Effect National Patient Safety Goals on Nurses Performance and Patients outcomes

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Abstract

Background: The International Patient Safety Goals are used to improve the quality of care and patient outcomes. **Aim**: The aim of this study to assess the effect of national patient safety goals application on nurses' performance and patient's outcomes. **Subjects and Methods**: **Research Design:** A quasi-experimental design had used to achieve the aims of the study. **Setting**: This study was conducted at The Academy of chest and Heart Surgery affiliated from Ain Shams University hospital. **Subject**s: A convenient sample of sixty nursing staff and 120 patient divided into two group from the previous mentioned setting. **Tools of data collection**: I: self-administer questionnaire, II: Nurses Observational checklist, III: Hospital staff Patient Safety attitude and culture. **Results**: More than three quarters of the studied nursing staff were between the age group of (18-35). Regarding gender more than half of the studied nurses were male. Total level of knowledge was **one third** pre and improved more than **four fifth** post implementation of intervention, and **two fifth** of nurses had total satisfactory level of practice pre implementation of educational program and more than **three quarters** of them had total satisfactory level of practice post implementation. **Three quarters** of nurses revealed negative attitude and impression regarding patient safety culture, while **one quarter** of them had positive attitude and impression regarding patient safety culture. Significant positive correlations were revealed among knowledge, satisfaction, and practice scores. **Conclusion:** The study intervention was a statistically significant independent positive predictor of all three scores and improved patient outcomes post implementation of educational program. **Recommendations**: The hospital administration should encourage the application of International Patient safety goal procedures to improve nurse's safety performance.

Keywords: Educational program, International Patient Safety Goals, Nurse performance, and Patient outcomes.

Introduction

Safety is the fundamental cornerstone of the health care system. Patient safety defined as; the prevention of harm to patients. Emphasis placed on the system of care delivery that prevents errors; learns from the errors that do occur and is built on a culture of safety that involves health care professionals, organizations, and patients **(Härkänen et al., 2018)**.

Patient safety is a new healthcare issue in the healthcare organizations that includes the reducing and preventing medical fault that often leads to harmful health consequences. Health care has become more efficient and also become more complex, with greater application of new technologies and therapies, which needs adopting with the international patient safety goals to improve the patient safety environment to simulate international competitions and to increase the competitive advantages of the healthcare organizations at the national and international grades **(Vlayen et al., 2021).**

National patient safety goals (NPSGs) are evidence-based standards of care established by the Patient Safety Advisory Group (PSAG) to improve the safety and quality of care provided to patients. National patient safety goals are intended to help accredited organizations, address specific areas of concern in regards to patient safety. These patient safety goals specify the best clinical practice in a number of areas including; correct patient identification, communication among medical providers, the safe use of medications, infection prevention, patient safety from risks, prevention of surgical mistakes, prevention, of fall and pressure ulcer **(Jha,2018).**

(NPSGs) are standards that published from a variety of health institutions like; hospitals, home care agencies, behavioral

health facilities, long-term care facilities, outpatient surgery centers, and laboratories. Improving the quality of care and national patient safety in practice are a challenge for nursing staff as well as healthcare organization; so, nurses have a critical and an essential role in patient safety, quality of care improvement and providing an ongoing leadership. Nurses are accountable for their role in assisting their staff to meet quality standards and to decrease barriers to provide patient safety care **(Abou Hashish, 2020**).

There is increasing concern about the link between performances of nurses' practices and national patient safety which create an urgent need for a more understanding of the nature of clinical supervisory activities at an operational level. The vital purpose of clinical supervision is to improve patient care and experiences, therefore, improvements in patients' outcomes are a major sign of effective supervision **(Almalki et al., 2021).**

Patient safety is a health care discipline that emerged with the evolving complexity in health care systems which lead to rise patient harm in health care facilities. Also, patient safety aims to prevent and reduce risks, errors and harm that occur during provision of health care. A cornerstone of the discipline is continuous improvement based on learning from errors and adverse events. Patient safety is fundamental to delivering quality essential health services. Indeed, is a clear consensus that quality health services across the world should be effective, safe and people-centered. In addition, to realize the benefits of quality health care, health services must be timely, equitable, integrated and efficient **(Timothy& Farlain,2019).**

(NPSGs) are directly impact the way nurses` practice within their organizations. Nurses alongside physicians, pharmacists, risk managers, clinical engineers, and other professionals, serve on the Patient Safety Advisory Group that formulates and revises the safety goals. Members of Patient Safety Advisory Group are used to accredit hospitals and other healthcare organizations. Organizations that fail to obtain or renew accreditation are at serious risk of closing and may not be reimbursed by Medicare and Medicaid. NPSG are standards of care that all healthcare professionals must learn and practice **(Vlayen et al.,2021)**.

Furthermore, nurses play a key role in improving patient safety due to their continuous presence at patients' bedsides, interaction with their families and other healthcare professionals for instance, critical care unit nurses have often reported that they identified and corrected errors such as medication and procedural implementor related to nurses and other caregivers. Patient safety is an important element in offering high-quality health care services **(Almalki et al.,2021).**

Significance of the problem:

Main Sentinel Events reported usually include; Unintended Retention of a Foreign Body 123 (13.14%), provide action for wrong–patient, wrong-site, wrong-procedure 121(12.93%), fall 95(10.15%), delay in treatment time 82(8.76%), and Op/Post-op Complication ,82(8.76%) **(Joint Commission, 2019).**

Aim of study:

The aim of this study is to assess the effect of national patient safety goals application on nurses' performance and patient's outcomes through: -

1- Assessing nurses' performance (knowledge – practice and attitude) regarding the national patient safety goals.

2- Assessing hospital environment regarding the available resources for applying the national patient safety goals.

3- Implement the national patient safety goals based on nurse's needs assessment through developing educational program.

4- Evaluating the effect of the national patient safety goals educational program on nurses' performance and patients' outcomes

5- Identifying the factors that hindered the application of the national patient safety goals during nursing care.

Research Hypothesis:

The application of national patient safety goals will positively affect the nurses'

performance regarding patient safety measures and nurses' level of performance as regarding to reduction in number of adverse events (medication errors – incompatible blood transfusion – blood transfusion reaction), prevention of sentinel events (wrong site, limb, patient surgery – forgetting foreign body inside the patient) and reduction of falling risks. As will positively affect patient's outcomes as regarding to hospital acquired infection – average length of stay and patient's readmission.

Research design

A quasi-experimental had used to achieve the aims of the study.

Setting:

This study was conducted at The Academy of chest and Heart Surgery affiliated from Ain Shams University hospital, where the study conducted

Subjects

Subjects of the study included two groups (group of nurses and group of Patients) each group divided into two sub groups.

I- The nursing group include-

A convenient sample of sixty nursing staff who accept to participate in the study in the previously mentioned setting were observed and audited for performance regarding the application of patient safety goals items from patients admission to discharge and conduction of the national patient safety goals educational program.

II- Patient samples include two groups

- The First group of the patients was sixty convenient sample from hospital records to assess readmission for the patients during the last six months under which cause complications or surgical site infection before the implementation of the national patient safety goals educational program.
- The second group of the patients was sixty convenient patients available in the different areas in the hospital all they were to checked and observed for the application of patient safety goals items related process as (patient identification, effective communication, fall risk and infection highlighting) or all what related care such as (infection control bundles, medications management, universal OR protocol) after implementing of the program.

Tools of data collection:

Tool I: self-administer questionnaire

It was used to assess level of nurses Knowledge about the patient safety goals measures. The pretest were developed by the investigator based on the related literature (**The Agency for Healthcare Research and Quality AHRQ 2019; JCI, 2020 and World Health Organization, 2020)**.

The tool consists of two parts:-

Part I: used to assess the demographic characteristics of the nurses group as; age, gender, qualifications, years of experience.

Part II: It used to assess nurses knowledge regarding patient safety goals. it include of nine parts all including :- Patient identification (20 questions), Effective Communication (28 questions), Safety of using Medications (28 questions), Safe surgery protocol (16 questions), Health Care-Associated Infections (16 questions), Risk of Patient Harm Resulting from Falls (12 questions), Rapid response team and cod blue team (16 questions), Keep patient confidentiality and privacy (4 questions), and Keep intact skin and prevent pressure ulcer (4 questions).

Scoring System

The total items was 144 items. Three point rating scale was used 1-3 degree and scale was yes answer take score 3, no take score 2 and not applicable item or question take score 1, the total score ranged from 144 to 432 degree.

The total score was 432 degree distributed as follows:

≥ 70% was considered as satisfactory level ≥303 degree.

< 70% was considered as unsatisfactory level <303 degree.

Tool II: Nurses Observational checklist

This tool was used to assess nurses' staff skills regarding the application of the patient safety measures. It was developed by the investigator based on the related literature **(European Union Network for Patient Safety, 2010; AHRQ 2019; Alberta Health Services (AHS) 2019; Centers for Disease Control and Prevention (CDC) 2019; Hendrich. 2020; the Association for Professionals in Infection Control and Epidemiology (APIC) 2020; WHO 2020 and JCI 2021).**

National patient's safety goals application survey. It consists of nine parts: - Patient identification consist of 6 items (12 steps); Effective communication (verbal and telephone order consist of 6 items (11 steps)- Reporting critical results consist of 5 items (7 steps) - Patient hand over and transfer consist of 13 items 24 steps). Universal OR Protocol for safe surgery (Sign in Pre-Operative Verification Process 5 items 6 steps - Site Marking 3 items 7 steps - Time Out Immediately Before Surgery 5 items 8 steps - Sign out 8 items 11 steps). Infection control items includes screening of health care associated infection 2 items 2 steps, Hand Hygiene 3 items 8 steps, Standard Precautions 9 items 9 steps, Airborne & Droplet Precautions 8 items 8 steps, Mention and Apply Contact Isolation precautions 5 items 5 steps.

Infection control Bundles of Care that includes Catheter Associated Urinary Tract Infection (CAUTI). Care bundles 8 items 8 steps, Central line Associated Blood Stream Infection (CLABSI). Bundles of Care 7 items 7 steps, Ventilator Associated Pneumonia (VAP). Bundles of Care 9 items 15 steps, and Surgical Site infection (SSI). Bundles of Care 12 items 12 steps. Decrease of falling 6 items 22 steps; Access to Care & Continuity of Care for patient Safety 11 items 16 steps, rapid response team for Proactive Patient saving 7 items 9 steps; Cardio pulmonary Resuscitation Cod Blue 10 items 14 steps; Prevention & Management Of Pressure Ulcers 7 items 12 steps, Patient's Privacy & Dignity 5 items 5 steps. Patients Care Policies 5 items 5 steps, Patient & Family Education 3 items 15 steps; Staff Qualifications & Education 2 items 2 steps, Management Of Safety Information safety polices 6 items 10 steps.

Medication room checklist: which include Medication Storing Places Precautions 3 items 11 steps, Ordering 1 items 3 steps, preparation 4 items 11 steps, dispensing 2 items 7 steps, administration 3 items 8 steps, narcotics 9 items 9 steps. Crash Cart Checklist 12 items 12 steps, Patient and family education about medications 2 items 11 steps.

Scoring system

The total number of steps was 342 Employee Performance Rating Scales 1-4 was used to rate and scale the of this tool. The score started from 3 = Met, 2= Partially Met, 1 = Not Met & zero= NA.

The total score was 1026 degree distributed as follows:

≥ 70% was considered as satisfactory level ≥718 degree.

< 70% was considered as unsatisfactory level <718 degree.

Tool III: Hospital staff nurses Patient Safety attitude and culture:

This tool was adapted by The Agency for Healthcare Research and Quality **(AHRQ 2019)** released the Survey on Patient Safety Culture (SOPS) Hospital questionnaire for providers and other staff to assess patient safety culture through ask for staff opinions about patient safety issues, medical error, and event reporting in the hospital. The investigator was translate tool into Arabic language.

It consist of 8 items as follow: work place 16 question, your supervisor or director 4 question, communication between team work in hospital 6 question, repetition of work problems or mistakes 11 question, degree of patient safety 1 question, your opinion about the hospital 10 question, number of mistakes that was document in the last 12 months 4 question, write freely any comment regarding patient safety and mistakes that was document in hospital 1 question.

2. Operational design:

The operational design includes preparatory phase, validity and reliability, pilot study and fieldwork.

The preparatory phase:

This phase included reviewing of the related literature and theoretical background of various aspects of the study using books, articles, internet periodicals and magazines to develop data collection tools.

Tools validity & reliability

Testing Validity of the proposed tools by using face and content validity. **Face validity** aimed at inspecting the items to determine whether the tools measure what supposed to measure. **Content validity** was conducted to determine whether the content of the tool cover the aim of the study. It was measured by a jury of 7 experts, three of them professors, two assistant professors and two of them lecturers of medical surgical nursing at faculty of nursing, Ain Shams University. The expertise reviewed the tool for clarity of sentences, relevance, accuracy, comprehensiveness, simplicity and applicability, minor modification was done. Finally, the final forms were developed.

Testing reliability: The reliability of the tools was assessed through measuring their internal consistency by Cronbach Alpha Coefficient test that was reliable at (0.847) according to **Knowledge about the patient safety goals measures**, (0.774) according to practice and (0.750) according to attitude.

II. Administrative design:

An official letters were issued from the faculty of nursing Ain-Shams University to general director of the Chest and Cardiac Surgery Academy where the study was conducted. Permission to carry out the study was obtained from the director of the previous setting after explaining the purpose of this study.

III-Ethical consideration:

The ethical research considerations in the study include the following:

The research approval was obtained from the ethical committee in Ain Shams University before starting the study. The researcher was assured maintaining anonymity and confidentiality of subjects' data. Nurses and patients were informed that they are allowed to choose to participate or withdraw from the study at any time without any consequences.

The pilot study

After development of the tools, the pilot study was conducted on 10% (10 nurses and 20 patients) of the study subject to check and ensures clarity, applicability, and feasibility of the tools and to identify the difficulties that may be faced during the application. Suggested changes were done, and then the final form was developed. The staff who included in the pilot study were excluded from the main study group.

The field work:

To carry out the study an approval was obtained from the hospital director and nursing directors of the Chest and cardiac surgery academy. A letter was issued to them from the Faculty of Nursing Ain Shams University, explaining the aim of the study in order to obtain permission and cooperation to conduct the study.

The educational program was designed based on analysis of the actual educational needs assessment of the study nurses by using the pre-constructed tools. The data collection was accomplished throughout the following phases:

Assessment phase:

- This phase includes assessment of working time that was suitable for implementation the educational sessions and didn't interfere with their work.
- Assessment of the place that was suitable for presenting the sessions of the educational program.
- Assessment of nurses' attendance and availability according to their schedule.
- Assessment of the actual educational needs of the studied nurses by using the pre-constructed tools.
- Assessment needed equipment such as laptop for presenting the sessions of the educational program, hard and soft copies for the program content.

Implementation phase:

This phase was divided into two phases: pre-test, application of the educational program as the following:

Phase one of implementation (pre-test):

- The researcher interviewed the nurses and explained the aim of the study. They were assured that information collected would be treated confidentially and it would be used only for purpose of research.
- The knowledge assessment questionnaire and Hospital staff Patient Safety attitude and culture were distributed to all respondents' nurses and the researcher was offered clarification whenever confusing questions arise. The average time of filling the questionnaires were 35-45 minutes. This process took two weeks, started from 1/1/2021 to 14/1/2021.
- The researcher was filling the observational checklist in the morning and afternoon shift during actual nurses' work. Nurses were observed while providing the care to the patient. Each nurse was observed one time. The observational checklist was completed by the researcher in the 30 to 35 min for every nursing personnel. This process took one month, started from 15/1/2021 to 14/2/2021. The pre-testing took about 45 days.

Phase two of implementation (application of the educational program):

- This phase included the application of the educational program. The content of the educational program was designed consistent with the related literature and meet the nurses' needs.
- The educational program consisted of (6) sessions was repeated over 7 weeks to cover the entire target population. Group of 2 to 3 nurses from each unit was participate in one session according to their working schedule. One session was done every day in the morning shift and repeated in the afternoon shift. The program was accomplished after attending 6 sessions (3 session theory and 3 session practice). This phases was started at 15/2/2021 and end at 30/4/2021.
- A hard and soft copy of the educational program was submitted to all nurses (study subject).

Evaluation phase:

- Evaluation of the educational program was done using the pre-constructed tools to measure the change in the studied nurses' performance regarding the patient safety goals.
- The researcher was distribute the pre-constructed tools to measure the knowledge assessment questionnaire and Hospital staff Patient Safety attitude and culture were distributed to all respondents' nurses. The average time of filling the questionnaires were 35-45 minutes. This process took two weeks, started from 1/5/2021 to 14/5/2021.
- The researcher was filling the observational checklist in the morning and afternoon shift during actual nurses' work. Nurses were observed while providing the care to the patient. Each nurse was observed one time. The observational checklist was completed by the researcher in the 30 to 35 min for every nursing personnel. This process took 45 days, started from 15/5/2021 to 30/7/2021.

Results

Table 1 showed that 76.7% of the studied nursing staff were between the age group of (18-35). Regarding to gender 51.7% of the studied nurses were male. Moreover, 45% of the studied nurses had bachelor degree; also 73.3% had courses about patient safety goals. Regarding to years of experiences there were 41.7% of the studied nurses had less than one year of experience, while 35.0% of them had experience between (1-5) years and 80.0% of those nurses were working only at the heart and chest surgery academy without parting time with other health care organizations.

Table 2 showed that there were highly statistically significant regarding total level of nurse's knowledge all items of patient safety before and after implementation of educational Program and there were significant difference regarding total level of nurse's knowledge all items of patient safety after post implementation of education program for infection control.

Figure 1 showed that the total level of knowledge was 33.30 pre and improved to 91.70% post implementation of patient safety goals educational program

Table (3) should that regarding to total level of nurses' practice regarding to all items of safety guidelines goals there were improving from pre to post implementation of educational program from 3.3% to 98.3% in Patient identification and 5.0% to 83.3% in Effective communication with highly statistically significant differences. In addition, there were no improved in nurses performance regarding Access to care it was 0.0% pre and post implementation of educational program.

Figure 2 showed that there were 40.0% of nurses have total satisfactory level of practice pre implementation of educational program and 78.30% of them have total satisfactory level of practice post implementation of educational program

Figure 3 should that 75% of nurses have unsatisfactory level of total satisfaction while, 25% of nurses have satisfactory level of satisfaction.

Table (4) showed that nurse's practice regarding Patient outcomes post implementation of educational program between study and control group there were improved in length of patient stay from $6.13 \pm 1.98\%$ in control group to 3.10 ± 0.94 in control group with statistically significant relation. While, regarding to patient readmission it was decrease from control group 75% to 38,8% in control group post implementation of educational program with statically significant relation.

Table (5) showed that 100% of the study subject complain of Crowded sections and the large number of patients and 95% of them complain of Training and empowering patients. While, 88.3% complain of Lack observation of head nurses related patient safety, 85% of them complain of Obtaining informed consent from patients and Resource management in the hospital as a factors affecting nurses performance from applying patient safety goals.

Table (6) showed that there were highly statistically significant relation regarding nurses' total level of knowledge and demographic characteristics regarding attending training course post implementation of education program. There were statistically significant relation regarding nurses' total level of knowledge and demographic characteristics regarding educational level, experience and position post implementation of education program. While there were no statistically significant relation regarding nurses' total level of knowledge and demographic characteristics regarding age, gender post implementation of education program

Table (7) showed that there were highly statistically significant relation regarding nurses' total level of practice and demographic characteristics regarding attending training course post implementation of education program. There were statistically significant relation regarding nurses' total level of practice and demographic characteristics regarding educational level, experience and position post implementation of education program. While there were no statistically significant relation regarding nurses' total level of practice and demographic characteristics regarding age, gender post implementation of education program

Table (8) showed that there were statistically significant relation regarding nurses' total level of satisfaction and demographic characteristics regarding educational level and position post implementation of education program. While there were no statistically significant relation regarding nurses' total level of satisfaction and demographic characteristics regarding age, gender, level of education and years of experience post implementation of education program

Table (9) showed that there were highly statistically significant relation regarding nurses' total level of knowledge and total level of practice and total level of satisfaction pre implementation of education program

Table (10) showed that there were highly statistically significant relation regarding nurses' total level of knowledge and total level of practice post implementation of education program

Table (1): Frequency distribution of demographic characteristics of the subjects under study (No = 60)

Demographic characteristics	Category	N	%
Age	18-35	46	76.7%
	36-45	10	16.7%
	46-60	4	6.7%
Gender	Male	31	**51.7%**
	Female	29	48.3%
Education	Master	4	6.7%
	Bachelor	27	**45.0%**
	Nursing technician	21	35.0%
	Diploma	8	13.3%
Years of experience	<1 year	25	41.7%
	1-5	21	**35.0%**
	6-10	14	23.3%
working hours per week	48 hours	20	33.3%
	<48 hours	9	15.0%
	>48 hours	31	51.7%
place of working	Hospital only	48	80.0%
	Other places	12	20.0%
Position	nursing supervisor	13	21.7%
	nursing specialist	26	43.3%
	nursing technician	16	26.7%
	nursing assistant	5	8.3%
patient safety courses	Yes	44	73.3%
	No	16	26.7%

Table 2: Frequency distribution of the studied nurse's total knowledge about all items of patient safety goals before and after educational Program No = 60 nurses.

		Pre-intervention		Post-intervention		P value*
		N	%	N	%	
Patient identification	Satisfactory	28	46.7%	60	100.0%	<0.001 HS
	Unsatisfactory	32	53.3%	0	0.0%	
Effective communication	Satisfactory	34	56.7%	60	100.0%	<0.001 HS
	Unsatisfactory	26	43.3%	0	0.0%	
Dealing with high risk medications	Satisfactory	0	0.0%	60	100.0%	<0.001 HS
	Unsatisfactory	60	100.0%	0	0.0%	
Safe surgery	Satisfactory	4	6.7%	53	88.3%	<0.001 HS
	Unsatisfactory	56	93.3%	7	11.7%	
Infection control	Satisfactory	57	95.0%	60	100.0%	0.25 NS
	Unsatisfactory	3	5.0%	0	0.0%	
Decreasing risk of patient falls	Satisfactory	5	8.3%	54	90.0%	<0.001 HS
	Unsatisfactory	55	91.7%	6	10.0%	
RRT	Satisfactory	0	0.0%	50	83.3%	<0.001 HS
	Unsatisfactory	60	100.0%	10	16.7%	
Patient privacy	Satisfactory	30	50.0%	55	91.7%	<0.001 HS
	Unsatisfactory	30	50.0%	5	8.3%	
Prevention of bed sores	Satisfactory	27	45.0%	47	78.3%	<0.001 HS
	Unsatisfactory	33	55.0%	13	21.7%	

No significant P ≥ 0.05 Significant P ≤ 0.05* High significant P ≥ 0.004**

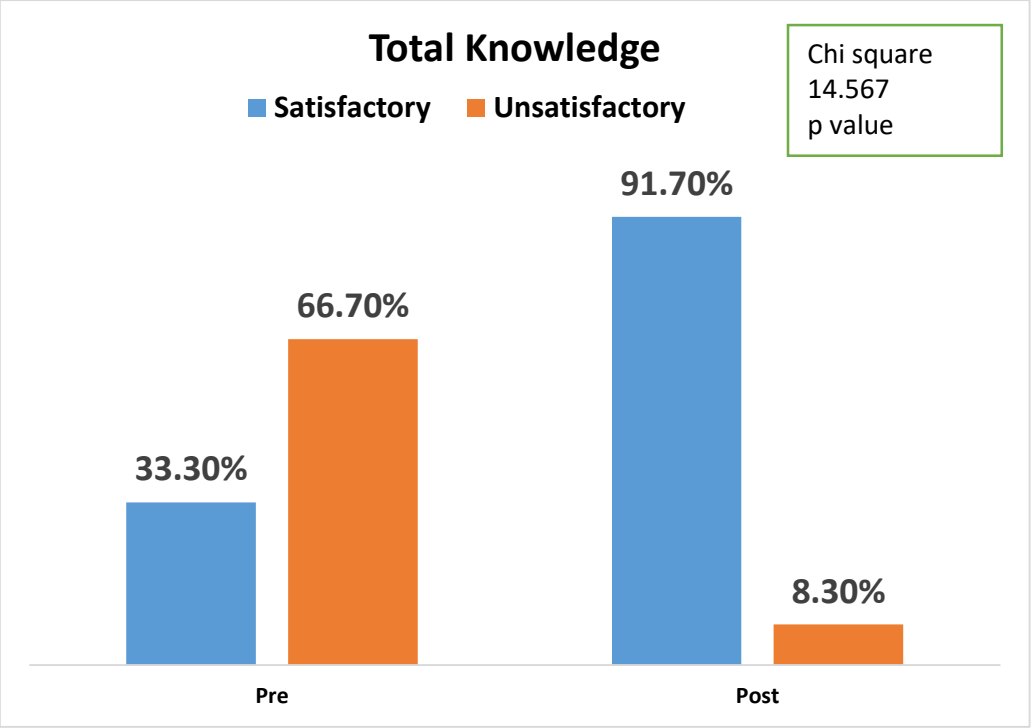

Figure (1) Frequency distribution of the studied nurse's total level of knowledge about patient safety goals before and after educational Program No = 60 nurses.

Table 3: Frequency distribution of the studied nurse's practice of all items of patient safety goals before and after educational Program No = 60 nurses.

		Pre-intervention		Post-intervention		P value*
		N	%	N	%	
Patient identification	Satisfactory	2	3.3%	59	98.3%	<0.001 HS
	Unsatisfactory	58	96.7%	1	1.7%	
Effective communication	Satisfactory	3	5.0%	50	83.3%	<0.001 HS
	Unsatisfactory	57	95.0%	10	16.7%	
Safe surgery	Satisfactory	60	100.0%	60	100.0%	-
	Unsatisfactory	0	0.0%	0	0.0%	
Infection control	Satisfactory	1	1.7%	38	63.3%	<0.001 HS
	Unsatisfactory	59	98.3%	22	36.7%	
Decreasing risk for fall	Satisfactory	5	8.3%	58	96.7%	<0.001 HS
	Unsatisfactory	55	91.7%	2	3.3%	
Access to care	Satisfactory	0	0.0%	0	0.0%	-
	Unsatisfactory	60	100.0%	60	100.0%	
RRT	Satisfactory	46	76.7%	58	96.7%	<0.001 HS
	Unsatisfactory	14	23.3%	2	3.3%	
CPR	Satisfactory	58	96.7%	59	98.3%	1.00 NS
	Unsatisfactory	2	3.3%	1	1.7%	
Prevention and management of pressure ulcers	Satisfactory	58	96.7%	59	98.3%	1.00 NS
	Unsatisfactory	2	3.3%	1	1.7%	
Patients privacy	Satisfactory	0	0.0%	14	23.3%	<0.001 HS
	Unsatisfactory	60	100.0%	46	76.7%	

		Pre-intervention		Post-intervention		P value*
		N	%	N	%	
Care policies	Satisfactory	23	38.3%	27	45.0%	0.29 NS
	Unsatisfactory	37	61.7%	33	55.0%	
Patient and family education	Satisfactory	33	55.0%	60	100.0%	<0.001 HS
	Unsatisfactory	27	45.0%	0	0.0%	
Staff qualification	Satisfactory	9	15.0%	16	26.7%	0.04 S
	Unsatisfactory	51	85.0%	44	73.3%	
Management of information	Satisfactory	4	6.7%	28	46.7%	<0.001 HS
	Unsatisfactory	56	93.3%	32	53.3%	
Medication room	Satisfactory	60	100.0%	60	100.0%	-
	Unsatisfactory	0	0.0%	0	0.0%	
Crash cart	Satisfactory	53	88.3%	60	100.0%	0.02 S
	Unsatisfactory	7	11.7%	0	0.0%	

No significant P ≥ 0.05 Significant P ≤ 0.05* High significant P ≥ 0.004**

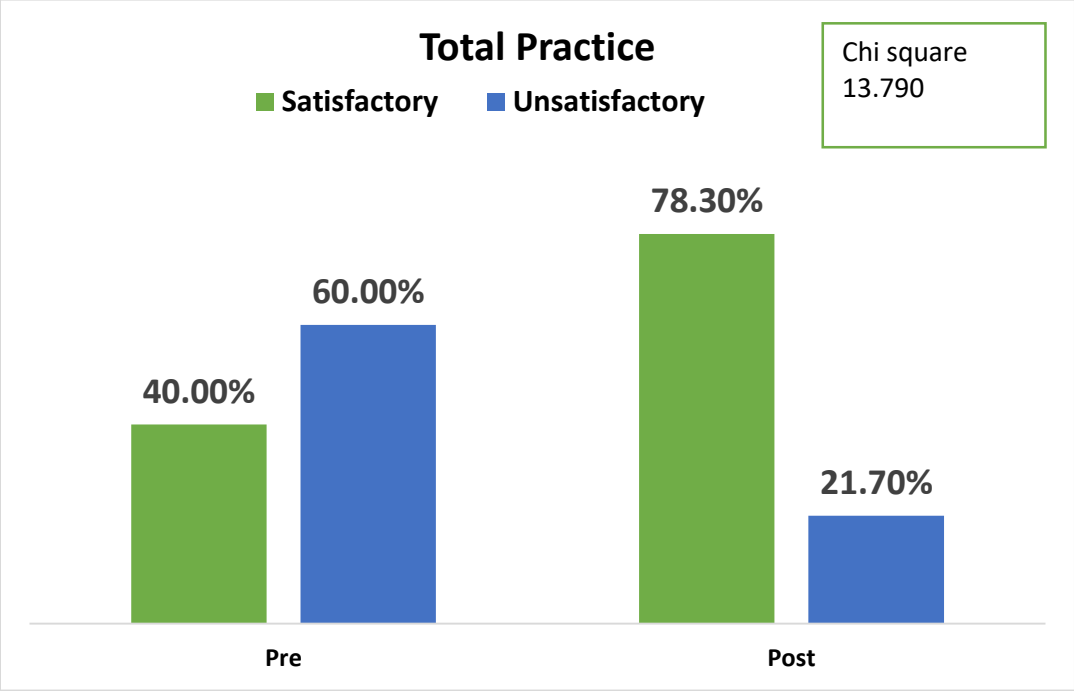

Figure (2): frequency distributions of total level of nurses practice between pre and post implementation of safety guidelines goals. No=60 nurses

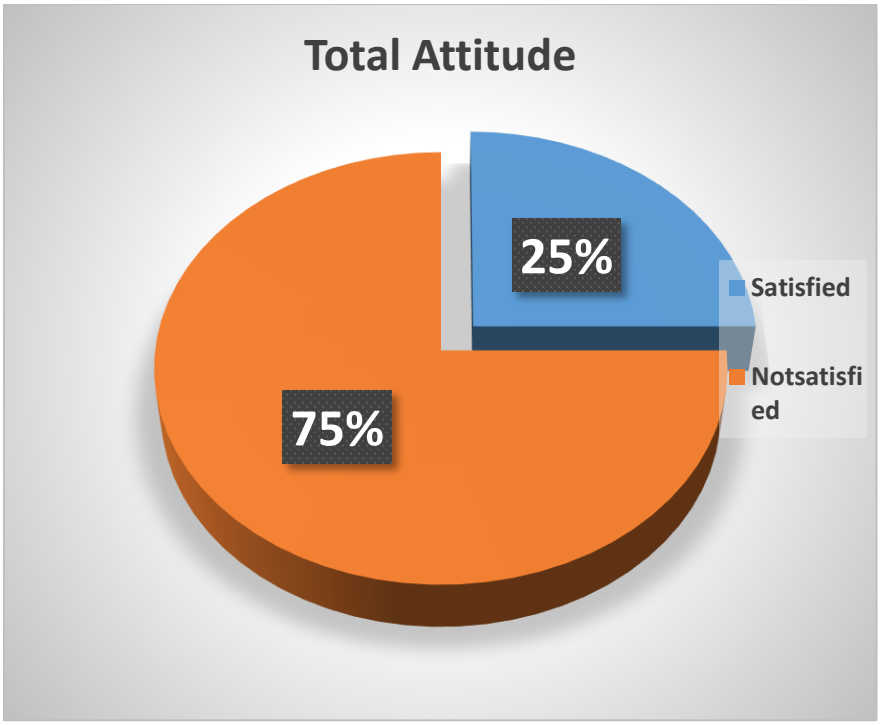

Figure (3): Frequency distribution of nurses' total level of satisfaction post implementation of educational program

Table (4): Distribution of patient about their outcome at control and study group (n=60)

	Control group		**Study group**		**P value**
Age:	**41.76±5.89**		**42.95±6.73**		**0.067**
Gender:					
Male	**35**	**58.3**	**31**	**51.7**	**0.059**
Female	**25**	**41.7**	**29**	**48.3**	
Diagnosis:					
Cardiac surgery	**37**	**61.7**	**42**	**70**	**0.060**
Chest surgery	**14**	**23.3**	**13**	**21.7**	
Cardiac catheter	**9**	**15**	**5**	**8.3**	
Co-morbidity status					
No	**35**	**58.3**	**36**	**60**	**0.057**
DM	**10**	**16.7**	**14**	**23.3**	
Hypertension	7	11.7	**3**	**5**	
DM & Hypertension	8	13.3	**7**	**11.7**	
Length of stay 1st	6.06 ± 1.76		**5.23 ± 2.13**		**0.041***
2nd	6.13±1.98		**3.10 ± 0.94**		**0.023***
Readmission					
Yes	45	75	**23**	**38.3**	**0.031***
No	15	25	**37**	**61.7**	
Cause of readmission					
Infection	26	57.8	**14**	**60.9**	**0.045***
Complications	4	8.9	**0**	**0**	
Other	15	33.3	**9**	**39.1**	

Table (5): Distribution of studied nurses about factors affecting applying patients safety (n=60)

Items	Yes		No	
	n	%	n	%
Planning to establish patient safety	48	80	12	20
Resource management in the hospital	51	85	9	15
Available of hospital statistics, information and indicators	45	75	15	25
The importance of ministry's plans and decisions on the performance of hospitals	49	81.7	11	18.3
Co-operation and participation of all in the patient safety program	52	86.7	8	13.3
Hospitals' relationship with each other	50	83.3	10	16.7
Communicating with patients	47	78.3	13	21.7
Training and empowering patients	57	95	3	5
Obtaining informed consent from patients	51	85	9	15
Crowded sections and the large number of patients	60	100	0	0
Plenty of changes in programs over time	41	68.3	19	31.7
Hospital financial problems	54	90	6	10
Lack of training nurses related patient safety	50	83.3	10	16.7
Lack observation of head nurses related patient safety	53	88.3	7	11.7

Table (6): Relation between nurses' characteristics and total knowledge post intervention (n=60)

Items	Satisfaction N=55		unSatisfaction N=5		X^2	P value
	N	%	n	%		
Age:						
18-35	**43**	**78.2**	**3**	**60**	**2.098**	**0.067**
36-45	**8**	**14.5**	**2**	**40**		
46-60	**4**	**7.3**	**0**	**0**		
Gender:						
Male	**28**	**50.9**	**3**	**60**	**1.776**	**0.083**
Female	**27**	**49.1**	**2**	**40**		
Education level						
Master	**4**	**7.3**	**0**	**0**	**7.805**	**0.013***
Bachelor	**27**	**49.1**	**0**	**0**		
nursing technician	**20**	**36.4**	**1**	**20**		
Diploma	**4**	**7.3**	**4**	**80**		
Experience						
6-10	**24**	**43.6**	**1**	**20**	**5.425**	**0.026***
1-5	**20**	**36.4**	**1**	**20**		
<1	**11**	**20**	**3**	**60**		
Positions:						
nursing supervisor	**13**	**23.6**	**0**	**0**	**6.004**	**0.018***
nursing specialist	**25**	**45.5**	**1**	**20**		
nursing technician/ assistant	**17**	**30.9**	**4**	**80**		
Patient safety courses:						
Yes 44	**44**	**80**	**0**	**0**	**9.851**	**0.009****
No 16	**11**	**20**	**5**	**100**		

Table (7): Relation between nurses' characteristics and total practice post intervention (n=60)

Items	Satisfaction N=47		UnSatisfaction N=13		X^2	P value
	n	%	N	%		
Age:						
18-35	**36**	**76.6**	**10**	**76.9**	**1.070**	**0.082**
36-45	**8**	**17**	**2**	**15.4**		
46-60	**3**	**6.4**	**1**	**7.7**		
Gender:						
Male	**26**	**55.3**	**5**	**38.5**	**2.104**	**0.075**
Female	**21**	**44.7**	**8**	**61.5**		
Education level						
Master	**4**	**8.5**	**0**	**0**	**4.880**	**0.028***
Bachelor	**26**	**55.3**	**2**	**15.4**		
nursing technician	**16**	**34**	**5**	**38.5**		
Diploma	**2**	**4.2**	**6**	**46.1**		
Experience						
6-10	**23**	**48.9**	**2**	**15.4**	**6.013**	**0.012***
1-5	**16**	**34**	**5**	**38.5**		
<1	**8**	**17.1**	**6**	**46.1**		
Positions:						
nursing supervisor	**12**	**25.5**	**1**	**7.7**	**4.367**	**0.024***
nursing specialist	**22**	**46.8**	**4**	**30.8**		
nursing technician/ assistant	**13**	**27.7**	**8**	**61.5**		
Patient safety courses:						
Yes	**45**	**95.7**	**2**	**15.4**	**8.965**	**0.001****
No	**2**	**4.3**	**11**	**84.6**		

Table (8): Relation between nurses' demographic characteristics and total satisfaction post intervention (n=60)

Items	Satisfaction N=15		UnSatisfaction N=45		X^2	P value
	N	%	n	%		
Age:						
18-35	**11**	**73.3**	**35**	**77.8**	**1.216**	**0.078**
36-45	**3**	**20**	**7**	**15.6**		
46-60	**1**	**6.7**	**3**	**6.6**		
Gender:						
Male	**10**	**66.7**	**19**	**42.2**	**1.776**	**0.066**
Female	**5**	**33.3**	**26**	**57.8**		
Education level						
Master	**3**	**20**	**1**	**2.2**	**4.970**	**0.024***
Bachelor	**9**	**60**	**18**	**40**		
nursing technician	**3**	**20**	**18**	**40**		
Diploma	**0**	**0**	**8**	**17.8**		
Experience						
6-10	**8**	**53.3**	**17**	**37.8**	**1.987**	**0.061**
1-5	**5**	**33.3**	**16**	**35.5**		
<1	**2**	**13.4**	**12**	**26.7**		
Positions:						
nursing supervisor	**11**	**73.3**	**2**	**4.4**	**3.955**	**0.029***
nursing specialist	**3**	**20**	**23**	**51.1**		
nursing technician/ assistant	**1**	**6.7**	**20**	**44.4**		
Patient safety courses:						
Yes	**11**	**73.3**	**33**	**73.3**	**2.541**	**0.058**
No	**4**	**26.7**	**12**	**26.7**		

Table (9): Correlation between studied variables pre intervention

	Total knowledge pre	Total practice pre
Total satisfaction	**r. 0.643** **p 0.006****	**r. 0.599** **p 0.007****
Total knowledge pre		**r. 0.704** **p 0.000****

Table (10): Correlation between total level of knowledge and total level of nurses practice post intervention

	Total knowledge post
Total practice post	**r. 0.766** **p 0.000****

Discussion

Patient safety is a major challenge for quality improvement and enhancing providers' nurses' performance. The World Health Organization (WHO) is committed to make patient safety a high priority on the policy agenda of countries. The increasing incidence of documented cases of adverse events in healthcare has to a growing concern in a number of countries about patient safety, which remains a fundamental principle of patient care and a critical component of quality management ***(*Smeulers, *et al, 2015)***.

The result of the present study showed that more than three quarter of the studied nursing staff were between the age group of (18-35). Regarding to gender more than half of the studied nurses were male. This finding was in agreement with **Smeulers, Onderwater, Zwieten, & Vermeulen, (2014)**, the study title was 'Nurses' experiences and perspectives on medication safety practices: an explorative qualitative study. Journal of nursing management' who found that majority of the study subject there age between (20-40) years old and two third of them was male.

Moreover, less than half of the studied nurses had bachelor degree; also less than three quarter had courses about patient safety goals. This result was in agreement with **Tjia, et al, (2009)** the study title was'' Nurse-physician communication in the long-term care setting: perceived barriers and impact on patient safety' who found that two third of the study subject have bachelor degree and attending training courses.

Regarding to years of experiences there were more than two fifth of the studied nurses had less than one year of experience, while more than one third of them had experience between (1-5) years and majority of those nurses were working only at the heart and chest surgery academy without parting time with other health care organizations. This result was in disagreement with **Keller (2009)** the study title was ''Effects of extended work shifts and shift works on patient safety, productivity, and employee health'' who found that majority of the study subject had more than 10 years of experience and working in more than one hospital.

Regarding to nurse's knowledge about prevention of bed sores before and after implementation of educational Program and there were highly significant difference in after Methods of prevention of bed sores from more than one fifth pre intervention to majority in psychological assessment of patient and more than two third to majority in assess urinary and fecal incontinence post implementation of education program. The result was in agreement with **Aljabri, (2012)** the study title was ''Assessment of Patient Safety Culture in Saudi Hospitals :A Baseline Study in the Eastern Region'' who found that majority of nurses apply methods of preventing bed sores as a routine work.

Regarding to total items of knowledge the result showed that there were highly statistically significant regarding total level of nurse's knowledge all items of patient safety before and after implementation of educational Program and there were significant difference regarding total

level of nurse's knowledge all items of patient safety after post implementation of education program for infection control. This result was in agreement with **Hamadan, Khraisat, & Eves, (2017),** the study title was '' Patient Safety Culture Structures and Outcomes: A Sample from Isolation Units at Saudi Arabia'' who found that the patient safety composites with the highest positive scores were organizational learning, feedback and communication about error and teamwork within units. The composites with the lowest scores were staffing, and non-punitive response to errors.

Regarding to the total level of knowledge was more than one-third pre and improved to almost of them post implementation of patient safety goals educational program. This result was in agreement with **Ammouri, etal, (2015)** the study title'' Patient safety culture among nurses'' who found that majority of study subject their knowledge with improved post implementation of program.

Regarding to nurse's practice regarding Effective communication (Verbal and Telephone orders)before and after implementation of educational Program and there were highly significant difference in Enumerate verbal / Telephone orders contraindications newborn or neonate that had been improved from minimum pre intervention to more than two third post implementation of education program with highly statistically significant for all items. This result was in disagreement with **Tjia, et al, (2009)** the study title was'' Nurse-physician communication in the long-term care setting: perceived barriers and impact on patient safety' who found that less than two fifth enumerate telephone order than written order.

Regarding to nurse's practice regarding Universal OR Protocol for safe surgery (Pre-Operative Verification Process) before and after implementation of educational Program and there were highly significant difference in Surgical equipment's, dressings, needles count written on the board that had been improved from non of the study subject pre intervention to majority post implementation of education program. This result was in disagreement with **Duguid, (2014)** the study title was'' Standardization in patient safety'' who found that majority of the study nurses' have significant practice regarding safe surgery and equipment during operation pre implementation of program. This may be due to education program improves nurses level of knowledge and practice regarding patient safety goals.

Regarding to nurse's practice regarding Rapid Response Team for Cardiopulmonary Resuscitation CPR for life saving patient care there were highly significant difference that had been improved from minimum pre intervention to more than one third in Measure surface area and depth of the ulcer every 2 days if present post implementation of education program. This result was in agreement with **Hickey, Scott, & Denaro (2017)** the study title was ''Using clinical indicators in a quality improvement program targeting cardiac care'' who found that there were improvement in nurses performance regarding CPR from pre to post program.

Regarding to nurse's practice regarding Patient's Privacy & Dignity there were highly significant difference that had been improved from less than one fifth pre intervention to two third in Use of curtains, sheets or blankets during patient examination/ during transfer and non of them to more than two fifth Wear & show an identification badge all the time post implementation of education program. This result was in agreement with **Al-Mandhari, et al (2014)** the study title was ''Patient safety culture assessment in Oman'' who found that majority of the study subject applying the patient privacy elements post program.

According to nurse's practice regarding nurses attitude there were highly significant difference that had been improved from one third pre intervention to less than half in Develop suitable balanced nurse staffing Plan suits patient number at all shifts post implementation of education program. **Hooshmand, et al, (2014)**. Challenges in evaluating clinical governance systems in Iran: A qualitative study'' who found that nurses attitude was improved post program implementation.

According to nurse's practice regarding Patient & Family Education there were highly significant difference that had been improved from minimum pre intervention to more than half in Assess patient's educational needs upon

admission Patient's rights & responsibilities post implementation of education program. This result was in agreement with **Lan, et al (2014).** The study title was 'Medication errors in pediatric nursing: Assessment of nurses 'knowledge and analysis of the consequences of errors' who found that there were improvement in patient and their families in care and apply instruction after program

Regarding to total level of nurses practice between pre and post implementation of safety guidelines goals. there were two fifth of nurses have total satisfactory level of practice pre implementation of educational program and more than three quarter of them have total satisfactory level of practice post implementation of educational program. This result was in agreement with **Kyrkjebø, et al, (2006)** the study title was ''Improving patient safety by using inter professional simulation training in health professional education'' who found that there were improvement in patient safety after improving nurses level of knowledge and practice.

According to distribution of nurses' total level of satisfaction post implementation of educational program The result showed that three quarter of nurses have unsatisfactory level of total satisfaction while, one quarter of nurses have satisfactory level of satisfaction. This result was in disagreement with **Ismail &, Yunus (2015).** The study title was ''Assessment of patient safety culture in Malaysia hospitals using Hospital Survey on Patient Safety Culture (HSOPSC) Survey'' who found that majority of the study subject have satisfactory level of satisfaction.

As regarding to nurse's practice regarding Patient outcomes post implementation of educational program between study and control group there were improved in length of patient stay from $6.13 \pm 1.98\%$ in control group to 3.10 ± 0.94 in control group with statistically significant relation. While, regarding to patient readmission it was decrease from control group three-quarter to less than two fifth in control group post implementation of educational program with statically significant relation. Finally, there were no statistically significant relation regarding age, gender, diagnosis and Co-morbidity status. This result was in agreement with **Hamadan, Khraisat, & Eves, (2017),** the study title was '' Patient Safety Culture Structures and Outcomes: A Sample from Isolation Units at Saudi Arabia'' who found that there were Positive significant correlations highlight staffing and non-punitive response to errors as key challenges for patient safe hospital care.

Regarding to factors affecting nurses applying patient safety goals the result showed that all of the study subject complain of crowded sections and the large number of patients and almost of them complain of Training and empowering patients. While, majority of the study subject complain of Lack observation of head nurses related patient safety, and Obtaining informed consent from patients and Resource management in the hospital as a factors affecting nurses performance from applying patient safety goals. This result was in agreement with **Meddings, et al. (2017)** the study title was ''Evaluation of the association between Hospital Survey on Patient Safety Culture (HSOPS) measures and catheter-associated infections: results of two national collaborative'' who found that majority of nurses complain of over crowing and didn't take sufficient training course.

The result showed that there were highly statistically significant relation regarding nurses' total level of knowledge and demographic characteristics regarding attending training course post implementation of education program. There were statistically significant relation regarding nurses' total level of knowledge and demographic characteristics regarding educational level, experience and position post implementation of education program. While there were no statistically significant relation regarding nurses' total level of knowledge and demographic characteristics regarding age, gender post implementation of education program. This finding was in agreement with **Hamdan, & Saleem, (2013)** the study title was ''Assessment of patient safety culture in Palestinian public hospitals'' who found that there were statistically significant relation between total knowledge and demographic characteristics regarding training course and education

This table showed that there were highly statistically significant relation regarding

nurses' total level of practice and demographic characteristics regarding attending training course post implementation of education program. There were statistically significant relation regarding nurses' total level of practice and demographic characteristics regarding educational level, experience and position post implementation of education program. While there were no statistically significant relation regarding nurses' total level of practice and demographic characteristics regarding age, gender post implementation of education program. This result was in agreement with **Ghobashi, et al.(2014)** the study title was **''**Assessment of Patient Safety Culture in Primary Health Care Settings in Kuwait'' who found that there were statistically significant relation between total practice and demographic characteristics regarding training course and education.

This table showed that there were statistically significant relation regarding nurses' total level of satisfaction and demographic characteristics regarding educational level and position post implementation of education program. While there were no statistically significant relation regarding nurses' total level of satisfaction and demographic characteristics regarding age, gender, level of education and years of experience post implementation of education program This finding was in agreement with **Hamdan, & Saleem, (2013)** the study title was ''Assessment of patient safety culture in Palestinian public hospitals'' who found that there were statistically significant relation between total satisfaction and demographic characteristics regarding training course and education.

This table showed that there were highly statistically significant relation regarding nurses' total level of knowledge and total level of practice and total level of satisfaction pre implementation of education program. This result was in agreement with **Ghobashi, et al.(2014)** the study title was **''**Assessment of Patient Safety Culture in Primary Health Care Settings in Kuwait'' who found that there were statistically significant relation between total practice and total knowledge and total satisfaction.

This table showed that there were highly statistically significant relation regarding nurses' total level of knowledge and total level of practice post implementation of education program. This finding was in agreement with **Hamdan, & Saleem, (2013)** the study title was ''Assessment of patient safety culture in Palestinian public hospitals'' who found that there were statistically significant relation between total knowledge and total practice.

Conclusion

The current study concluded that the nurse in the study settings have deficient knowledge of patient safety, low awareness of patient safety culture, and inadequate performance and satisfaction of international patient safety goals (IPSGs) at the pre intervention phase. These were influenced by their age, gender, education and the training hospital. The use of the developed educational program is effective in improving their knowledge, awareness, and performance. Thus, the set research hypothesis can be accepted, and the educational program affected positively on nurses performs and patient outcomes.

Recommendation

1. Close and continuing supervision of the application of (IPSGs) is recommend in all settings, to enhance the development of patient safety culture among nurses.
2. The current study recommends analyzing all infection and fall hazards occurring in daily hospital work to reduce the Infection and fall.
3. Further studies are need for assessing safety performance and its effect on the quality of patient care and on nurses' job satisfaction.
4. A strategic plan for patient safety should applied in the study settings.
5. Further empirical research work needed to test the degree to which the study findings can generalized to other Public Hospitals.

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