

Success Factors Key for Lean Management Practice and Clinical Governance Climate Implementation as Perceived by Nurse Managers: A comparative Study.

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Abstract:

Background: lean management and clinical governance as solutions for quality health care require rigorous consideration of the essential success factors for their adoption. **Aim:** To assess the level of the Success Factors Key for Lean management practice and clinical governance climate implementation as perceived by nurse managers at selected hospitals. **Methods:** Descriptive, comparative, research design was used and was conducted in two selected hospitals in Egypt; namely, Menoufia University Hospital and Benha University Hospital on all nurse managers in the different managerial levels from each of the selected hospitals were included (no= 152). by using two tools, Lean Management Practice Questionnaire and Clinical Governance Climate Questionnaire **Results:** The level of the success factors key of Lean management in Menoufia University Hospital and Benha University Hospital was moderate level, the level of the Success Factors Key of clinical governance at Menoufia University Hospital was low level while in Benha University Hospital was moderate level. Additionally, the majority of the nurse managers in both study settings moderately perceived the success factors key for lean management practice and clinical governance climate implementation. **Conclusion:** There was a statistically significant correlation of success factors key for Lean management practice and clinical governance climate implementation in both study settings. **Recommendations:** Developing a strategy for lean management integrating clinical governance is recommended as a quality improvement initiative in health care organizations.

Keywords: *Clinical governance climate, Success factors key, Lean management practice & Nurse managers*

Introduction:

Due to increased demand for quality and limited funds to improve the quality of services delivered to patients, health care institutions are constantly challenged. Health care costs are rising due to the high prevalence of chronic and infectious diseases that require long-term care and costly new technologies and drugs (Antony et al., 2019); as in periods of the Covid-19 pandemic. Applying the principles of lean management help in the reduction of costs of health care and adds value for patients; because eliminating waste at every level of an organization is the basic of the lean principles, and because “lean thinking” requires buy-in from every member of an organization’s team to be successful. Therefore, the focus is directed toward increasing “customer” (patients and payers) satisfaction and doing so profitably, it becomes deeply embedded in the culture and decisions, and processes become more and more patient-centered (Costa & Godinho, 2016). Lean Management (LM) is the use of lean principles in healthcare to reduce waste and enhance processes. Every care episode and every patient interaction represent possibilities to cultivate value and remove wastes in every process, procedure, and activity,

according to lean methods focused at establishing value-based health care (Costa & Godinho, 2016). All parts of the organization, from clinicians to operations and administration staff, use lean management principles to detect waste and eliminate everything that does not create value for patients (D’Andreanmatteo et al., 2015). Finally, Lean aims to improve access to cost-effective, high-quality, and creative healthcare by putting patients and direct-care providers at the centre of choosing what kind of treatment is best and what resources are required.

Two defining characteristics can be recognized when transferring lean principles to health care including: 1) *Philosophies*, or a set of principles, aimed at transforming the workplace culture and focusing on continuous improvement by eliminating waste, improving flow of patients, providers, and supplies, and processes; 2) *Assessment activities* or analytic tools that identify waste and improvement activities (Rotter et al., 2018). Value-added activities in health care refers to what the patient value and want such as; no waits treatment & results, appropriate information throughout the process of care bed available when needed private changing facilities clean environment be informed about what’s wrong

treated kindly by friendly staff, reduced duplication, not to be moved from one waiting area to another, and relatives/carers kept informed appropriately (Aij et al., 2015).

When applying lean principles to health care, two distinct characteristics can be identified: 1) philosophies, or a set of principles, aimed at transforming workplace culture and focusing on continuous improvement by eliminating waste, improving patient, provider, and supply flow, and processes; and 2) assessment activities, or analytic tools, that identify waste and improvement activities (Rotter et al., 2018). Examples of value-added activities in health care included, overcoming waits for treatment or results, timely information throughout the process of care, bed accessible when needed, private changing facilities, clean environment, being informed about what's wrong, being treated kindly by friendly staff, reduced duplication, not to be moved from one waiting area to another, and relatives/carers kept informed appropriately (Aij et al.).

Dahlgard et al., (2011) provided a model to analyze healthcare organizations in terms of their challenges and outcomes, and it served as a foundation for demonstrating the link between lean practice and key success factors. Leadership, people management, partnerships and resources, procedures, and results are the five criteria that make up the model. Lean management emphasizes the need of nurse managers' presence on the unit for the purposes of being visible, coaching, and reinforcing new procedures in order to reinforce behavior and sustain change (Aij & Marion 2017) In addition nurse managers play a key role in creating and updating outcome measures, focusing on root cause analysis and issue solving and performing value stream mapping (Udod et al., 2020).

The restrictions related to rapidly intensifying costs, inefficiencies, lack of consumer-centeredness, and concerns about quality and safety of health care have activated the capacity of nurse managers to perform their role in seeking out strategies to promote access to cost-effective, high-quality, and innovative health care that puts the patients and direct-care providers at the centre of determining what care is optimal, and what essential resources are required to achieve the best patient outcomes (Veenstra et al., 2017). Nurse managers also play an important role in creating and maintaining workplaces that promote increased productivity, cost-effectiveness, quality, and timely delivery of healthcare services (Kaltenbrunner et al., 2017).

(CG) is defined as "the obligations established by a health service organization to guarantee good clinical results between its state or territory department of health, governing body executive, physicians,

patients, consumers, and other stakeholders" (Australian Commission on Safety and Quality in Health Care, 2017). Clinical governance provides the opportunity to understand and learn how to develop the fundamental components needed to facilitate the delivery of high-quality care—a culture of no blame, questioning, and learning, strong leadership, and a climate in which employees are valued and supported as they form partnerships with patients (Ebadi Fardazar et al., 2015).

Healthcare professionals' active engagement and shared responsibility in the design and execution of healthcare and quality improvement are referred to as ownership. Through reciprocal learning and increasing knowledge and abilities within a team, teamwork helps to high-quality patient care (Kristensen et al., 2015). It is critical to have leadership that encourages teamwork and creates a conducive working atmosphere (McFadden et al., 2015). Effective communication increases the sharing of values and beliefs, resulting in a collective vision held by all members of the organization. The knowledge that healthcare procedures are interconnected is referred to as systems awareness, and it should ideally lead to a re-evaluation of processes in order to reduce risks (Veenstra et al., 2017).

Significance of the study:

Lean Management (LM) practices and Clinical Governance climate (CG) as strategies for maintaining quality health care require a strong and valid prerequisite that must be in place to ensure proper implementation of these strategies. However, as a result of diverse circumstances of health care organizations, the careful assessment of the success factors key for lean management practices and clinical governance implementation under such conditions is worthy. Consequentially, allowing nurse managers to take an active role to share their perspectives about factors affecting LM and CG implementation within health care organizations. Such perspectives require more assertive efforts to promote comprehension and allow anticipating potential issues and vulnerabilities throughout the implementation process and avoiding the utilization of a general and ineffective approach. Thus, the aim of the current study is to assess the level of success factors key for lean management practice and clinical governance climate implementation as perceived by nurse managers at selected hospitals.

Aim of the study:

The study aim is to assess success factors key for lean management practice and clinical governance climate implementation as perceived by nurse managers at selected hospitals.

This aim should be fulfilled through the following objectives:

1. Assess level of success factors key for lean management practice implementation at selected hospitals as perceived by the nurse managers.
2. Assess the level of success factors key for clinical governance climate at selected hospitals.
3. Assess the difference regarding levels of success factors key for lean management practice and clinical governance climate implementation between the selected hospitals
4. Assess nurse managers perceived level of success factors key for lean management practice and clinical governance climate implementation.
5. Determine the relation between success factors key for lean management practice and clinical governance climate implementation.

Research questions:

Q1.What is the level of success factors key for lean management practice implementation at selected hospitals as perceived by the nurse managers?

Q2.What is the level of success factors key for clinical governance climate at selected hospitals?

Q3.Are there a difference regarding levels of success factors key for lean management practice and clinical governance climate implementation between the selected hospitals?

Q4.To what extent nurse managers perceived level of success factors key for lean management practice and clinical governance climate implementation?

Q5.Is there a statistical significance correlation between success factors key for lean management practice and clinical governance climate implementation?

Conceptual Framework:

Two conceptual frameworks were utilized in the current study:

1- 4P Excellence Model:

Dahlgard et al. (2011) suggested a model that was used by the researchers in the current study to assist managers and staff in identifying critical success criteria for effective lean implementation by examining healthcare organizations' problems and outcomes. **Building Leadership** entails developing (educating/training) and/or recruiting leaders with the appropriate values and competencies. The next stage is to promote and/or hire **people** who have the appropriate values and skills. **Building Partnership/Teams** entails determining and developing teams so that each team may exercise the appropriate and necessary values and competencies, as well as establishing a partnership in all interpersonal relationships. **Building Processes** entail leaders, individuals, and teams attempting to put the required values and competencies into practice on a daily basis, based on the principle of continuous

improvement and in accordance with the organization's purpose, vision, goals, and strategies. **Building Products/Services** entails delivering high-quality services while maintaining a consistent focus on the demands of consumers and adhering to the principles of continuous improvement.

2- Seven Pillars of Clinical Governance:

Clinical governance philosophy is delineated through five pillars based on clinical governance reviews (**Chief Psychiatrist's Review, 2013**) including: 1- organizational capability, The organization has a clear vision and strategies for achieving the vision, and Staff are committed to the organization, have expertise in change management and create an environment that allows innovation. 2- risk management, involves methods to understand, monitor, and minimize risks to patients and staff. Moreover; learning from any mistakes/accidents that have happened previously. 3-clinical effectiveness and research; to ensure that care provided based on the best available evidence and research to provide the best possible outcomes for patients. 4- Staffing and staff Management; this emphasized proper staffing and selection and addressing staffing issues related to performance, active participation of staff in the environment and the open attitude of leaders and managers with good working conditions and appropriate management of staff members 5- Education and Training: to ensure that practitioners remain up-to-date with the latest skills, knowledge, and research (**Prateek Biyani, 2018 & All Answers Ltd, 2018**).

Materials & Methods:

Research Design: Descriptive, comparative, research design was used in the current study.

Setting: the current study was conducted in randomly two selected hospitals in Egypt; namely, Menoufia University Hospital, Menoufia Governorate and Benha University Hospital, Qalubia Governorate.

Participants: All nurse managers in different managerial level from each of the selected hospitals were included in the current study (no= 152).

Levels of Management can be generally classified into three principal categories:

Levels of Management	Menoufia University Hospital	Benha University Hospital	Total
Top-level managers: are responsible for controlling and overseeing the entire organization	1	1	2
Middle-level managers (supervisors): are responsible for executing organizational plans which comply with the company's policies. They act as an intermediary between top-level and low-level administration.	7	10	17
Low-level managers (head nurses): focus on the execution of tasks and deliverables, serving as role models for the employees they supervise.	61	72	133
Total	69	83	152

Tools of data collection: Two tools of data collection were used as follows:

Tool 1: Lean Management Practice Questionnaire: Developed by Dahlgaard, et al., (2011) based on the 4 Ps model which aims to evaluate the level of the success factors key for lean management practice implementation and to what extent these Success Factors Key are perceived by the nurse managers in the selected hospitals. The tool composed of two parts: **1st part** is socio-demographic characteristics of nurse managers include; age, years of experiences, qualification, job title, working unit, and whether or not they attended any workshops regarding lean management or clinical governance. **2nd part:** Consisted of 5 dimensions as criteria for evaluating success factors key for lean management implementation representing 50 items as follows: Leadership (10 items), people (10 items), partnership/Teams (10 items), processes (10 items) and products/Services (10 items).

Scoring System:

To be able to assess the level of the success factors key of lean implementation in the selected hospitals, nurse managers were asked to rank each item (factor) according to **occurrence frequency** using a Likert scale ranging from 1= never, 2= rarely, often=3, usually=4, and 5= always. The total mean score of Success Factors Key of lean management ranged from (50 to 250). Scores ranged from (188 to 250) represented high level of success factors key of lean management, scores ranged from (164 to 187) as

moderate level of success factors key of lean management, and scores ranged from (50 to 163) as low level of success factors key of lean management. Additionally, nurse managers were distributed according the extent to which they perceived the success factors key was scored as follow: less than or equal 33% low perceived, more than 33% to 66% moderately perceived, more than 66% highly perceived.

Tool (II): Clinical Governance Climate Questionnaire: Developed by Freeman, (2003) and updated through (Chief Psychiatrist's Review, 2013). The questionnaire used to assess key factors for clinical governance climate in the selected hospitals as perceives by nurse managers. The tool consisted of 70 items under 5 categories including: Leadership and Organizational capability (20 items), Clinical risk management (21 items), Research and Effectiveness (11 items), Staffing and Staff management (7 items), and Education, Training and Professional development (11 items).

Scoring System: Nurse Managers were asked to evaluate their hospital clinical governance climate based on five-point Likert scale where; 1= strongly disagree, 2= disagree, and 3= neutral, 4 = agree, 5= strongly agree. Total scores of success factors key of clinical governance range from (70 to 350). as follows: Scores ranged from (263 to 350) are described as good level of Success Factors Key of clinical governance, (228 to 262) as moderate level of Success Factors Key of lean management, and (70 to 227) as low level of success factors key of clinical governance. Additionally, nurse managers were distributed according to the extent to which they perceived the success factors key was scored as follow: less than or equal 33% low perceived, more than 33% to 66% moderately perceived, more than 66% high perceived.

Validity and reliability:

The content and face validity of tools were tested through a jury 5 nursing experts in the field of nursing administration to check completeness, coverage of the content and clarity of the items. The wanted modification was carried out accordingly. Moreover; the researchers translated the main tools into Arabic language, then through back interpretation, the Arabic tools were translated still into English and compared with original English tools to ensure conformity of items after being translated and identify any confusion and ambiguities of tools. The study tools were examined to accuracy through measuring their internal consistency using Cranach's alpha coefficient method. This turned to be for Lean Management Practice Questionnaire (tool I) was ($\alpha=0.93$) and for Clinical Governance Climate Questionnaire (tool II) ($\alpha=0.90$).

Pilot study:

A Pilot study was conducted to estimate the feasibility and applicability of the questionnaires and determine the time needed for data collection. It was conducted on 10% (15 nurse managers). Participants in the pilot study were excluded from the final analysis. The results of piloting were taken in consideration and modifications were done.

Field work:

Official approval was taken from nursing managers of the selected hospitals, to be able to carry out data collection and conduct the study. Initial number that included in the study was 167 then excluding 15 for pilot study, the actual number were 152 with response rate 100%. The researchers collected data from the first of January 2021 to the end of April 2021. An interview was carried out by the researchers for the participants during the different shifts(morning, afternoon shift) when most of the nurse managers were available to orient them about how they filled the two tools of the study; it took about 20 to 25 minutes.

Ethical consideration:

In order to adhere to the ethical aspects of the research, the following steps were secured; written

assent was gained from the hospital administrator and nursing authority at the study setting with a caption of the purpose and procedures of the study. The respondents' rights were kept by ensuring voluntary participation and oral informed assent was obtained after explaining the purpose, study procedures, and potential benefits of the study. The respondents were emphasized that the data would be treated as accurately confidential.

Statistical design:

Data were collected, tabulated, statistically analyzed using an IBM single computer with Statistical Package of Social Science (SPSS) version 22 (SPSS, Inc, Chicago, Illinois, USA). Descriptive statistics were applied in the form of mean, standard deviation (SD) and range for quantitative data and numbers and percentages for qualitative data. The paired t-test is used to compare between two related means. Pearson correlation (r) is a test used to measure the strength and direction of the association between two quantitative variables. Considered not significance at $P > 0.05$ and highly statistically significance at p -value $p < 0.001$.

Results:

Table (1): Distribution of the Studied Groups According to Their Socio-Demographic Characteristics (N=152)

Socio-demographic characteristics		Group				X ²	p-value
		Menoufia (N=69)		Benha (N=83)			
		No	%	No	%		
Age	25-<30	8	11.6	9	11.0	5.758	0.124
	30-<40	13	18.8	20	24.1		
	40-<50	47	68.2	46	55.4		
	50 and more	1	1.4	8	9.5		
Educational qualification	Technical institute	1	1.4	14	16.9	43.49	0.001*
	Bachelor degree	68	98.6	42	50.6		
	Others	0	0.0	27	32.5		
Years of experience in managerial positions	< 5	0	0.0	6	7.2	11.04	0.051*
	5-<10	19	27.5	23	27.7		
	10-<15	47	68.1	43	51.8		
	15 and more	3	4.4	11	13.3		
Job title	Head nurses	61	88.4	72	86.8	0.151	0.927
	Supervisors	7	10.2	10	12		
	Top level managers	1	1.4	1	1.2		
Workshop about lean management	Yes	0	0.0	14	16.9	12.82	0.001*
	No	69	100	69	83.1		
Workshop about clinical governance	Yes	0	0.0	3	3.6	2.54	0.251
	No	69	100	80	96.4		

Non statistical significant difference ($P > 0.05$)

** Highly statistically significant at ($p \leq 0.001$)

Table (2): Mean Score of Success Factors key of Lean Management Practice Implementation As Perceived By Nurse Managers in The Selected Hospitals (No=152)

Success Factors key of Lean management	Menoufia (No= 69)	Ranking	Benha (No=83)	Ranking	t-test	p-value
Leadership	37.26±4.34	1	32.13±6.50	3	2.459	.001*
People	36.83±3.29	3	32.25±5.96	4	5.634	.001*
Partners	34.33±3.74	5	31.24±7.61	5	5.767	.015*
Process	37.09±3.89	2	33.81±7.93	2	3.101	.002*
Results	36.14±3.69	4	34.24±8.84	1	1.661	.099
Total	181.65±12.8		164.14±27.74		4.83	0.001*

Non statistical significant difference ($P > 0.05$)

** Highly statistically significant at ($p \leq 0.001$)

Table (3): Mean Score of Success Factors key of Clinical Governance Climate As Perceived By Nurse Managers in The Selected Hospitals (No=152)

Success Factors key of Clinical governance climate	Menoufia (No= 69)	Ranking	Benha (No=83)	Ranking	t-test	p-value
Organizational capability	61.12±1.52	2	67.52±11.83	2	4.463	0.001*
Clinical risk management	65.81±2.69	1	74.20±11.67	1	5.831	0.001*
Research and effectiveness	39.04±3.26	3	39.25±8.92	3	.184	0.854
Staffing and staff management	17.9275±2.58	5	24.92±4.35	5	11.6	0.001*
Education, training and professional development	33.94±4.76	4	38.03±6.44	4	4.299	0.001*
Total	217.84±10.54		245.49±27.6		7.87	0.001*

Non statistical significant difference ($P > 0.05$)

** Highly statistically significant at ($p \leq 0.001$)

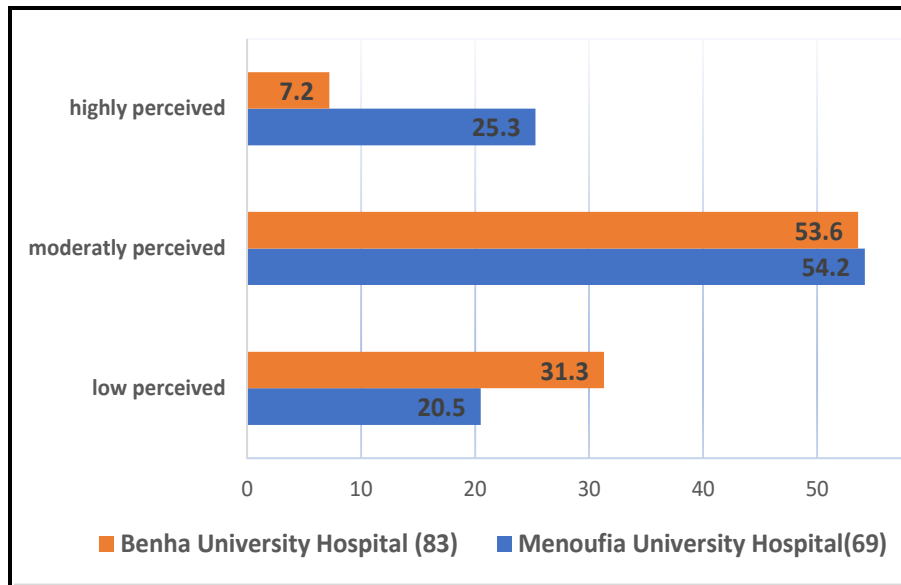


Figure (1): Frequency Distribution of The Nurse Managers According the Extent They Perceived Success Factors key for Lean Management in The Selected Hospitals (no=152)

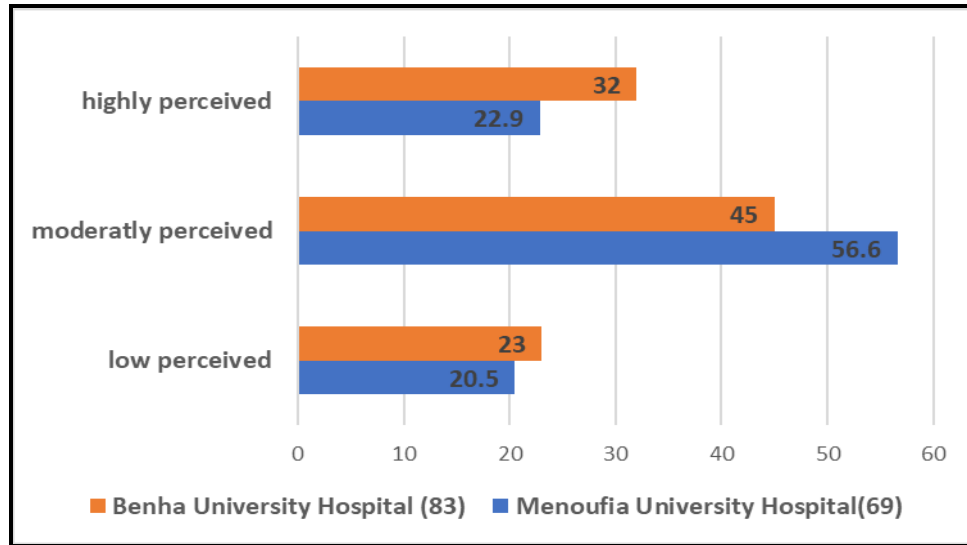


Figure (2): Frequency Distribution of The Nurse Managers According the Extent They Perceived Success Factors key for Clinical Governance in The Selected Hospitals (no=152).

Table (4): Correlation between Success Factors Key of Lean Management and Success Factors Key of Clinical Governance Climate in both Hospitals (N=152)

Variables		Success Factors key of Lean management	
		Menoufia	Benha
Success Factors key of Clinical governance climate	R	0.397**	.448**
	P	0.001*	0.001*

** Highly statistically significant at (p≤ 0.001)

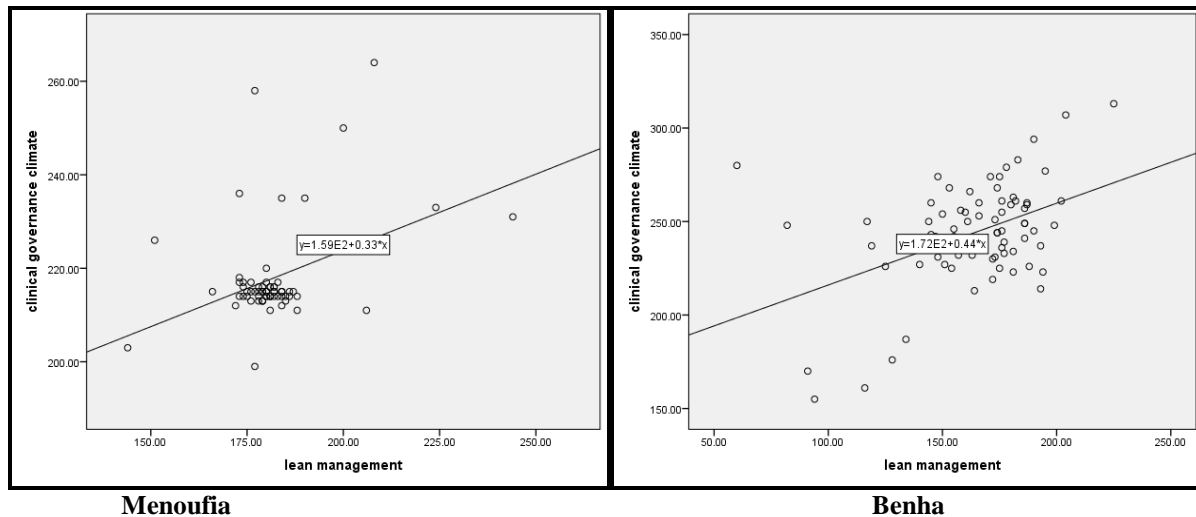


Figure (3): Correlation between Success Factors key of Lean Management and Success Factors key of Clinical Governance Climate Among Studied Groups(N=152)

Table (1): Shows that there was non statistical significant difference between the studied groups regarding socio-demographic characteristics (p>0.05) except educational qualification and attending workshop about lean management had highly statistical significance. The most of study sample (68.2%,55.4%) had age between 40-<50 years old in

both setting Menoufia University Hospital and Benha University Hospital respectively. The highest percentage of study sample had Bachelor degree in both setting (98.6%, 50.6%) respectively. Regarding year of experience in managerial positions, the study sample had experience ranged from 10-<15 years in both setting (68.1%, 51.8%) respectively.

The highest percentage of study sample had job title as head nurses (88.4%-86.8%) respectively in both setting. Regarding attending workshop about lean management, all study sample (100%) in Menoufia University Hospital didn't attend any workshop about lean management, while study sample in Benha University Hospital (83.1%) didn't attend any workshop about lean management. all study sample (100%) in Menoufia University Hospital didn't attend any workshop about clinical governance, while study sample in Benha University Hospital (96.4%) didn't attend any workshop about clinical governance.

Table (2): As evidenced from the table, the level of success factors key of lean management was moderate level in Menoufia University Hospital and Benha University Hospital. (181.65 ± 164.14) respectively. Additionally, there was highly a statistically significant difference between both hospitals regarding total success factors key of lean Management. In Menoufia University Hospital, the highest mean score with first ranking was for leadership while the lowest mean score with last ranking was for partner as a success factor key of lean management. In Benha University Hospital, the highest mean score with first ranking was for result while the lowest mean score with last ranking was for partners as a success factor key of lean management.

Table (3): As shown in the table; the level of success factors key of clinical governance at Menoufia University Hospital was low level (217.84), while in Benha University Hospital was moderate level (245.49). There was a statistically significant difference between total success factors key in both hospitals. The highest mean score with first ranking was in both setting clinical risk management, while the lowest mean score with last ranking was for staffing and staff management in both setting as a success factor key of clinical governance in Menoufia University Hospital and Benha University Hospital respectively.

Figure (1): As shown in the figure; more than half of nurse managers (54.2%-53.6%) in Menoufia University Hospital and Benha University Hospital respectively moderately perceived the success factors key for lean management implementation.

Figure (2): Displays that more than half of nurse managers (56.6%) in Menoufia University Hospital and (45%) of them in Benha University Hospital moderately perceived the success factors key for lean management implementation.

Table (4): Shows that, there was a highly statistically significant positive correlation between success factors key of lean management and success factors key of clinical governance climate in both study settings.

Figure (3): displayed that, there was a highly statistically significant positive correlation between success factors key of lean management and success factors key of clinical governance climate in both study settings.

Discussion

The cornerstone of identifying and resolving operational problems while lowering inefficiency and cost is successful Lean implementation (Moldovan, 2018). Clinical governance, which aims to make management more accountable and provide better care quality, is one of the quality measures that can improve the service level. Clinical governance involves all stakeholders in the ongoing improvement of services and the provision of high-quality care in a safe setting (Veenstra et al., 2017). However, before an organization can be transformed, its leaders must first grasp its culture and current state. Knowledge of lean Success Factors Key and criteria is seen to be necessary for assessing the readiness of health care organizations embarking on a Lean journey and for more effective Lean implementation (Al Zefeiti & Mohamad, 2015)

The current study aimed at assessing the level of the success factors key for lean management practice and clinical governance climate implementation as perceived by nurse managers at selected hospitals. Regarding the first study question about what is the level of the success factors key for lean management practice implementation at selected hospitals as perceived by the nurse managers, the current study results revealed that the level of the success factors key of lean management was moderate level in Menoufia University Hospital and Benha University Hospital. These results could be justified as participants were unable to gain an understanding and create the conditions for sustaining the Lean system. Moreover, there was limited focus on supporting managers through investing in education and learning about the Lean philosophy or promoting an organizational culture that supported Lean practice. In a similar vein, Naidoo & Fields^b (2019) discovered that lean management was moderately adopted in South African public hospitals. Similarly, Hussain & Malik (2016) found that in the United States, full application of lean principles was reported to be as low as 4%, with 53% of hospitals indicating a moderate level of lean implementation. On the other hand, according to the findings of Udod et al. (2020), the lean management system was not properly incorporated into organisational cultures. Furthermore, Leite et al., (2016) investigated the causes of implementation failure and discovered that 70% of lean programmes in healthcare institutions failed. Mann (2020) also determined that healthcare

organisations in the United Kingdom are not lean-ready.

The current study findings revealed that, In Menoufia University Hospital, the highest mean score was for leadership (first ranking) while the lowest mean score was for the partner as a success factor key of lean management. From the researcher's point of view, leadership is the most driving enabler which influences people, processes, technology, and other resources of the healthcare unit. Additionally, developing leadership capacity that influences the organizational culture is necessary for a successful lean implementation to improve patient outcomes. Successful lean implementation or any continuous improvement initiative requires the commitment of top leadership. All directors at all levels of the hospital should be convinced that implementing lean is the best course of action. Decision-makers at the hospital supply chain need to explain strong commitment and full support in providing all lean implementation requirements such as resources, employees training, budget, and other needs that help, facilitate, and accelerate lean implementation. Moreover, leadership must develop a vision and a roadmap for Lean, set targets, and also follow up on these targets.

In support of these findings, **Udod et al., (2020)** concluded that one of the three success factors for the proper initiation of Lean in public hospitals was strategic leadership and organizational attitude, in addition to the integration of Lean elements, tools, and techniques; and basic consistency in operational processes. Lean leadership was also identified as one of the top-level criteria by **Ajmera & Jain (2019)**. In a similar vein, **Patri & Suresh ,(2018)** found that the most important aspect for a successful lean deployment is leadership. Apart from that, establishing a clear project aim in advance and proper personnel training are critical components of the lean intervention. On the other hand, according to **Alkhoraif & McLaughlin (2018)** the organizational culture act as one of the most essential aspects in implementing lean in the Saudi setting.

In Benha University Hospital, the highest mean score was for the result (first ranking) while the lowest mean score was for partners as a success factor key of lean management. From the researchers' points of view, lean implementation implies the aspect of "doing the right thing the first time" which entails avoiding the instances of corrections and recalls after the service has reached its ultimate point. Moreover, within the internal processes, there is minimum or no corrections that are done. this will increase the patients' and employees' satisfaction and proper utilization of the available scarce resource in service delivery, this being a clear pointer in improved

operational performance of the organization which in turn could be reflected on improving efficiency, effectiveness, innovations, and enhancing the overall image of the health care organization

In the same line, **Simon et al., (2017)** concluded the implementation of specific Lean interventions improved the radiation technologist's satisfaction regarding salary, professional status, administration, autonomy, and task requirements. Moreover, the percentage of absenteeism decreased; the number of reported patient safety incidents decreased, as an improved treatment process, waiting times before radiotherapy treatment were reduced. Further., there were sustainable improvements for safety culture, safety awareness, and enhanced intentions to structurally solve problems among employees in the same time period, and patient satisfaction remained high. In the contrast, **Hartzband & Groopman, (2016)** reported that lean management claims that employee satisfaction would decrease as work pressure would increase. Also, **Rundall et al., (2020)** concluded that lean adoption is not associated with most measures of hospital performance. It's likely that Lean implementation varies a lot from hospital to hospital. As a result, improvement in hospital-wide performance metrics necessitates a broad, long-term commitment to Lean techniques and tools.

According to the current study findings, process factors (as a success factor key for lean implementation) represented the second factor in the ranking of factors in both hospitals. In justification, the role of the organizations is important to invest adequate resources to engage in process improvement activities that facilitate lean process implementation. In support, the study by **Almutairi et al., (2021)** revealed that it is difficult for hospitals to predict the patients' demand accurately and it constitutes a real barrier for implementing lean thinking. However, **Gupta & Potthoff, (2016)** proposed that clear policy, procedures, and practices should be implemented by hospitals to manage the demand of patients, especially the cases that can wait for some time without any serious harm. Moreover, using different mathematical models can contribute significantly to control patients' demands. Additionally, the use of information technology can minimize the uncertainty and the unpredictable demand in healthcare organizations. Moreover, **D'Andreamatteo et al., (2015)** found that one of the main aims of lean implementation is to eliminate waste from the processes. Process analysis should be performed to identify waste in each process, which can subsequently be eliminated as part of the improvement process. Finally, **Hazelton et al. (2019)** claimed that using an innovative collaborative

management method to generate quality-valued outputs could be an alternate strategy.

The current study illustrated that partners factor was the lowest success factor key (last ranking) for lean implementation in both study hospitals which was contradicted with **Altman et al., (2019)** who claimed that healthcare striving for quality care, requires an investment of scarce resources to achieve strategic future returns, not only to benefit patients but also all taxpayers (funders) and potential users of the healthcare ecosystem. This new innovation collaborative concept may be described as a managed ecosystem engaging user communities yet retaining some form of control over the outcomes by the participating core organizations. Additionally, **Tortorella et al., (2019)** concluded that the collaboration of multi-skilled and multidisciplinary teams in the hospital, together with administrative project management, practical support, management and physicians' engagement at the frontline, and the empowerment of staff, facilitates Lean application. Finally, a supportive environment with functional communication, feedback to employees and patients, the adoption of a holistic quality improvement philosophy, and the establishment of a long-term continuous improvement plan in a system-wide, multifaceted approach uphold the outcomes domain of the framework.

In relation to the second study question, the current findings revealed that; the level of the success factors key of clinical governance climate at Menoufia University Hospital was low level, while in Benha University Hospital was moderate level. From the researchers' point of view lack of culture and low awareness about clinical governance. Followed by a lack of experience to apply it, with no real will to implement its aspects, inappropriate organizational structure of health system, and fragmentation of services provision between public and private sectors. Finally, they added the absence of participatory vision from all stakeholders, inappropriate health care work environment with weak supervision and monitoring mechanisms. In support of the previous justification, **Abd El Fatah et al., (2019)** revealed that the majority of experts reported presence of barriers for implementing clinical governance aspects in the form of deficiency of clear policies, rules, and regulations for clinical governance. In same line, **South Australian health, (2018)** reported that CG implementation is a complex, multi-faceted and dynamic process, and identifying suitable procedures for its development requires a thorough understanding of the current state of the target health system

In the same line, **Mosadeghrad et al., (2017)** concluded that clinical governance was moderately successful in Tehran university hospitals (58%). In

the same line, **Bahrami et al., (2015)** detected that their hospitals' climates are not supportive sufficient for CG application. In addition, the analysis of mean scores for the CG climate elements shows that the hospitals under study do not have a favourable situation in these areas. Additionally, **Fardazar et al., (2015)** concluded that hospitals' readiness for CG implementation was "average or weak". In order to implement CG successfully, A quality-centred culture, defined by less paperwork, more self-sufficiency, and suppleness in hospital affairs, as well as a common vision and goals with an emphasis on continual improvement and innovation, is critical.

On contrary, the study by **Vassos et al., (2019)** found that the positive clinical governance climate indicators of planned and integrated quality improvement, proactive risk management, professional development, teamwork, and organizational learning were present within their work environment, the negative indicator of blame and punishment was not present. Additionally, According to **Veenstra et al., (2017)**, the top 50 components that the panel thought were most important were using a bottom-up approach to clinical governance, taking accountability, collaborating, learning from mistakes, and providing feedback. The panel was unable to reach an agreement on elements relating to patient involvement. The panel excluded elements that related to a managerial approach to clinical governance and job standardization. According to the current study findings, the highest mean score (first ranking) was in clinical risk management, while the lowest mean score (last ranking) was for staffing and staff management as a key success factor of clinical governance in Menoufia University Hospital and Benha University Hospital respectively

From the researchers' point of view, developing a system of risk reporting in hospital wards, and a system of learning from mistakes is vital in risk management, which should lead to a reduced incidence of mistakes. In accordance with the current findings, the results by **(Abd El Fatah et al., 2019)** showed health experts' suggestions for dealing with barriers for clinical governance were improving continuous evaluation; developing a system for continuous accountability and clinical audit and clinical risk management, decentralization in taking and implementing decisions

In congruence with the current findings, clinical governance has emerged because there were some expectations about services security and quality. Risk management is paramount as one of the main criteria to evaluate clinical governance application. In other word, clinical governance provides the main standards to promote quality of care and to prevent

medical errors (Hamza., 2017). Also, **South Australian health, (2018)** claimed that, the goal of clinical governance is congruent with the goal of risk management, which refers to effective, efficient health care and patient safety. Health facilities require risk management to reduce inefficiency, improve cost-effectiveness, and consider patient safety. In the same line, **Vassos et al., (2019)** found that 63.3% of allied health professionals agreed that their organization collects information on clinical risks to support the claim of proactive risk management.

On contrary, **Ghavamabad et al., (2021)** found that regarding the performance of the principles and precondition of clinical governance included; quality assurance and refinement should be the focus of all healthcare systems and suppliers, patient and community involvement, patient relief and empowerment, and decreased burden of complaints. Moreover, **Mosadeghrad et al., (2017)** found that the most success was achieved in patient involvement, management, and leadership and clinical audit had the most effect on CG success. In addition, **Alison, (2019)** reported that clinical Governance at a health service level requires structures, processes, and frameworks that articulate the key roles, responsibilities, and accountabilities at all staff levels from Board, management, and clinicians. These structures are enabled by durable data, culture, education and training, and a continuous learning environment. Clinical governance encompasses the domains of clinical effectiveness, risk management, patient safety, and consumer engagement, and should address the priority areas and accreditation requirements of any national regulatory body.

Also, in the current study, it was revealed that the lowest mean score (last ranking) was for staffing and staff management as a success factor key of clinical governance in Menoufia University Hospital and Benha University Hospital respectively. It was a surprising result because, from the researcher's point of view, Personnel management that views nurses as human resources should not only benefit the hospital's vision but also create a desirable nurse practice environment in which nurses are committed to stay. In supporting these findings, the study by **Ansah et al., (2021)** found that the demand for nurses to work in the unit was not scientific. Nurses affirmed their frustration of inappropriate numbers of staff in the unit especially, at the periphery hospitals. Nurses should be included in the preparation of the duty schedule to ensure effective compliance, and time can be utilized as a source of motivation for them. Compensation for extra responsibilities is important in nursing. Inadequate staffing has major consequences for patient safety, care quality, and employee outcomes. This circumstance needs the

adoption of healthcare staffing standards to ensure that the correct mix of workers is recruited and retained.

Accordingly, **Ziolo, (2016)** confirmed that as patient populations and their associated healthcare needs grow, health care organizations should put a great effort to source, attract, and retain adequate numbers of trained, qualified healthcare professionals, especially physicians and nurses. Additionally, the flexible deployment of staff not only allows hospitals to function more efficiently; it also increases employee satisfaction, as team members' tasks become more varied. According to the American Hospital Association research, "hospitals must replace old human resources policies that were applied consistently to all personnel with policies and programs that incorporate flexibility and choices to confirm the preferences of diverse workforce generations."

The current study findings revealed varying levels of the success factors key for lean management practices and clinical governance climate in two different governmental hospitals in two different Governorate, that results supported by **The Egyptian Journal of Hospital Medicine,(2019)** that claimed the following, in Egypt, different means were considered to improve the quality and safety of care delivered through implementation of Continuous Quality Improvement and Quality Assurance initiatives. Furthermore, from 1997 until the present, Egypt has seen a variety of public-sector health reform projects. Furthermore, the Ministry of Health's institutional capacity to strengthen the health system. Egypt's Plan for Long-Term Development Universal health coverage (UHC) is a stated aim in Vision 2030. The Social Health Insurance (SHI) law, which was passed in 2018, is a significant new motivator toward this goal. The SHI aims to secure appropriate and long-term health funding while also lowering out-of-pocket spending. To this aim, the United Health Care Partnership (UHC-P) assists Egypt in achieving the SHI. In terms of health service delivery, UHC-P will help health facilities implementing SHI integrate safety and quality measures in 2019. It will also make health information systems more reliable.

Moreover, **Aly, (2020)** concluded that Egypt aims recently to make the change to a healthcare quality culture (as contradicted to a fiscally managed healthcare culture of the government) to make a healthier populace according to its sustainable development vision 2030; advocated by the commitment of the political leadership. Therefore, the deficiencies restraining the nature of Lean Six Sigma programs in health and hospital will gain more importance. Eradicating flaws and inadequacies in the provision of health care will finally yield an enhanced

health care service. The Egyptian government tends to realize such an aim at an inferior cost with superior reliability, quality, and carefulness. Hence, the investments in cultural quality conversions, such as Lean and Six Sigma will significantly be increased in the next decade. It has occurred through the manufacturing field. It is nowadays grabbing interest in the provision and creation of health care services by decreasing deficiencies, improving customer service and generally diminishing costs through the board and accomplishing delight for operational efficacy in the public health care system.

Regarding the third study question, the current study findings there was a statistically significant difference between both study settings regarding success factors key for lean management practice and clinical governance climate. These differences could be justified as follow: From the researchers' point of view, the differences in implementation context of both study settings regarding lean management and clinical governance are as follow; the maturity and overall experiences regarding process development. For example, systems for optimizing patient flows or for visualizing work processes have been implemented. Working according to lean principles increased the people perceptions of influence in the change in one setting rather than the other, A more sustainable hospital-wide participation in the lean and clinical governance in one hospital would probably also require more education and engagement of managers and physicians, as well as more support and follow-ups by the top management, a top-down approach with high ownership of lean practice, the degree of responsiveness and mutual adaptation of motives and strategies.

The current findings could also be justified according to **Vassos et al., (2019)** who concluded that participation among different organizational actors in the different implementation steps, quality attitudes between staff and organization learning, willingness and interest from all staff can lead to achieving clinical governance objectives, Dedicated enough resources (money, materials, and manpower), spent time for research, audit and benchmarking, managerial support and continuous supervision are fundamental infrastructure to make quality in health services, furthermore; creating a sense of ownership, use of educative methods, use of organizational strategies to increase no blame culture, improvement of the partnership between staff, information sharing, use of procedures and clinical guidelines can be effective in better implementation of clinical governance. The listed factors could be different in one hospital than the other.

Regarding the fourth research question on to what extent nurse managers perceived the level of the

success factors key for lean management practice and clinical governance climate implementation, the current study revealed that the majority of the nurse managers moderately perceived Success Factors Key for lean management practice and clinical governance climate implementation. From the researchers' point of view, it is paramount to gain a deeper understanding of the new roles, responsibilities, and job characteristics of employees in Lean healthcare organizations because the most frequently mentioned barriers to Lean implementation in healthcare are the staff's disbelief that Lean can be applied in a healthcare setting, limited educators and consultants who have knowledge and experience and the culture of healthcare and principles, methods and tools of Lean implementation. **Costa & Godinho Filho, (2016)** supposed that the most important cause behind implementation lack of success is the shortage of knowledge of tendency management practices. In the same vein as the current findings, **Udod et al. (2020)** confirmed that nurse managers recognized the value of Lean, but the context in which they were tasked with implementing it was overshadowed and dominated by more restraining forces (patient complexities, financial constraints) than driving forces (champions). Furthermore, a lack of comprehension and knowledge of the Lean system, paired with their own growing workloads, added to the pressures and hampered efficient implementation. The current study shed the light on how nurse managers perceived the success factors key for lean management implementation and clinical governance climate as an initiative to be able to translate lean principles into the healthcare language and facilitate adaptation and ownership of lean tools and techniques by the healthcare staff. that was supported by **(Jain & Ajmera, 2019)** who reported that the managers and healthcare professionals can acquire information about the strength of various factors in advance which would help them to thoroughly understand the relative importance, interdependencies, and relationships among these factors so that lean precepts can be applied successfully in the organization.

In agreement, **Salonitis ; Tsinopoulos, (2016) & AlManei et al., (2017)** found that several organizations attempt to adopt the lean management philosophy without necessarily understanding the lean principles and the possible barriers that they will have to face during the implementation. Most of these entities struggle to acquire the desired outcomes and give up their attempts eventually. Additionally, it is necessary to identify the potential barriers and obstacles prior to the implementation of lean within the organization as trying to overcoming these barriers after the implementation has started can be a

hard mission for the practitioners. Moreover, **Yadav et al., (2018)** mentioned that the failures in lean project implementation in most of the health care organizations are attributed to failing to pay attention the critical success factors before and during lean implementation. According to **Ravaghi et al., (2014)**, addressing enablers and barriers from the perspective of senior managers can help the CG programme move successfully. Because these managers are directly responsible for piloting such high-quality programmes, they are the most conversant with the obstacles to CG implementation. Mitigating these barriers through the use of appropriate facilitators can aid in the implementation of CG.

On contrary, **Naidoo & Fields,^a (2019)** reported that, the level of knowledge of and practical experience with Lean and its tools and techniques is very low amongst senior health care managers in public hospitals. Approximate one-third of managers who had heard of Lean admitted that their level of knowledge was significantly low. Most managers indicated that they have not heard of Lean before and had no prior practical experience thereof. All of the participants expressed an interest in learning more about Lean, believing that there was potential for implementing Lean techniques in their hospitals and that Lean might potentially improve operational performance.

Finally, the current study findings revealed that, there was a highly statistically significance positive correlation between success factors key of lean management and success factors key of clinical governance climate in both study settings. In justification of the current study, the strategies for quality improvement in health care organizations based on three major quality improvement methods including; Lean, Six Sigma, and Patient Safety, these three methods are two to three times as paramount as other methods like accreditation, process redesign, or clinical governance.

The current results were in the same vein with **Matt & Rauch, (2018)** who proposed that both (LM) and (CG) share the efficacy-oriented goals applied to good clinical practice, error prevention, and the optimization of available resources. Moreover, Lean could provide the necessary tools to reach the objectives described in the pillars of Clinical Governance. Moreover, **Arcidiacono et al., (2017)** concluded that clinical governance and lean were applied to successfully optimize patient flows. Furthermore, in their systematic literature review, **Crema & Verbano, (2015)** showed that Lean has often been used for cost-cutting while having a significant impact on risk management in healthcare. Therefore, their suggestion is to evolve integrated

methodologies that include both Lean and risk management tools and practices.

Conclusion:

In the light of the current study, it could be concluded that, the level of the success factors key of lean management was moderate level in Menoufia University Hospital and Benha University Hospital respectively, the level of the success factors key of clinical governance climate at Menoufia University Hospital was low level, while in Benha University Hospital was moderate level. Additionally, there was a statistically significant differences between both hospitals regarding Success Factors Key for LM and CG implementation. Nurse managers in both hospitals moderately perceived the Success Factors Key for lean management practices and clinical governance climate implementation. Moreover, there was a highly statistically significant positive correlation between Success Factors Key of LM and CG both study settings.

Recommendations:

- Conduct training programs for health care staff, including, staff nurses, physicians, laboratory technicians, and administrative staff as awareness sessions to improve their knowledge and understanding regarding principles and prerequisites for lean management and clinical governance.
- Further study for developing a strategy for lean management integrating clinical governance is recommended as a quality improvement initiative in health care organizations.
- Participation of all levels of managers and staff, organizational structures and procedures is paramount to create a lean culture and clinical governance climate.
- Use the success factors key as a framework by hospital leaders to realize level of resistance for new initiatives and then, a good understanding of the internal environment for the organization with a focus on strengths and weaknesses points.

References

- **Abd El Fatah, Th. Ali, N. Elazazy, E. Dowidar, N. Abd Elgalil, H. & Mohamed, S. (2019):** Assessment of Clinical Governance in Primary Health Care Services: A Case Study on Dakahlia Governorate, Egypt.
- **Aij, K. Visse, M. & Widdershoven, G. (2015):** Lean leadership: An ethnographic study. *Leadership in Health Services*, 28(2): 119-134.
- **Aij, K. & Marion, E. (2017):** Leadership Requirements for Successful Implementation of Lean Management in Health Care: A Systematic

- Review of the Literature, Contemporary Leadership Challenges, Aida Alvinus, IntechOpen, DOI: 10.5772/65653. Available from: <https://www.intechopen.com/books/contemporary-leadership-challenges/leadership-requirements-for-successful-implementation-of-lean-management-in-health-care-a-systematic>.
- **Ajmera, P. & Jain, V. (2019):** A fuzzy interpretive structural modelling approach for evaluating the factors affecting lean implementation in Indian healthcare industry. *International Journal of Lean Six Sigma*. 11. 10.1108/IJLSS-02-2018-0016.
 - **Al Zefeiti, S. & Mohamad, N. (2015):** Methodological Considerations in Studying Transformational Leadership and its Outcomes. *International Journal of Engineering Business Management*, 7. [DOI: <https://doi.org/10.5772/60429>].
 - **Alison, D. (2019):** Clinical Governance and Risk Management for Medical Administrators. DOI: [10.1007/978-981-10-5454-9_7](https://doi.org/10.1007/978-981-10-5454-9_7). Textbook of Medical Administration and Leadership ,99-125
 - **Alkhoraf, A & McLaughlin, P. (2018):** Lean implementation within manufacturing SMEs in Saudi Arabia: Organizational culture aspects. *J. King Saud Univ. Eng. Sci* , 30: 232-242. [[Google Scholar](#)] [[CrossRef](#)].
 - **All Answers Ltd. (2018):** Summary of clinical governance. Retrieved from <https://nursinganswers.net/essays/summary-of-clinical-governance-nursing-essay.php?vref=1>
 - **AlManei, M. Salonitis, K. & Xu, Y. (2017):** Lean implementation frameworks: The challenges for SMEs. *Procedia CIRP* 63, 750-755. [[Google Scholar](#)] [[CrossRef](#)].
 - **Almutairi, A. Almani, M. Al-Ashaab, A. & Salonitis, K. (2021):** Prioritized Solutions for Overcoming Barriers When Implementing Lean in the Healthcare Supply Chain: A Saudi Perspective. *Logistics*, 5, 9. <https://doi.org/10.3390/logistics5010009>.
 - **Altman, E. & Nagle, F. & Tushman, M. (2019):** Managed Ecosystems and Translucent Institutional Logics: Engaging Communities. *SSRN Electronic Journal*. 10.2139/ssrn.3344435.
 - **Aly, W. (2020):** Lean Six Sigma Methodology: The Nub to Boost the Public Healthcare System in Egypt. *Journal of Public Administration and Governance*. 10. 67. 10.5296/jpag.v10i1.16028.
 - **Ansah Ofei, A. Paarima, Y. Barnes, T. & Kwashie, A. (2021):** "Staffing the unit with nurses: the role of nurse managers", *Journal of Health Organization and Management*, 35 (5): 614-627. <https://doi.org/10.1108/JHOM-04-2020-0134>.
 - **Antony, J. Sunder, V. Sreedharan, M. Chakraborty, A. & Gunasekaran, A. (2019):** "A systematic review of Lean in healthcare: a global prospective," *Int. J. Qual. Reliab. Manag.* 36(8):0346.IJQRM-12-2018, May 2019.
 - **Arcidiacono, G. Matt, D. & Rauch, E. (2017):** "Axiomatic Design of a Framework for the Comprehensive Optimization of Patient Flows in Hospitals", *Journal of HealthCare Engineering*, Article ID 2309265, 9- 2017.
 - **Australian Commission on Safety and Quality in Health Care. (2017):** National Model Clinical Governance Framework. Sydney: ACSQHC.
 - **Bahrami, M. Sabahi, A. Montazeralfaraj, R. Shamsi, F. & Entezarian, S. (2015):** Hospitals' Readiness for Clinical Governance Implementation in Educational Hospitals of Yazd, Iran. *Electronic Physician* 6:794-800.
 - **Chief Psychiatrist's Review. (2013):** Clinical Governance Climate in WA Mental Health Services, May,2013.
 - **Costa, L. & Godinho Filho, M. (2016):** Lean health care: review, classification and analysis of literature. *Production Planning and Control*, 27(10):823-836. <http://dx.doi.org/10.1080/09537287.2016.1143131>.
 - **Crema, M. & Verbano, C. (2015):** Investigating the connections between health lean management and clinical risk management: insights from a systematic literature review. *International Journal of Health Care Quality Assurance*,2(8):791-811.
 - **D'Andre Matteo, A. Ianni, L. Lega, F. & Sargiacomo, M. (2015):** Lean in healthcare: a comprehensive review. *Health Policy*, 119(9), 1197-1209. <http://dx.doi.org/10.1016/j.healthpol.2015.02.002>. PMID:25737260.
 - **Dahlgaard, J. Pettersen, J. & Dahlgaard-Park, S. (2011):** Quality and lean health care: a system for assessing and improving the health of healthcare organizations. *Total Quality Management & Business Excellence*, 22(6), 673-689. <http://dx.doi.org/10.1080/14783363.2011.580651>.
 - **Ebadi Fardazar, F. Safari, H. Habibi, F. Akbari Haghighi, F. & Rezapour, L. (2015):** Hospitals' readiness to implement clinical governance. *Int J Health Policy Manag.*;4(2):69-74.
 - **Fardazar, F. Safari, H. Habibi, F. & Haghighi, F. (2015):** Hospitals' readiness to implement clinical governance. *Int J Health Policy Manag.* 2015;4(2):69-74. DOI: [10.15171/ijhpm.2014.111](https://doi.org/10.15171/ijhpm.2014.111).
 - **Freeman, T. (2003):** Measuring progress in clinical governance: Assessing the reliability and validity of the Clinical Governance Climate Questionnaire. December. [Health Services Management Research](#) ,16(4):234-50. DOI: [10.1258/095148403322488937](https://doi.org/10.1258/095148403322488937). [PubMed](#).

- **Ghavamabad, L. Vosoogh-Moghaddam, A. Zaboli, R. & Aarabi, M. (2021):** Establishing clinical governance model in primary health care: A systematic review. *Journal of education and health promotion*, 10, 338. https://doi.org/10.4103/jehp.jehp_1299_20.
- **Gupta, D. & Potthoff, S. (2016):** Matching Supply and Demand for Hospital Services. *Found. Trends Technol. Inf. Oper. Manag.* 8, 131-274. [Google Scholar] [CrossRef].
- **Hamza, M. (2017):** Egypt's Universal Healthcare Act Enterprise Press. enterprise. press/wp content/.../2017/12/Egypt's-Universal-Healthcare-Act-APrimer.
- **Hartzband, P. & Groopman, J. (2016):** "Medical Taylorism, Lean, and Toyota", *The New England Journal of Medicine*, 374 (20):1994-1994.
- **Hazelton, L. Gillin, L. Kerr, F. Kitson, A. & Lindsay, N. (2019):** An ageing well collaboration: opportunity or wicked problem. *Journal of Business Strategy*, 40(1):18-27. <https://doi.org/10.1108/JBS-01-2018-0008>.
- **Hussain, M. & Malik, M. (2016):** "Prioritizing lean management practices in public and private hospitals," *Journal of Health Organization and Management*, 30(3): 457-474.
- **Jain, V. & Ajmera, P. (2019):** Modelling of the factors affecting lean implementation in healthcare using structural equation modelling. *International Journal of System Assurance Engineering and Management*, 1-13.
- **Kaltenbrunner, M. Bengtsson, L. Mathiassen, S. & Engström, M. (2017):** "A questionnaire measuring staff perceptions of Lean adoption in healthcare: development and psychometric testing," *BMC Health Serv. Res.* 17 (1): 235, Dec. 2017
- **Kristensen, S. Hammer, A. & Bartels, P. (2015):** Quality management and perceptions of teamwork and safety climate in European hospitals. *Int J Qual Health Care*;27: 499-506.
- **Leite, D. Bateman, N. & Radnor, Z. (2016):** "A classification model of the lean barriers and enablers: a case from Brazilian healthcare," in *Proceedings of the 23rd EurOMA Conference*, Trondheim, Norway, June 2016.
- **Mann, N.(2020):** Lean methods: inappropriate for healthcare. *BMJ*. ;368 doi: 10.1136/bmj.m836.m836.
- **Matt, G. & Rauch, E.(2018):** Applying Lean to Healthcare Delivery Processes – a Case-based Research. *International Journal on Advanced Science Engineering and Information Technology* · February 2018. DOI: 10.18517/ijaseit.8.1. 1(8): 4965.
- **McFadden, K. Stock, G & Gowen, C. (2015):** Leadership, safety climate, and continuous quality improvement: impact on process quality and patient safety. *Health Care Manage Rev*; 40:24-34.
- **Moldovan, F. (2018):** New Approaches and Trends in Health Care. *Procedia Manufacturing*, 22: 947-951. [DOI: <https://doi.org/10.1016/j.promfg.2018.03.135>].
- **Mosadeghrad, A. Arab, M. & Shahidi ,S. (2017):** A survey of clinical governance success in Tehran hospitals. *Hakim Health Sys Res.* 19 (3):129-140.
- **Naidoo, L. & Fields, Z.a (2019):** Critical success factors for the successful initiation of lean in public hospitals in KwaZulu-Natal: a factor analysis and structural equation modelling study. *Hum Resour Health* 17, 69 <https://doi.org/10.1186/s12960-019-0405-1>
- **Naidoo, L. & Fields, Z.b(2019):** Knowledge and Experience of Lean Thinking Amongst Senior Health Care Managers in Selected South African Public Hospitals SPOUDAI *Journal of Economics and Business*,69 (4):21-37.
- **Patri, R. & Suresh, M., (2018):** Factors influencing lean implementation in healthcare organizations: An ISM approach, *International Journal of Healthcare Management*, 11:1, 25-37, DOI: [10.1080/20479700.2017.1300380](https://doi.org/10.1080/20479700.2017.1300380)
- **Prateek Biyani, P. (2018):** The 7 Pillars of Clinical Governance. April 25, <https://www.dentalnotebook.com/7-pillars-clinical-governance/>.
- **Ravaghi H. Heidarpour, P. Mohseni, M. & Rafiei. S. (2014):** Senior managers' viewpoints toward challenges of implementing clinical governance: a national study in Iran. *International Journal of Health Policy and Management*; 1: 295-299.
- **Rotter, T. Plishka, C. Adegboyega, L. Harrison, E. Sari, N., Goodridge, D. Flynn, R. Chan, J. Fiander, M. Poksinska, B. Willoughby, K. & Kinsman, L. (2018):** What Is Lean Management in Health Care? Development of an Operational Definition for a Cochrane Systematic Review. *Evaluation & the Health Professions*. 42(3):366-390. <https://doi.org/10.1177/0163278718756992>
- **Rundall, T. Shortell, S. Blodgett, J. Henke, R. & Foster, D. (2020):** Adoption of Lean management and hospital performance: Results from a national survey. *Health Care Management Review*. Publish Ahead of Print. 10.1097/HMR. 287. B
- **Salonitis, K. & Tsinopoulos, C. (2016):** Drivers and Barriers of Lean Implementation in the Greek Manufacturing Sector. *Procedia CIRP* ,57: 189-194. [Google Scholar] [CrossRef]
- **Simons, P. Backes, H. Bergs, J. & Emans, D. (2017):** The effects of a lean transition on process times, patients and employees. *International Journal*

- of Health Care Quality Assurance. 30. 103-118. 10.1108/IJHCQA-08-2015-0106.
- **South Australian Health, (2018):** Clinical governance framework for Allied Health professionals. <http://www.health.sa.gov.au/alliedandscientifichealth>
 - **The Egyptian Journal of Hospital Medicine (2019):** 76(1): 3355-3365 3355 Received:8/4/2019 Accepted:7/5/2019.
 - **Tortorella, G. Augusto, B. França, S. & Sawhney, R. (2019):** Assessment methodology for Lean Practices in healthcare organizations: case study in a Brazilian public hospital. Production , 29, e20180080. <https://doi.org/10.1590/0103-6513.20180080>.
 - **Udod, S. Duchscher, J. Goodridge, D. Rotter, T. McGrath, P. & Hewitt, D. (2020):** Nurse managers implementing the lean management system: A qualitative study in Western Canada. J Nurs Manag.;28: 221-228. 10.1111/jonm.12898 [PMC free article] [PubMed] [CrossRef] [Google Scholar].
 - **Vassos, M. Nankervis, K. & Chan, J. (2019):** Clinical Governance Climate within Disability Service Organizations from the Perspective of Allied Health Professionals: Clinical Governance Climate. Journal of Policy and Practice in Intellectual Disabilities. 16. 10.1111/jppi.12281.
 - **Veenstra, G. Ahaus, K. Welker, G. Heineman ,E. van der, L. Aan, M. & Muntinghe, F. (2017):** Rethinking clinical governance: healthcare professionals' views: a delphi study. BMJ Open.7(1):12591. doi:10.1136/bmjopen-012591.
 -
 - **Yadav, G. Seth, D. & Desai, T. (2018):** Prioritising solutions for Lean Six Sigma adoption barriers through fuzzy AHP-modified TOPSIS framework. Int. J. Lean Six Sigma , 9, 270-300. [\[Google Scholar\]](#) [\[CrossRef\]](#).
 - **Ziolo, B.(2016):** The Digital Hospital: Streamlining Workflow to Improve Care. Healthcare Business & Technology. August 25, 2015. <http://www.healthcarebusinesstech.com/digital-hospital-workflow/>. Accessed November 23, 2016.