarily whether to participate in the study or to withdraw from the study and the right to ask questions at any time during the course of study. The investigator maintained the study participant’s privacy throughout the study and the same intervention was administered to the control group after post-test assessment.

Statistical Analysis

Statistical analysis was performed using the Statistical Package for Social Sciences programme (SPSS) version 17.0. Descriptive statistics was used to describe the demographic variables. Chi square and student t test were used to analyze the post-test level of knowledge and skill of operating room nurses. The association of the knowledge and skill score with selected demographic variables was done by using chi square.
III Results

Demographic variables

The analysis of data revealed that in both study and control groups, 17 (56.67%) OR nurses belonged to the age group of 21–30 years, 24 (80%) were females and 21 (70%) were unmarried, 18 (60%) had secured Post Basic Nursing degree. Most of the OR nurses, 20 (66.67%), had passed out in the year 2013 or earlier, most of the OR nurses - 23 (76.67%) had graduated from Tamil Nadu and 28 (93.33%) had received education from the private sector.

With regard to the duration of experience 17 (56.67%) nurses in the study group had >5 years of experience, whereas in the control group 15 (50%) of them had 1-3 years of experience; 17 OR nurses (56.67%) had >5 years of overall clinical experience in the study group, whereas in the control group, 14 (46.67%) had 1-3 years’ experience. Considering their duration of experience in the OR, 11 (36.67%) in the study group had >5 years, while in control group 10 (34.48%) had 1-3 years’ experience. None the OR nurses had ever attended in-service education on Timeout Procedure. This revealed the need for education and training on Timeout Procedure.

Assessment of the level of need for Timeout Procedure Protocol

All the OR nurses expressed the need to update their knowledge and skill regarding the timeout procedure since they believed that this study would be very valuable to them.

Assessment of the level of knowledge and skill regarding Timeout Procedure Protocol

![Figure 1: Frequency and percentage distribution of post-test level of knowledge regarding Timeout Procedure Protocol in the study and control group](image)

Figure 1 depicts the frequency and percentage distribution of the post-test level of knowledge regarding Timeout Procedure Protocol. The results showed a marked variation between study and control group among OR nurses. In the study group, 19 (63.3%) of the OR nurses had adequate level of knowledge and 11 (36.7%) had moderate level of knowledge, whereas most of the nurses, 22 (76.7%), in the control group had inadequate knowledge.
Hence, it was found that the study group had gained better knowledge when compared with the control group.

Figure 2: Frequency and percentage distribution of the post-test level of skill regarding Timeout Procedure Protocol in the study and control group

Figure 2 signifies the frequency and percentage distribution of post-test level of skill regarding Timeout Procedure Protocol. The results revealed that, in the study group most of them - 22 (73.3%) had good skill and only few had fair skill. In the control group, 24 (80%) of them needed improvement in skill, only 20% had fair skill and none of them had good skill. Thus, the above results evidently proved that the OR nurses in study group had performed the timeout procedure better, when compared to the control group.

Comparison of post-test knowledge and skill mean score on Timeout Procedure Protocol between the study and control group

Table 1: Comparison of post-test knowledge mean score on Timeout Procedure Protocol between study and control group

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Mean Difference</th>
<th>Student independent t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study</td>
<td>30</td>
<td>14.60</td>
<td>2.66</td>
<td>5.20</td>
<td>t=8.66, p=0.001***</td>
</tr>
<tr>
<td>Control</td>
<td>30</td>
<td>9.40</td>
<td>1.93</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***p<0.001, S- Very highly significant

Table 1 shows the comparison of the post-test knowledge score on Timeout Procedure Protocol between study and control groups. In the study group, while comparing the post-test level of knowledge, the mean score of knowledge was 14.60 with standard deviation of 2.66, whereas in the control group, the mean post-test knowledge score was 9.40 with standard deviation of 1.93 and the mean difference was 5.20. The calculated independent t-test value was 8.66 which was found to have a very high statistical significance at p<0.001 level. This inference suggests the effectiveness of the intervention in improving the knowledge in the study group.
Table 2: Comparison of post-test mean skill score on Timeout Procedure Protocol between study and control group.

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Mean Difference</th>
<th>Student Independent t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study</td>
<td>30</td>
<td>9.77</td>
<td>1.17</td>
<td>5.13</td>
<td>t=12.96 ***, p=0.001</td>
</tr>
<tr>
<td>Control</td>
<td>30</td>
<td>4.63</td>
<td>1.82</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***p<0.001, S- Very highly significant

Table 2 shows the comparison of post-test skill score on Timeout Procedure Protocol between study and control groups.

In the study group while comparing the post-test level of skill, the mean skill score was 9.77 with standard deviation of 1.17, whereas in the control group the mean post-test level of skill score was 4.63 with standard deviation and the mean difference was 1.82. The calculated independent t-test value of 12.96 was found to show very high statistical significance at p<0.001 level.

**Effectiveness of Timeout Procedure Protocol on the overall post-test level of knowledge and skill**

![Fig 3: Effectiveness of Timeout Procedure Protocol on the overall post-test level of knowledge and skill in study and control groups](image)

Figure 3 points out the effectiveness of Timeout Procedure Protocol. The findings showed that the overall level of knowledge of OR nurses in the study group was 73% whereas in the control group it was only 47%, with a variation of 26% between the groups. Considering the skill score, the overall level of skill of OR nurses in the study group was 76.9% whereas in the control group it was only 40.8%, with a variation of 36.1% between the groups.

These scores indicate the markedly higher post-test knowledge and skill scores in the study group, thus proving the effectiveness of the Timeout Procedure Protocol on the study group.

**Correlation between post-test knowledge means score with skill score**
Table 3: Correlation between post-test knowledge mean score with skill score in the study and control group among OR nurses.  

<table>
<thead>
<tr>
<th>Group</th>
<th>Variables</th>
<th>Post-test Mean</th>
<th>SD</th>
<th>Spearman Rank Correlation coefficient</th>
<th>Type of correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study</td>
<td>Knowledge Vs Skill</td>
<td>14.60</td>
<td>2.66</td>
<td>( r = 0.48 ) p=0.001***</td>
<td>Moderate +</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.23</td>
<td>1.30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>Knowledge Vs Skill</td>
<td>9.40</td>
<td>1.93</td>
<td>( r = 0.18 ) p=0.26 N.S</td>
<td>Poor +</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.90</td>
<td>2.01</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***p<0.001 S- very highly significant, N.S-Not Significant

Table 3 depicts the correlation between knowledge mean score with skill score among study and control groups, analyzed using Spearman rank Correlation coefficient. 

This indicates that, in the study group there was a significant positive moderate correlation between post-test knowledge score and post-test skill score, which infers that as knowledge increases, their skill also increases moderately. In contrast to the above result, in the control group only a poor correlation was identified between post-test knowledge score and post-test skill score.

The calculated ‘r’ value, \( r=0.48 \), in the study group revealed a positive moderate correlation between knowledge and skill and a high statistical significance at p<0.001 level. Hence, improving knowledge regarding Timeout Procedure Protocol had also enhanced the skill in the study group.

**Association of selected demographic variables with knowledge and skill score regarding Timeout Procedure Protocol**

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Inadequate</th>
<th>Moderate</th>
<th>Adequate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6months</td>
<td>100</td>
<td>71.4</td>
<td>40</td>
</tr>
<tr>
<td>1-3 years</td>
<td>0</td>
<td>28.6</td>
<td>60</td>
</tr>
<tr>
<td>4-5 years</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Fig 4: Association of age of OR nurses with post-test level of knowledge in the study group
Fig 5: Association of duration of OR experience with post-test level of knowledge in the study group

The figures 4 - 6 represent the association between post-test level of knowledge and selected demographic variables. The age of OR Nurses, the duration of their experience in the OR and overall clinical experience was found to have significant statistical association with the post-test level of knowledge. None of the other variables in the study group showed any statistically significant association with the post-test knowledge mean score.

Fig 7: Association of age of OR nurses with post-test level of skill in the study group
The figures 7 - 9 deal with the association of post-test level of skill and selected demographic variables such as age of OR nurses, the duration of their experience and overall clinical experience. These variables were found to be statistically associated with the post-test skill mean score while none of the other variables in the study group showed any statistically significant association.

Considering the control group, none of the demographic variables showed statistical significant association with post-test knowledge and skill mean score.

**IV Discussion**

*Need for Timeout Procedure Protocol*

All the OR nurses expressed the need to update their knowledge and skill regarding Timeout Procedure Protocol since they felt that improved knowledge and skill in implementing it would improve their communication and teamwork and thereby, patient safety.
The above findings of the study were found to be consistent with the report of the study by Roopali P. (2016)\(^5\), which revealed that OR nurses need to upgrade their knowledge on Timeout Procedure and Surgical Safety Checklist.

**Assessment of the level of knowledge and skill regarding Timeout Procedure Protocol**

In the study group most of the OR nurses, 19 (63.3%), had adequate level of knowledge whereas in the control group majority of nurses, 22 (76.7%), had inadequate knowledge. Hence, it was found that the study group had better knowledge when compared to the control group.

With regard to the skill in performing Timeout Procedure Protocol, most of the OR nurses, 22 (73.3%), in the study group had good skill whereas in the control group, 24 (80%) nurses needed improvement in skill and only 20% had fair skill. Thus, the above results evidently proved that the OR nurses in the study group had comparatively higher skill in performing the timeout procedure than the control group.

The above findings reflect the impact of administration of Timeout Procedure Protocol to the study group in enhancing their knowledge and skill when compared to the markedly lower scores of the control group.

**Comparison of post-test mean knowledge and skill score on Timeout Procedure Protocol between the study and control group.**

The calculated independent t-test value of 8.66 and 12.96 for the post-test knowledge and skill mean score respectively, was found to have very high statistical significance at p<0.001 level. This inference suggests the effectiveness of the intervention in improving the knowledge and skill of nurses in the study group.

Hence the null hypothesis, stated earlier that “**There is no significant difference in the post-test level of knowledge and skill regarding Timeout Procedure Protocol on patient safety among operating room nurses between study and control group**” was not accepted for the study group and accepted for the control group.

**Correlation between post-test knowledge score with skill score**

The calculated ‘r’ value r =0.48, in the study group revealed a high statistical significance and a positive moderate correlation between knowledge and skill at p<0.001 level. The control group did not reveal any significant correlation with regard to the above variables. Hence, knowledge gained through exposure to the various strategies administered by the investigator regarding Timeout Procedure Protocol had enhanced the knowledge and also the skill of the study group in performing the Protocol with better accuracy.

Hence the null hypothesis, stated earlier that “**There is no significant correlation between the post-test level of knowledge with skill regarding Timeout Procedure Protocol among operating room nurses in the study group and control group**” was not accepted for the study group and accepted for the control group.

**Association of selected demographic variables with knowledge and skill score regarding Timeout Procedure Protocol**

The association between post-test level of knowledge and skill of the study group with selected demographic variables such as age of OR nurses, the duration of their
experience and overall clinical experience were found to be statistically associated with the post-test skill mean score.

Considering the control group, none of the demographic variables showed any statistically significant association with post-test knowledge and skill score mean.

Hence the null hypothesis, stated earlier that “There is no significant association of the selected demographic variables with post-test mean score of knowledge and skill regarding Timeout Procedure Protocol among operating room nurses in the study group and control group” was not accepted for the above mentioned variables in the study group and accepted for all the other variables in the study group and all variables in the control group.

Limitations

- The researcher experienced difficulty in getting Indian reviews and Nursing studies related to the topic. Adequate statistical information regarding surgical error was also not available since it is an iceberg phenomenon and hence, the accurate burden of surgical error could not be evaluated.
- The researcher found it very difficult to gather the sample since the OR nurses had busy schedules due to shift duty and excess workload. The researcher managed this situation by conducting classes before and after each shift in the OR dining room which was arranged by the OR manager.

V Conclusion

The present study assessed the effectiveness of Timeout Procedure Protocol on knowledge and skill regarding patient safety among operating room nurses. The study findings comparing the post-test level of knowledge and skill score between study and control groups showed significantly higher scores in the study group after the administration of Timeout Procedure Protocol, devised by the investigator, in comparison to the control group who followed the routine OT protocols. Hence, it was proved that the Timeout Procedure Protocol could be utilized as an effective tool to update knowledge and improve the skill of operating room nurses. To conclude, as an operating room nurse, one must

“Raise Awareness, increase engagement and be a Timeout Super Hero”
Speak up; let your VOICE lead the surgery.

VI References


VII Source of support: None

VIII Conflict of interest: None declared

IX Acknowledgement:

The researcher wishes to express heartfelt gratitude to the Administrators, Assistant Nursing Officer, and OR in-charge of SIMS Hospital for their cooperation in arranging the data collection with the OR nurses. Special and warm thanks to all the OR nurses who willingly participated in the study to upgrade their knowledge and skill and displayed remarkable commitment towards patient safety.

X Contributors

EJ: Conceptualization of the study, collection, analysis of the data, writing the manuscript, finalized the manuscript and will act as the guarantor of the paper; SS, JR: Conceptualization of the study, critical analysis of the data, writing the manuscript, finalized the manuscript, edited and critically evaluated the manuscript; KS, CD: Edited, critically evaluated and finalized the manuscript.