Article

The effects of TeamSTEPPS implementation by nurses on situation monitoring in hospital

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Abstract

Introduction: Patient safety is a healthcare system, which minimizes the occurrence and impact of side effects. It also helps to facilitate full recovery in patients, and efforts to improve their safety require teamwork, such as situation monitoring by nurses. Therefore, this study aims to determine the effects of TeamSTEPPS implementation by nurses on situation monitoring in hospitals.

Design and Methods: A quasi-experimental pre-post test design was used with a total of 56 nurses, which were selected using the purposive sampling technique. They were then shared equally into 2 groups, namely control and intervention groups.

Results: The unpaired t-test result shows that the value of |t count| was lower than the t table (0.210 < 2.005), while the p-value was greater than α (0.835 > 0.050). This result indicates that implementing TeamSTEPPS by nurses have an insignificant effect on situation monitoring in the hospital.

Conclusions: In conclusion, hospitals are advised to implement TeamSTEPPS regularly to improve teamwork, specifically in situation monitoring by nurses.

Introduction

Hospital is a professional place that provides safe services, which prioritize the patients' needs, such as optimal safety during the treatment.[1] Patient safety is a system that involves risk assessment, identification, incident reporting, and implementation of solutions to minimize risks.[2] The Institute of Medicine (IOM) revealed that the rate of adverse effects in Utah and Colorado, United States was 2.9% with a 6.6% mortality rate, while a prevalence and death rate of 3.7% and 13.6%, respectively were recorded in New York. Meanwhile, hospitals in Australia and Denmark reported a prevalence rate of 3.2%-16.6% and 12% in Canada.[3]

Over the years, the prevalence of Patient Safety Incidents (PSIs) in Indonesia has also increased with a total of 144 cases in 2009, 103 cases in 2010, and 34 cases between January-April 2011. Furthermore, at the province level, the reported rates in DKI Jakarta, Central Java, Yogyakarta, and East Java as of 2007 were 37.9%, 15.9%, 12.8%, and 11.7%, respectively.[4] In Malang, the reported near misses and adverse events cases were 47.6% and 46.2%, respectively. An observation revealed that 30 PSIs were not reported, which consist of 12 no harm cases and 18 reportable circumstances.[5]

This high prevalence rate has several material and immaterial impacts on the hospitals and patients. The material impacts are caused by the high number of patient safety incidents, such as the USD 37.6 billion financial loss experienced by the United States annually due to these events.[6] Other material impacts include injuries, deformities, deaths, extension of the treatment period, additional treatment costs, and similar events recurrence. Meanwhile, the immaterial impacts include patients' loss of motivation to experience the treatments as well as declining trust in health workers who provides health services due to the trauma they experienced.[7]

These data revealed that all health workers, specifically nurses, have the potential to contribute towards the increase in the number of patient safety incidents. This is because nurses account for approximately 40%-60% of health workers who provide health care services in hospitals. They also have the most direct contact with patients in 24 hours.[6] Meanwhile, nurses can fail to understand the patient's declining condition because they often ignore the clinical information reported by other team members,[8] which is also known as situation monitoring.

Situation monitoring is a process of actively assessing and understanding the patient's internal and external situations.[9] Internal situation is the conditions of patients and team members, while the external situation is the physical environment.[9] Situation monitoring helps to resolve issues that occur between team members, understand the situation of the surrounding environment, monitor the patient's condition as well as to learn the appropriate measures that can be used to avoid mistakes.[10] Furthermore, it is one of the major methods used to increase patient satisfaction and the quality of teamwork.

TeamSTEPPS training has been proven to be an efficient method that can be used to prevent patient safety incidents. The method uses the concept of collaboration between teams and it

Significance for public health

The nurse's ability to read changes in the patient's situation is critical in predicting potential worsening conditions that could endanger the patient's life. Situation monitoring aids in the resolution of conflicts among team members, allowing them to learn the best practices for avoiding medical errors, adverse events, and sentinel events. The adoption of modified TeamSTEPPS is expected to result in improved situation monitoring and, as a result, a reduction in the occurrence of medical errors. This study investigated the impact of a modified TeamSTEEPS on Nurses' situation monitoring in the hospital. The findings could lead to new ways to improve hospital and other healthcare facility safety.

consists of four main components, namely leadership, communication, mutual support, and situation monitoring between the teams.[11]

Study revealed that TeamSTEPPS can improve patient safety and healthcare quality, hence, it needs to be implemented in Indonesia's nursing services. Furthermore, previous studies reported that poor situation monitoring or situation awareness accounts for 80% of anesthesia patient safety incidence.[12,13] Qualitative review also showed that understanding of situation monitoring improves nurses' decision-making ability and health care quality.[12] Therefore, this study aims to determine the effects of TeamSTEPPS implementation by nurses on situation monitoring in hospitals.

Design and Methods

This study used a quasi-experimental pre-post-test design to examine the difference between situation monitoring in the control group and the intervention group after the TeamSTEPPS treatment. This study was carried out from November 2019 to February 2020

among nurses in the inpatient rooms of Muhammadiyah Malang University (UMM) Hospital and Brawijaya University (UB) Hospital, with a total of 75 and 50 nurses, respectively. The samples were then selected using the purposive sampling technique, which was based on several inclusion and exclusion criteria. Nurses that are willing to participate for a minimum of two months and are ready to perform nursing care directly to the patients for more than 7.5 hours/week were selected, while nurses on leave or probation were excluded. A total of 28 samples were then obtained from each hospital after the selection process. The UMM and UB Hospitals samples were served as the control and intervention groups, respectively.

The Situational Monitoring as part of the TeamSTEPPS Teamwork Perceptions Questionnaire (T-TPQ) and TeamSTEPPS Teamwork Attitudes Questionnaire (T-TAQ) from the AHRQ were used for this study. They contain 13 questions, which consist of 7 perceptions dimension items, and 6 attitudes dimension items (Table 1). The validity and reliability test was carried out using Pearson's correlation and Cronbach's Alpha on 43 respondents who were outside the sample population but had the same charac-

Table 1. The situational monitoring perceptions and attitudes questionnaire.

teristics as the sample. The validity and reliability test showed that T-TPQ was 0.713 and 0.849, while TTAQ was 0.683 and 0.706. Therefore, it was concluded that the situaional monitoring questionnaire items on T-TPQ and T-TAQ were valid.

Results and Discussions

Characteristics of respondents

The description of the respondents can be seen at Table 2. The control group contains 16 female (57.1%), while the intervention group has 23 female (82.1%). Furthermore, 23 respondents (82.1%) in the control group are between the age of 20-30, while 20 respondents (71.4%) in the intervention group are in this age range. The Diploma Nursing Program was the latest education of 15 respondents (53.6%) in the control group, while in the intervention group, the Nurse Profession Program was the latest for 16 respondents (57.1%). 21 respondents (75.0%) are working in the inpatient rooms in the intervention group, while all 28 respondents (100.0%) in the control group work there. 22 respondents (78.6%) in the control group and 18 (64.3%) respondents in the intervention group have been working at the unit for one to five years. This range of working periods is similar to that of the samples with 18 respondents (64.3%) in the control group and 20 respondents (71.4%) in the intervention group.

Situation monitoring in the control group and intervention group

Situation Monitoring in control group shows that the perceptions pretest scores median of 28.00 was equal to that of the posttest scores. Also, the attitudes pretest scores median of 24.00 was equal to that of the posttest scores. However, Situation Monitoring in intervention group shows that the perceptions pretest scores median of 27.00 is less than the posttest which was 28.00. It also shows that the attitude pretest scores median of 24.50 is greater than the posttest which was 24.00 (Table 3).

Analysis of the difference in the situation monitoring pretest and posttest scores

Table 4 reveals that the p-value of perceptions is 0.406, which indicates that there is no significant difference in the perceptions scores of the control group. Furthermore, the p-value of attitudes was 0.737, which shows that there is no significant difference in the attitudes scores of the control group. The p-value of perceptions was 0.732, which indicates that there was no significant difference between the pretest and posttest perceptions scores in the intervention group. Furthermore, the attitudes had a p-value of 0.830, which shows that there was also no significant difference between the pretest and posttest attitudes scores in the intervention group.

Analysis of the difference in the situation monitoring pretest and posttest scores in the control and intervention groups

Table 5 shows that p-value of the Situation Monitoring Perceptions was 0.610 ($p > 0.05$), which indicates that there was no significant difference in the averages of both groups based on the measured improvement. In the situation monitoring variable, the average improvement of the intervention group was slightly higher than the control, but the difference was insignificant. Moreover, the p-value of the Situation Monitoring Attitudes was 0.835 ($p > 0.05$), which indicates that there was no significant difference in the averages of both groups based on the measured improvement. In the situation monitoring variable, the average improvement of the intervention group was slightly lower than the control, but the difference was insignificant. This indicates H0 was accepted, meaning that the implementation of TeamSTEPPS by the nurses has no significant effects on their situation monitoring.

The majority of nurses in this study are female and based on psychological theories perspective, they adhere to the rules and expect success at work more than male.[14] However, there is no difference between the male and female nurses in terms of solving problems, skills, competition drive, motivation, and ability to provide good nursing care to patients. Most of the samples were 20-30 years old, which shows that the way of thinking as well as prob-

Table 2. Characteristics of respondents.

Characteristic	Control Group (n=28)		Intervention Group (n=28)	
	F	%	F	%
Age				
20-30 y.o.	23	82.1%	20	71.4%
31-40 y.o.	5	17.9%	8	28.6%
Gender				
Male	12	42.9%	5	17.9%
Female	16	57.1%	23	82.1%
Latest Education				
Nurse Profession Program	13	46.4%	16	57.1%
D3 Nursing Program	15	53.6%	11	39.3%
Others	0	0%	1	3.6%
Years Working in the Unit				
< 1 year	0	0%	10	35.7%
1-5 years	22	78.6%	18	64.3%
6-10 years	6	21.4%	0	0%
Years Working at the Hospital				
< 1 year	0	0%	10	35.7%
1-5 years	22	78.6%	18	64.3%
6-10 years	6	21.4%	0	0%
Work Unit				
Inpatient	28	100,0%	21	75.0%
ICU	0	0,0%	7	25.0%

lem-solving ability increases along with age, and this improves their performance, experience and knowledge.[15]

The latest education of most nurses in the control group was the D3 Nursing Program, while the Nurse Profession Program was the lastest in the intervention group. Therefore, it was assumed that the nurses' level of education affects their perception of nursing care provision system as well as the need to implement their knowledge and skills in patient safety.[16]

The nurses' working period in the unit ranges between one to five years. It was also observed that respondents with ≤ 6 years working experience provided better nursing care because they are more enthusiastic and have greater curiosity while performing their duties. Therefore, the working period in the units and hospitals significantly affected their performance while providing healthcare services to patients.[17] The majority of the respondents work in inpatient units, and a previous study reported that nurses working in different rooms in a hospital have no significant effects on their performance.[18]

Situation monitoring in the control group

In the control group, the pretest scores of perceptions towards situation monitoring were higher than their posttest scores. Meanwhile, their attitudes pretest scores were lower than their posttest scores because the control group was not given the TeamSTTEPS treatment. This finding is consistent with a previous study, which reported that there was no significant improvement in the perceptions and attitudes posttest and pretest for the control group. This was because they work in the same unit in the hospital and they were not trained.[19]

Situation monitoring in the intervention group before and after the TeamSTEPPS training

The pretest scores of the nurses' perceptions towards situation monitoring were lower than the posttest, while the pretest scores of their attitudes were higher than the posttest scores. Furthermore, King *et al.* (2015) stated that there was an improvement in nurses' perceptions because the TeamSTEPPS training was administered in accordance with the AHRQ guidelines. The training was then monitored regularly by the High-Reliability Organization (HRO) and supported by the AHRQ through teleconference for two months.[20] These findings are in line with Goebel (2016) that there was an improvement of perceptions in the intervention group, but it was insignificant with a p-value of 0.84.[21]

Meanwhile, the pretest scores of the nurses' attitudes were higher than the posttest, but it was insignificant. This is in line with a similar study that the improvement of situation monitoring observed through the teamwork attitude was caused by the poor motivation and compliance while implementing the training in real-life situations.[22] Furthermore, Shaw (2015) reported that TeamSTEPPS has several benefits, such as improving nurses' perceptions, although the employment rate before and after the training was constant.[23]

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Based on perceptions improvement, there was no significant difference between the averages of the two groups. The interven-

Table 3. Results of the situation monitoring pretest and posttest in the control group and intervention group.

Group	Variable	Median	N	IQR	Min	Max
Control Group	Pretest					
	Perceptions	28.00	28	2.75	21.00	35.00
	Attitudes	24.00	28	2.75	20.00	30.00
	Posttest					
	Perceptions	28.00	28	2.00	21.00	35.00
	Attitudes	24.00	28	1.00	20.00	30.00
Intervention Group	Pretest					
	Perceptions	27.00	28	2.00	19.00	34.00
	Attitudes	24.50	28	4.50	16.00	30.00
	Posttest					
	Perceptions	28.00	28	2.75	22.00	35.00
	Attitudes	24.00	28	0.00	21.00	30.00

Table 4. Situation monitoring in the control group using Wilcoxon test.

Group	Variable		Z	p-value
Control Group	Perceptions	Pretest Posttest	-0.832	0.406
	Attitudes	Pretest Posttest	-0.336	0.737
Intervention Group	Perceptions	Pretest Posttest	-0.342	0.732
	Attitudes	Pretest	-0.215	0.830

Table 5. Results of the unpaired T-Test on the situation monitoring perceptions and attitudes in the control and intervention groups.

Variables	Group	Mean	N	Std. Dev	T	P-value
Perceptions	Control	-0.4286	28	4.76429	0.513	0.610
	Intervention	0.2143	28	4.60561		
Attitudes	Control	0.1429	28	3.80754	-0.210	0.835
	Intervention	-0.0714	28	3.83868		

tion group's average perception was slightly higher than the control, but the difference was insignificant. Meanwhile, in terms of the attitudes towards situation monitoring, the average improvement of the intervention group was slightly lower than the control group, and the difference was also insignificant. This study shows that the improvement of average perceptions in the intervention group was slightly higher than the control, but it was insignificant. This finding is consistent with Shaw (2015) that there was no significant difference in situation monitoring, but there was an improvement of perceptions in the posttest.[23] Furthermore, this was caused by the limited time of training, which was conducted for only four hours. It was also caused by the instructor's inadequate skills while conducting the training, which led to the loss of interest by the participants. In terms of the attitudes, the average improvement in the intervention group was slightly lower than the control group, and the difference was also insignificant. This is in line with a previous study that there was a slight and insignificant improvement in the nurses' attitudes towards situation monitoring.[24] This was because the respondents had positive attitudes before the TeamSTEPPS training, consequently, the change after the training was insignificant.

The factor that caused the insignificant improvement of situation monitoring in this study was the poor commitment of the intervention group respondents in attending the training. This lack of commitment can be observed through the undisciplined participants that came late and left the training room during the TeamSTEPPS training. The workshop lasted for only two hours, after which the seminar was carried out on the same day. Meanwhile, the AHRQ advised that the workshop needs to be administered a day after the seminar for four to six hours.[10] After the training, advisory sessions and follow-ups regarding teamwork were regularly conducted, but the nurses showed poor commitment towards implementing the program in their units. Consequently, the teamwork in situation monitoring after the training was suboptimal.

Regular observation needs to be carried out for one month after the implementation of TeamSTEPPS to monitor the improvement of perceptions and attitudes.[25] Another observation must be done 6 and 12 months after the implementation to monitor the significant improvement of the competence in every PICU and SICU. The improvement of situation monitoring scores of both control and intervention groups was caused by various factors including the age of most of the respondents and their working duration in the units and hospital. The working period correlates with their experiences in teamwork. Furthermore, these experiences help to develop workplace comfort, which indirectly builds a trusting relationship in nursing care and fosters effective teamwork. Based on the results, the implementation of TeamSTEPPS had no significant effects on situation monitoring by nurses at Brawijaya and Muhammadiyah Malang Hospitals. This study found that TeamSTEPPS had no significant effects on hospital situation monitoring. TeamSTEPPS should also be improved through a more effective method and training duration to achieve the best results. After receiving TeamSTEPPS training, at least six months of observation is required to track teamwork improvement in situation monitoring. These ongoing check-ins help to reinforce the nurses' commitment to the program's implementation.

Conclusions

The improvement of the intervention group's perceptions towards situation monitoring was slightly higher than the control. Meanwhile, the improvement of the intervention group's attitudes was slightly higher than the control group, but the difference was insignificant. These findings indicate that there was an insignificant difference between the perceptions and attitudes towards situation monitoring after the TeamSTEPPS treatment in a hospital.

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