

Effect of Applying A training Program about Reducing the Risk of Patient Fall on Patient's Safety Culture

Bassam Abduh Saaid¹, Samah Mohamed Abdalla², Nahed Shawkat Abo Elmagd³

¹. Assistant Lecturer of Nursing Administration, Faculty of Medicine & Health Science Hodiedah University, Yemen

². Professor of Nursing Administration, Faculty of Nursing, Assiut University, Assiut, Egypt.

³. Professor of Nursing Administration, Faculty of Nursing, Assiut University, Assiut, Egypt.

Abstracts

Background: Head nurses play a major role in managing patient safety, which is considered a critical component of quality health care. **Aim:** To assess the effect of applying a training program about reducing the risk of patient fall on patient's safety culture at Rajhy Liver Hospital, Assiut University. **Subject and Method:** A quasi-experimental design used to conduct this study. The study subject included one nursing director and (n=28) head nurses, their assistances, and charge nurses from different health care units. The data collection tool included three tools: The personal characteristics questionnaire, Head nurses management regarding patient's safety questionnaire, and Hospital survey on patient's safety culture questionnaire. **Results:** there was a highly statistically significant difference with a strong positive correlation impact between head nurses' management toward reducing the risk of patient fall using the PDCA model and patient's safety culture. **Conclusion:** The implementation of the training program is successful and effective in improving head nurses' management toward reducing the risk of patient fall using the PDCA model after implementing the training program. **Recommendations:** Developing a policy to conduct in-service training program and development activities related to reducing the risk of patient fall at the health care setting.

Keywords: *Patient Fall Risk, Patient's Safety Culture & Training Program*

Introduction

Nowadays, a wide range of safety issues has challenged healthcare delivery, and therefore, many personal and organizational strategies have been developed for promoting patient safety (Vincent et al., 2016; Darwish et al., 2014). The importance of patient safety as one of the components of health care quality improvement has led to prioritizing accurate and conspicuous assessment of the performance of health care organizations to determine the efficiency of these services. (Musavi et al., 2016)

Falls represent a major public health problem around the world and continue to be the top adverse event in hospital settings (Najafpour et al., 2019). Falls and their complications are responsible for a large part of preventable health care costs (Fehlberg et al., 2017). Measurement of fall rates and fall prevention practices is an element of all quality improvement programs. (Kerzman & Goldberg 2016). Falls in the hospital are associated with increased length of stay, use of health resources, and increased rates of discharge to residential care facilities (Abousallah, 2018). According to the Agency for Healthcare Research and Quality (AHRQ, 2012) the best practices for fall prevention involve interdisciplinary teams to guide protocols and strategies. Educating clinical and non-clinical staff inpatient fall

prevention is essential to creating a safety culture, should be aware of the fall policies and procedures in place, as patient safety is not limited to nursing and bedside healthcare providers. (Cortina, 2016)

The common reason head nurses' management in reducing the risk of falls was at a low level due to some hospitals have not applied assessment tools for falls yet. Using the assessment tool for falls is very useful to identify the potential risk of falls in order, to reduce fall incidents in the ward. Several risk factors for falls are identified such as advanced age, muscle weakness, gait, balance problem, visual impairment, altered bowel, vertigo, cognitive deficits, use of psychotropic medications, and history of fall. (Sharif et al., 2018)

Head nurses are at the middle level of the nursing management system. Head nurses should evaluate their patients' risk for falls and take action to reduce the risk of falling. The evaluation could include fall history, medications and alcohol consumption review, gait and balance screening, and walking aids used by the patient. They are also involved in some long-term planning and in establishing unit policies. Their major roles include dealing with issues related to the delivery of care. They must have managing ability so that any innovative changes for the quality of care enhancing patient safety can be effectively implemented. (Yuswardi et al., 2015)

The most common method applied in healthcare for patient safety management is the PDCA (plan-do-check-act) cycle or the Deming model. Application of the PDCA cycle is more effective than adopting the right-first-time approach. Using the PDCA cycle refers to continuously looking for better methods of improvement. The PDCA cycle is effective in doing a job and managing a program and enables two types of corrective action – temporary and permanent (Seliem et al., 2019). The PDCA cycle will determine the success and effectiveness of the improvement program. The PDCA cycle is more than just a tool it is a concept of continuous improvement of the processes embedded in the organization's culture. (Taufik, 2020)

Patient safety culture is defined as an integrated pattern of individual and organizational behavior, based upon shared beliefs and values that continuously seek to minimize patient harm, which may result from the processes of care delivery (El-Sherbiny et al., 2020). Promoting a culture of safety has become one of the pillars of patient safety. As healthcare organizations make every effort to improve their quality of care and provide their service to an adequate standard, focusing on patient safety has become an international priority (Abousallah, 2018). The evaluation of the patient safety culture is the first step in establishing a culture that promotes and supports safety. (Mahrous, 2018)

Significance of the study

Many researchers indicated that patient safety is a global public health problem. Internationally, Abousallah, (2018), indicated that falls are significant trouble in acute care hospital settings, and can have severe outcomes, especially for older patients. Fall prevention has therefore been recognized as a significant area for research and intervention. Yuswardi et al., (2015), indicated that patient falls represent over one-third of incidents reported in hospitals. Researchers and health care institutions have placed prioritization on the development and implementation of in-hospital fall prevention strategies and programs.

Nationally, Al-Rafay et al., (2018), indicated that studies conducted in different countries addressed falls, and detect annual frequencies ranging from 6.5% to 42% at least an annual fall worldwide. Seliem et al., (2019), asserted that there is an increasing demand for healthcare and nursing services due to population growth and, more significantly, due to the increasing proportion of people over the age of 65 those more likely to be a fall risk. At the same time, the supply of nurses is diminishing. This shortage would have a negative impact on patient safety.

At the same time, indicated that enhancing head nurses' competencies in leading their teams towards the application of patient safety procedures toward reducing the risk of patient fall through a systematic methodology as "Plan-Do-Check-Act" may help to overcome this negative impact and recommended that the training program should be applied to all head and staff nurses in the study setting, and should be extended to other similar settings.

Aims of the study

The current study aims to assess the effect of applying a training program about reducing the risk of patient fall on patient's safety culture at Rajhy Liver Hospital-Assiut University, through:

- Assess the level of head nurses' management toward reducing the risk of patient fall using the PDCA model at Rajhy Liver Hospital-Assiut University.
- Assess the level of head nurses' perception regarding patient's safety culture at Rajhy Liver Hospital-Assiut University.
- Developing a training program about reducing the risk of patient fall using the PDCA model for head nurses at Rajhy Liver Hospital-Assiut University.

Study hypotheses

To fulfill the aim of the study, the following research hypotheses were formulated:

Hypothesis (H.1): There will be an increase of head nurses' management level toward reducing the risk of patient fall using the PDCA model after the training program is implemented.

Hypothesis (H.2): There will be an increase of head nurses' perception level regarding patient's safety culture after the training program is implemented.

Hypothesis (H.3): There is a highly significant positive impact after applying a training program about reducing the risk of patient fall using the PDCA model on patient's safety culture for head nurses.

Subject and Methods

The methodology followed in carrying out the study is presented in four designs, namely: technical, operational, administrative, and statistical design.

Technical design

This design involved the study design, setting, subject, and tools of data collection.

Study design:

A quasi-experimental design with (pre-post assessment) was utilized for this study.

Study setting:

The study was carried out at Rajhy Liver Hospital-Assiut University in all health care units (n=12) included; Medical unit, Surgical unit, Operating room unit, Liver care unit (LCU), Intensive care unit (ICU), Critical care unit (CCU), Interventional and

X-ray radiology, Infection control unit, Endemic unit, Endoscopes unit, Outpatient clinics unit, and Laboratory unit.

Study subject:

The study subject included a convenient sample of one nursing director and (n=28) head nurses, their assistances, and charge nurses from different health care units at Rajhy Liver Hospital-Assiut University.

Tools of the study:

The study tool was used for data collection. It consisted of three tools:

First tool: Personal Characteristics Questionnaire (PCQ); this questionnaire was developed by the researcher. It is used to gather data about head nurses regarding personal datasheet as a unit (workplace), age, gender, level of education, years of experience, and type of nursing care delivery.

Second tool: Head Nurses Management regarding Patient's Safety questionnaire (HNM-PSQ); this questionnaire was adopted by **Yuswardi et al., (2015)**, to assess the level of head nurses management regarding patient's safety toward reducing the risk of patient fall using the PDCA model. The PDCA method stands for Plan, Do, Check, and Act. The total items consist of (14) items. This tool was collected and analyzed three times through pretest, posttest, and follow-up after three months.

Scoring system:

The standard scoring system adopted by **Yuswardi et al., (2015)**, each statement is rated on a five-point Likert scale, the scores ranging from value 1 (like or do not perform) to value 5 (exactly perform) are used throughout the questionnaire as follows: Head nurse performed patient safety management (1= did not perform, 2= less perform, 3= moderate perform, 4= much likely perform, 5= exactly perform). The total scores of the head nurse management toward reducing the risk of patient fall using the PDCA model statements were calculated and presented as;

- The high average scores are calculated (51.34 - 70.00),
- The moderate average scores are calculated (32.68 - 51.33),
- The low average scores are calculated (14.00 - 32.67).

Third tool: Hospital Survey on Patient's Safety Culture (HISOPSC) questionnaire; this questionnaire was adopted by **Abousallah (2018)**, to assess the level of head nurses' perceptions regarding patient safety culture. It is included (12) patient's safety culture dimensions as (7) patient safety culture at Unit-level aspects, included; supervisor/manager expectations & actions promoting safety, organizational learning-continuous improvement, teamwork within units, communication openness,

feedback, and communication about the error, non-punitive response to error, and staffing, and (3) patient safety culture at hospital-level aspect included; hospital management support for patient safety, teamwork across units, and hospital handoffs and transitions and (2) patient safety culture at outcome-level aspects included; overall perceptions of safety, and frequency of event reporting. Each sub-dimension is measured by 3-4 items. The total items consist of (42) items. This tool was collected and analyzed three times through pretest, posttest, and follow-up after three months.

Scoring system:

The standard scoring system developed by **El-Sherbiny et al., (2020)**, each statement is rated on a five-point Likert scale, the scores ranging from value 1 (strongly disagree) to value 5 (strongly agree) are used throughout the questionnaire as follows: (1=strongly disagree, 2= disagree, 3= neither agree nor (non) disagree, 4= agree, 5= strongly agree). The total scores of the patient safety culture dimensions were calculated and presented as

The dimensions with positive response rates of (75% or above) will be identified as strengths.

The dimensions with positive response rates of (at least 50%) will be identified as potential for improvement

The dimensions with positive response rates of (less than 50%) will be identified as weaknesses.

Operational design

This design explains the steps of the actual implementation of the study, including the pilot and fieldwork.

Pilot study

A pilot study was carried out on a group (10%) of the study subject chosen randomly in different hospital departments to ensure the accessibility, time-consuming, and understanding of the study tools before the beginning of actual data collection, there were no modifications in the tools, so pilot study sample was included in the study sample. The content validity of the training program and Arabic translation of the study tools were reviewed by the expertise of the nursing administration department (Jury from five experts in the specialty). The study tools reliability tested using (a) Cronbach's test for the structured questionnaires as 0.947 for Head Nurses Management regarding Patient's Safety questionnaire (HNM-PSQ) and 0.955 for Hospital Survey on Patient's Safety Culture (HISOPSC) questionnaire.

Fieldwork

The researcher's started to collect data and implement the training program through 3days per week started from the 4th week, 25 August, and lasted at 2nd week from 15 September (2019) and follow-up

after 3 months later. The researcher develops a training program through four phases:

The assessment phase of a training program: The data was collected during this phase constituted the pre-test or baseline for the study.

The planning phase of a training program: The program was planned and designed based on the needs assessment in this study through (a pre-test questionnaire). The training program was conducted in the measurement and evaluation unit at the Faculty of Nursing- Assiut University.

The implementation phase of a training program: The program was implemented by the researcher on the participants (n=27) because there were withdraw (n=2) from the sample after participated in the pre-test phase without presenting the program. The participants were divided into three groups. Every group consists of (n=9) participants. The groups organized to avoid shortage and don't distribute their work in the units. The program was implemented in three days for each group. The course content was spread into three sessions for every group. The total time of the program was 40.5 hours, three sessions per day, every session 1.5 hours for the three groups. At the beginning of the first session, an orientation to the program, and its purpose was done and the participants were informed about the time and place of the session taken. The teaching methods used in the program include; lectures, small group discussions, (group discussion), brainstorming, demonstration, case study, and practical training. Teaching aids used included; booklet, handout, PowerPoint, flip charts, photographs, drawings for illustrations, and video presentations.

The evaluation phase of a training program: Immediately after implementation of the training program, the researcher use post-test format to evaluate the effect of the training program as same pre-test format that was used at the beginning of program implementation, after three months later for the follow-up to evaluate the retention of head nurses management toward reducing the risk of patient fall using the PDCA model. Lastly, the participant's reaction form (opinionnaire sheet) was distributed immediately after program implementation to elicit participants' opinions and the worth points about various aspects of the training program as an educational experience and the benefits gained from it.

Administrative design

Official permission to collect data and implement a training program was obtained from the Dean of Faculty of Nursing-Assiut University, Hospital director, and Nursing Director of Rajhy Liver Hospital-Assiut University.

Ethical considerations

The research proposal was approved by the Ethical Committee in the Faculty of Nursing. The study followed common ethical principles in research. The study subject had the right to refuse to participate and /or withdraw from the study at any time. There was no risk for the study subject during the application of the research. Study subject privacy was considered during the collection of data. The purpose of this study was explained to all participants. Informed them that the information and data obtained will be confidential and used only for the purpose of the study. Oral and written consent was taken from the participants before the training program was implemented.

Limitations of the study

Withdraw for (n=2) of head nurses after participated in the pre-test phase without presenting the program.

Statistical design

Collected data were verified prior to computerized data entry and analysis by using a statistical software package for social sciences (IBM SPSS-22). Data were presented using descriptive statistics in the form of frequencies and percentages. Quantitative variables were presented in the form of mean and standard deviation. Qualitative variables were compared using (chi-square test) and (ANOVA test). Used (Pearson Correlation) to examine the association between scores was considered a statistically significant difference ($P < 0.05$).

Results

Table (1): Distribution of head nurses personal characteristics participated in the program at Rajhy Liver Hospital - Assiut University (N=27)

Variables	No.=27	
	No	%
1. Age		
• < 25 year	2	7.4
• 25 - < 35 year	20	74.1
• 35 - < 45 year	4	14.8
• > 45 year	1	3.7
2. Gender		
• Male	1	3.7
• Female	26	96.3
3. Work unit place		
• Medical (Gastroenterology) unit	3	11.1
• Surgical (Liver and Gastroenterology) unit	2	7.4
• Intensive care unit (ICU)	2	7.4
• Critical care unit (CCU)	2	7.4
• Liver care unit (LCU)	3	11.1
• Operating room unit	4	14.8
• Endemic unit	2	7.4
• Endoscopes unit	2	7.4
• Outpatient clinics unit	1	3.7
• Interventional and X-ray radiology	2	7.4
• Laboratory unit	1	3.7
• Control infection unit	2	7.4
• Nursing director office	1	3.7
4. Level of education		
• Bachelor of Nursing	22	81.5
• Master's of Nursing	4	14.8
• Doctorate of Nursing	1	3.7
5. Years of experience		
• < 5 year	11	40.7
• 5 - < 10 year	8	29.6
• 10 - < 15 year	5	18.5
• > 15 year	3	11.1
6. Type of nursing care delivery method		
• Total patient care (Case method)	20	74.1
• Functional care (Task method)	2	7.4
• Team care method	5	18.5

Table (2): Total mean scores of head nurses management toward reducing the risk of patient fall using (PDCA) model during the different periods of the testing training program (N=27)

Head nurses management toward reducing the risk of patient fall using (PDCA) model	Max score	Pre	Post	Follow-up 3 months	P. value
		Mean±SD			
• Plan	15	6.85±2.18	12.74±2.19	12.56±2.08	<0.001**
• Do	25	11.04±2.59	21.15±2.93	21.26±3.13	
• Check	20	9.33±2.17	17.33±2.37	16.41±3.12	
• Act	10	4.93±1.11	9.15±1.03	8.41±1.15	
Total score	70	32.15±6.43	60.37±7.7	58.63±8.62	

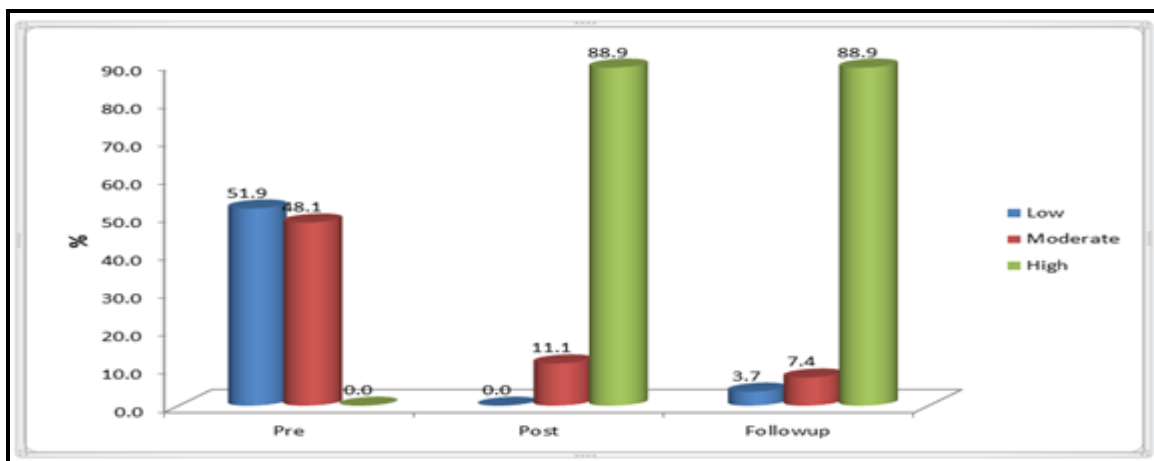


Figure (1): Distribution of head nurses management level toward reducing the risk of patient fall using (PDCA) model during the different periods of the testing training program (N=27)

Table (3): Total mean score of head nurses perception regarding patient's safety culture (PSC) aspects during the different periods of the testing training program (N=27)

Patient safety culture (PSC) aspects	Pre	Post	Follow-up 3 months	P. value
	Mean±SD			
Patient's safety culture at unit -level aspects	73.59±12.19	99.48±16.12	97.52±10.93	<0.001**
• Supervisor expectations promoting safety	12.44±3.02	16.52±2.68	16.41±1.95	<0.001**
• Organizational-learning-continuous improvement	12.26±2.81	16.48±3.47	16.7±2.11	<0.001**
• Teamwork within units	9.59±1.5	12.96±2.7	12.56±1.8	<0.001**
• Communication openness	9.44±2.03	12.41±2.44	11.81±2.22	<0.001**
• Feedback- &communication about error	9.63±1.39	12.81±2.73	12.89±1.63	<0.001**
• Non-punitive response to error	9.52±1.85	12.93±2.04	12.37±2.4	<0.001**
• Staffing	10.7±2.83	15.37±2.9	14.78±3.15	<0.001**
Patient's safety culture at hospital -level aspects	31.85±5.3	43.37±5.91	43.41±4.09	<0.001**
• Hospital-management support for patient safety	9.37±1.92	12.44±2.45	12.48±1.34	<0.001**
• Teamwork across units	11.89±2.21	16.04±2.92	15.81±1.92	<0.001**
• Hospital handoffs &transitions	10.59±2.59	14.89±1.8	15.11±2.71	<0.001**
Patient's safety at outcome-level aspects	20±3.86	30.22±3.66	26.85±4.35	<0.001**
• Overall perceptions of safety	11.26±2.14	17.11±2.61	15.52±2.62	<0.001**
• Frequency of event reporting	8.74±2.01	13.11±1.53	11.33±1.92	<0.001**
Total score	125.44±18.74	173.07±24.15	167.78±16.06	<0.001**

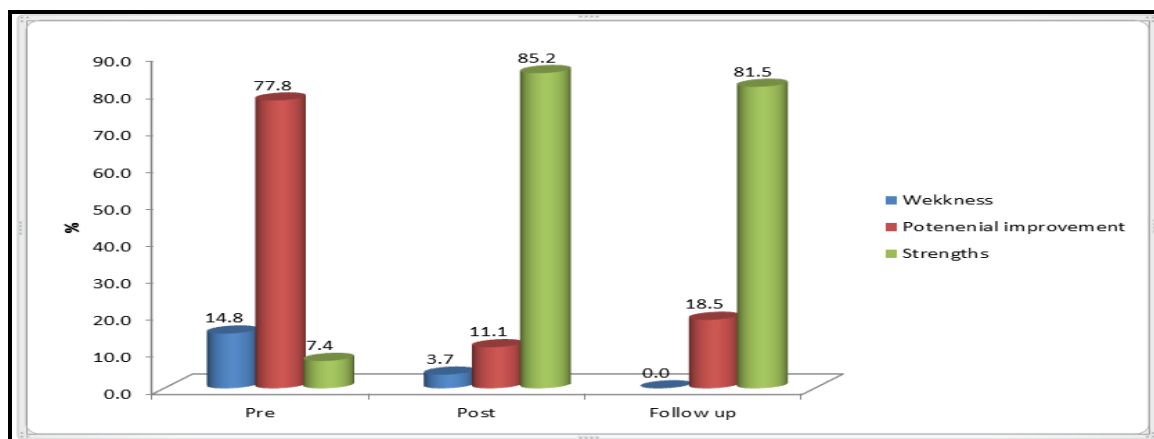


Figure (2): Distribution of head nurses perception level regarding patient's safety culture (PSC) aspects during the different periods of the testing training program (N=27)

Table (4): Correlation between head nurses management toward reducing the risk of patient fall using (PDCA) model and patient safety culture during the different periods of the testing training program (N=27)

Correlation	Patient Safety Culture (PSC)					
	Pre		Post		Follow-up 3 months	
	r	p	r	P	r	p
Head nurses management toward reducing the risk of patient fall using (PDCA) model	.433	0.024*	0.278	0.160	.599	0.001**
Total Score	.616	0.001**	.395	0.042*	.713	0.000**

Table (1): Shows that the highest percentage of head nurses in the study (74.1%) their age ranged from 25- < 35 years old and (96.3%) are females. Whereas, (14.8%) of them are working in the operating room unit, and (81.5%) are having a bachelor of nursing. Meanwhile, (40.7%) of them have less than 5 years of experience in work. Finally, (74.1%) of them are using the total patient care (Case method) of the nursing care delivery.

Table (2): Shows that the total mean score pre-program implementation (32.15±6.43) and improved post-program implementation (60.37±7.7) and then slightly, decreased to (58.63±8.62) of follow-up program after 3 months with highly statistical significance differences (P=<0.001).

Figure (1): Presents that, the highest percentage of head nurses in the study (51.9%) pre-program implementation have low management level toward reducing the risk of patient fall using the PDCA model. While the majority of them (88.9%) have improved through the post and follow-up program implementation become high management level.

Table (3): Shows that the total mean score pre-program implementation (125.44±18.74) and improve post-program implementation (173.07±24.15) and then slightly decrease to (167.78±16.06) of follow-up program after 3 months with highly statistical significance differences (P=<0.001).

Figure (2): Reveals that the highest percentage of head nurses in the study (77.8%) pre-program implementation have potential improvement level regarding patient's safety culture (PSC) aspects. Whereas, (85.2. %) of them have improved post-program implementation become strengths level and then slightly, decrease to (81.5%) of follow-up after 3 months.

Table (4): Reveals that there are highly statistical significance differences with a strong positive correlation between head nurse management toward reducing the risk of patient fall using the PDCA model and patient safety culture of pre and follow-up-program implementation (**r < 0.6 > 10.0). Meanwhile, there are highly statistical significance

differences with mild positive correlation in post-program implementation (r < 0.2 > 0.4).

Discussion

Developing a safety culture regarding reducing patient falls in the discussed most institution was seen already as a priority by the nursing administration. Educating clinical and non-clinical staff in the patient fall prevention is essential to creating a safety culture. The health leader's role is to place patient safety as a high priority, should apply significant effort toward the prevention of adverse events. (Cortina, 2016 & Mahrous, 2018). One of the main head nurses' roles in nursing administration is to achieve quality, particularly regarding patient safety the Plan-Do-Check-Act (PDCA) model has been shown to be an effective quality management tool in improving patient's outcomes and augmenting the efficiency of the organization to the maximum. (Severinsson, 2013; Johnson et al., 2016 & Garrett et al., 2017)

Consequently, the current study was aimed to; assess the effect of applying a training program about reducing the risk of patient fall on patient's safety culture at Rajhy Liver Hospital-Assiut University. In the contrast, the present study hypothesized there will be an increase of head nurses' management level toward reducing the risk of patient fall using the PDCA model and patient's safety culture perception level. Furthermore, there is a highly significant positive correlation of head nurses' management toward reducing the risk of patient fall using the PDCA model on patient's safety culture after the training program is implemented.

According to the head nurses' management toward reducing the risk of patient fall using the PDCA model, the present study findings showed that the total mean score and the highest percentage of head nurses about half of them before program implementation was low management level toward reducing the risk of patient fall using the PDCA model. Thus, from the researcher's view of point, this may be due to head nurses not applying assessment tools for falls, although it's available in the hospital.

These present findings are in agreement with **Yuswardi et al., (2015)**, who showed that head nurses' management toward reducing the risk of patient fall using the PDCA model was low management level. Furthermore, the common reason head nurses' management in reducing the risk of falls was at low level due to some hospitals have not applied assessment tools for falls.

These present findings are in disagreement with **Boonyoung et al., (2013)**, who found that head nurses' management toward reducing the risk of patient fall using the PDCA model was a high management level. Furthermore, the common reason that head nurses' management in reducing the risk of fall was at a high level was due to head nurses have applied assessment tool for fall and discussed that using assessment tool for fall are very useful to identify the potential risk of fall in order to reduce fall incident in the unit.

Overall, the present study findings showed that the head nurse's management toward reducing the risk of patient fall using the PDCA model had improved after program implementation and follow-up after 3 months become a high management level. Furthermore, there were highly statistical significance differences ($P < 0.001$). Thus, from the researcher's point of view, these findings assert that training program implementation is successful and effective in improving head nurses' management level toward reducing the risk of patient fall using the PDCA model.

These present findings are consistent with **Seliem et al., (2019)**, who indicated statistically significant improvements in all areas of practice of the PDCA model among head nurses' after implementation of the intervention. While, concluded that, the implementation of a training program is successful in improving head nurses' related knowledge and practice. In the same line, **Flores et al., (2013)**, demonstrated that the success of training staff nurses in PDCA is a quality improvement tool in enhancing their related competencies.

According to the head nurses' perception regarding patient's safety culture (PSC), the present study finding revealed that the total mean score and the highest percentage of head nurses about more than two-thirds of them before program implementation had potential improvement level regarding patient's safety culture (PSC) aspects at the unit, hospital, and outcome level.

These findings are in agreement with **Abousallah, (2018)**, who showed that the highest percentage of head nurses before program implementation had a potential improvement level of patient's safety culture (PSC) aspects. These findings strongly confirm with **Aljabri, (2012)**, who explained how

these variables contribute to achieving an excellent patient safety culture.

These findings are in disagreement with **Hanifi et al, (2018)**, who showed that the surprising results the positive response rate to the patient's safety culture in some composites in the control group was reduced after the intervention although this reduction was not statistically significant. It seems that changing the patient's safety culture using educational programs requires more training courses.

In the same line, **Azimi et al., (2012)**, stated that the hospitals need some education and training programs to meet their nursing staff's needs to improve the patient safety culture. Some studies showed significant improvements in most dimensions. Also, **Abousallah, (2018)**, who discussed that important aspects of the patient safety culture in these hospitals need improvement, and **Abu-El-Noor et al., (2019)**, who mentioned that a significant improvement in nurses' attitudes towards most safety culture dimensions after training was observed.

Overall, the present study findings showed that head nurses' perception regarding patient's safety culture (PSC) aspects at unit, hospital, and outcome level had improved after program implementation and follow-up after 3 months become strengths level. Furthermore, there were highly statistical significance differences ($P < 0.001$). Thus, from the researcher's point of view, these findings assert that training program implementation is successful and effective in improving head nurses' perception level regarding patient's safety culture (PSC) aspects.

As regards, the correlation between head nurses management toward reducing the risk of patient fall using the PDCA model and patient safety culture, the present study findings found that there were highly statistical significance differences with a strong positive correlation between head nurses management toward reducing the risk of patient fall using the PDCA model and patient safety culture before and follow-up program implementation and mild positive correlation after program implementation. Thus, from the researcher's point of view, these findings assert that training program implementation is successful and effective, in which there were significant positive impacts of head nurses' management toward reducing the risk of patient fall using the PDCA model on their patient safety culture level.

These findings are in congruence with **Elmontsri, (2017) & Abousallah, (2018)**, who found a significant positive strong correlation impact of the application of reducing the risk of patient fall on patient safety culture. Also, **Ulrich & Kear, (2014)**, who emphasized the strong relationship between reducing the risk of patient fall using the PDCA

model and patient safety culture, found that a better patient safety culture was associated with a lower risk of patient safety issues.

Conclusions

In light of the study findings, the following conclusion can be drawn:

It is concluded that the implementation of the training program is successful and effective in improving head nurses' management toward reducing the risk of patient fall using the PDCA model and their perception regarding patient's safety culture (PSC) after program implementation and follow-up after 3 months with highly statistical significance differences ($P < 0.001$). Furthermore, there was a strong positive correlation impact of head nurses' management toward reducing the risk of patient fall using the PDCA model on their patient's safety culture level.

Recommendations

In light of the results of this study, the following recommendations are suggested;

1. Developing a policy to conduct in-service training program and development activities related to reducing the risk of patient fall at the health care setting.
2. The concept of patient safety management and the PDCA model should be included in nursing courses at the faculty of nursing- Assiut University.
3. The patient safety culture perception should be measured as a continuous quality improvement (CQI) indicator for a safe health system at Rajhy Liver Hospital- Assiut University.

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