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USE OF THE MODIFIED DEMING TECHNOLOGY (PDSA) TO IMPROVE THE QUALITY OF HEALTH SERVICES IN AL-KADHIMIN (PEACE BE UPON HIM) MEDICAL CITY

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A B S T R A C T

The aim of this research is to explore the role of applying the modified Deming Technology (PDSA) in improving the quality of health services in Imam Al-Kadhimin Medical City, where the actual reality of the medical city and its strengths and weaknesses were reviewed. Identified with the checklist and work to improve it. The study is the first of its kind in the Iraqi health environment in terms of using Deming technology (PDSA) to improve service, and the results showed that Deming technology can improve the quality of health services by providing a set of solutions and treatments that will enhance the actual reality of the medical city. The research sample.

1. INTRODUCTION

Upgrading of the health level of health organizations is based on the necessity of providing health service and improving its quality and efficiency, by constantly learning about the latest developments and developments in the health field such as treatments and new technologies that serve the patient and meet their expectations and desires and the importance they attach to the elements of the service. The organization to maintain a competitive advantage as all hospitals have similar services, but with different levels of quality in which all hospitals aim to compete with the quality of their services and prefer to choose the hospital and thus attract new (patients) customers. The modified Deming wheel (PDSA) is one of the modern ways to improve the weaknesses and enhance the strengths of Al-Imameen Al-Kazimin (Peace be upon him) Medical City.

2. RESEARCH METHODOLOGY AND SOME PREVIOUS STUDIES

The scientific path of research is defined, by identifying the research problem, its importance and the most important goals that it seeks to achieve, and then clarifying its hypothesis model and its own hypothesis, and then the most important tools used in data analysis, as follows.

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2.1 Research problem

The health service is a basic issue whose importance prevails in all aspects of society because of its medical, social, ethical and financial implications. Hence, health services are not similar to other services in terms of importance, type and impact as they are directly related to human life, as the medical city should pay attention Continuous introduction of improvements with the latest developments in the health system, so the need for modern practical approaches led by workers to improve the health service for patients and the use of developed quality improvement (QI) methods, including the Modified Deming Technique (PDSA) through which a change in health service practice is introduced, replicated and included. By the workers responsible for providing the service, and based on the foregoing, the research problem can be formulated with questions that can be answered and the appropriate treatments and solutions can be found. These questions are as follows:

The first question: What is the level of quality of health services in the medical city, the study sample?

The second question: To what extent is it possible to use Deming's modified technology (PDSA) to address weaknesses in the medical city, the study sample?

2.2 The importance of the research

The importance of the research: The importance of the research stems from obtaining information that helps the medical city administration the research sample to keep pace with the development and progress in the field of providing health services by contributing to improving the health services provided that reflect the health reality.

2.3 Research objectives

This research seeks to achieve a set of objectives, which are represented in the following:

A. Identify the level of quality of health service in the medical city, the research sample.
B. Improving weaknesses and strengthening strengths by applying a modified Deming Cycle (PDSA)
C. Contribute to presenting a set of conclusions and recommendations that would enhance the actual reality of the medical city of the research sample.

2.4 The research model and its hypotheses

Based on the research problem and its objectives, the research model was designed as shown in Figure (1).

Source: Prepared by the researcher

Figure 1. Research form

This research starts from a main idea trying to test his hypothesis:

Hypothesis: "The possibility of using the modified Deming technique (PDSA) to enhance the strengths and address weaknesses in the quality of health services in the Medical City, the study sample."

2.5 Search tools

A checklist was used for five dimensions (objective quality, process quality, infrastructure quality, reactive quality, atmosphere quality) and the five Likert scale was relied on with relative weights (1,2,3,4,5), and then quantitatively analyzed the data and interpreted the results, and the strengths and weaknesses were reached.

2.6 Previous studies

Some previous ideas related to the research variable are discussed, and among the most important of these scientific efforts are the following:

1) Study:(McNicholas et al., 2019): "Developing Quality Improvements Supporting Strategies to Improve Accuracy of the Planning Implementation Study-Acting Cycle: A mixed multi-method study". This study attempted to evaluate the accuracy of using the PDSA method in the practical method, and the data collected from (39) Improvement projects between 2009 and 2012 were used, from the research evidence the actual practice of the frontline improvement team and provides an opportunity to retrospectively investigate Cycle Use (PDSA). The most prominent results of the study are that the use of (PDSA) technology caused statistically significant improvements in the accuracy of the improvements.
2) Study: (Afroze et at, 2020):" Reducing neonatal hypothermia by PDSA): Initiative quality improvement in neonatal practice". This study attempted to achieve a reduction in hypothermia as the goal is to reduce from 39% to 0% among all live newborns in the first hour of life. The quality improvement approach of Deming

Technique (PDSA) in (Phulbari Upazilla) was used. One of the remote areas in Bangladesh, where Upazilla Health complex serves about (140,392) people and the sample size was (41) births. There were (16) newborns with hypothermia, and hypothermia of newborns was reached in all live births who were born In the labor room, moreover, this work also indirectly improved the warm chain practice which should be followed in every neonatal care service center.

3) Study: (Jadoon et at, 2021):" Improving blood sugar control in patients with COVID-19: Quality Improvement Project". This study attempted to conduct a quality improvement project to evaluate the current practice of managing blood sugar in patients with (COVID19) in hospitals and to improve blood sugar control in these patients. The research was conducted in British hospitals, and (20133).
British patients were selected. The first results of the study showed (PDSA) that although in most cases there were timely referrals to (DSN) in many cases, the most prominent results of the study were: Cases, however, monitoring and management of glycemic excursions were sub-optimal in all cases.

3. THE THEORETICAL FRAMEWORK

3.1 The origin and concept of the modified Deming technique (PDSA)

PDSA arose from the efforts of Shewhart and Deming in the mid-20th century. The aim of the early use of technology was to understand "production as a system." Shewhart first presented the model in his book "The Statistical Approach to Quality Control." It consists of three processes of specifications, production and inspection in the form of a straight line. Circular, (Papcun, 2019" 57) In the 1990s, technology in how it appears today. In particular, Deming identified the four stages, namely, planning, implementation, study, and correction, and defined the indicative summary for each of these steps, which was originally built on steps Shewhart) and Deming developed it into the PDSA (Saier, 2017:9). As the PDSA technology is defined according to the opinions of some researchers and according to chronology as shown in Table 1.

Table 1. The definitions of some writers and researchers in chronological order

Researcher and year	Definition
Donnelly & Kirk,2015:279	A process often used to help teams improve the quality of health services in a safer, more effective, efficient, patient-centered and timely manner.
Coury et at,2017:2	A technique that helps introduce a new program into the environmental community that may identify a need for workflow, improve efficiency, or train on best practices
Ramadin,2018:36 –A	"A systematic series of steps to gain valuable knowledge and knowledge for the continuous improvement of a product or process"

3.2 Basic Principles of Use (PDSA)

Five main principles of the method have been identified. They will be explained below and will form framework areas for assessing their use as follows (McNicholas et al, 2016: 75) and (Knudsen et al, 2019:3)

1) Using Iterative Cycles: The central characteristic of iterative development is achieved by examining sequential iterative cycles and adapting change (Langley et al. 2009:90) and it provides the main pathway for learning and iteration of change. The approach also reflects the learning cycles used in education and organizational development depending on Knowledge gained from PDSA technology.
2) Testing based on predicting change: Informing the change testing process requires understanding and using existing knowledge to define the goal and change the concept that aims to achieve that goal. (Langley et al. 2009: 85) It can be developed from an existing external research base but also enables internal knowledge through an understanding of the national or local health service system and performance and / or the involvement and empowerment of people involved in improvement efforts (Taylor et at, 2014: 291).
3) Initial testing on a small scale: to support replication, small samples and short experimental sessions are used to learn quickly and cumulatively. Small-scale initial testing ensures that the change is modified or removed if it does not have the intended effect or the change leads to a negative response (Berwick 1998:316).
4) Regular data usage over time: Tracking data over time is also essential to support redundancy. The measurement should be proportional to the certainty of success which in turn will guide the measure of change testing. Measurement over time allows identifying temporal relationships with tested changes and building evidence of improvement (Taylor et at , 2014:291).
5) Documentation: Documenting all four phases of PDSA technology, including reflections on quantitative and qualitative information, is

critical. This not only clarifies whether improvement has been achieved but it ensures that learning is cumulative, informs future cycles, avoids repetition, and provides scientific accuracy of the method (McNicholas, 2016: 78).

3.3 The benefits of applying PDSA technology

The use of PDSA technology results in a number of benefits, including (Leis & Shojania, 2016:574)

1) Effective use of data, ie collecting enough information and data to reach the best improved procedures that lead to improvement.
2) High "return on failure" ratio.
3) Determine the necessary improvements in performance.
4) Forecasting the errors expected to occur during implementation.
5) Increases confidence that the change under consideration will lead to improvement.

4. THE APPLIED SIDE

The modified Deming technique (PDSA) is applied to the strengths and weaknesses that were identified according to the checklist for each of the five dimensions represented by (objective quality, process quality, infrastructure quality, interactive quality, quality of general feeling) to measure the quality of the health service of the medical city The research sample, and the following is an application for it:- According to its stages and for each of the dimensions of the checklist, namely:
1 After objective quality Weaknesses will be improved and the strengths revealed as a result of the checklist will be enhanced according to the following Deming technique stages:

Phase 1: Planning: The planning activity is the first step in the PDSA technique. In this phase, a plan is developed to improve weaknesses and strengthen strengths, and the prediction of change success is expressed, provides clarity on the intended effects of the change, and clarifies Improvement plan as in Table 2 improvement plan for the dimension of objectivity quality.

The second stage: Implementation (DO): In this stage, the improvement plan is implemented as in Table 3, the improvement plan is implemented for the objective quality dimension.

Table 2. Improvement plan for the objective quality dimension

No.	Weak points	Optimization process	Working procedures	Entity responsible for implementation	Completion time
1	Poor accuracy in providing error-free diagnostic and treatment services	Providing error-free diagnostic services	A.- Keeping abreast of the latest technical and professional developments to develop capabilities by providing services B.- Making improvements to the development plan by conducting training courses with the latest developments to apply them in their daily work in improving the service provided C.- Providing modern and advanced medical equipment	The senior management unit of continuing medical education	2 to 4 months
2	Not all medical specialties are available	Providing medical specialties	Providing medical staff from all specialties through a new appointment, transfer or placement from outside the medical city	Higher Management	
	Strength point				
	The medical staff is efficient in providing health services to patients	Increasing the efficiency of medical staff in providing services by reviewing the latest technical and professional developments in the health system	a. Encouraging the submission of scientific research to keep abreast of the latest updates in health service provision B. Encouraging them to put forward ideas and suggestions and adopt them for improvement c. Sending staff to developed countries to gain capabilities and experiences that raise the level of service		
	After the objective quality	31.60 %gap	Prediction 28%		

Table 3. Implementation of the improvement plan for the objective quality dimension

Executing the plan as expected (were there deviations from the plan)	**Surprises or challenges**
Working with the electronic system will facilitate work for doctors and other health service providers through which to follow up the patients' condition and all related results (examinations, radiological reports, etc.) to avoid errors in diagnosis or treatment, as well as conducting training courses to improve efficiency and raise awareness to reflect the standards Results The impact on the patient or the health system shows the end result of our improvement work.	1. There will be difficulty when implementing in the first days of changing the behavior of the medical staff and the behavior of patients in documenting and protecting the patient information in the electronic medical file 2. .It takes time to learn a new system 3. The need to redesign the workflow to accommodate the new system. 4. .Increasing the test scale after the initial tests, ie improper use. 5. The concern of the employees that the workflow of the new changes made to the system may weaken the quality and safety of the system.

The third stage: Study: In this stage, the data and results that were identified in the previous stage (DO) are analyzed, compared to the identified goals (taking into account that all changes that have occurred should contribute to improving the quality of the specified processes), and the figure 2. The fishbone diagram shows the objective quality dimension.

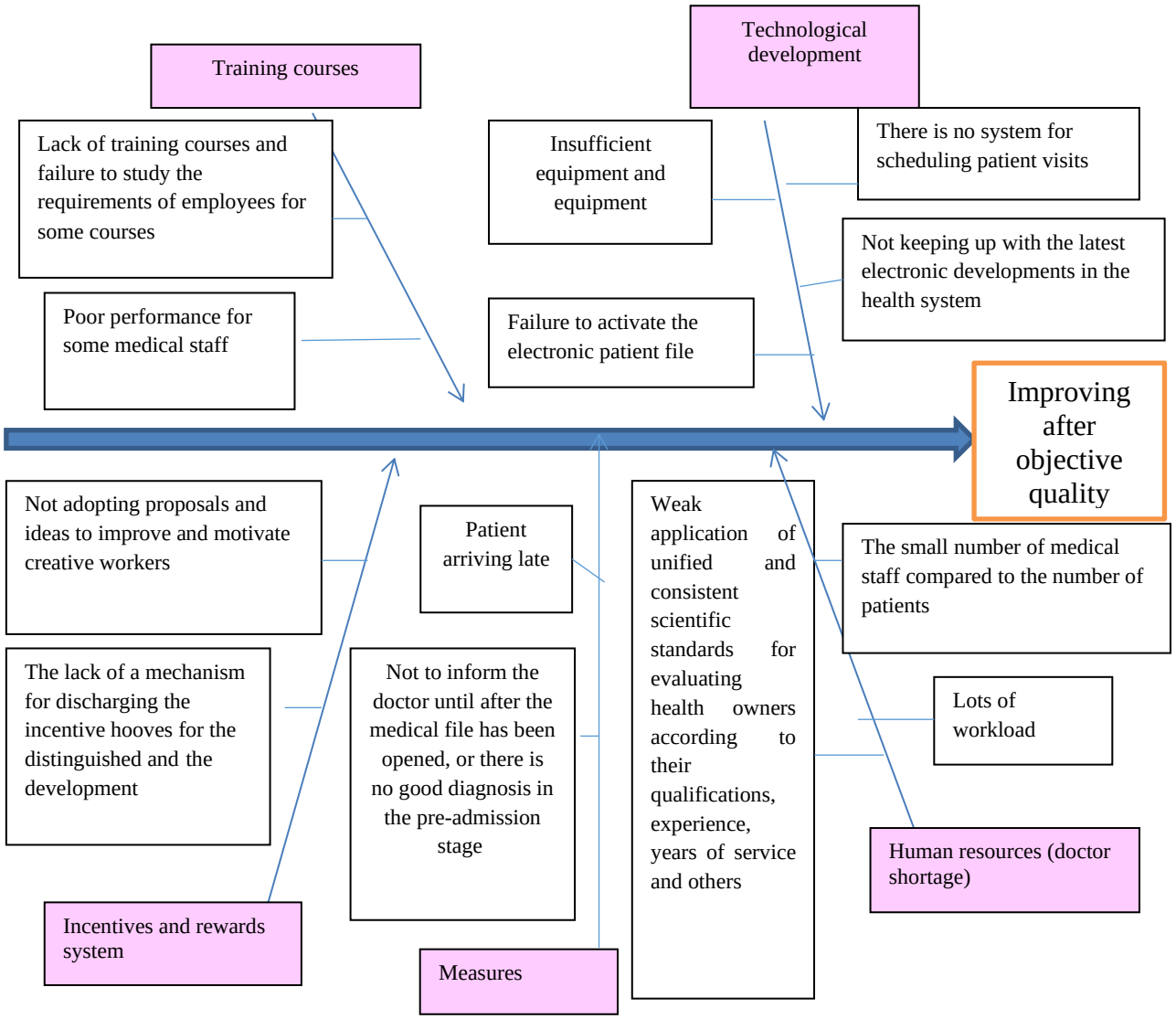


Figure 2. Fishbone diagram for the objective quality dimension

Phase IV: Action (ACT): The final step in the PDSA rapid improvement cycle is the Act phase based on what has been learned from the test results such as implementing solutions and adopting changes if successful. One of the following stages is approved and worked:

A. Adapt: modify changes and conduct another PDSA cycle. What will we change in the next test?
B. Approval: Extending changes in the organization to the rest of the medical city departments, personnel, etc. How will the test be expanded in the next cycle?
C. Abandonment: This idea of change is not being implemented. Methods and methods are reviewed and a new cycle begins.

1 - After the quality of the process:
Weaknesses and strengths will be improved for the process quality dimension according to the following

Deming technique stages:
The first stage: Planning (plan): In this stage, a plan is developed to improve the weaknesses and strengthen the strengths, and an improvement plan is made for the quality dimension of the process as in Table 4.

Table 4. Improvement plan for the process quality dimension

No.	Weak points	Optimization process	Working procedures	Entity responsible for implementation	Completion time
1	Long patient waiting to receive medical services.	Reducing patient waiting time to receive medical services.	a. Increasing the number of medical personnel	Higher Management	4 to 6months
2	The hospital is distinguished by providing the medical services that it promised to provide to the patient	Fulfilling the promises that the service meets the patient's needs, according to what is announced to achieve the hospital's goals	Providing a safe and healthy environment suitable for the needs and expectations of the patient	Higher management and workers in the Medical City	
	Strength point				
	The medical staff is distinguished by providing medical services in accordance with professional standards	Adhering to the profession's regulations and activating it	Working with the principles of medical ethics and professional behavior for all medical professions under the motto of the patient first.	Higher management	
	After the quality of the operation	33.40%	30%		

The second stage: Implementation (DO): In this stage, the improvement plan will be implemented, and the workflow will be in this stage as in Table 5, the implementation of the improvement plan for the quality dimension of the process.

Table 5. Implementation of the improvement plan for the process quality dimension

Executing the plan as expected (were there deviations from the plan)	surprises or challenges
Working to change the behavior of staff and patients by responding quickly to the residing patient and meeting his needs as soon as possible. The medical service is provided according to the schedule at the time specified for the patient in the electronic system and communication with patients regarding appointments, that is, an appointment system should be used to schedule patients' reviews, and handle the order of patients who visit without a prior appointment Patients accept appointments if there is justification for that. And arranging cases according to importance, to determine the priority of providing health services in emergency cases, to avoid favoritism and external interventions, and when the number of medical staff increases compared to the number of patients and the service provider is not late for working hours, especially during the peak period in the morning, since some patients need to undergo examinations while they are in a state. Fasting, will lead to no delay in the health service and consequently the patient's satisfaction with the quality of the service provided.	1. There will be difficulty when implementing in the first days of changing the behavior of the medical staff and the behavior of patients in documenting and protecting the patient information in the electronic medical file 2. .It takes time to learn a new system 3. The need to redesign the workflow to accommodate the new system. 4. .Increasing the test scale after the initial tests, ie improper use. 5. The concern of the employees that the workflow of the new changes made to the system may weaken the quality and safety of the system.

The second stage: Study: In this stage, the factors that hinder the implementation process are studied and analyzed, as shown in Figure 3, a fishbone diagram for the quality of infrastructure.

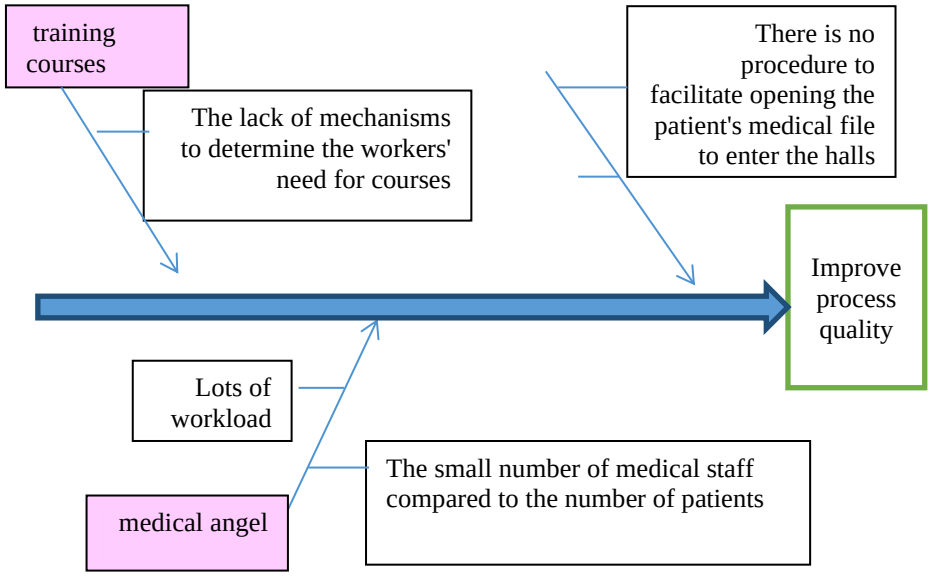


Figure 3. Fishbone diagram for the quality dimension of the operation

Phase IV: Action (ACT): The final step in the PDSA Rapid Improvement cycle is the Action Phase (Act) based on what has been learned from the exam. Reliance and work are carried out on one of the following stages:

A. Adapt: modify changes and conduct another PDSA cycle. What will we change in the next test?
B. Approval: Expand the changes in the organization to the rest of the medical city departments, staff, and so on. How will the test be expanded in the next cycle?
C. Abandonment: This idea of change is not being implemented. Methods and methods are reviewed and a new cycle begins

3 - After the quality of the infrastructure

We will improve the weaknesses and enhance the strengths of the infrastructure quality dimension according to the following Deming technology stages:

The first stage: Planning (plan): In this stage, a plan is developed to improve the weaknesses and strengthen the strengths of the infrastructure quality dimension, as shown in Table 6, the improvement plan for the infrastructure quality dimension.

Table 6. Improvement plan for infrastructure quality dimension

S.	**Weak points**	**optimization process**	**Working procedures**	**Entity responsible for implementation**	**Completion time**
1	Lack of sufficient and necessary medicines that the patient needs Providing adequate and necessary medicines for the patient	A. Purchasing scarce medicines before they run out, especially for diseases that require continuing the same treatment and not replacing it with an alternative.	B. Transferring medicines that are in excess in some other hospitals and that are scarce in the medical city.	Pharmacy Division	6 to 8 months
2	Reducing the number of operating theaters, lounges and waiting areas to meet the needs of patients. Customize	Operating theaters and waiting areas to suit the number of patients	A request from the Engineering Division to rearrange the interior design or add a building as much as possible to increase the number of halls for some specialties.	Engineering Division	
After the quality of infrastructure		**gap 40%**		**Prediction 35%**	

The second stage: Implementation (DO): In this stage, the improvement plan will be implemented, and the workflow in this stage will be as in Table 7 the implementation of the improvement plan for the infrastructure quality dimension.

Table 7. Improvement plan for infrastructure quality dimension

Implementation of the plan as expected Have there been deviations from the plan?	Surprises and challenges
Providing modern and advanced equipment and supplies is very important for the patient to obtain an accurate diagnosis and give him confidence in the results and not have to go outside the hospital for examinations. Also, the availability of medicines reduces the patient's financial expenses to buy medicines from outside the hospital or causes many risks. There may be side effects of using an alternative medicine or late treatment. Appropriate places should be allocated for waiting for the patient's companions, and the phenomenon of some companions staying overnight in hospital waiting areas should be eliminated.	1. It will appear difficult when implementing in the early days in changing the behavior of the medical staff and the behavior of patients in the documentation and all protection of patient information in the electronic medical file. 2. It takes time to learn a new system 3. The workflow needs to be redesigned to accommodate the new system

The third stage: Study: In this stage, the factors that hinder the implementation process are studied and analyzed, as in Figure 4 the fishbone diagram for the quality of infrastructure.

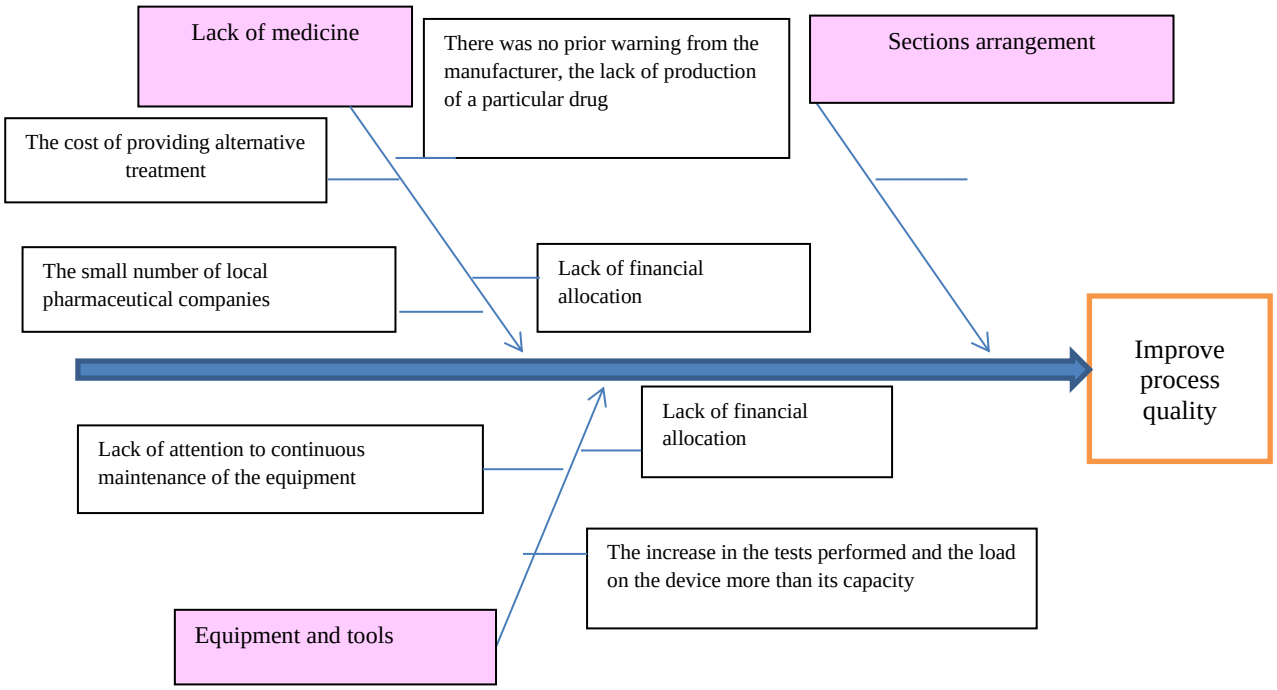


Figure 4. Fishbone diagram for the quality of infrastructure

Phase IV: Action (ACT): The final step in the PDSA Rapid Improvement cycle is the Action Phase (Act) based on what has been learned from the exam. Accreditation and work is done on one of the following stages:

A. Adapt: modify changes and conduct another PDSA cycle. What will we change in the next test?
B. Approval: Extending changes in the organization to the rest of the medical city departments, personnel, etc. How will the test be expanded in the next cycle?
C. Abandonment: This idea of change is not being implemented. Methods and methods are reviewed and a new cycle begins.

4 - After the interactive quality

The weaknesses and strengths of the interactive quality dimension will be improved according to the following Deming Technology phases:

The first stage: Planning (plan): In this stage, a plan is developed to improve the weaknesses and strengthen the strengths of the interactive quality dimension as in Table 8 the improvement plan for the interactive quality dimension.

Table 8. Improvement plan for the interactive quality dimension

No.	Weak points	optimization process	Working procedures	Entity responsible for implementation	Completion time
1	The hospital's lack of interest in the patient's financial and social situation	Attention to the patient's financial and social status	a. Providing the service to the patient in an equitable manner, not on the basis of discrimination based on race, religion, customs, or source of income. Or employing personal relationships, all patients will receive equal medical treatment B. Exempting some patients who are unable to pay fees in return for conducting some tests, in appreciation of their financial situation.	Higher Management Medical staff	8 to 10 months
	Lack of interest in taking into account the psychological state of the patient and dealing with him sympathetically	Attention to the moral culture of how to deal with the patient, taking into account the psychological state he is going through because of his illness	Preparing training programs to develop behaviors of interacting with patients and supporting them, assessing their conditions, caring, caring and embracing and avoiding expressing blame, it will increase the degree of his recovery as it is closely related to the psychological state of the patient	Medical staff	
	After the interactive quality	Gap 40.80%	Prediction 37%		

The second stage: Implementation (DO): In this stage, the improvement plan will be implemented, and the workflow in this stage will be as in Table 9 the implementation of the improvement plan for the interactive quality dimension.

Table 9. Implementation of the improvement plan for the interactive quality dimension

Executing the plan as expected (were there deviations from the plan)	Surprises or challenges
Collecting data and information about the patient's psychological, social, and physical condition and pathology to know how to deal with the patient, each according to his condition, and the patient's knowledge of his rights and how to deal with them, and conducting training courses to educate the patient's rights and medical ethics owed to the medical staff and how to deal with the patient with kindness, care, respect, appreciation of their feelings and protecting their dignity, Appreciating the psychological state he is going through, in addition to the hospital's interest in the patient's financial situation, not giving appointments to patients on the private ward, and disbursing some medications or tests from outside the hospital, which increases the patient's burden.	1. It will appear difficult when implementing in the early days in changing the behavior of the medical staff and the behavior of patients in documenting and all protecting patient information in the electronic medical file 2. It takes time to learn a new system 3. The workflow needs to be redesigned to accommodate the new system. 4. Increasing the test scale after the initial tests, ie improper use

The third stage: Study: In this stage, the factors that hinder the implementation process are studied and analyzed, as in Figure 5 the fishbone diagram for the interactive quality dimension.

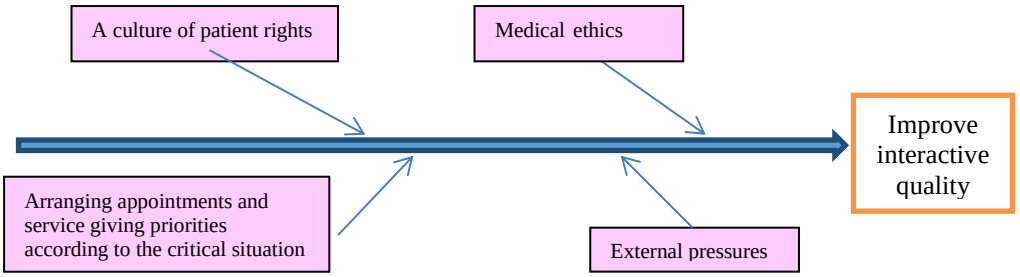


Figure 5. Fishbone diagram for the interactive quality dimension

Phase IV: Action (ACT): The final step in the PDSA Rapid Improvement cycle is the Action Phase (Act) based on what has been learned from the exam. Accreditation and work is done on one of the following stages:

A. Adapt: modify changes and conduct another PDSA cycle. What will we change in the next test?
B. Approval: Extending changes in the organization to the rest of the medical city departments, personnel, etc. How will the test be expanded in the next cycle?
C. Abandonment: This idea of change is not being implemented. Methods and methods are reviewed and a new cycle begins.

5 - After the quality of the atmosphere

The weaknesses and strengths of the atmosphere quality dimension will be improved according to the following Deming Technology phases:

The first stage: planning: In this stage, a plan is developed to improve the weaknesses and strengthen the strengths according to Table 10 of the improvement plan for the dimension of quality.

Table 10. improvement plan for the dimension of quality

No.	**Weak points**	**optimization process**	**Working procedures**	**Entity responsible for implementation**	**Completion time**
1	Weakness in infection prevention programs and preventive measures against infectious diseases	Improving and developing the program and preventive measures taken against infectious diseases	a. Develop an effective program to prevent and control infection with all the tools and materials necessary for the success of the program B. Work periodically to evaluate the infection prevention and control program and evaluate it in terms of the measures taken and measures to provide a safe environment for the patient.	Infection Control and Prevention Committee	10 to 12 months
2	The patient's lack of confidence that he is dealing with a qualified and competent medical staff while receiving health services	Increasing the patient's confidence and making him feel safe that he is dealing with a qualified and efficient medical staff	The interaction of the medical staff with the patient is a basic rule that should be formed to instill a spirit of reassurance when performing the service, such as providing sufficient information about examination, diagnosis and treatment, i.e. the ability of the medical staff to treat them in the way they expected		
	Strength point				
	The medical staff in the hospital takes into account the customs, traditions and social norms of patients	Respecting the rights of the patient in terms of customs and traditions.	Strengthening and informing the medical staff of their role by respecting the patient's culture and habits during examination or treatment		
	After the quality of the general feeling	Gap 32.40%	Prediction 29%		

The second stage: Implementation (DO): In this stage, the improvement plan is implemented, and the workflow in this stage will be as in Table 11 the improvement plan for the quality dimension of the atmosphere

Table 11. Improvement plan for the dimension of quality of the atmosphere

Executing the plan as expected (were there deviations from the plan)	Surprises or challenges
Develop and improve the infection prevention program by providing all resources such as disinfectants, sterilizers and tools that help us to control or protect from acquired diseases such as appropriate use of personal protective equipment, best practices for cleaning hands, comprehensive implementation of mask-wearing policies and appropriate training on infection prevention, control and awareness, and work on Evaluate the program periodically to see how effective it is in decreasing acquired infections.	1. There will be difficulty when implementing in the first days of changing the behavior of the medical staff and the behavior of patients in documenting and protecting the patient's information in the electronic medical file. 2. It takes time to learn a new system. 3. The workflow needs to be redesigned to accommodate the new system. 4. Increasing the test scale after the initial tests, ie improper use.

The third stage: Study: In this stage, the factors that hinder the implementation process are studied and analyzed, as in Figure 6 the fishbone diagram for the quality of the atmosphere.

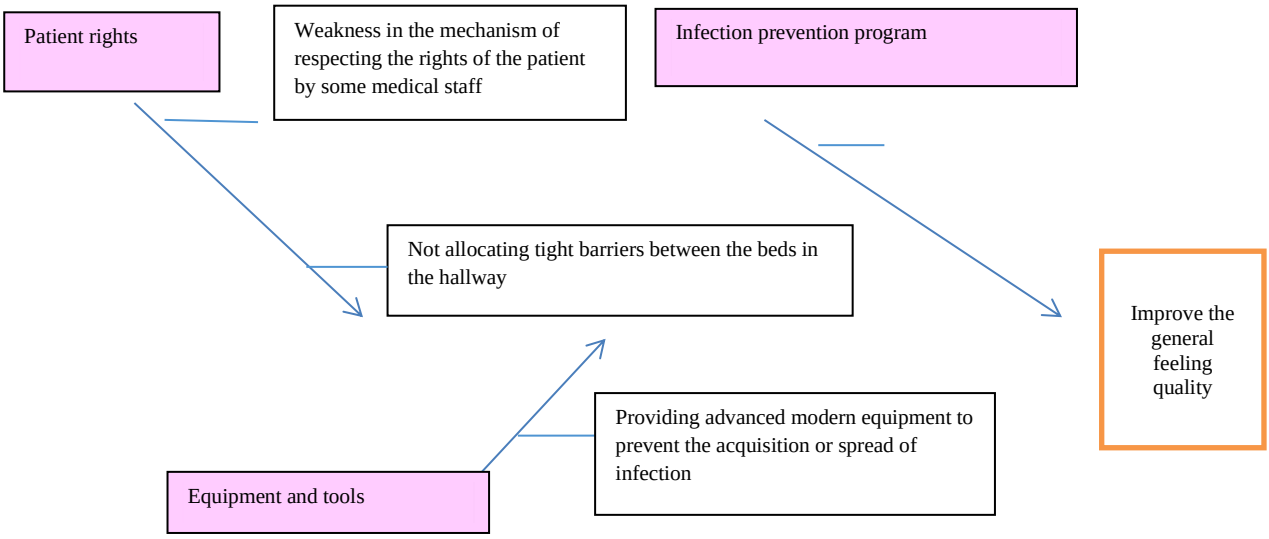


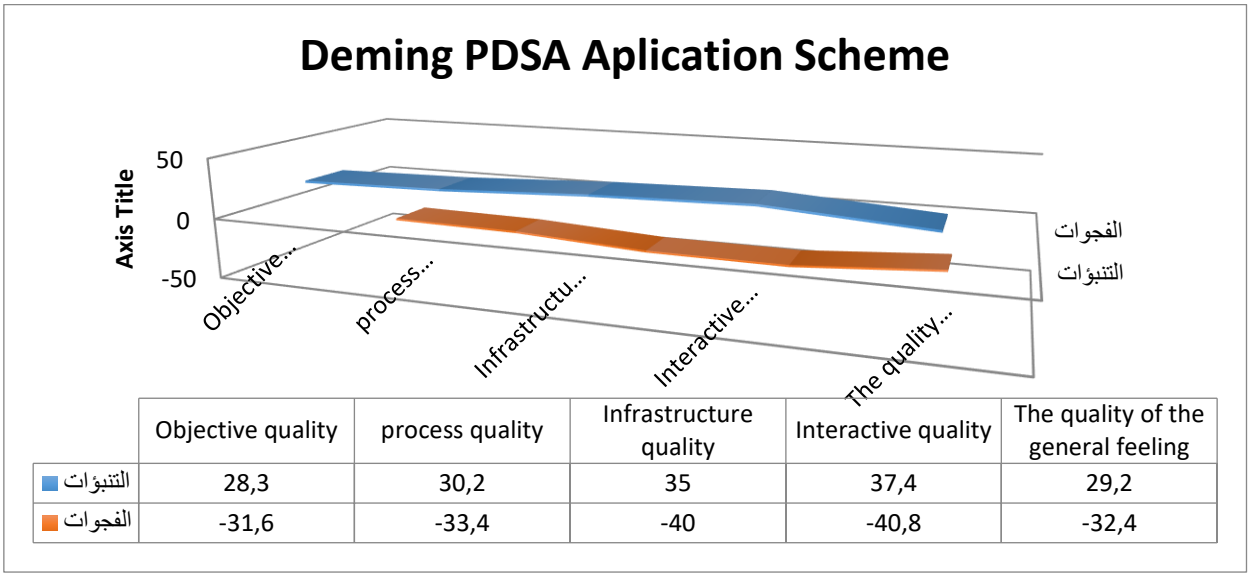
Figure 6. Fishbone diagram for the overall feeling quality dimension

Phase IV: Action (ACT): The final step in the PDSA Rapid Improvement cycle is the Action Phase (Act) based on what has been learned from the exam. Reliance and work are carried out on one of the following stages:

A. Adapt: modify changes and conduct another PDSA cycle. What will we change in the next test?
B. Approval: Extending changes in the organization to the rest of the medical city departments, personnel, etc. How will the test be expanded in the next cycle?
C. Abandonment: This idea of change is not being implemented. Methods and methods are reviewed and a new cycle begins.

5. TEST AND DISCUSS THE RESEARCH HYPOTHESIS

The extent to which PDSA can improve the quality of health service and obtain patient satisfaction will be clarified graphically if it turns out that PDSA is very useful to reach the goals using the limited resources that we have, which were clarified in the improvement plan and incorporate new ideas into routine practice about By involving health service providers in the depth of the problem and solving problems themselves. But motivating patients was the most challenging part because they are overburdened and have negative expectations of the health service. This was attempted to be overcome through regular communication with patients, problem solving skills and good coordination which finally helped us achieve the goals. And figure 7 the graph of the success of the five cycles of PDSA technology in improving the health service.



	Objective quality	process quality	Infrastructure quality	Interactive quality	The quality of the general feeling
التنبؤات	28,3	30,2	35	37,4	29,2
الفجوات	-31,6	-33,4	-40	-40,8	-32,4

Figure 7. PDSA application flow chart

As it was noted for the objective quality dimension, our gap was (-31.60%) when implementing the improvement plan, which would reduce the gap by (28.30%), and also for the process quality dimension, our gap was (-33.40%) when working with PDSA technology). From reducing the gap, which amounts to (30.20%), and then to the dimension of the quality of the infrastructure, our gap ratio was (40-40%), and when applying the technology we were able to bridge the gap by 35%), and as for the quality of interaction, the gap in this dimension was (40.80). -) And when applying the technique, we were able to bridge the gap by 37.40% (-) and finally for the dimension of grandmother of general feeling, the gap was (-32.40%) and the success rate was (29.20%).

The improvements that were obtained in the accuracy of the success of applying the methodology that we relied on the basic principles of its application in terms of starting to implement the change on a small size and setting a prediction for success, and then the technology was used repeatedly to reach success at the end of the change and all procedures were documented to benefit from them in the Deming technique suffix. Thus, through the results, this supports the second hypothesis that states (the possibility of using the modified Deming technique (PDSA) to improve the weaknesses and enhance the strengths in the quality of health services in the medical city study sample), as the modified Deming technique was able to improve the weaknesses and enhance the strengths in the quality of services health.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 The conclusions

The most important conclusions will be presented based on the stages of the modified Deming technique, as follows:

1. **Planning phase (PLAN)**

A- Lack of interest in developing strategic and operational plans that can be modified according to the variables of the surrounding environment of the medical city.

B. Lack of interest in giving an opportunity to all employees to present ideas and solutions to improve the change plan for the weaknesses of the Medical City and to develop the work of an electronic system.

2. **Implementation Phase (DO)**

A. Failure to employ modern technological techniques in implementing the activities and procedures of the improvement plan for strengths and weaknesses in order to increase the efficiency of the health service.

B. Difficulty in changing the culture of workers and patients in the first days of implementing the improvement plan for the medical city.

3. **Study stage**

A. Weakness of the medical city's interest in discussing and studying the problems that impede the implementation of the improvement plan for weaknesses

B. Weakness in analyzing the data collected in the implementation phase of the dimensional improvement plan (5Qs) model by adopting quality improvement tools, including the cause and effect tool to diagnose the main and subsidiary causes of the implementation phase.

4. **Action Phase (ACT)**

A. The medical city's lack of interest in adopting modern systems to facilitate and facilitate work procedures and activities with the aim of continuous improvement.

B. Utilize the data of the initial and post PDSA cycles so that the team knows what will change in the process of subsequent PDSA cycles.

6.2 Recommendations

Recommendations will be written based on the conclusions and as follows:

1. **The plan stage**

A. Attention to developing strategic and operational plans according to the circumstances surrounding the medical city, because it is the first and most important step to raise the level of quality of health services.

B. Empowering and encouraging workers and giving them opportunities to participate in developing an improvement plan for weaknesses because they are in direct contact with work and face the problems facing patients.

2. **Implementation Phase (DO)**

Introducing modern technological means to obtain accuracy in completing the service easily and not disturbing the patient with routine procedures.

3. **Study stage**

A. It is necessary to pay attention to the analysis of the data collected during the implementation phase to discuss its conformity with the goal set in the plan phase.

B. Adopting quality improvement tools in data analysis and problem diagnosis, i.e. accuracy in collecting facts and investigating matters such as the cause and effect tool to know the causes of the root problem that may hinder the process of implementing the service quality improvement plan.

4. **Action Phase (ACT)**

Modern and advanced systems should be adopted to facilitate the procedures for the work of the improvement results that were reached during the three stages of the modified Deming technology (PDSA) either by adapting to the new change to improve the quality of service with appropriate modifications to be ready for adoption, or adopting this change without making any modifications and expanding the procedures Other courses include all Medical City lobbies, Or abandon this idea of change and it has not been implemented and the methods and methods are reviewed and a new cycle begins.

References:

Afroze, S., Hossain, M. S., Sooden, A., Wahab, A., Islam, M. H., & Secretariat, Q. I. (2020). Reduction of Neonatal Hypothermia by PDSA: A Quality Improvement Initiative in Neonatal Practice. *International Journal of Medical Science and Health Research*, *4*(03). 101-110.

Al-Ramadin, A. Y. (2018). Employing the PDSA cycle to improve the quality of blended learning in basic medical science courses. Masters Thesis. To the Faculty of California State University Dominguez Hills, Retrieved from: https://scholarworks.calstate.edu/downloads/bc386j95d

Berwic D. M. (1998). Developing and Testing Changes in Delivery of Care. *Academia and Clinic. 128*(8). 651-656.

Clifford, L. N. (2016), *Evolution of PDSA and the Difference Between PDSA and PDCA.* Austin ASQ Meeting February 10(2016). Retrieved from: https://www.pdfdrive.com/evolution-of-pdsa-and-the-difference-between-pdsa-and-pdca-e59177156.html

Coury, J., Schneider, J. L., Rivelli, J. S., Petrik, A. F., Seibel, E., D'Agostini, B., ... & Coronado, G. D. (2017). Applying the Plan-Do-Study-Act (PDSA) approach to a large pragmatic study involving safety net clinics. *BMC health services research*, *17*(1), 1-10.

Donnelly, P., & Kirk, P. (2015). Use the PDSA model for effective change management. *Education for Primary Care*, *26*(4), 279-281.

Jadoon, N. A., Noor, S., Iqbal, M., & Pervez, N. (2021). Improving Glycemic Control in Patients With COVID-19: A Quality Improvement Project. *Metabolism-Clinical and Experimental*, 116. doi: 10.1016/j.metabol.2020.154488

Knudsen, S. V., Laursen, H. V. B., Johnsen, S. P., Bartels, P. D., Ehlers, L. H., & Mainz, J. (2019). Can quality improvement improve the quality of care? A systematic review of reported effects and methodological rigor in plan-do-study-act projects. *BMC health services research*, *19*(1), 1-10.

Langley, G. J., Moen, R. D., Nolan, K. M., Nolan, T. W., Norman, C. L., & Provost, L. P. (2009). *The improvement guide (2nd ed.)*. Jossey Bass Wiley. San Francisco

Leis, J. A., & Shojania, K. G. (2017). A primer on PDSA: executing plan–do–study–act cycles in practice, not just in name. *BMJ quality & safety*, *26*(7), 572-577.

McNicholas, C. (2016). A scientific approach to improvement: the use of Plan-Do-Study-Act cycles in healthcare.

McNicholas, C., Lennox, L., Woodcock, T., Bell, D., & Reed, J. E. (2019). Evolving quality improvement support strategies to improve Plan–Do–Study–Act cycle fidelity: a retrospective mixed-methods study. *BMJ quality & safety*, *28*(5), 356-365.

Papcun, G. J. (2019). Medical device quality: managing cybersecurity design requirements through the application of PDSA and QFD. (Masters Thesis College of Extended and International Education) Retrieved from http://hdl.handle.net/20.500.12680/gq67jr829

Saier, M. C. (2017). Going back to the roots of WA Shewhart (and further) and introduction of a new CPD cycle. *International Journal of Managing Projects in Business*, *10*(1), 143.

Taylor, M. J., McNicholas, C., Nicolay, C., Darzi, A., Bell, D., & Reed, J. E. (2014). Systematic review of the application of the plan–do–study–act method to improve quality in healthcare. *BMJ quality & safety*, *23*(4), 290-298.

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