

## **Effect of Training Program about Lean Strategies for Head Nurses on Their Leadership Effectiveness**

**Asmaa Helmy Elsayed<sup>1</sup>, Rabab Mahmod Hassan<sup>2</sup> and Howida Hassan Mahfouz<sup>3</sup>**

*(1) Nursing Specialist at Technical Institute of Nursing Ain shams University, (2) Professor of Nursing Administration, Faculty of Nursing, Ain shams University and (3) Assistant Professor of Nursing Administration, Faculty of Nursing Benha University*

### **Abstract**

**Background:** Currently, healthcare organizations work in a very competitive environment, which requires organizations to be flexible and acquire knowledge, technologies and processes to introduce new services, decrease costs and act faster than competitors. Lean strategies, therefore, have been necessary for healthcare organizations to produce quality, efficiency and improving leadership effectiveness. **Aim:** The study aimed to assess the effect of training program about lean strategies for head nurses on their leadership effectiveness. **Design:** A quasi-experimental design was utilized. **Setting:** In all units at medical and surgical departments at Benha University Hospital. **Subjects:** All available 55 head nurses. **Tools for data collection:** Three tools were used for data collection; Lean strategies knowledge questionnaire, Head nurses lean performance observation checklist and Leadership effectiveness questionnaire. **Results:** That there was highly statistically significant correlation between pre, post program & pre, follow up program regarding head nurses knowledge, performance regarding lean strategies and leadership effectiveness. **Conclusion:** There was an improvement in the head nurses knowledge and performance regarding lean strategies after the implementation of the program and there was positive effect on their leadership effectiveness. Also, there was a highly statistically significant improvement of leadership effectiveness after program implementation. **Recommendations:** Demonstrate a strong orientation toward lean and its strategies, which is clearly communicated and enacted, from the highest levels of management, throughout the hospital.

**Keywords:** Head nurses, Leadership effectiveness, Lean strategies, Training program

### **Introduction**

A good healthcare system should be structured in a way that does not interrupt people's day-to-day life. Thus, lean strategies for healthcare are important for processes to be organized and resources used efficiently. Lean in healthcare centers on shortening patient's waiting time, adding value to patients and increasing patient's safety. Lean ensures that patient's journey in receiving quality care is smooth and effective. Therefore, lean guarantees an organized

process and efficient use of resources (D'Andreanmatteo & Sargiacomo, 2019).

The implementation of lean in healthcare focused more on improving safety, efficiency and quality. These improvements were aimed at improving the flow of information and communication, the implementation of IT solutions and the delivery of new methods to enhance continuous improvement in patient care. In addition, the implementation of lean methods in healthcare focused on redesigning the patient journey to improve access and reduce waiting times as well as managing the

chain of medical supply (Antony, 2019). There are many useful lean strategies for healthcare to help improve quality of care like Poka yoke, Jidoka, 5s, Just in time, KPI, PDCA, Heijunka, Kaisen and Kanban system (Tlapa et al., 2019).

Successful lean implementation is highly dependent on its people, both leaders and followers. Hence, the way leaders act and behave influence attitudes and behaviors of the followers, setting the predominant culture within the organization undergoing a lean implementation (Liker, 2019). Leadership in lean environment is usually a hands-on and ever-present kind of leadership, where leaders are obliged to spend time in operations where customer value is being created, to truly understand what is going on and support their teams. Leadership effectiveness revolves around a leader's ability to support and influence in organization to ensure that everyone moves in the same direction to achieve goals (Hogan & Curphy, 2019).

Leadership of health care organizations could focus on improving the quality of their services, provide adequate facilities to their patients, their patients should be satisfied and their expectations must be fulfilled. The needs and requirements of the health care organizations staff must also be fulfilled so that they may carry on their duties efficiently and effectively (Ali & Anwar, 2021). Leadership is responsible to manage inside and outside stakeholders and resources. Leadership has to arrange financial, non-financial, human and non-human resources and make it available for their employees, patients, and staff so that they may use these resources and perform their jobs and duties efficiently (Puccio et al., 2020).

In health care settings head nurses are influencing organizations at all levels, and in every setting and discipline. "While nursing

leadership is considered a relatively new role in the healthcare setting. A primary role of the nurse leader is to serve as a role model to healthcare and team members. Being able to effectively communicate the goals and expectations of each team member is key. Leadership in nursing begins at the bedside. Then, by developing and honing their fundamental leadership skills (Bryant & Yoder, 2021).

### **Significance of the study**

Lean strategies reduce workload and enable staff to produce the highest quality output with the least amount of work possible. Lean help an organization survive for the long-term, as it faces new competition. Lean makes organization more flexible and adaptable to change ;so lean process is a better way to deal with low economic growth which we may face for some time (Fischman, 2018). There are many national and international studies about lean strategies; Egyptian's study revealed that there was significant improvement in head nurses and nurses' knowledge and skills regarding lean and increasing environmental quality (Hamed, 2018). The international study in India (Pai, 2010) studied the relationship between lean and safety and revealed that if both lean and safety are addressed, it would lead to more productive and safe environment in the organizations; hence it is important to make a lot of researches about lean and its positive impact in organizations.

### **Aim of the study**

**The current study aimed to** assess the effect of training program about lean strategies for head nurses on their leadership effectiveness at Benha University Hospital.

### **Research Hypotheses**

It is hypothesized that, designing and implementing the training program will improve head nurses' knowledge and skills

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regarding lean strategies after implementing the program and there will be positive effect on their leadership effectiveness.

### **Subjects and Methods**

#### **Research design:**

A quasi-experimental research design with pre, post-test, and follow up assessment carried out in this study.

#### **Study setting:**

The study was conducted in all 55 medical and surgical departments at Benha University Hospital.

#### **Subjects of the study:**

The subjects included all 55 head nurses who were working at the above mentioned study setting.

**Sampling technique:** Convenient sample

#### **Tools of data collection:**

To achieve the aim of the study the following three tools were used.

#### **1-Lean Strategies Knowledge Questionnaire**

A structured questionnaire was developed by researchers after the review of related literature (Mann, 2012; Fausez, 2015; Mielke, 2016; Tlapa et al., 2019 & Akmal et al., 2021) to assess head nurses knowledge regarding lean strategies, it consisted of two parts:

**Part (1):** Personal & job characteristics of the head nurses, including: age, gender, marital status, years of experience, work department, academic qualifications, and attended previous courses in lean strategies.

**Part (2):** Composed of 40 questions to assess head nurses knowledge regarding lean strategies in the form of multiple choice (25), true or false (15) questions.

#### **Scoring System:**

The head nurses answers were compared with a model key answer and scored as (one) for correct and (zero) for incorrect, so the total scores are 40 and cut off point done at

60% that equal 24 points. The score of each dimension was summed up & the total was divided by the number of questions giving mean score for this part, the mean score was converted into mean percent. Score of total knowledge was considered adequate if percent score was 60% or more (24-40 points) and inadequate if total score less than 60% (0-23 points) converted into mean percent (Gupta & Jain, 2019).

#### **2-Head nurses lean performance observation checklist:**

An observational checklist was developed by the researchers after the review of related literature (Hummer, 2017; Burgess, 2018; Vanichchinchai, 2019; Marolla & Manfredi, 2020) it aimed to measure head nurses' performance regarding lean strategies throughout program phases. It consisted of 62 items categorized under four main category as follows: Continuous improvements (22 items), self-development (11 items), qualification development (17 items) and lean thinking (12 items).

#### **Scoring system**

Responses of each statement was measured by using two scores as the following (1) done, (0) not done. Range of scores is from 0 - 62. Cut off point was done at 75% that equal 46 points. Scores of each statement was summed up and converted into percent scores as following: Adequate (more than 75%) from (47- 62 points) & inadequate (less than 75%) from (0 - 46 points) (Hadid & Mansouri, 2019).

#### **3-Leadership effectiveness questionnaire:**

A structured questionnaire developed by (Anderson, et al., 2008), it aimed to assess leadership effectiveness among head nurses. It consisted of 88 statement included 9 subscales namely: Relational leadership (16 items), impartial leadership (16 items),

technical leadership (9 items), creative leadership (11 items), directive leadership (8 items), tenacious leadership (9 items), empowering leadership (8 items), influential leadership (6 items) and strategic leadership (5 items).

#### **Scoring System:**

Responses of each statement were evaluated by using a three-point likert scale as follow; (3) always, (2) sometimes, (1) never. Range of scores is from 88-264. Cut off point was done at 60% that equal 160 points. Scores of each statement was summed up and converted into percent scores as following: High (more than 75%) from (198-264 points), moderate (60-75 %) from (159–197 points) & low (less than 60%) from (1 -158 points) (Upenieks, 2020).

#### **Validity of the tools**

The study tools were tested for validity (face, content) through distribution of the tool to a panel of experts consisting of 5 experts; (4) professors and (1) assistant professor of nursing administration, Faculty of Nursing ( Ain shams, Menofia, Port said and Benha University as follows: one professor of nursing administration from Ain Shams University and two Professor of nursing administration from Menofia University as well as one professor of nursing administration from Port said University, one assistant professor of nursing administration from Benha University, finally, modifications were done in the light of their valuable comments such as modify some words to give the most appropriate meaning for the phrase which were not clear. This phase took two months starting from June, 2021 to the end of July, 2021.

#### **Reliability of tools:**

Reliability of the tools was tested and measured by Cronbach Alpha. It was (0.842) for lean strategies knowledge questionnaire,

(0.920) for head nurses lean performance observation checklist and (0.760) for leadership effectiveness skills questionnaire and which indicate high internal consistency of the tools.

#### **Operational design:**

The study passed over the following phases: Preparatory phase, pilot study and field work. These phases took about 12 months, starting from the beginning of April 2021 to the end March of 2022.

#### **A- Preparatory phase**

In this phase, the researchers reviewed the national and international related literature using journals, periodicals, textbooks, internet and theoretical knowledge of various aspects concerning the topic of the study to develop the tools for data collection. This phase took about two months, extended from the beginning of April 2021 to the end of May 2021.

#### **Pilot Study**

Pilot study was carried out from the beginning of August 2021 to the end of August 2021 to assess the tools clarity, applicability, practice ability and the feasibility of the tools. In addition to estimating the time required to fill the tools that approximately ranged from 40 - 50 minutes. It was done on 10% of the subjects. It was done on 6 head nurses from the medical and surgical departments at Benha University Hospital who were included in the main study subject and they were selected randomly. No changes were done in the tools.

#### **Field Work**

The following phases were adopted to achieve the aim of the current study: Assessment, planning, implementation and evaluation phases. These phases took seven months started from September, 2021 to the end of March, 2022.

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### **Phase I (Assessment):**

- The process of data collection was carried out in September 2021 to assess head nurses knowledge, leadership effectiveness and lean performance level regarding lean strategies before the implementation of the training program.
- The researchers was available at the previously mentioned setting three days weekly during morning shifts to collect baseline data.
- At the beginning, the researchers welcomed head nurses and gave brief idea about the aim and activity of the program for all head nurses.
- Then, the researchers collected data by using the different tools of data collection in the available hospital classroom.
- The time required for finishing all questionnaires was around 40 -50 min as follows; Lean strategies knowledge questionnaire 15-20 min, head nurses lean performance observational checklist 10-15 min collected by the researcher and leadership effectiveness questionnaire 10-15 min.
- The average number collected was 4-5 head nurses per day.

### **Phase II (Program planning)**

Based on baseline data obtained from pre-test assessment and relevant review of literature, the program was developed by the researchers. This was taken one month in October 2021. The training program was developed based on determined needs and a relevant review of literature. Program construction in a form of printed arabic booklet and included different topics related to lean strategies knowledge.

### **Phase III (Program implementation)**

The implementation phase was initiated in November, 2021 to December 2021. The

researchers visited each previously mentioned setting in the morning shift, two days weekly. Then the researchers divided head nurses into six groups, each group composed of 9 head nurses except one group composed of 10 head nurses. The training program involved 6 sessions and was implemented according to working circumstances the teaching sessions were 9-12 hours distributed as 6 sessions. These sessions were repeated with the same for each group of head nurses. The duration of each session lasted for 1.30 - 2 hours, achieved by using available resources, relevant content and instructional strategies for each session.

### **Phase IV (Post program evaluation)**

During this phase, the impact of the training program was evaluated. The immediate evaluation included an immediate post-program implemented for all subjects using the same tools which were used before the program. Follow up after three months of program implementation, all the study tools were applied to head nurses to test the follow up gain in the head nurses regarding lean strategies, leadership effectiveness perception and lean performance level. The time of the data collection lasted for three months from the beginning of January 2022 to the end of March 2022.

### **Ethical considerations:**

Ethical approval was obtained from the scientific research committee at the Faculty of Nursing, Benha University. The oral consent was obtained from each participant, they were informed about the purpose and benefits of the study and the fact that their participation is voluntary and they have the right to refuse to participate in the study without giving any reason. In addition, confidentiality and anonymity of the subjects were assured through coding of all data.

**Statistical analysis:**

Data analysis was performed using the SPSS software (version 24). Qualitative data were presented as a number and percent. Furthermore, quantitative data was described as mean or standard deviation, as appropriate. The Chi - square test was used to examine the difference and relation between qualitative variables during different periods, when more than 20% of the cells had an expected count less than 5, correction for chi-square was conducted using Fisher's exact test correction. For normally distributed data, the paired t-tests were used for comparing the mean scores between two different periods within the same group. Pearson correlation coefficients were used to measure how strong a relationship is between two variables. The results were considered statistically significant at  $P \leq 0.05$  and highly significant at  $P < 0.01^{**}$ .

**Results:**

**Table (1):** Displays that, more than half (52.7 %) of head nurses were aged more than and equals  $\geq 40$  with mean score  $40 \pm 2.234$ , more than three quarters of them (76.4 %) were female, more than half (58.2 %) of them were married, (45.4 %) of them had from 5 to less than 15 years of experiences, (36.3 %) of them had Bachelor of Nursing and less than two thirds (63.6 %) of them hadn't attended previous training courses on lean strategies.

**Figure (1):** Illustrates that, there are highly improvement in head nurses' lean strategies total knowledge levels after implementing the program, minority of head nurses (11.7%) are have adequate knowledge level in the preprogram and improved to (84.4%) in immediately post program and still decreased to (61%) in the follow up phase but still more than preprogram.

**Figure (2):** Clarifies that, there was statistically improvement in head nurses' lean

performance after implementing the program. About one thirds (33.8%) of head nurses are having adequate lean performance level in the preprogram, while it improved to (83.1%) in immediate post program and slightly decreased to (74%) in the follow up program.

**Figure (3):** Clarifies that, the program has a greater effect on improving head nurses' level regarding leadership effectiveness after implementation the program. One fifth of head nurses (20.8%) had high level regarding leadership effectiveness in preprogram and increased to (81.8%) in immediate post program and still decreased to (67.5%) in the follow up phase but still more than preprogram.

**Table (2):** Shows that, there was highly statistical significance improvement in total head nurses' knowledge about lean strategies after implementation of the program. the lowest total mean score of head nurses was  $(.28 \pm 1.471)$  is related to kanban strategy and improved at post program to  $(2.16 \pm 1.63)$  and decline at follow up phases  $(2.01 \pm 1.54)$  but still more than the preprogram phase.

**Table (3):** Illustrates that, there were a highly statistical significant improvement of head nurses' lean performance after implementation of the program, the lowest mean percent, 43.8% was related to qualification development and improve to 90.8% at post program phase & slightly declined to 88.3 % at follow up program but still more than preprogram.

**Table (4):** Reveals that, there were a highly statistical significant improvement in head nurses' leadership effectiveness dimensions after implementation of the program, the lowest mean score was related to empowering leadership with mean  $(9.89 \pm 1.74)$  at preprogram phase and improve to  $(23.89 \pm 1.24)$  at post program phase & the

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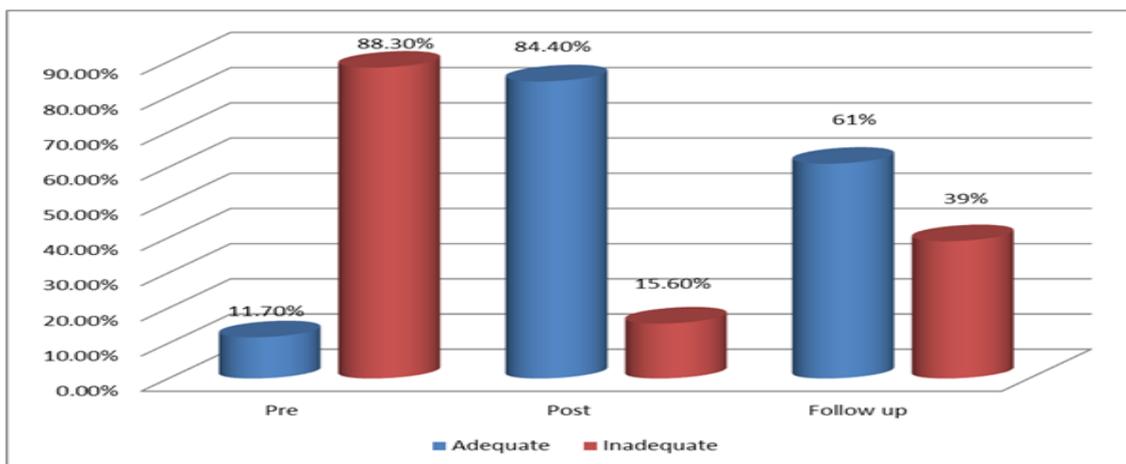
score was declined to (20.89±1.74) at follow up program but still more than preprogram.

knowledge, leadership effectiveness and lean performance at post program phase.

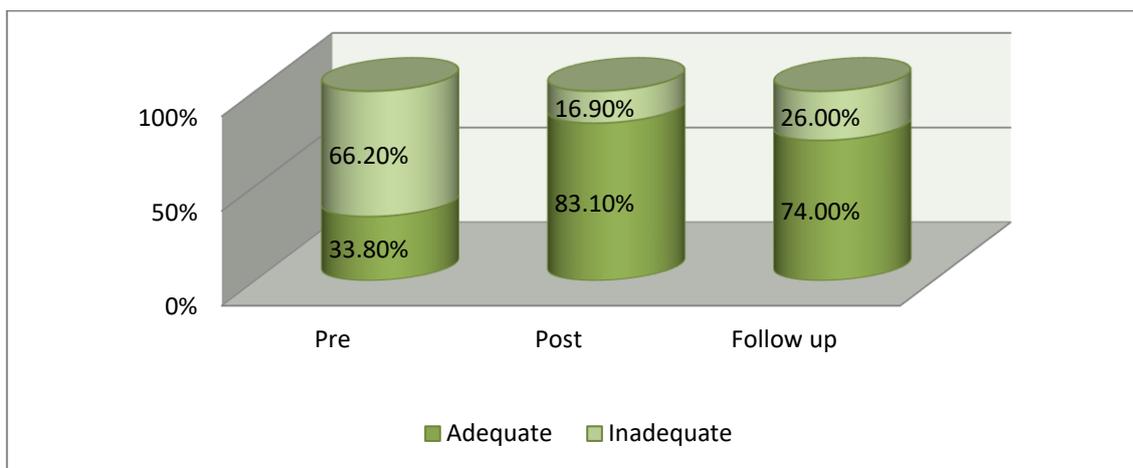
**Table (5):** Indicates that, there were highly statistically significant positive correlations between study variables: Head nurses'

**Table (1): Frequency distribution of the head nurses' personnel & job characteristics (n=55)**

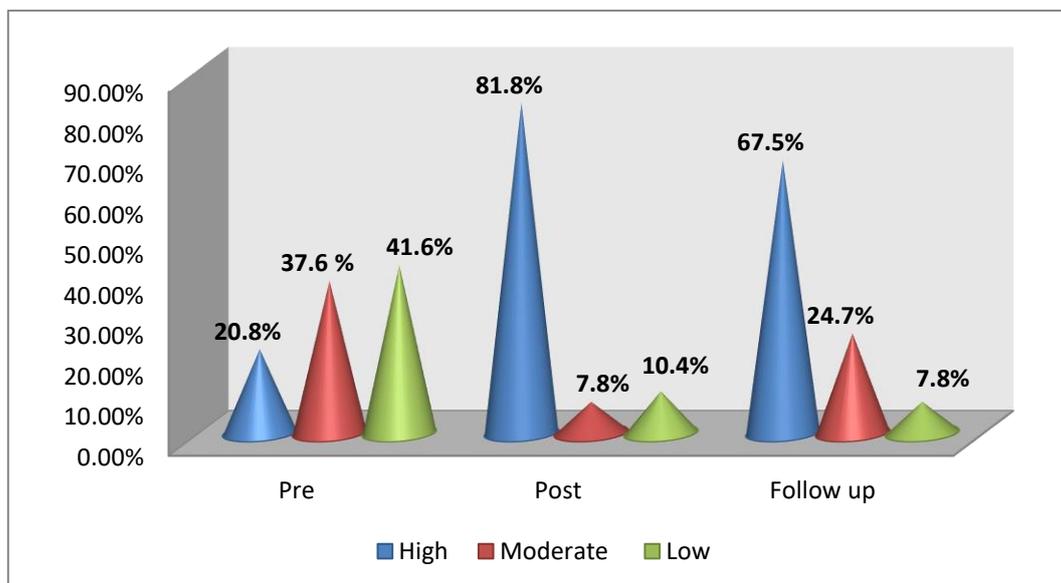
Head nurses characteristics	No	%
<b>Age</b>		
- Less than < 30	<b>6</b>	<b>10.9</b>
- From 30-< 40	<b>20</b>	<b>36.4</b>
- More than >40	<b>29</b>	<b>52.7</b>
<b>Mean ± SD 40± 2.234</b>		
<b>Gender</b>		
Male	<b>13</b>	<b>23.6</b>
Female	<b>42</b>	<b>76.4</b>
<b>Marital status</b>		
- Married	<b>32</b>	<b>58.2</b>
- Single	<b>10</b>	<b>18.2</b>
- Widow	<b>9</b>	<b>16.3</b>
- Divorced	<b>4</b>	<b>7.3</b>
<b>Academic Qualifications</b>		
- Diploma of Nursing	<b>5</b>	<b>9.2</b>
- Associated Degree of Nursing	<b>10</b>	<b>18.2</b>
- Bachelor of Nursing Science	<b>20</b>	<b>36.3</b>
- Master degree	<b>12</b>	<b>21.8</b>
- Ph.D. degree	<b>8</b>	<b>14.5</b>
<b>Years of experience</b>		
- < 5 years	<b>20</b>	<b>36.4</b>
- From 5- < 15	<b>25</b>	<b>45.4</b>
- ≥ 15	<b>10</b>	<b>18.2</b>
<b>Attending training courses about lean strategies</b>		
-Yes	<b>20</b>	<b>36.4</b>
-No	<b>35</b>	<b>63.6</b>



**Figure (1) : Head nurses' total knowledge regarding lean strategies throughout program phases**



**Figure (2): Head nurses ' lean performance total level throughout program phases.**



**Figure (3): Head nurses' total level regarding leadership effectiveness throughout program phases.**

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**Table (2): Mean scores of head nurses' knowledge regarding lean strategies throughout program phases (n=55)**

Head nurses Knowledge	Maximum Scores	Pre program		Post program		Follow up		Pairedt (1)	P-Value	Paired t (2)	P-value
		Mean± SD	Mean %	Mean± SD	Mean %	Mean ± SD	Mean %				
Definition	4	1.75±2.0	43.7	3.76±2.08	94	3.58±1.83	89.5	3.927	.000**	6.973	.000*
Importance of lean strategies	2	.90±2.0	45	1.95±2.0	97.5	1.88±2.0	94	5.882	.000**	4.572	.000*
Kaisen strategy	5	1.48±1.644	29.6	4.72±1.94	94.4	4.06±1.62	81.2	3.080	.000**	5.714	.000*
5s strategy	7	2.60±2.0	37.1	6.68±2.0	95.4	6.60±2.0	94.2	2.381	.000**	2.973	.000*
Kanban strategy	3	.28±1.471	9.3	2.16±1.63	72	2.01±1.54	67	2.046	.000**	3.997	.000*
Poka-yoke strategy	3	1.70±2.0	56.7	2.70±2.0	90	2.68±2.0	89.3	5.036	.000**	6.953	.000*
Just in time strategy	4	1.52±1.71	38	3.40±2.57	85	3.22±2.42	80.5	75.151	.000**	6.591	.000*
Jidoka strategy	3	1.60±2.0	53.3	2.98±2.0	99.3	2.71±2.0	90.3	3.180	.000**	6.973	.000*
Takt time strategy	2	1.36±2.38	68	1.96±3.36	98	1.81±3.12	90.5	6.220	.000**	5.678	.000*
Hijunka strategy	2	.67±2.0	33.5	1.77±2.0	88.5	1.65±2.0	82.5	2.365	.000**	6.973	.000*
PDCA strategy	2	.32±1.26	16	1.98±1.68	99	1.68±1.58	84	71397	.000**	7.576	.000*
KPI strategy	3	.50±2.0	16.7	2.92±2.0	97.3	2.79±2.0	93	5.180	.000**	5.973	.000*

\*\* A highly statistically significant difference  $P \leq 0.01$

t (1) paired t test between pre and post program, t(2) paired t test between pre and follow up program.

X = Mean      SD= standard deviation

**Table (3): Mean scores of head nurses ' performance regarding lean strategies throughout program phases (n=55)**

Lean Performance category	Maximum Scores	Pre program		Post program		Follow up		Paired t (1)	P- Value	Paired t (2)	P- value
		Mean ± SD	Mean %	Mean ± SD	Mean %	Mean ± SD	Mean %				
Continuous improvements	22	9.97±2.13	45.3	20.97±2.19	95.3	18.97±1.03	86.2	8.28	0.001**	1.02	0.001**
Self – development	11	4.94±1.42	44.9	9.94±2.35	90.4	7.94±1.12	72.2	9.68	.001**	3.304	0.001**
Qualification development	17	7.44±4.54	43.8	15.44±2.64	90.8	15.01±1.53	88.3	11.4	0.001**	3.12	0.001**
Lean thinking	12	5.72±4.164	47.7	9.72±1.124	81.0	7.72±3.124	64.3	18.6	0.001**	12.42	0.001**

**\*\* A highly statistically significant difference  $P \leq 0.01$**

**t(1) paired t test between pre and post program (2) paired t test between pre and follow up program**

**X = Mean      SD= standard deviation**

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**Table (4): Mean scores of leadership effectiveness among head nurses throughout program phases (n=55)**

Leadership effectiveness dimensions	Maximum Scores	Pre program		Post program		Follow up		t (1)	P-Value	t (2)	P-value
		Mean±SD	Mean %	Mean±SD	Mean %	Mean±SD	Mean %				
Relational Leadership	48	29.19±2.09	60.8	45.19±1.09	93.9	39.19±2.56	81.6	7.28	0.001*	6.92	0.001**
Impartial	48	31.80±3.33	66.5	46.80±3.93	97.8	40.80±3.22	85	9.08	.001**	4.304	0.001**
Technical	27	16.29±1.23	60.3	25.29±7.23	93.3	20.29±1.73	74.1	1.40	0.001*	9.02	0.001**
Creative	33	19.97±3.22	60.3	29.97±2.12	90.6	22.97±1.22	69.3	16.6	0.001*	11.12	0.001**
Directive	24	18.15±1.23	75.5	20.15±1.93	83.9	20.15±1.23	83.7	2.62	0.001*	18.31	0.001**
Tenacious	27	17.16±1.87	63	26.16±1.84	96.3	22.16±1.01	82.1	22.28	0.001*	9.200	0.001**
Empowering	24	9.89±1.74	41.2	23.89±1.24	99.5	20.89±1.74	86.6	1.618	0.001*	4.34	0.001**
Influential	18	13.25±2.77	73.6	15.25±2.23	84.6	15.25±4.77	84	7.28	0.001*	7.02	0.001**
Strategic	15	10.19±2.83	67.9	12.19±1.83	81.3	11.19±3.83	74.6	9.88	.001**	11.304	0.001**

\*\* A highly statistically significant difference  $P \leq 0.001$  t1 between pre and post program  
t2 between pre and follow up program  
X = Mean SD= standard deviation

**Table (5): Correlation matrix between study variables through the program phases (n=55)**

Variables	Time assessment	Head nurses' knowledge		Leadership effectiveness		Lean performance	
		r	P	r	P	r	P
Head nurses' knowledge	Pre	--	--	.247	1.39	.027	.703
Leadership effectiveness		.247	1.39	--	--	.584	.002**
Lean performance		.027	.703	.584	.002**	--	--
Head nurses' knowledge	Post	--	--	.272	.002**	.835	.000**
Leadership effectiveness		.272	.002**	--	--	1.600	.005**
Lean performance		.835	.000**	1.600	.005**	--	--
Leadership effectiveness		1.37	.025*	--	--	.534	.000**
Lean performance	1.38	.000**	.534	.000**	--	--	

A statistically significant correlation  $P \leq 0.05$  \*\* A highly statistically significant correlation  $P \leq 0.01$

## **Discussion**

Health-care systems around the world are facing the challenges of improving patient care quality, reducing waiting times and increasing the efficiency of patient treatment while also keeping costs from escalating out of control. Nursing leaders face unprecedented challenges as health care organizations struggle to adapt to ever-accelerating rates of change both internally with the external environment in which they are embedded. Such change challenges include the knowledge, skills and abilities of leaders, and perhaps even more important, the self-conceptualizations of their leadership capabilities and psychological resources as their leadership effectiveness to meet the ever-increasing demands of their roles (Deblois & Lepanto, 2018).

The current study aimed to assess the effect of training program about lean strategies for head nurses on their leadership effectiveness. This aim could be achieved through the following objectives: assessing the head nurses' knowledge about lean strategies through program, assessing the head nurses' perception regarding leadership effectiveness thorough program, designing and implementing educational program about lean strategies& assessing the effect of training program about lean strategies for head nurses on their leadership effectiveness

Discussion of the study result is presented in the following sequence: **The first part** will be concerned with personal characteristic of head nurses: **The second part** will elaborate head nurses' knowledge about lean strategies thorough program: **The third part** will concerned with head nurses ' performance regarding lean throughout program phases **The fourth part** will focus on the head nurses' perception regarding leadership effectiveness throughout program phases::

**The fifth part** will concern with correlation between head nurses' knowledge, leadership effectiveness and lean performance throughout the program phases.

On the light of the study findings, concerning personal characteristics of the studied head nurses, more than half of head nurses are aged than forty years or more, majority of them are female, more than half of them married, less than half of them have Bachelor of Nursing and nearly tow third of them attended workplace on training courses on lean strategies From the researchers point of view, this result could be due to the nursing learning was specialized only for long time for females and males starting entering nursing field from short time

This result was in agreement with **Al-Balushi et al. (2018)**, who conducted study on "Readiness factors for lean implementation in healthcare settings " and showed that more than half of head nurses are aged more than forty years, majority of them are female. Conversely, this result disagreement with **Patri & Suresh (2018)**, who conducted study on "Factors influencing lean implementation in healthcare organizations " and revealed that less than half of head nurses are aged more than forty years.

Regarding total knowledge mean scores the present study findings showed that there was highly statistically significance improvement in total head nurses' knowledge mean scores about lean strategies after the implementation of the training program.

From the researchers' point of view, this result may be due to the majority of head nurses hadn't attended previous training courses about lean strategies, also it is a new concepts they hadn't any information about it ;so increasing knowledge acquired by head nurses could explain that learning was not a passive experience, and the program created an

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interactive environment. Also, improvement of their knowledge besides this retention of knowledge immediate post-program implementation is higher than after three months.

The result consistent with **Abdel Ghafar et al., (2020)** who carried out their study at Dar Al Fouad hospital, Cairo, Egypt about "Effect of lean management strategies on the quality of perioperative nursing roles" and showed that the mostly of nurses had unsatisfactory knowledge in the preprogram and improved in immediately post program. Also, this result is in agreement with **Prado et al., (2020)** who conducted their study about "Increasing competitiveness through the implementation of lean management in healthcare." in Tehran and revealed that mostly of studied sample had unsatisfactory knowledge in the preprogram and improved in immediately post program.

These results were congruent with **Stoutzenberger, (2018)** who carried out their study in England about "using lean strategies to improve operating room efficiency, access intelligence." and revealed that there was a highly statistically significant difference among studied sample regarding total mean scores of knowledge at pre & post-test.

Regarding total lean performance mean scores, the study findings showed at preprogram phase the head nurses had little lean performance mean scores compared to post and follow up phases and there was highly statistically significant improvement of head nurses' lean performance after the implementation of the program. This could be due to the fact that head nurse acquired lean skills as an effect of the training program that improve nurse managers' abilities for change through accepting advices from their trainers. The study finding supported by **Hassanain et al., (2017)** who revealed in their study at

Kingdom of Saudi Arabia that the tow third of the studied sample had poor level bout lean performance in the preprogram.

Regarding continuous improvements among head nurses, the present study clarified that there were highly statistically significant improvements in head nurses' performance regarding continuous improvements after the implementation of the program. less than one quarter of head nurses done "looking for hygiene in his/her ward, especially inpatient's rooms" at preprogram and it was improved and increased to the most and more than three quarter in immediately post program and follow up program respectively. This could be due to the effective of using lean strategies program that improved the quality of nursing care ,also perfect head nurse knows that hygiene is very important in hospital to prevent increasing infection.

The study findings are consistent with **Toussaint & Berry, (2019)** who done their study about "the effect of lean strategies in health care." in Malaysia and indicated that there were a statistically significant difference between continues improvement dimension before and after the training sessions. Also, this result is in agreement with **Blackmore et al., (2019)** who reported that there were a statistically significant difference between the continues improvement dimension before and after the training program.

According to self –development among head nurses, the findings indicated that there were highly statistically significant improvements after the implementation of the program. Less than one quarter of head nurses done "identify problems in their early stages through morning rounds" at preprogram and It was improved post and follow up program. These may due to large number of routine duties assigned to the head nurses and they not determine the priorities of these duties

during morning round. Study findings agreed with **Farmahini et al., (2018)** in Damascus University Hospital who revealed that less than one quarter of head nurses identify problems in their early stages.

As regards to qualification development among head nurses, the results of the study indicated there were highly statistically significant improvements after the implementation of the program. Less than one fifth of head nurses done "Set high standards for staff performance regarding patient care" at preprogram and it was improved and reached to the most and nearly three quarter in immediately post program and follow up program respectively. This could be due to head nurses had workload and there was no time to set high standards for staff performance regarding patient care. The study findings supported by **Jorma et al., (2019)** in United States who revealed in their study findings at that nearly one fifth of head nurses done "Set high standards for staff performance regarding patient care".

The study findings was disagreed with **Ahmed, (2018)** who carried out their study at Cairo University Hospital in Egypt about "effect of training program on nurse managers knowledge and performance At Selected Hospital" and revealed that one half of head nurses done "Set high standards for staff performance regarding patient care".

Regarding lean thinking among head nurses, the current study findings revealed that there were highly statistically significant improvements after the implementation of the program. Less than one fifth of head nurses done "Respect every individual no matter who they are and what is their position" at preprogram and it was improved post and follow up program. This could be due to the effectiveness of the program at post and follow up phases.

The study findings supported by **Jorma et al., (2019)** who conducted a study about "Lean thinking in Finnish healthcare. Leadership in Health Services" and stated that Less than one fifth of head nurses done "Respect every individual no matter who they are and what is their position". The study finding was inconsistent with **Kovacevic et al., (2018)** who conducted their study at "Leadership and lean thinking in healthcare: review of implementation results", and stated that one half of head nurses done "Respect every individual no matter who they are and what is their position".

The study findings showed that at preprogram phase the participants had low mean scores regarding leadership effectiveness compared to post and follow up phases and there was highly statistically significant improvements in head nurses' mean scores regarding leadership effectiveness after implementation of the program. This could be due to effective open communication between head nurses and their staff as it is one of the most important skill in leadership and decision-making.

This result was congruent with **Ojjan et al., (2018)** who conducted their study about "Effect of management development program based on lean strategies for head nurses on their leadership style and its' effectiveness." in Faisalabad, Pakistan and displayed that more than three quarters of head nurses became good regarding leadership effectiveness immediately after the program. Conversely this result was inconsistent with **Farmahini et al., (2018)** who carried out their study in Romania about "the impact of lean management strategies program on effectiveness of leadership of head nurses." and revealed that only one third of them became good total level regarding leadership effectiveness immediately post program.

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For leadership effectiveness regarding relational leadership throughout program phases, the present study clarified that there were highly statistically significant improvements regarding relational leadership after implementation of the program. From the researchers point of view, this could be due to head nurses started to emphasize the relationships among staff nurses when leading them and they saw the strengths and weaknesses of each member of their team, and work to enhance strengths and improve weaknesses.

The study finding supported by **Krugman & Smith, (2017)** who carried out their study in Kuala Lumpur area about "the role of leadership to head nurses: charge nurse leadership development and evaluation" and revealed that less than one quarter of head nurses agree on having high perception related to " show deep personal interest towards the health and safety of others, their needs, goals and ambitions." during assessment. Conversely, this result disagreement with **Aij & Rapsaniotis, (2019)** who carried a study in Romania about "Leadership requirements for Lean versus servant leadership in health care" and revealed that one half of head nurses agree on having high perception related to " Show deep personal interest towards the health and safety of others, their needs, goals and ambitions." during assessment.

Concerning leadership effectiveness about impartial leadership among head nurses throughout program phases, the result of the study indicated that there are highly statistically significant improvements after the implementation of the program. Less than one quarter of head nurses agree on " Taking into account different perspectives on workers and work problems." at preprogram phase and it was improved and increased to significantly

less than three quarters and less than half after the post program and in follow up phase respectively. From the researchers opinion it could be due to the limited time available and increase responsibilities of head nurses with managerial issues and patient care.

These results were compatible with **Vesterinen et al., (2017)** who carried a study in Finland about "nurse managers' perceptions related to their leadership styles, knowledge and skills case of health center, wards." and displayed that nearly one quarter of the studied sample taking into account different perspectives on workers and work problems.

As regards studied head nurses' leadership effectiveness regarding technical leadership throughout the program phases, there were highly statistically significant improvements after implementation of the program. From the researchers opinion it could be due to head nurses started in collaborating with their staff to assess and fix technical problems facing them and initiate their willingness to learn and handle these problems.

The study findings supported by **Krajewski, (2018)** who done their study on "leadership, self-efficacy taxonomy and its relation to effective leadership" in the U.S. and revealed that only about one quarter of nurses show agreement regarding " Show the ability to obtain results, thereby setting the goals of the work into existence".

Regarding creative leadership throughout program phases, the present study findings concluded that there were highly statistically significant improvements in head nurses' effectiveness regarding creative leadership after the implementation of the program. Less than one quarter of head nurses were effective about " See new initiatives and opportunities and take actions to implement them in reality " at preprogram and it was clearly improved

and reached to three quarter and less than half at immediately post program and follow up program respectively. This could be due to the high management in hospital motivate them and initiate innovative work to be creative and apply creativity and change at work place.

The study findings inconsistent with **Ben & Abbas, (2019)** who elaborated a study in Queen Elizabethc hospitals in Malawi that explored relationship of employee performance and several factors of organizational change such as communication, leadership and clarified that more than three quarters of head nurses agree on " See new initiatives and opportunities and take actions to implement them in reality ".

As regard to directive leadership among head nurses throughout program phases, the present study findings clarified that there were highly statistically significant improvements after the implementation of the program. Less than one quarter of head nurses agree on " Stay informed of priorities without dispersion " at preprogram and it was improved and reached to three quarter and less than half in immediately post program and follow up program respectively. This could be due to head nurses started to guide the team's goal and provide coaching, clarify the responsibilities, and give praise when appropriate.

The findings were congruent with **Vesterinen et al., (2017)** who carried a study in Finland about " nurse managers' perceptions related to their leadership styles, knowledge and skills case of health center, wards " and displayed that less than one quarter of head nurses stay informed of priorities without dispersion. Conversely this result disagreement with **Agot et al., (2019)** who carried a study in Romania about "Directive leadership perception, trust in the

leader, and followers' emotions in organizational change processes." and displayed that three quarters of the studied sample stay informed of priorities without dispersion.

Concerning to tenacious leadership among head nurses throughout program phases, there were highly statistically significant improvements after the implementation of the program. Less than one quarter of head nurses agree on " Put the great interests of the institution above the needs or personal desires." at preprogram and it was improved and reached to less than three quarter and more than half in immediately post program and follow up program respectively. This could be due to head nurses actively compete with others and their ability to achieve a goal despite any difficulties encountered while achieving that goal.

The findings were congruent with **Aarons, (2019)** who carried a study in Korea about " Transformational and transactional leadership: association with attitudes toward evidence-based practice. "and displayed that less than one quarter of head nurses agree on " Put the great interests of the institution above the needs or personal desires." Conversely this result disagreement with **Arroliga et al., (2018)** who conducted their study in Barcelona, Spain on "leadership in health care for the 21st century: challenges and opportunities" and displayed that majority of the studied sample agree on having high perception related to "Put the great interests of the institution above the needs or personal desires.

According to empowering leadership among head nurses throughout program phases, minority of head nurses agree on " Choose and attract individuals to the establishment when they wish to apply for employment." at preprogram and it was

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improved and reached to more than three quarter and more than half in immediately post program and follow up program respectively. This could be due to empowering leadership builds confidence in head nurses capacity to execute collective mission and goals, establishes essential trust in an organization.

The findings was in contrary with **Shaheen, (2021)** who carried a study about "impact of implementing a leadership development training program for staff nurses on structural, leadership self-efficacy and clinical leadership practice " in the U.S and displayed that minority of nurses agree on "Choose and attract individuals to the establishment when they wish to apply for employment." at preprogram phase.

As for influential leadership among head nurses throughout program phases, there were highly statistically significant improvements after the implementation of the program. less than one quarter of head nurses agree on " Speak fluently and speak in the language in which the work takes place." at preprogram and it was improved and reached to majority and more than half in immediately post program and follow up program respectively. This could be due to head nurses can persuade others to agree with them and draw respect from those around them, also people with influence at work tend to be more trusted and recognized. And often, influential people are also more effective leaders.

The findings supported by **Chemers et al., (2020)** who carried a study about " dispositions affect and leadership effectiveness" in Greece and displayed less than one quarter of head nurses agree on " Speak fluently and speak in the language in which the work takes place." Conversely, this result disagreement with **Mercado, (2022)** who carried a study about " exploring

leadership training strategies for novice nurses on patient Care in Puerto Rico " and revealed that more than half of head nurses agree on " Speak fluently and speak in the language in which the work takes place."

Concerning strategic leadership throughout the program phases, there were highly statistically significant improvements after the implementation of the program. less than one quarter of head nurses agree on " Keep the leaders of the authority (officials) aware and knowledgeable of the main issues." at preprogram and it was improved and reached to more than three quarter and more than half in immediately post program and follow up program respectively. This could be due to strategic leader has the ability to influence others to voluntarily make decisions that enhance the prospects for the organization's long-term success while maintaining short-term financial stability.

The findings was accordance with **Kovacevic et al., (2018)** who carried a study about "leadership and lean thinking in healthcare: review of implementation results" in New Zealand and displayed that less than one quarter of head nurses agree on " Keep the leaders of the authority (officials) aware and knowledgeable of the main issues."

According to the relation between head nurses' knowledge and their leadership effectiveness throughout program phases, the present findings displayed that there were highly statistically significant positive correlations between head nurses' lean strategies knowledge scores and their leadership effectiveness score at immediately post program.

The researchers interpreted that, the training program was effective in improving nurses' knowledge and practice regarding lean strategies so when the nurses' knowledge improved these led to direct improvement in

their leadership effectiveness. These finding in the same context with **Ojian et al., (2018)** in UK who conducted their study about “Effect of management development program based on lean strategies for head nurses on their leadership style and its' effectiveness”, and stated that there was highly statistically significant positive correlation between nurses' lean strategies knowledge scores and their leadership effectiveness score.

Regarding the relation between head nurses' knowledge and their lean performance, the present findings showed that there was there was highly statistically significant positive correlation between head nurses' knowledge and their lean performance score at post and follow up program phases. The researchers interpreted that, the importance of the tanning program in improving the nurses' their performance.

These findings agreed with **Mohammed, (2018)** in Mansoura university hospital who indicated in their study about "Effect of lean leadership training program on head nurse's performance and patient satisfaction" and relived that there was highly statistically significant positive correlation between head nurses' knowledge and their lean performance. Also this result is accordance with **Al-Balushi et al. (2018)** in at Rumallah Hospital in the state of Qatar, who indicated a highly statistically significant positive correlation between head nurses' knowledge and their lean performance.

Concerning the relation between head nurses' Leadership effectiveness scores and their lean performance, the present study revealed that there was highly statistically significant positive correlation between head nurses' leadership effectiveness score and their lean performance score at pre, post and follow up program phases. This result could be due to the applicability of improving head

nurses' leadership effectiveness and readiness of them to apply effective leadership styles.

These findings agreed with **Abou, (2017)** who carried out their study about “Relationship between lean strategies utilization and leadership effectiveness of first-line nurse managers.” and **Adiguzel, (2019)** who done their study on "Relationship among leader effectiveness, learning orientation, lean strategies utilization, team ability, and repair innovation within the service sector" and displayed that there was highly statistically significant positive correlation between head nurses' leadership effectiveness and their lean performance.

Concerning the relation between study variables through the program phases, the present study revealed that there was highly statistically significant positive correlation between study variables at post program phase. This result could be due to the importance of lean strategies program and its implementation on improving leadership effectiveness and quality of nursing services. These findings agreed with **Abou, (2017)** who carried out their study about “relationship between lean strategies utilization and leadership effectiveness nurse managers.” in a Swiss insurance hospital and **Adiguzel, (2019)** who done their study on "relationship among leader effectiveness, lean strategies utilization, team ability, and repair innovation within the service sector" and displayed that there was highly statistically significant positive correlation between study variables at post program phase.

### **Conclusion**

There was significant improvement of studied head nurses' knowledge, performance regarding lean strategies after program implementation ,also there was highly statistically significant improvement of leadership effectiveness after program

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implementation. Moreover, there was highly statistically significant correlation between head nurses' knowledge, performance related to lean strategies and leadership effectiveness at immediate post and follow-up program phases.

### **Recommendations**

#### **For hospital administration**

- Initiating a strong orientation toward lean and its strategies, which is clearly communicated and enacted, from the highest levels of management, throughout the hospital.
- Introducing lean approach in the healthcare strategic plan, policy as well as vision this will ensure that the healthcare providers understand the importance of lean approach to the organization.
- Transforming the administration in healthcare settings to lean management might be challenging, to mitigate these challenges ensure leadership and management support and follow-up procedures are in place.

#### **For educational level**

- Lean approach and its branches should be introduced in nursing curriculum to acquaint students with up-to-date knowledge and skills in lean management and lean leadership strategies.
- Allocate sufficient time for nursing educators to practice the implementation of lean strategies. This planning and training ensured relatively effective transfer to the new curriculum and increase educators confidence in the transformation process.
- Nursing administrators maintain workshops and conferences among internal and external health care team members to exchange knowledge and experience for head nurses, improve communications skills and build teamwork.

#### **For further research**

- Conduct more comparative studies among various healthcare settings regarding the impact of lean leadership training program on the performance of managers at different levels of management.
- Conduct more studies regarding lean management strategies and its effect on patients and organizational outcomes.
- Conduct more studies to identify the effect of leadership effectiveness on patient flow.
- Conduct more studies regarding the effect of 5s strategy on staff nurses performance in healthcare settings.

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## تأثير برنامج تدريبي عن استراتيجيات اللين لرؤساء التمريض على فاعلية قيادتهم

اسماء حلمي السيد علي - رباب محمود حسن - هويدا حسن السيد محفوظ

مؤسسات الرعاية الصحية تعمل حاليًا في بيئة تنافسية للغاية ، مما يتطلب من المنظمات أن تكون مرنة وان تكتسب المعرفة والتقنيات لتقديم خدمات جديدة وخفض التكاليف والعمل بشكل أسرع من المنافسين، لذلك كانت استراتيجيات اللين ضرورية لمنظمات الرعاية الصحية لتحسين الجودة ، الكفاءة وتحسين فاعلية القيادة. هدفت الدراسة إلى تقييم تأثير البرنامج التدريبي حول استراتيجيات اللين لرؤساء التمريض على فاعلية قيادتهم. تم استخدام تصميم شبه تجريبي في هذه الدراسة. اجريت هذه الدراسة في جميع الوحدات بأقسام الباطنة والجراحة بمستشفى جامعة بنها. تكونت عينة الدراسة من 55 من رؤساء التمريض. حيث كشفت النتائج بان هناك ارتباط ايجابي ذات دلالة إحصائية بين اجمالي المعلومات والمهارات لرؤساء التمريض فيما يتعلق باستراتيجيات اللين وفاعلية القيادة في مرحلة ما بعد تنفيذ البرنامج والمتابعة. بينما لم يكن هناك ارتباط ذو دلالة إحصائية في مرحلة ما قبل البرنامج مما يدعم فرضيات الدراسة. كما اوصت الدراسة بإظهار التوجه القوي نحو اللين واستراتيجياته ، والتي يتم توصيلها وتنفيذها بوضوح من أعلى مستويات الإدارة في جميع أنحاء المستشفى.