Effect of Implementing Educational Program about Head Nurses' Collaborative Behaviors on Nurses' Errors

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Abstract

Background: Collaboration is a significant concept in healthcare organization and especially in nursing as improving collaboration leading to improve nursing performance and decrease nursing errors. **Aim of the study:** Determine the effect of implementing educational program about head nurses' collaborative behaviors on nurses' errors. **Design:** Quasi-experimental design was used. **Setting**: The study was conducted in two different setting, Tanta University Psychiatry and Neurology center and Tanta University Main Hospital. **Subjects:** Two groups; the first group consisted of all (N=52) head nurses, the second group contained 360 nurse. **Tools:** Three tools; Collaborative Behaviors Knowledge, Head Nurses' Collaborative Behaviors self - report and Nurses' Errors Structured Questionnaire. **Results:** About 61.5% of head nurses had a moderate level of knowledge about collaborative behaviors preprogram which improved to be 100%, 96.2% had a high level immediately and after three months post program. Preprogram, 53.8% of them rated themselves as low level of collaborative behaviors. While, post and follow up program implementation, 92.3%, 73.1% had a high level of collaborative behaviors. **Conclusion:** There was a significant improvement of head nurses' knowledge and their collaborative behaviors post program. The majority of nurses had a low level of medication and documentation errors preprogram that can be improved immediately and after three months post program. **Recommendation:** Periodically in-service training program was required to maintain and enhance head nurses' knowledge and practice regarding collaborative behaviors.

Key words: Collaborative behaviors, Educational Program, Head Nurses, Nurses' Errors.

Introduction

Collaboration is a process connecting two or more individuals jointly working to accomplish a mutual goal based on valuing contributions of each group member **(Ellis&Han, 2021)**. In nursing, collaboration refers to intra professional interactions within nursing professionals or between nurses and non-nursing professionals **(Emich, 2018)**.Collaboration is a significant principle in medical organization particularly in nursing, as improving collaboration leading to improve nursing performance and decrease nursing errors. Also, it leads to improvement in safety of patients, quality of care, patient satisfaction, decrease mortality rates, length of hospital stay and rates of turnover and enhance job satisfaction **(Avcı, & Avcı, 2025; Ibraheem, 2020; Ylitörmänen, Kvist, & Turunen, 2022)**. Head nurses' collaborative behavior refers to ability of head nurses to act and collaborate as a team, create a cooperative environment to find a mutually agreeable solution. Along with accepting new ideas from others, the head nurse should reward nursing team members for their hard work **(Abozied, 2021)**. Head nurses collaborative behaviors consist of six behaviors that are an essential requirement for clinical practice which include communication, coordination, shared process, conflict management, decision making and professionalism **(Shalaby, Shazly, & Elsayed, 2022; Prentice, Moore, Fernandes, & Larabie, 2022)**. Collaborative communication behavior is an act of exchanging information, ideas, thoughts and feelings between head nurse and nurses **(Eid, 2019)**. Coordination collaborative behavior includes organizing nursing team efforts in hospital to achieve shared objectives and enhance quality of care by ducking lapping and duplication of work **(Abdallah&Mostafa, 2021)**. Shared process is a necessity for head nurses' collaboration as head nurses and nurses share objectives and goals; and decision making **(Emich, 2018)**. Collaborative conflict management behavior refers to the various methods that head nurses and nurses can use to cope with conflict **(Dewi, Yanti, Rahajeng, & Krisnawati, 2022)**. Head nurses' decision making behavior has been defined as the process through which head nurse and nurses reach a conclusion about what to do next given a set of goals and resources constraints **(Martins, Babajide, Maani, Abdalla, & Gómez et al., 2021)**.Head nurses' collaborative professionalism refers to knowledge, attitudes and behaviors of head nurses that make up proficient nursing practice with minimal error **(Şçi&Altuntaş, 2019)**.

Nurses' errors are mistakes or failures in the nursing process in which nurses are accountable that result in harm or potential harm to patients. The most common nursing errors are medication errors and documentation

errors **(Younes, Elsabahy, & Kassem, 2022; Ayesh, Fekry, & Elewa, 2023)**. It is necessary to identify nursing errors in order to increase patient safety and to attain a high level of care quality **(Jachan, Müller-Werdan, & Lahmann, 2021)**. A medication error is any avoidable incident that may lead to improper use of medication or patient injury **(WHO, 2022)**. Such events include incorrect medication preparation, wrong administration technique and ignoring or avoiding the administration which threatening patient life **(Eltaybani, Abdelwareth, AbouZeid, & Ahmed, 2020; Alandajani, Khalid, Ng, & Banakher, 2022)**. Documentation errors involve inaccurate, illegible, incorrect chart recording, missing documentation or charting that is unclear or incomplete **(Kaihlanen, Gluschkoff, Saranto, Kinnunen, & Heponiemi, 2021; Maryniak, 2023)**.

Significance of the study:

Collaboration is a crucial behavior in both national and international quality improvement plans. It is necessary to change the avoidance and isolation culture that keeps nurses making mistakes and improving patients' outcomes **(Martin & Bryant, 2023)**. Especially psychiatric nurses deal with a number of issues, including overwhelming work load, patient' serious health, absence of collaboration role with supervisors and coworkers, relational conflict, feeling of humbleness, lack of job satisfaction. Therefore, susceptibility of errors can take place between nurses during their work **(Hammed, & Allo, 2018)**. According to **Marten, & Bryant, (2020)** poor collaborative behavior among care providers is one of the most common and important sources of nursing errors. It is crucial for head nurses to have the fundamental information of how to convey the new vision of collaborative behavior practice as a way to reduce errors in nursing environment, so the study intended to determine the effect of implementing educational program about head nurses' collaborative behaviors on nurses' errors.

Aim of study

Determine the effect of implementing educational program about head nurses' collaborative behaviors on nurses' errors.

Research hypothesis

After implementing the educational program, it is expected that head nurses' knowledge and practice about collaborative behaviors will be improved and nurses' errors will be decreased.

Subjects and Method:

Research design:

A quasi-experimental design was employed to fulfill the aim of the study.

Setting:

The study was conducted in two different setting, Tanta University Psychiatry and Neurology center and Tanta University Main Hospital.

Subjects:

The study subjects consisted of two groups:

- The first group consisted of all (N=52) available head nurses that was divided into 25 head nurses from Tanta University Psychiatry and Neurology center and 27 head nurses from Tanta University Main Hospital.
- The second group contained a representative sample (35%) from all (N=791) nurses working at Tanta University Main Hospital included (n=276) nurse and from all (N=241) nurses working at Tanta University Psychiatry and Neurology center included (n=84) nurse. A total number was 360 nurse.

Tools of data collection

Data collected using three tools:

Tool I: Collaborative Behaviors Knowledge Structured Questionnaire: This tool was developed by the investigator directed by Almutairi, (2011); Dean,(2010) and Mohsenpour et al.,(2017). It was used to assess the head nurses' knowledge about their collaborative behaviors. It included two parts:

Part I: Head nurses' personal characteristics and work related data. It included age, marital status, educational level, department, years of experience and previous attending educational program about collaborative behaviors.

Part II: Head Nurses' Collaborative Behaviors Knowledge Structured Questionnaire. It consisted of (56) questions presented in true & false, multiple choices, cross matching in addition to situations on collaborative practice.

Scoring system:

Question of knowledge test was allotted score of one for correct answer and wrong answer given zero. The overall scores represented varying levels of head nurses' knowledge according to statistical cut-off points (60%) as follows: Highly knowledge level >80% equal to (>44.8), moderately knowledge level 60 - 80% equal to (33.6 – 44.8), low knowledge level < 60% equal to (< 33.6).

Tool II: Head Nurses' Collaborative Behaviors self - report Structured Questionnaire: the investigator developed the tool depending on **Liao et al., (2015); Lamont et al., (2015) and related literatures (Temuçin et al., 2019; Taskiran Eskici, & Baykal, 2021; Hafez, 2022).** It used to determine to what extent collaborative behaviors exist between head nurses and nurses. 35 items included in this tool and it was divided into six behaviors as follows; communication (5 items), coordination (7 items), shared process (7 items), conflict management (6 items), decision making (6items), professionalism (4 items).

Scoring system:

Head nurses' answers were measured on a five points Likert Scale ranging from (1-5) where; never = 1, rarely =

2, sometimes = 3, often = 4 and always = 5. The total scores were calculated by summing scores of all categories. The total score represented varying levels of head nurses' collaborative behaviors according to statistical cut-off points (60%) as follow: High level of head nurses' collaborative behaviors > 80% equal to (>140), moderate level of head nurses' collaborative behaviors 60-80% equal to (105 - 140), low level of head nurses' collaborative behaviors < 60% equal to (<105).

Tool III: Nurses' Errors Structured Questionnaire: Based on **Zeighami et al., (2015); El Sayad, (2017) and Eltaybani et al., (2018),** the investigator developed the tool. It was used to assess to what extent errors exist amongst nurses. It contained two parts:

Part one: Nurses' personal data and work related data: As age, marital status, educational level, department and years of experience.

Part two: Nurses' Errors Structured Questionnaire. It consisted of 47 items, included two dimensions as follow:

A. Medication error consisted of 24 items which divided into 3 subscales: Pre administration (6 items), during administration (16 items) and after administration (2 items).

B. Documentation error consisted of (23 items).

Scoring system: Nurses' comebacks measured on a five points Likert Scale ranging from (1-5) where; never=1, rarely = 2, sometimes = 3, often = 4, and always = 5. The total score planned by summating scores of all classes. The overall scores represented varying levels according to statistical cut- off points (60%) as follow: High level of errors > 80% equal to (>188), moderate level of errors 60-80% equal to (141-188), low level of error < 60% equal to (<141).

Method

1. An official permission was obtained from Dean of Faculty of Nursing at Tanta University and send to Tanta University Psychiatry and Neurology center and Tanta University Main Hospital responsible authority.
2. **Ethical considerations**

- Approval code no (15/2/2021) was obtained from ethical committee at Faculty of Nursing.
- All participants were informed about purpose of the study.
- An informed agreement was gotten from head nurses and nurses after explanation of the nature and the aim of the study.
- The investigator assured to study sample that the nature of the study does not root any harm.

3. Discretion and the privacy were taken into consideration.
4. Tools I, II and III were developed by the investigator based on relevant literatures review.
5. A jury of five experts check tools for content validity. The experts were four Professors and one

Assistant Professor of Nursing Administration from Tanta University, Faculty of Nursing.

6. Tools reliability was verified by using Cronbach Alpha Coefficient test, its value was (0.737) for tool I, (0.957) for tool II and (0.891) for tool III.
7. Pilot study was conducted on (10%) of head nurses = (6) and (10%) of nurses = (36) to check and ensure the clarity of the tools. This sample was excluded from the total study subjects.
8. The tools I, II and III were used before, immediately after and three months post the program implementation.
9. The educational program for head nurses was prepared by the investigator based on review of recent relevant different literature.

Results

Table (1) illustrates that 51.9% of head nurses from Tanta University Main hospital and 48.1 % of them from Tanta University Psychiatry and Neurology center. The mean age 39.27 ± 5.28 and 78.8% of them were in age group >35 years. Majority (98.1%, 94.2%, 90.4%) of head nurses were female, married and had bachelor degree. Nearly one third (30.8%) worked in Tanta University Psychiatry and Neurology intensive care units. More than half (57.7%) had 15≤ 20 years of experience with mean years of experience 16.73 ±5.22. All of head nurses (100%) didn't attend any previous training program about collaborative behavior.

Table (2) represented that 76.7% of nurses were from Tanta University Main hospital. High percent (65.6%) of nurses ranged from 25-35 years with mean age 31.89 ± 8.59. The majority (83.6%, 78.9%) of nurses were married and female respectively. Two third (66.4%) of nurses had nursing institute degree and 16.4% had bachelor degree. Less than fifth (15.0 %) worked in Chest ICU and the lowest (1.4%) worked in addiction ward. Nearly one third (32.5%) of nurses had 5 ≤ 10 years of experience with mean (10.76 ± 9.52).

Table (3) shows a highly statistically significant improvement in total levels of head nurses' knowledge about collaborative behaviors immediately and after 3th months post program at $p<0.001$. Preprogram, nearly two third (61.5%) of head nurses had a moderate knowledge level about collaborative behaviors changed to be all (100%) of them had high level immediately post program and then slightly decline to majority (96.2%) of them had a high knowledge level after 3th months post program. The total mean score was 35.25 ± 4.94 preprogram improved to be 53.15 ± 1.94 immediately and 47.81 ± 1.73 after 3th post program.

Table (4), Figure (1) illustrate a highly statistically significant improvement in head nurses' collaborative behaviors preprogram, immediately and 3th months after

program ($p<0.001$). More than half (53.8%) of head nurses had a low level of collaborative behaviors preprogram changed to be none of them had low level immediately and after 3th months post program.

Table (5) reveals that there was a statistically significant improvement in overall level of errors preprogram, immediately and 3th months after program ($p < 0.05$). Preprogram, the majority (99.2%) of nurses had a low level of errors which improved to be all (100%) of nurses had a low level of errors immediately and 3th months after program. Also, the majority (99.2%, 98.9%) of nurses had a low level of documentation and medication errors preprogram which improved to be all (100%) of nurses had a low level of documentation and medication errors immediately and 3th months after program.

Table (1): Distribution of studied head nurses according to their personal characteristics & work related data (n= 52)

Head nurses ' characteristics	No.	%
Hospital name		
Tanta University Psychiatry and Neurology	**25**	**48.1**
Tanta University Main Hospital	**27**	**51.9**
Age (years)		
≤ 35	**11**	**21.2**
>35	**41**	**78.8**
Min. – Max.	**32.0 – 55.0**	
Mean ± SD.	**39.27 ± 5.28**	
Sex		
Male	**1**	**1.9**
Female	**51**	**98.1**
Marital status		
Married	**49**	**94.2**
Not married	**3**	**5.8**
Level of education and qualification		
Bachelor	**47**	**90.4**
Master	**5**	**9.6**
Doctorate	**0**	**0.0**
Department		
Tanta University Psychiatry and Neurology ICUs	**16**	**30.8**
Psychiatry wards	**5**	**9.6**
Addiction ward	**1**	**1.9**
Neurological wards	**3**	**5.8**
Cardiac ICUs	**9**	**17.3**
Chest ICU	**6**	**11.5**
Gynecology and obstetric	**2**	**3.8**
Internal medicine	**2**	**3.8**
Plastic surgery	**1**	**1.9**
Dermatology and natural medicine	**1**	**1.9**
Neurological ICUs	**6**	**11.5**
Years of experience		
5 ≤ 10	**1**	**1.9**
10 ≤ 15	**12**	**23.1**
15 ≤ 20	**30**	**57.7**
20 ≤ 25	**4**	**7.7**
≥ 25	**5**	**9.6**
Min. – Max.	**8.0 –33.0**	
Mean ± SD.	**16.73 ±5.22**	
Attend any previous training program about collaborative behaviors		
No	**52**	**100.0**
Yes	**0**	**0.0**

SD: **Standard deviation**

Table (2): Distribution of studied nurses according to their personal characteristics & work related data (n = 360)

Nurses' characteristics	No.	%
Hospital name		
Tanta University Psychiatry and Neurology	**84**	**23.3**
Tanta University Main Hospital	**276**	**76.7**
Age (years)		
<25	**49**	**13.6**
25 –35	**236**	**65.6**
>35	**75**	**20.8**
Min. – Max.	**21.0 – 60.0**	
Mean ± SD.	**31.89 ± 8.59**	
Sex		
Male	**76**	**21.1**
Female	**284**	**78.9**
Marital status		
Married	**301**	**83.6**
Not married	**59**	**16.4**
Level of education and qualification		
Nursing diploma	**62**	**17.2**
Nursing institute	**239**	**66.4**
Bachelor	**59**	**16.4**
Department		
Tanta University Psychiatry and Neurology ICUs	**21**	**5.8**
Psychiatric wards	**36**	**10.0**
Addiction ward	**5**	**1.4**
Neurological ward	**22**	**6.1**
Cardiac ICUs	**40**	**11.1**
Chest ICU	**54**	**15.0**
Gynecology and obstetric	**51**	**14.2**
Endemic interior	**33**	**9.2**
Plastic surgery	**27**	**7.5**
Dermatology and natural medicine	**20**	**5.6**
Neurological ICUs	**51**	**14.2**
Years of experience		
<5	**100**	**27.8**
5 ≤ 10	**117**	**32.5**
10 ≤ 15	**68**	**18.9**
15 ≤ 20	**10**	**2.8**
20 ≤ 25	**5**	**1.4**
≥ 25	**60**	**16.7**
Min. – Max.	**1.0 – 42.0**	
Mean ± SD.	**10.76 ± 9.52**	

SD: **Standard deviation**

Table (3): Total levels and mean scores of head nurses' knowledge about collaborative behaviors preprogram, immediately and after 3th months post program (n = 52)

Knowledge	Preprogram		Immediately post program		After 3th months post program		Test of Sig.	P
	No.	%	No.	%	No.	%		
Low (<60%)	18	34.6	0	0.0	0	0.0	F= 97.444	<0.001*
Moderate (60 – 80%)	32	61.5	0	0.0	2	3.8		
High (> 80%)	2	3.8	52	100.0	50	96.2		
Total score (0 – 56)							F= 426.006	<0.001*
Min. – Max.	24.0 – 47.0		48.0 – 56.0		44.0 – 51.0			
Mean ± SD.	35.25 ± 4.94		53.15 ± 1.94		47.81 ± 1.73			
Average Score (0 – 1) (Mean ± SD.)	0.63 ± 0.09		0.95 ± 0.03		0.85 ± 0.03			

SD: **Standard deviation** **F**: **Friedman test** **F: F test (ANOVA) with repeated measures**
p: p value for comparing between the **different periods** *: Statistically significant at $p \leq 0.05$

Table (4): Distribution of the studied head nurses according to levels of collaborative behaviors dimensions preprogram, immediately and after 3th months post program (n =52)

Head nurses ' collaborative behaviors	Preprogram		Immediately post program		After 3th months post program		F	P
	No.	%	No.	%	No.	%		
Communication								
Low (<60%)	26	50.0	1	1.9	0	0.0	61.483	<0.001*
Moderate (60 –80%)	17	32.7	8	15.4	17	32.7		
High (> 80%)	9	17.3	43	82.7	35	67.3		
Coordination								
Low (<60%)	31	59.6	0	0.0	0	0.0	64.000	<0.001*
Moderate (60 –80%)	13	25.0	13	25.0	26	50.0		
High (> 80%)	8	15.4	39	75.0	26	50.0		
Shared process								
Low (<60%)	30	57.7	0	0.0	0	0.0	73.973	<0.001*
Moderate (60 –80%)	14	26.9	3	5.8	17	32.7		
High (> 80%)	8	15.4	49	94.2	35	67.3		

Conflict management								
Low (<60%)	**26**	**50.0**	**0**	**0.0**	**1**	**1.9**		
Moderate (60 –80%)	**18**	**34.6**	**2**	**3.8**	**9**	**17.3**	**75.632**	**<0.001***
High (> 80%)	**8**	**15.4**	**50**	**96.2**	**42**	**80.8**		
Decision making								
Low (<60%)	**30**	**57.7**	**0**	**0.0**	**0**	**0.0**		
Moderate (60 –80%)	**13**	**25.0**	**7**	**13.5**	**14**	**26.9**	**67.900**	**<0.001***
High (> 80%)	**9**	**17.3**	**45**	**86.5**	**38**	**73.1**		
Professionalism								
Low (<60%)	**27**	**51.9**	**0**	**0.0**	**2**	**3.8**		
Moderate (60 –80%)	**9**	**17.3**	**4**	**7.7**	**7**	**13.5**	**49.117**	**<0.001***
High (> 80%)	**16**	**30.8**	**48**	**92.3**	**43**	**82.7**		
Overall								
Low (<60%)	**28**	**53.8**	**0**	**0.0**	**0**	**0.0**		
Moderate (60 –80%)	**16**	**30.8**	**3**	**5.8**	**14**	**26.9**	**75.872**	**<0.001***
High (> 80%)	**8**	**15.4**	**49**	**94.2**	**38**	**73.1**		

SD: **Standard deviation**
p: p value for comparing between the **different periods**

F: **Friedman test**
*: Statistically significant at $p \leq 0.05$

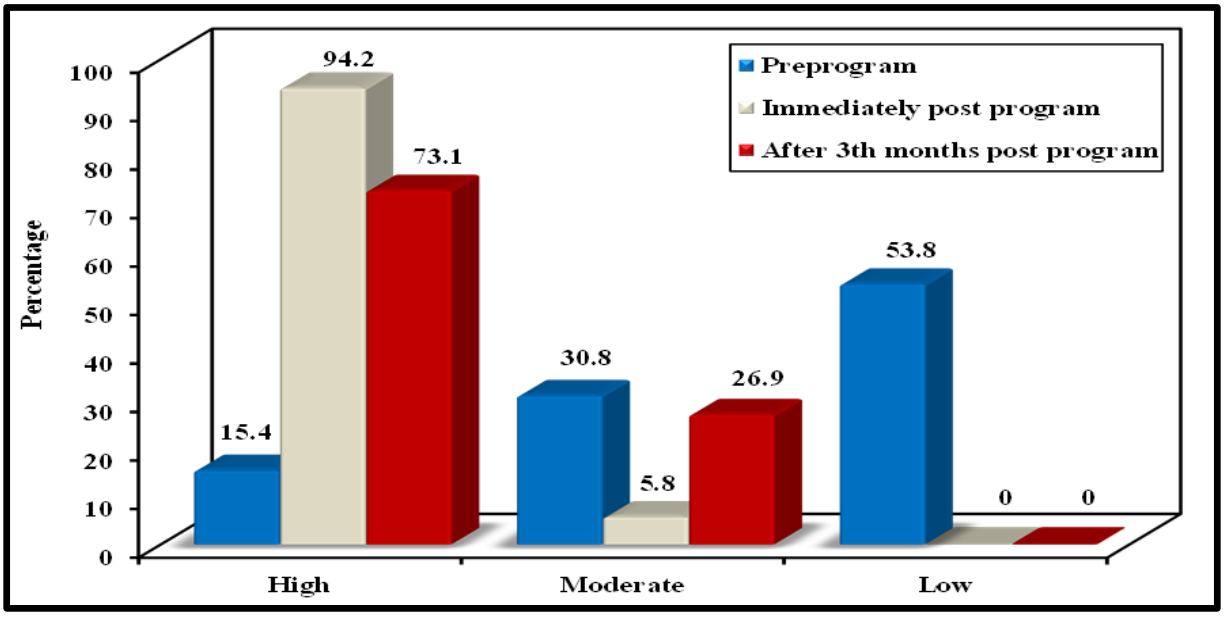

Figure (1): Distribution of the studied head nurses' overall level of collaborative behaviors preprogram, immediately and after 3th months post program

Table (5): Distribution of the studied nurses according to levels of errors preprogram, immediately post program and 3th months after program (n = 360)

Nurses' errors	Preprogram		Immediately post program		After 3th months post program		Q	P
	No.	%	No.	%	No.	%		
Medication error								
Low (<60%)	356	98.9	360	100.0	360	100.0		
Moderate (60 –80%)	4	1.1	0	0.0	0	0.0	8.000	0.018*
High (> 80%)	0	0.0	0	0.0	0	0.0		
Documentation errors								
Low (<60%)	357	99.2	360	100.0	360	100.0		
Moderate (60 –80%)	3	0.8	0	0.0	0	0.0	6.000	0.049*
High (> 80%)	0	0.0	0	0.0	0	0.0		
Overall								
Low (<60%)	357	99.2	360	100.0	360	100.0		
Moderate (60 –80%)	3	0.8	0	0.0	0	0.0	6.000	0.049*
High (> 80%)	0	0.0	0	0.0	0	0.0		

SD: **Standard deviation** **Q**: **Cochran's test**
p: p value for comparing between the **different periods** *: Statistically significant at p ≤ 0.05

Discussion

Regarding head nurses' collaborative behaviors knowledge: Preprogram assessment of head nurses' total knowledge about collaborative behaviors revealed that nearly two third of head nurses had a moderate level of knowledge about collaborative behaviors. This may be due to above half of head nurses had more than twenty years of experience working in healthcare settings where collaboration is essential; experience can lead to a greater understanding of collaborative behaviors, therefore enhancing their knowledge. Also, nursing profession is based on team work as, head nurses through their day to day work, they had likely developed a deep understanding of how to effectively work with others to achieve common goals. Furthermore, head nurses are typically in leadership positions within their teams or departments, they are responsible for facilitating collaboration among team members, promoting effective

communication and fostering a culture of teamwork.

The study result is inconsistent with a study **Abo El-Naga, Eid, & Mahfouz, (2024)** found that the majority of nurses had a low knowledge preprogram. **Ibraheem, Eid, & Rashad, (2020)** revealed that all head nurses had a low level of knowledge and recommended about importance of training workshops for nurses on their knowledge, skills. **Wang, Wan, Lin, Zhou, &Shang, (2018)** concluded that the nurses had a low knowledge regarding collaboration at pre-test.

Regarding head nurses' collaborative behaviors:

Preprogram, over half of head nurses rated themselves as low level of collaborative behaviors. This is due to all head nurses didn't attend any training program or workshops about communication, coordination, conflict management, shared process, decision making and professionalism. These results similar with the result of Saleh **&Ali, (2023)** reported that two third of participants had a low level of intra professional collaboration preprogram. **Çelik Durmuş & Gezer, (2022)** found that the nurses' collaboration was low which similar with the results of the present study preprogram. The present study result is inconsistent with **Ali, Ebrahem, & Ali, (2024**) revealed that a small percentage of nurses exhibited a high level of collaborative behavior before the implementation of program.

In contrast with this study result preprogram, **AbdEl-Monem, Elsaiad, & Hasanin, (2024)** showed that high percent of studied nurses had a high perception toward inter-professional collaboration. Also, **Avci & Yilmaz, (2022)**; **Hatip & Seren, (2021)** who reported collaboration among nurses was above average.

Regarding nurses' errors:

Preprogram, majority of nurses had a low level in overall and in medication and documentation errors. This may be due nearly two third of nurses were novice nurses ranged from twenty five to thirty five years old, who are often in peak physical and cognitive condition, enabling them to better handling demands of multi-tasking, time pressure. Their psychomotor efficiency contributes to fewer error rate. Also, data collected by self-administered questionnaire that keep nurses may under report their errors due to fear of punishment or legal consequences and damage of their professional reputation.

The present study confirmed with **Demir & Karadag, (2024)** found low nurses tendency to commit medical errors. While, a study done by **Abd El Aziz, Ahmed, & Abolwafa, (2021)** revealed that nurses had average practice toward errors. On the other hand, these results contradicted with **García, Serrano, & Garrido, (2019)** who reported that nurses committed a greater number of medication errors. Also, **Ragheb, El.Sayed, El.Sayed, & Metwally, (2016)** who found that total errors was high in preprogram.

II) Immediate post educational program

There was a noteworthy improvement in head nurses' collaborative behaviors knowledge as, all of them had a high level immediately post program. Also, that there was highly

statistically significant improvement in head nurses' collaborative behaviors practice directly post program from head nurses' viewpoint as, the majority of them had a high level of collaborative behaviors immediately post program. This improvement may result from applying new teaching approaches that simplify the learning process. Also, this shows that the present study educational program had a positive effect to improve head nurses' knowledge and practice regarding collaborative behaviors by enabling them to deep understanding of how effectively work with each other to achieve common goals through day to day work, promoting effective communication and fostering a culture of teamwork. Furthermore, knowledge acquired through educational program assists head nurses to expand their collaborative behaviors practice. They understood the concept of collaborative behaviors that permits them to execute their collaborative behaviors effectively and efficiently. Thus, educational program enables head nurses to be at a good level of collaborative behaviors, therefore enhancing their knowledge and practice.

Along with study, **Wu, Li, Huang, & Jiang, (2024)** found that training program can improve the participant's skill levels, knowledge about team cooperation scores as, the total team cooperation, communication and over all decision making scores of the trainees were significantly higher after than before the training. Also, this study agreed with **Ahn & Lee, (2021)** who found that training program increases nurses' capabilities in terms of knowledge, attitude, skills and behaviors. **Buljac-Samardzic, Doekhie, & Wijngaarden, (2020)** found an enhancement of knowledge after nurses attended a specially prepared educational program. Also, **Ibraheem et al., (2020)** revealed that there was an improvement post program in the level of knowledge and skills.

Also, this study finding agrees with **Pasyar, Rambod, & Gholamzadeh, (2018)** who recommended that holding workshops and training courses promoting the collaborative behaviors of head nurses. **Ali et al., (2024)** revealed that the majority demonstrated a high level of collaborative behavior immediately post program. The current study finding is similar to **a** study by **Saleh & Ali, (2023)** who revealed that the level of intra professional collaboration improved post program than preprogram as, sixty one percent of sample had a moderate level and one quarter had a high level of intra professional collaboration at post program. Furthermore, **Avci&Yilmaz, (2022)** reported that receiving training on collaboration positively affect the nurses' level of collaboration which is similar with the results of the present study.

After program, there was a significant decreased in levels of nurses' errors both at medication and documentation. This improvement can be attributed to the program effectiveness which likely enhanced nurses' knowledge, awareness about importance of verifying patient's identity, giving medication in the right

time, following the documentation principles as documentation accuracy, completeness ,timeliness and legibility, documenting patient feedback, documenting routine care that provided by other health care providers and adherence to standard procedures leading to better clinical performance and reduced errors rates. The results similar to the study by **AlThubaity & Shalby, (2023)** concluded that documentation errors improved after intervention which confirmed in the present study result post program implementation. Also, the present study result was consistent with **Ahmed & Nimer, (2022)** who found that the nursing documentation error improved post training program than pretest. **Zakria & Mohamed, (2017)** found decreased errors post interference than before intervention. These results contradicted with **Ahn & Lee, (2021)** who conducted a study which revealed that there was an insignificant pretest and posttest variance in surgical nursing error between the two groups within a four week.

III) Three months after educational program

A significant improvement in head nurses' knowledge about collaborative behaviors; but slightly decreased than immediately post educational program implementation. Also, there was a significant improvement in head nurses' collaborative behaviors practice from head nurses' view of point; more than pre educational program; but slightly decreased than immediately post educational program implementation, as the majority of head nurses had a high level of knowledge about collaborative behaviors 3th months post program.

This decline in the finding may be due to time factor, the fact that some theoretical knowledge that not used in regular practice is likely to be reduced, diminished and even missing with passage of time. This showed the importance of continuous follow up after program implementation. Giving periodical enforcement for educational program for head nurses is very important.

Furthermore, the present study shows that overall level of errors and medication and documentation errors 3th months post program slightly decreased than preprogram, this may be due the positive influence of educational program on nurses' knowledge and practice regarding to errors.

Abo El-Naga et al., (2024) and Ali et al., (2024) concluded that majority of nurses had a high level of collaboration 3th months after program implementation. Similar results confirmed with a study by **Sedaghati Kesbakhi, Hosseini Tabaghdehi, Arab, & Rohani,(2024)** stated that the educational program has positive effect on skills of undergraduate nursing students and the mean total scores increased 2nd after intervention than before intervention. **Ibraheem et al., (2020)** conducted a study which supported our result and found slightly decline in their knowledge, skills, performance at follow up as compared to posttest. This result supported by **Ragheb et al., (2016)** who revealed that total errors decrease to nearly one quarter in three months

later phase. Also, reported that training program had a positive effect on nurses' knowledge and performance, as regard to medication errors, the percent of total high errors was decreased in comparing to preprogram implementation.

Conclusion

There is an important improvement of head nurses' knowledge and their collaborative behaviors post program. The majority of nurses had a low level of medication and documentation errors preprogram that can be improved immediately and 3th months post program.

Recommendations:

For Hospital Administration:

- Design and implement periodical in-service training program about collaboration to offer head nurses with adequate knowledge about collaboration enhancing their collaborative behaviors knowledge and practice.
- Include collaborative behavior expectations in job description for nurse leaders and head nurses to emphasize its importance in work process.

For Head Nurses:

- Conduct periodical workshops about communication, coordination, shared process, professionalism and decision making.

For Nursing Education:

- Nurse educators need to provide a comprehensive training program about collaborative behaviors to students.

For Future Research:

- Assess the impact of collaborative behavior on nurses' job satisfaction, stress levels and overall work place morale and how these factors mediate errors rates.

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