

Nurse Manager's Perception Regarding lean System Factors at Assiut University Hospitals

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Abstract

Background: Lean is the systematic removal of waste by all members of the organization. **Aims:** assess nurse manager's perception of lean system factors at Assiut University Hospitals. **Study design:** A descriptive correlational design. **Setting:** The study was conducted in all Assiut University Hospitals. **Subject:** Convenience sample of Nurse Managers (N= 251). **Methods:** It including personal characteristics data sheet, Lean system questionnaire that included nine factors. **Results:** the highest mean scores regarding "Education and training" factor among the studied subject in all hospitals, the highest mean scores regarding all factors in Al-Orman hospital. **Conclusion:** There were statistically significance differences regarding all factors of lean system among studied nurse managers' in Al Orman hospital. **Recommendation:** Policy makers who are responsible for healthcare management by Lean system factors should become standard procedures at all healthcare institutions can also limit the maximum time and maximum walking distances for patients to reduce the waste.

Keywords: *Lean System Factors, Nurse Managers & Perception.*

Introduction

Healthcare organizations face considerably more difficulties in staying aware of the competition and the expense of offering medical services and conveying a high quality health services at an acceptable expense is the target of proprietors and managers (Abdallah, 2014). The systems of health care and units, around the world, centring ceaseless strain to diminish a wide range of expenses for its administrations from one side, yet additionally, on the opposite side, to build quality, lessen reaction, pausing and lead time, work on tolerant wellbeing, continually present development and exorbitant techniques and hardware in ordinary practice (Jovicic & Macuzic, 2012). Effective lean execution to presents extraordinary difficulties, albeit lean standards, devices and methodologies for execution are generally known and all around archived, organizations actually battle.

Lean framework is a sort of nonstop quality improvement that is a way of thinking and a bunch of devices for working on quality and diminishing expenses by disposing of all waste" in work measures (Grabau, 2012). Lean cycle is a coordinated socio-specialized framework whose fundamental target is to kill squander by simultaneously lessening or limiting provider, client and inside fluctuation. Lean way of thinking tries to lessen squander anyplace in the organization, streamline center assets and build up a corporate culture committed to distinguishing and ceaselessly encouraging consumer loyalty (Karim &

Arif, 2013) & (Staudacher, & Tantardini, 2017). It is an interaction reengineering theory made out of a vital core values and a bunch of devices at the functional level. Lean is a framework which requires less time, less human exertion, less expense, less space, with less wounds, and less missteps, to make an association that achieves more and does these better (Al-Balushi, et al. 2014).

While Bajjuoe, & En-nadi, (2019) Added that, the term of Lean" signifies the ideal utilization of the accessible assets inside the organization. This methodology utilizes just 50% of the HR, a big part of the creation space, and a big part of the speculation costs in instruments and new development innovations, while keeping half of the necessary stock to guarantee regard of the exhibition models (cost, time, quality) and to accomplish the fulfillment of the clients' requirements. Lean is to be perceived as an administration framework that acquires best outcomes a drawn out point of view. As in the transient too solid benefit direction might be illustrated (Antony, 2015). Lean methodology doesn't need to be proficient in all applications (Rymaszewska, 2014).

Lean framework factors incorporates solid initiative, top administration support ,preparing and instruction, successful correspondence, coordinating with request and ability to further develop stream, patient concentration , award and estimation framework, Strategic plan of medical care setting, and Undertaking the start to finish measure see (Al Anwar, 2021).

Lean framework factors incorporates solid initiative, top administration support ,preparing and instruction, successful correspondence, coordinating with request and ability to further develop stream, patient concentration , award and estimation framework, Strategic plan of medical care setting, and Undertaking the start to finish measure see (Al Anwar, 2021). Lean framework execution has many advantages, worked on quality and wellbeing less slip-ups, mishaps and mistakes, bringing about better consideration, further developed help insight, further developed conveyance/idealness, better work finishes sooner (meets targets), further developed throughput (more pay) similar individuals, utilizing a similar gear, find are fit for accomplishing more sped up force stable work space with clear, normalized methods makes establishments for consistent improvement, an incentive for cash (lower costs), less waste and further developed staff assurance (Haluk, 2017). Compelling execution of lean framework that requires being prepared which is viewed as a basic antecedent to the effective execution of complicated changes in medical care settings (Al Anwar, 2021).

Mudhafar, et al., (2020) detailed that, the lean effects the entire of the association and in many cases is considered as another administration reasoning. The way of life of the association and the acknowledgment of progress can significantly affect the effective lean execution. The structures accessible are described by high intricacy and, as a rule, ambiguity. It is accordingly self-evident, that few elements should be thought of, even before the start of any lean execution project, as partners inside and outside the association can have clashing interests.

Significance of the study:

Much has appeared in professional articles and journals regarding the lean system factors. The studies that conduct by Mudhafar, et al, (2020) & Abdullah, (2020) found that, the important of the lean system for nurse managers' to accomplish of quality, safety, delivery improvements in addition to cost reduction in all departments at Assiut University Hospitals, and the researcher was observed that, there is no Upper Egypt studies in this point. So, the researcher interest to conduct such type of study to find the perception of nurse manager's regarding lean system factors at Assiut University Hospitals to motive those implements it.

Aim of the study:

The present study aims to: assess nurse manager's perception of lean system factors at Assiut University Hospitals

Research Questions:

To fulfill the aim of the present study, the following research questions are formulated:

Q1: What is extending of nurse managers' perception about lean system factors At Assiut University Hospitals?

Q2: What is the correlation between lean system factors among studied Nurse Managers?

Q3: What is the correlation between lean system factors with studied Nurse Managers' personal & job characteristics?

Methods:

A descriptive design was utilized for the current study. The study was conducted in all Assiut University Hospitals (Main, Productive Woman, Pediatric, El Rajehe, Al Orman, Neurological and Urological Hospitals) and Convenience sample of Nurse Managers working (N= 251) in Assiut University Hospitals as the following table.

Hospitals	No. Nurse Managers
1. Main Hospital	47
2. Productive Woman Hospital	30
3. Pediatric Hospital	40
4. El Rajeh Hospital	25
5. Al Orman Hospital	40
6. Neurological Hospital	33
7. Urological Hospital	36
Total	251

Data collection:

The data were collected using self-administered questionnaire including: Study tool (I): Personal & Job characteristics for study subject: It was developed by the researcher, it include questions related to Age, Gender, unit, marital status, job position, Educational qualification, and years of experience. Study tool (II): Lean system questionnaire: included 56 Items classified into nine factors: This was developed by the researchers, based on review of current related literature (Al Anwar, 2017) to assess nurse manager's perception about lean system factors. Strong leadership (6 items), Administrative support (5 items), training and education (8 Items), effective communication (5 items), matching demand and capacity to improve flow (5 items), Evaluation and incentive system (10 items), Continuous improvement (5 items), Standard work (5 items), Getting rid of wastes (7 items). The participants were answered the all questions by yes scored (one) or no scored (zero).

Study Procedures:

Faced validity: was done to guarantee precise understanding of the review apparatus. The information was gathered by the analyst through organized talking with Nurse Managers. The analyst had disclosed the survey to everyone. An authority authorization will get from the medical clinic chief, the nursing administration organization chief, and the top of every division prior to leaving on the information assortment. The genuine information assortment will begin in February 2019 and finished in April 2019. The analysts will meet the attendant's supervisors, disclosing to them the reason for the review, and asking them for their oral agree to partake. Also,

Content Validity was checked and dissected utilizing corroborative factor examination test to guarantee (significance, clearness, and responsibility of every

things of the review device) and its outcome was ≥ 1.8 for all things of the review instrument.

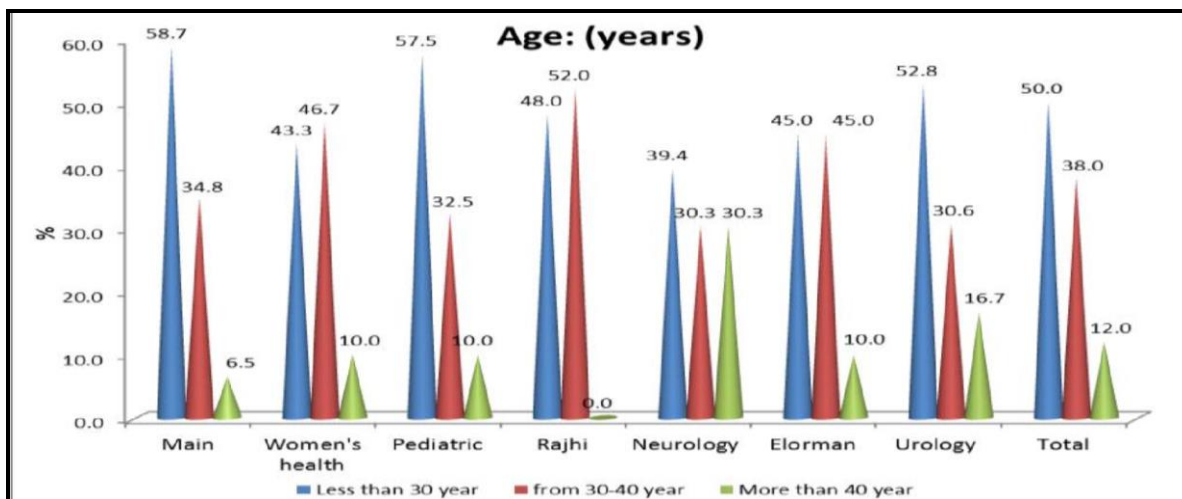
The pilot study: The pilot study serves to test the attainability, clearness, and practicability of the information assortment instrument. It did on 10% attendant's directors from various Assiut University Hospitals. The pilot study was gathered in January 2019. The review subject remembered for the pilot study was remembered for the current review. Information gathered from the pilot study were dissected to test consistency of study apparatus utilizing Cronbach's Alpha Coefficient test. The outcome was $\alpha \geq 0.86$ for every thing of the instrument things.

Ethical consideration: The Nurse Managers remembered for the pilot study were incorporated from the current review. Examination proposition supported from moral council at the Faculty of Nursing Assiut University. There is no danger for

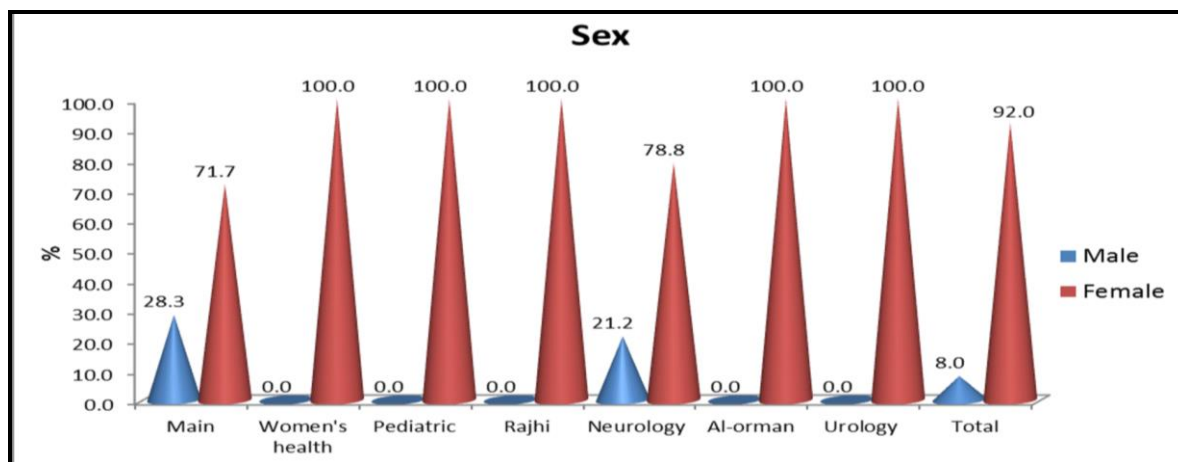
concentrate on members during utilization of the examination. The review followed normal moral standards in clinical exploration. Oral arrangement took from the members in this review. Study members reserve the option to decline or to take part as well as pull out from the review with no judicious whenever. Secrecy and namelessness guaranteed. Study members protection thought about assortment of information.

Statically analysis: Information section and measurable investigation utilized SPSS 20.0 factual programming bundle. Information present utilizes illustrative measurements as recurrence, rates, mean and standard deviation. Pearson connection examination can use for appraisal of the between connections among quantitative factors, and Spearman rank relationship for positioned ones. Measurable importance consider at $p\text{-value} < 0.05$.

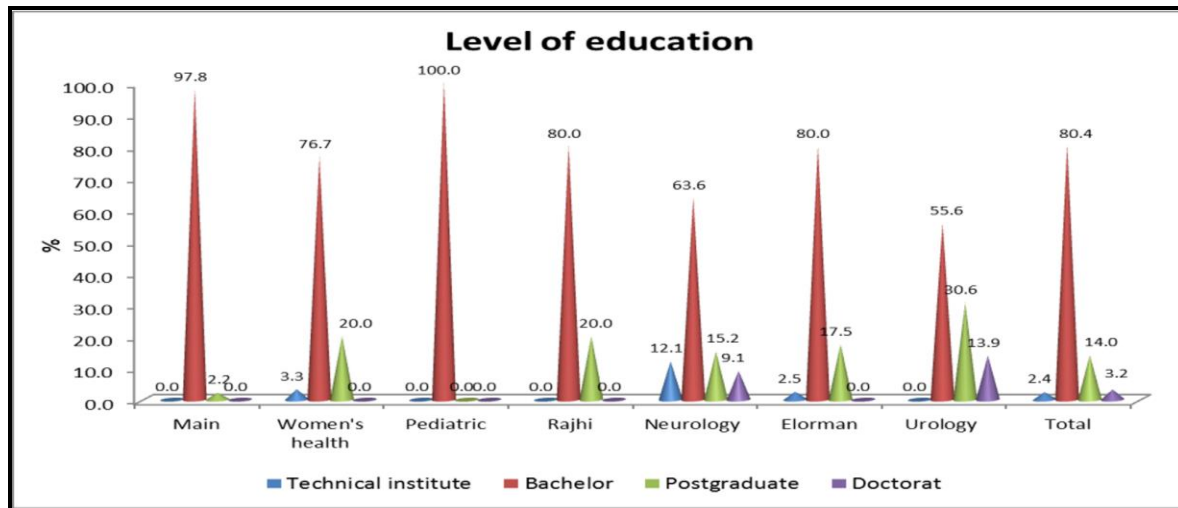
Results:



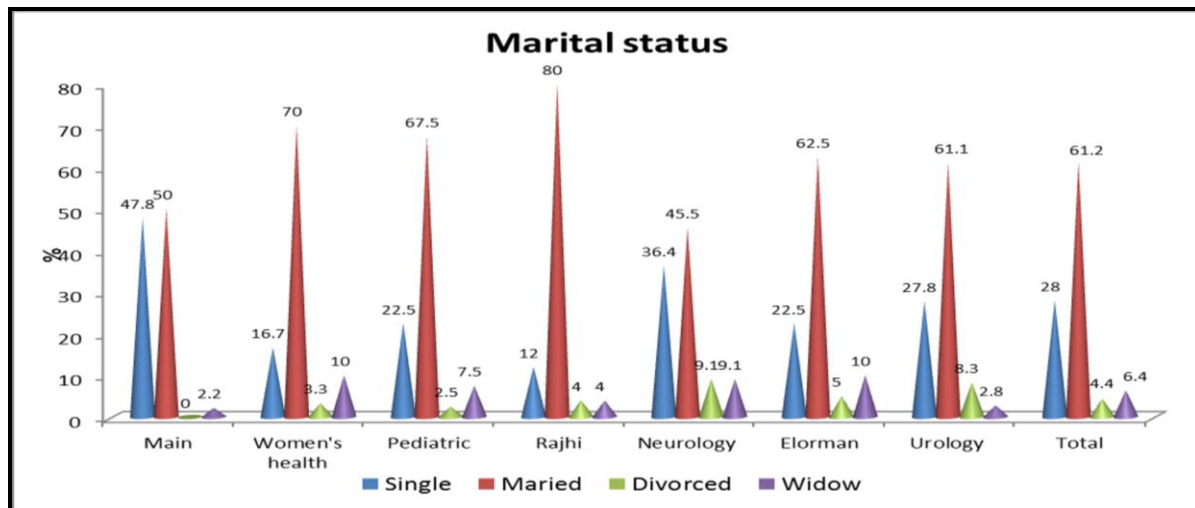
(Fig. 1): The percentage distribution of age for the studied subjects



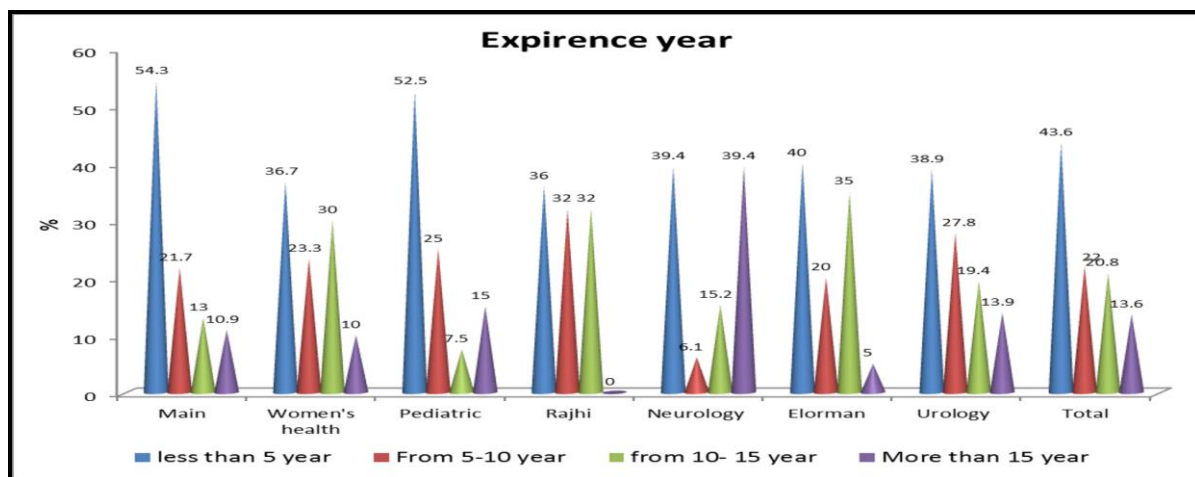
(Fig. 2): The percentage distribution of sex for the studied subjects



(Fig. 3): The percentage distribution of level of education for the studied subjects



(Fig. 4): The percentage distribution of marital status for the studied subjects



(Fig. 5): The percentage distribution years of experience for the studied subjects

Table (1): Mean scores of lean system factors as perceived by the studied Nurse Managers'

Lean system factors	Main Hospital	Women Health	Pediatric	Al Rajhe	Neurology	Al-Orman	Urology	P. value
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	
Strong leadership	4.35±1.65	3.27±1.51	4.6±1.43	4.4±1.44	3.82±1.26	4.73±0.99	4.42±1.05	0.001**
Administrative support	3.46±1.28	2.73±1.28	3.53±1.34	4.16±1.11	3.06±1.37	3.95±0.9	4.22±0.93	0.001**
Continuous improvement	3.11±1.62	2.8±1.37	2.75±1.61	3.44±1.83	2.79±1.22	3.73±0.99	3.17±1.13	0.025*
Standard work	3.3±1.59	2.53±1.25	3.2±1.44	3.56±1.53	3.03±0.88	3.73±0.93	4.25±0.94	0.001**
Education and Training	4.8±2.4	4.27±2.1	4.23±2.57	5.08±2.16	4.45±1.46	5.65±1.14	5.81±1.69	0.000**
Matching Demand & Optimization Capacity	2.74±1.94	2.67±1.24	2.5±1.65	2.36±2.23	3.15±1.23	3.8±0.91	3.36±0.99	0.001**
Effective communication between workers	2.96±1.66	2.43±1.38	2.5±1.65	3.32±1.86	3±0.83	3.78±1.03	2.97±1.06	0.000**
Evaluation and incentive system	3.83±2.65	3.77±1.28	4.3±2.31	3.44±2.26	4.79±1.11	6±1.2	5.47±1.44	0.001**
Getting rid of wastes	4.57±2.16	3.6±2.09	4±2.05	5.56±1.53	3.97±1.38	4.88±1.14	4.28±1.49	0.001**
Total	33.11±11.7	28.07±12	31.45±9.98	35.32±10.53	32.06±6.11	40.23±4.12	37.94±7.14	0.001**

ANOVA TEST

**Statistically Significant Correlation at P .value <0.01

Table (2): Correlational between lean system factors among the studied Nurse Managers

Lean system factors	Strong leadership	Administrative support	Continuous improvement	Standard work	Education & Training	Matching Demand & Optimization Capacity	Effective communication	Evaluation & incentive system:	Getting rid of wastes
Strong leadership	1								
Administrative support	.304**	1							
Continuous improvement	.417**	.298**	1						
Standard work	.236**	.437**	.339**	1					
Education and Training	.386**	.280**	.495**	.318**	1				
Matching Demand & Optimization Capacity	.271**	.233**	.474**	.332**	.583**	1			
Effective communication	.317**	.354**	.454**	.336**	.548**	.594**	1		
Evaluation & incentive system	.277**	.165**	.338**	.286**	.512**	.627**	.462**	1	
Getting rid of wastes	.336**	.318**	.371**	.364**	.456**	.413**	.622**	.390**	1

Pearson test

**Statistically Significant Correlation at P .value <0.01

Table (3): Correlational between lean system factors with studied subject personal & job characteristics At Assiut University Hospitals.

personal & job characteristics		Spearman rank correlation						
		Main	Women's health	Pediatric	Al Rajhe	Neurology	Al Orman	Urology
Age	R	.241	.262	-.066	-.110	-.017	.325*	.146
	P	.106	.162	.686	.601	.927	.041	.395
Gender	R	-.144	-	-	-	.757**	-	-
	P	.339	-	-	-	.000	-	-
Level of education	R	.063	-.167	-	.033	.631**	.035	.028
	P	.677	.377	-	.876	.000	.832	.870
Marital status	R	.154	-.063	-.017	-.240	.018	.148	.086
	P	.308	.742	.915	.248	.922	.363	.616
Experience years	R	.131	.305	-.076	.040	-.053	.444**	.139
	P	.385	.101	.643	.849	.768	.004	.420

Pearson correlation

*Statistically Significant Correlation at P .value <0.05

Figure (1): Showed that more than half of nurses Managers were aged less than 30 yrs. old in Main, Pediatric and Urology Hospitals (58.7%, 57.5%, 52.8%) respectively

Figure (2): Represented that, the high percentage of study subject in all Hospitals were female (100%) and except in Main Hospital were nearly three quarters,

Figure (3): Showed that, (100%) of study subject in Pediatric Hospital have Bachelor degree, and followed it Main Hospital (97.8%) then El Rajhi and El Orman (80%) of study subject have the same degree.

Figure (4): Represented that, more than half percentage of study subject were married in most Hospitals except in Main Hospital were nearly half percentage for male study subject (47.8%) respectively.

Figure (5): Showed that, the high percentage of study subject were have years of experience that less than five in Main hospital followed pediatric hospital (54.3%, 52.5%) respectively.

Table (1): Showed that, the highest main scores of total lean system factors in Al Orman Hospital among the studied subjects 40.23 ± 4.12 . But, the highest main scores regarding "Education and training" factor among the studied subject in all hospitals, (4.8 ± 2.4 , 4.27 ± 2.1 , 4.23 ± 2.57 , 5.08 ± 2.16 , 4.45 ± 1.46 , 5.65 ± 1.14 & 5.81 ± 1.69) respectively., the highest mean scores regarding evaluation and incentive system factor in Al-Orman hospital & followed it Neurology hospital among the studied nurses (6 ± 1.2 & 4.79 ± 1.11) respectively. And there were statistically significant difference among all lean system factors in all Hospitals (*P \leq 0.001**).

Table (2): Depicted that, highly positive correlation between Matching Demand & Optimization Capacity factor with Evaluation & incentive system factor among studied subject. Also, positive correlation between Effective communication with Getting rid of wastes among studied subject (0.627^{**} & 0.622^{**}) respectively.

Table (3): Illustrated that, there were highly positive correlations between all factors of lean system with level of education and gender items as regard personal & job characteristics in neurological hospital ($.757^{**}$ & $.631^{**}$) respectively. And there were statistical significant differences between level of education and gender with all factors of lean system in Neurology Hospital (P .value<0.05) .

Discussion:

Lean is an orderly methodology of disposing of waste so every progression adds an incentive for the customer. The current review was directed with the mean to evaluate lean framework factors as seen by nurse managers at all Assiut University Hospitals.

The most noteworthy primary score were in solid initiative factor at Al Orman and pediatric Hospital among the concentrated on subject in the current study, this could the medical caretaker chief executed the administration styles in great way. In this finding reliable with **Aij, (2015)** showed the significance of the leadership in giving successful execution of incline in healthcare organization. Additionally, **Abullah, (2020)** who revealed that the hierarchical initiative is by all accounts the most prevailing component, trailed by information on workers about lean, preparing, and patient fulfillment (client center).

From the discoveries of the current study, it is created the impression that there is the decidedly relationship among Education and Training and Continuous improvement and likewise showed that emphatically connection between Continuous improvement and Matching Demand and Optimization Capacity, In this finding steady with **Azraai, (2014)** showed that request joint effort, persistent improvement, and stock administration rehearses are the main variables in Lean framework execution. Then again **Abullah, (2020)** who revealed that lean execution achievement relies upon teaching of staff about ceaseless improvement and lean and guaranteeing they are important for the improvement group.

From the discoveries of the current study, it is gave the idea that there is the most noteworthy principle score were in Getting freed of squanders factor and ceaseless improvement at Al Orman Hospital, In this finding steady with **Carvalho, & Garrido, (2010)** detailed that, the lean framework addresses a procedure dependent on cost decrease and adaptability, zeroed in on measure enhancements, through the decrease or end of all waste (non-esteem adding tasks). Furthermore **Anas, (2010)** showed that, there are nine primary Lean Construction standards and which are: client center, supply, persistent improvement, squander end, individuals association, arranging and booking, quality, normalization, and straightforwardness. On the other hand, **Womack & Jones, (2013) & (2015); Naslund, (2018)** Clarified that, on them study, Lean zeroed in on end of non-esteem added exercises and squander (or "muda"). What's more, **Bajjou ,et al. (2017)** announced in his review showed the significant of Creating esteem and dispensing with squander; Planning and shared coordination; Site association factors in lean framework to development the way of thinking of the association.

Moreover, **Vinodh et al., (2011), Chakravorty & Shah, (2012); Bhuiyan, et al., (2016), Lee & Wei, (2019);** addressed that, the seven squanders are: movement, overproduction, over preparing, lead time, adjust, stock and imperfections. Underutilization of individuals' imagination and ecological waste expressed, **Vinodh et al. (2012). Drohomerski et al., (2013); Lee & Wei, (2019)** added that, the Lean spotlights on decrease of absolute process duration and decrease of lead time detailed by Chen et al., (2010) and Hu et al., (2018). At long last, **Bajjuoe, & Ennadi, (2019)** showed that, Lean Construction has turned into a viable way of planning development frameworks, which targets

diminishing all types of waste and making the limit of significant worth for the client.

But, **Womack & Jones (2015)** contended that the way of life change is a major test in Lean as the execution of Lean requires an essential change in the method of partners' thinking and in the idea of the connection between them to decrease cost and waste and **Marvel & Standridge, (2019)** added that, Unsuccessful execution can significantly affect association's assets, however considerably more critically, influence workers and their trust in lean way of thinking.

Ongoing to the present study discoveries, it is seemed the emphatically connection between's Continuous improvement and with Effective correspondence factors among concentrated on subject. This finding was upheld by finding of **Salonitis & Tsinopoulos, (2016)** Who distinguished a few ones, for example, Organizational culture and possession, Developing authoritative availability, Management responsibility and ability, Providing sufficient assets to help change, External help from advisors in the main occasion, 'Successful correspondence and commitment', 'Key way to deal with upgrades', 'Collaboration and signed up entire frameworks thinking' and 'Timing to set practical timescales for change and to utilize responsibilities and excitement for change'.

Conclusion:

Based on the results of the present study, the following conclusions: The highest main scores regarding "Education and training" among the studied nurses Manager in all hospitals. And there were statistically significance differences regarding all factors of lean system among studied subject in all hospitals. There were a highly positive correlation between Matching Demand & Optimization Capacity factor with Evaluation & incentive system factor among studied subject. Also, positive correlation between Effective communications with Getting rid of wastes among studied subject. Also, there were highly positive correlations between all factors of lean system with level of education and gender items as regard personal & job characteristics in neurological hospital respectively. And there were statistical significant differences between level of education and gender with all factors of lean system in Neurology Hospital.

Recommendations:

The researchers recommended the following:

- 1- Policy makers who are responsible for healthcare management by Lean system factors and tools, visual management, and standardization should

become standard procedures at all healthcare institutions can also limit the maximum time and maximum walking distances for patients to reduce the waste.

- 2- The Nurse Managers opportunities in their area of responsibility participate in decision making to implement lean system in all areas at Assiut University Hospitals
- 3- Encourage the nurse managers to participate in workshop about lean management system to increase their commitment toward goal achievement.
- 4- Increase administrative support through lean system to remove waste.
- 5- Formulate training sessions about lean system and implement their factors at hospitals,
- 6- First line nurse managers must be encouraged them with the important of lean management
- 7- Frequent meeting with nursing directors and supervisors and encouraging discussion of lean factors using in guiding and supporting nursing personnel.

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