

# The Principles of Total Quality Management in Hospitals: The Case of a Greek Public Hospital

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**Abstract:** The need to apply the principles, techniques and methods of Total Quality Management (TQM) in public hospitals becomes increasingly urgent, as the benefits that are achieved result in reducing costs and providing better quality services to patients. The purpose of this research is to explore the potential applications of TQM principles in a Greek public hospital, to record the role of management and leadership in shaping the work environment and relationships, to evaluate the quality of health services and to diagnose quality problems that may exist in the hospital. This research is qualitative and the tool which was used is the questionnaire. The sample consisted of ten (10) people. The results showed that the quality problems in the hospital, mainly arose from the health policies pursued and implemented by government mechanisms, and the inability of the administration to intervene. Additionally, the quality problems which depend on the administration of the hospital mainly focus on the responsiveness, the efficiency and the behavior of health personnel.

**Keywords:** Quality, Total Quality Management (TQM), Health Services, Public Hospital.

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## 1. INTRODUCTION

Providing quality services in health care has always been a requirement in respect of the human life. The direct connection of health to the very existence and survival of people shows that the need for health care must be considered essential and people must try to fulfill it in every possible way. Nowadays, quality is a key criterion for all products and services available on the market; hence, the quality assurance services which seek to meet vital human needs are very important.

The need for quality becomes imperative in public hospitals because of the particular nature of health goods, which are primarily public goods (Dikaios et al., 1999). Therefore, improving the quality of health services in the public sector is a dominant issue in the world, as it has many dimensions such as ethical, technical, scientific, financial and administrative. Moreover, the issue of TQM in public hospitals maintain a strong research and scientific interest because of their special features compared to other organizations and businesses. These special features include the management, the hierarchy in structure and operation, the high level of state intervention, the labor intensity, the special interest and great sensitivity that accompany each health problem, the patients' inability to make decisions by themselves on the supplied health services in the ever changing environment in the health sector, the constantly rising cost of health services, the continuous operation and standby, as well as the strong and universal requirement of society for quality in offered health services (Dikaios et al., 1999; Liaropoulos, 2007).

## 2. THEORETICAL PART

### **The definition of quality in the health sector:**

The concept of quality in health services presents difficulties mainly due to the specific nature of health services and the peculiarities of the health goods.

Donabedian (1980) was one of the first who focused on quality in health care, its definition and its improvement. He presented the three dimensions of health services: the technical part (technical science of medicine), the interpersonal part (interpersonal art of medicine) and the hotel infrastructure (amenities). The technical part refers to the application of medical science and technology in order to best address the patient's health problem. The interpersonal part refers to the human (psychological) dimension of the patient's treatment by the physician and other health professionals and their behavior towards him, determined by their professional ethics, the patient's expectations and the morals of the society. The third dimension refers to the space, the environment and the conditions under which health services are provided. Given these dimensions, Donabedian defined quality in health services as "this kind of care which is expected to maximize the well-being of the patient, taking into account the benefits and losses inherent in the care process in all its component parts" (Theodorakioglou & Tsiotras, 2000).

Nelson (1980) defined the quality of health services as "the degree to which health services for individuals and entire populations increase the likelihood of desired health outcomes and are addressed under the existing professional knowledge." The World Health Organization (WHO) claimed that "quality is to provide diagnostic and therapeutic instruments, capable to ensure the best possible result in the health sector, within the possibilities of modern medical science, which should aim at the best possible result with minimal iatrogenic risk and at the maximum patient's satisfaction in terms of procedures, results and human contact" (WHO, 1993).

All quality definitions of health services, focus on the benefit that arises for the patient, which must in any case be greater than the potential damage, while in most of them include the overall benefit for the society and the effective use of available resources. Furthermore, through the various definitions it is understood that the concept of quality is complex and subjective, while it monitors the developments in society and economy by incorporating the actual requirements of the parties and their socio-economic reflections (Reeves & Bednar, 1994) .

Furthermore, Parasuraman et al. (1985) resulted in five key dimensions of quality:

- reliability (the ability to accurately provide the promised service)
- responsiveness (the will and readiness of the organization to fully serve the customer)
- security (training and readiness of employees toward customer satisfaction)
- precision (the execution of the service correctly the first time)
- uniqueness (the production of a different service according to each customer).

#### **Quality in the health units:**

The hospitals are complex organizations. They operate in a constantly evolving environment which requires adaptation in order to meet the requirement for providing quality health services in the best possible way. The main and critical factors affecting the quality of health services provided by hospitals are the following (Adamantidou, 2004; Tsouga, 2004; Sarafidis & Stafylis 2005; Papakostidis & Tsoukalas, 2012):

- direct and equal access to health facilities, without bureaucracy, intermediaries or prohibitions
- providing medical care around the clock (continuous readiness of health services)
- appropriate organizational structure (legal framework and method of organization, coordination of operations, appropriate working conditions, adequacy of staff) to provide medical care to patients
- administration and leadership of organizations (high administrative skills for continuous quality improvement)
- human resources (skills, scientific knowledge, experience and professionalism of doctors and staff, adequate human resources)
- good patient treatment conditions (friendly attitude, respect for patients' rights and personality)
- adequate logistics (adequacy/availability of beds, modern devices and medical equipment etc.)
- hotel infrastructure and the proper design of premises
- reception and handling of patients (friendly behavior, awareness and information, promptness of service)

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- compliance with hygiene standards and limited hospital infections
- cleanliness and food control
- use of technology
- costs (which must be at acceptable levels).

The World Health Organization defines the following health care quality improvement factors (WHO, 1993):

- patients' satisfaction
- the final positive effect on the level of the patient's health
- the reduction of risk for patients
- the efficient use of available resources
- the high level of professionalism

### TQM in the health sector:

The key point for overcoming the current challenges is the TQM and the adoption of its principles, techniques and methods (Alexiadis & Sigalas, 1999). Specifically, the TQM can operate as:

- 1) an implementing tool for rational procedures, with the acceptance and support of management and employees, ensuring quality of service and user satisfaction,
- 2) a means for efficient management application in order to achieve patients' satisfaction with the optimum use of resources to control costs and increase efficiency and profitability, and
- 3) a guarantee of good operation for the community, the insurance organizations and the state (Raftopoulos & Economopoulou, 2003).

Moreover, according to the theory on the cost of quality, good quality has a direct impact on costs: the good quality of service contributes significantly to reducing costs, while poor quality is expensive. The benefits arising from TQM affect (Alexiadis & Sigalas, 1999):

- **Patients:** The benefits for patients are divided into health benefits, psychological and financial. The health benefits are the early diagnosis of health problems, the effective therapy, the prevention of any complications, etc. The psychological benefits refer to the environment of the health unit and the patients' stay there. The economic benefits are associated with a reduction in health care costs of the patients but also with the reduction of costs for the stay of family members.
- **Healthcare professionals (doctors, nurses, administrators, technicians, etc.):** The benefits for healthcare professionals are summarized in legal rights, safety and effectiveness of their work, satisfaction from their work, stress relief and lack of frustration, respect and trust from patients and their families, social tolerance for errors etc.
- **Health service facilities:** The benefits for health service units are summarized in operational, economic and to those which include recognition and reputation. The operational benefits include the reduction of the burden for all services and parts of the unit. The economic benefits mainly refer to the reduction of operating costs, as the improvement of the quality of service can result in considerable savings for other patients' needs, improvement of the staff's working conditions, research etc.
- **Pension funds:** The benefits for the pension funds are divided into health, economic and social. The health benefits refer to the quick and effective response to the health problems of their patients. The economic benefits are associated with the reduction of their costs and refer to the money paid to health service facilities for health care, the allowance granted to their members, etc. The social benefits are associated with the greater satisfaction of their members by improving the quality of health services, and the feeling that the pension funds fulfilled their social role properly and in the best possible way.

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- The state and the society: The benefits for the state and society are divided in health benefits, economic and social. The health benefits are associated with the efficient and rapid treatment of patients, which affects productivity, hence the economy of society and the state. The economic benefits are related to the reduction of unnecessary costs in the health sector and the improvement of people's productivity, as a result of shortening the residence time in the healthcare and generally shortening the duration of illness. The social benefits are associated with the strengthening of social cohesion and the sense of security. Additionally they include the improvement of the image of the state and society both nationally and internationally.

### **Evaluation and measurement of quality in health facilities:**

The evaluation of quality in health care is related to the critical assessment of the extent to which all of the services are provided in regards with the objectives set (Soulis, 1998). Successful health units are customer-oriented and provide quality health services with particular attention to the optimal response to the needs and requirements of the customer/patients. Assessing and measuring the quality of health service units must be conducted through critical evaluation of clients/patients, because it is they who effectively determine what needs and requirements must be fulfilled through these specific organizations.

The Advisory Council on Health Research (ACHR) defined 24 dimensions of health care quality from the patients' perspective (Wensing et al., 1994):

- efficiency
- appropriateness of care
- professional competences (appropriate knowledge and skills)
- responsibility of health care professional
- insight of professional health care
- efficacy
- safety
- accuracy
- humanity
- information
- confidence
- cooperation
- continuity
- availability
- holistic care
- accessibility (physical and geographical)
- financial access to care
- reception
- privacy
- hygiene
- diet
- empathy
- autonomy of the patient in decisions

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The idea of recording the view of the customer service as a way of assessing and measuring the quality of health services, has developed a series of tools and models for this purpose. The quality evaluation and measurement models are the following (Seth et al., 2005):

- SQ1 «Technical and functional quality model» (Gronroos, 1984)
- SQ2 «SERVQUAL» (Parasuraman et al., 1985)
- SQ3 «Attribute service quality model» (Haywood-Farmer, 1988)
- SQ4 «Synthesised model of service quality» (Brogowicz et al., 1990)
- SQ5 «Performance only model» (Cronin & Taylor, 1992)
- SQ6 «Ideal value model of service quality» (Mattsson, 1992)
- SQ7 «Evaluated performance and normed quality model» (Teas, 1993)
- SQ8 «IT alignment model» (Berkley & Gupta, 1994)
- SQ9 «Attribute and overall affect model» (Dabholkar, 1996)
- SQ10 «Model of perceived service quality and satisfaction» (Spreng & Mackoy, 1996)
- SQ11 «PCP attribute model» (Philip & Hazlett, 1997)
- SQ12 «Retail service quality and perceived value model» (Sweeney et al., 1997)
- SQ13 «Service quality, customer value and customer satisfaction model» (Oh, 1999)
- SQ14 «Antecedents and mediator model» (Dabholkar et al., 2000)
- SQ15 «Internal service quality model» (Frost & Kumar, 2000)
- SQ16 «Internal service quality DEA model» (Soteriou & Stavrinides, 2000)
- SQ17 «Internet banking model» (Broderick & Vachirapornpuk, 2002)
- SQ18 «IT-based model» (Zhu et al., 2002)
- SQ19 «Model of e-service quality» (Santos, 2003).

The use of these models in research, provides the possibility for quality evaluation and measurement of health services, the investigation of the points where there are quality problems, and the possibility for adaptation and reorganization of services to eliminate these problems while promoting continuous improvement of services. The models have a key role in the pursuit of TQM in every organization and especially in health care units. Furthermore, they are in line with the customer-oriented approach of TQM as all measurements refer to the perceptions and experiences, expectations, needs and requirements of customers/patients.

### 3. RESEARCH PART

#### **Purpose of the research:**

The purpose of this research is to investigate the potential application of the principles of TQM in a Greek public hospital.

The objectives of the study are:

- The investigation of the administrative operations in the hospital
- The recognition of the existing organizational culture of the public hospital
- To record the role of management and leadership in shaping the work environment and relationships
- The evaluation of the quality of hospital services
- The diagnosis of quality problems which may exist in the organization and operation of the hospital and the provided services.

**Methodology:**

This research is qualitative. The choice of qualitative research was made, because it aims at the description, analysis, interpretation and understanding of social phenomena, mainly in response to the questions "how" and "why" (Iosifidis, 2003). Also, the qualitative research results in detailed data on multiple aspects of the case under investigation, while it facilitates the development and clarification of conceptual categories (Kyriazi, 1999). The objective of the qualitative investigation is not simply a description of an attitude or a behavior, but the holistic understanding. Qualitative research explores the experiences of individuals and their subjective meanings, always focusing on the broader social and cultural context (Wellington, 2000).

The data was collected with questionnaires and semi-structured interviews. The questionnaire is a useful tool for the collection of primary data. The questions call for free and unhindered expression of their opinion. The interview is an essential qualitative research tool, as it allows the researcher to explore thoughts, values, prejudices, attitudes, feelings, experiences, opinions and representations of participants freely and in depth (Avramidis & Kalyva, 2006; Iosifidis, 2003; Wellington, 2000). Qualitative semi-structured interview is a flexible and powerful tool which is not strictly structured and formalized, with questions that can be open-ended.

Regarding the questionnaires, in this research we used two questionnaires with open-ended questions and closed-ended questions. The first questionnaire was addressed to the hospital's human resources (managers/supervisors), while the second questionnaire addressed to users of hospital services (patients' attendants).

***Human resources of the hospital:***

The questionnaire consisted of twenty (20) questions, which are divided into four (4) sections:

- Demographics (7 questions)
- Management (4 questions)
- Participation in the structure and organization of the hospital (4 questions)
- General assessment (5 questions)

***Patients' attendants:***

The questionnaire consisted of twenty (21) questions, which are divided into four (4) sections:

- Demographics (8 questions)
- Admission services (3 questions)
- Provided services (5 questions)
- General assessment of the services (5 questions)

**Sample:**

Qualitative sampling is based on two basic rules: appropriateness and adequacy (Morse & Field, 1996). This means that for qualitative research the sample should be appropriate to interpret the phenomenon and should be sufficient not in quantity but in providing quality information that will achieve the sense of satiety, concerning the information on the phenomenon under study (Polit & Hungler, 1999). In qualitative research the sample usually refers to a two-digit or even single-digit number, as a large sample does not serve the aims and the purpose of the qualitative research. Moreover, the sample must be adequate and suitable, i.e. it must have the elements that the qualitative researcher wants to investigate, and the knowledge and will to participate in the research (Morse, 2003). This sample is selected via purposive sampling, i.e. the researcher deliberately selects this specific sample, because it has the knowledge of the characteristics and the will to give more comprehensive and thorough answers. Therefore, the selection of the sample is not based on objective and random techniques, but on the subjective knowledge of the researcher on the characteristics of the sample.

This research was conducted at the General Hospital Panagiotis & Aglaia Kyriakou in Athens. The sample consisted ten (10) people, who were selected from the hospital personnel (managers/supervisors) and the patients' attendants. This

hospital is a pediatric hospital, therefore, it was impossible to reflect the opinion of patients in a field study, and the questionnaire addressed to the patients' attendants.

#### **Data analysis:**

Data analysis in qualitative research does not use statistical analysis and comparative graphs, as in quantitative research. The first step is to record the data so the researcher will be able to completely understand what the participants say or do (Morse & Field, 1996; Brink & Wood, 1998). The next step is the encoding. The researchers gave representative codes which expressed briefly their interpretation of this part of the interview. Then, after all the text of the interview was summarized in a number of representative codes, the codes are compared with each other, identifying codes with similar characteristics or meanings (Polit & Hungler, 1999). Afterwards, the modules were formed based on the identification of similar codes which were put together. The modules give the interpretation, perception of the participants to the phenomenon under investigation, providing a deeper understanding and treated for participants knowledge (Huberman & Miles, 1998).

## **4. RESULTS**

### ***Human resources of the hospital:***

#### **Management:**

The effective management-leadership is a very important issue that concerns all those who seek the efficiency, effectiveness, personal development and social progress. The connection of the administration with leadership is a continuing challenge, which according to the research requires the assimilation of leader characteristics by those who are in the administration. The research highlights the necessity of leaders in the administration area, because in order to administrate in the best possible way, you should be a leader and have innovative ideas. The research shows that a manager is able to exercise management and leadership. The differences between the specific characteristics of a manager and a leader, make it difficult to exercise management and leadership simultaneously from a director. However the abilities, the skills, the experience and the education, could help a manager to combine management and leadership.

According to the results, the main actions of the hospital administration should undoubtedly encourage the teamwork, the coordination and control of all administrative functions, the achievement of the objectives and overall the coordination of health services. The hospital officials note the reduced efficiency, absenteeism, misbehavior and lack of communication can cause conflicts in the working environment. According to the participants, conflict in the workplace cause multiple problems, affecting the performance of the employee but also they can act as an inhibitor in achieving the organization's objectives.

#### **Participation in the structure and organization of the hospital:**

In public hospitals, the individuals involved in the administration come from many different areas and structure of the organization is not clear in some cases. Unfortunately, as demonstrated by the results of research, the human resources of the hospital claim that the responsibilities of each employee are not clear resulting in a confusion of responsibilities and actions of each individual.

At the same time, the majority of respondents believes that the hierarchical and organizational structure of the hospital in which they work, are not clearly understood and known to all, and this is mainly due to lack of adequate information, and the unclear responsibilities. However, there is a percentage of the sample which indicates that the hierarchical and organizational structure of the organization is perceived and known to all stakeholders and relevant seminars are held in order to inform the newly appointed officials.

In health care units, communication on the part of management is done through leaflets and announcements, and with meetings when necessary. Unfortunately, it seems that there are no scheduled/systematic meetings nor personal conversations.

The quality of service should be the first priority for the hospital. The majority of respondents believes that the quality of the providing services is a top priority for the hospital, and when the services are not the expected, it is due to deficiencies in equipment and human resources.

The cost is a hindering factor and the application of TQM can help an organization to survive.

**General evaluation:**

The management style is authoritarian, sometimes participative and rarely democratic. According to the research, management can either be perceived as "person-centered" and "hard" which takes up its responsibilities, or as "empowering" which wants to empower and follows a collaborative decision making process.

At the same time, all the respondents appear to be unsatisfied with the administration at the hospital, which presents serious deficiencies related to communication, coordination and collaboration. It is clear that many of the major problems in the exercise of the administration are directly related to the human factor, which is one of the major elements affecting the effective administration.

The system of rules is considered as an effective principle of hospitals as organizations. The hospital rules are guides or official boundaries for operations performed in the hospital room. According to the research there is not a system of rules that specify the operations limits and responsibilities of each employee. The main reason for this is the staff shortages, a problem which is characterized as the most important for the management of hospitals.

Additionally, there are cases where even if the employees have the appropriate educational background, they do not have the experience to cope with the difficult administrative conditions of a health care unit. The majority of respondents say that the hospital has ongoing procedures for staff training. Employees at the hospital, seems to be educated and trained through attending seminars, training and continuous information on health and safety issues. However, it seems that there are no training practices to enhance participation in research and in group projects nor to improve the collaborative spirit.

Regarding avoidance of conflicts within the workplace, it does not seem to be an issue for the administration of the hospital. Furthermore, for some of the respondents, the administration itself is responsible for creating conflicts in the workplace. The management does not assign specific tasks to staff and does not create the right conditions for good cooperation, so there are conflicts and miscommunication between the employees. Therefore, the organizational culture of the hospital must change.

***Patients' attendants:*****Admission services:**

The hospitalization is always a critical process for the patient and their relatives, even more when the patient is a child or teenager.

The evaluation of admission services is particularly important, as these services are the first picture of the hospital's provided services. Possible delays in these processes worry the patient and may cause irritation of attendants, resulting in significant difficulties in working with the medical and nursing staff of the hospital. A warm environment that welcomes the patient predisposes the users positively for further cooperation. It is important for the patients to be serviced immediately without wasting time trying to find the right procedures. Additionally, the behavior of the admission staff can greatly affect the overall attitude of the attendant and the patient to the other hospital services.

This study assessed three dimensions that constitute the admission procedures for patients in the hospital: the provided information, the speed of service and the general attitude of the staff. The majority of attendants do not have good opinion regarding the admission procedures. This finding indicates that there is much room for improvement in this area. Indicators regarding the quality of communication consist of whether the attendants are familiar with the procedures to be followed, their possibility to communicate with a senior hospital employee for explaining specific circumstances, as well as the existence of information points in the hospital.

Regarding the speed of service, all attendants have very good impressions, but they suggest to reduce waiting times for admission to the hospital. To the admission to the hospital, basic steps are the registration of the procedures and time of the admission, the search of the causes that create problems and delays and ways to solve each problem individually, and possibly feedback on the waiting time.

The behavior of the employees appears to be one of the strongest points of the hospital regarding admission procedures. All attendants were satisfied with the overall attitude of the staff, which indicates that the staff made significant efforts to serve patients.

**Provided Services:**

The hospital product can be described as the result of a multifactorial process, each stage of which contribute in defining and evaluating the efficiency. According to Breyer (1987), those hospital activity indicators are usually categorized in relation to the production stage, the outcome of which is measured (Polyzos et al, 2005). The productive use of hospital resources increases the efficiency of services, ensuring excellent impact of health services on population health.

The improvement or at least the maintenance of the patients' level of health and the possibility of meeting the demand for hospital services, are important indicators in the total outcome evaluation. In this context, we asked respondents to rate specific aspects of hospital services, such as medical care, nursing care and administrative services.

The research assesses the medical care in the dimensions of information and response to disease. According to the results, the treatment of the disease is evaluated higher than providing information. The abilities and skills of human resources (scientific knowledge, experience and professionalism) are regarded as the most important feature of medical care for the treatment of disease. Respectively regarding information there are deficiencies and coordination problems.

Nursing care includes the dimensions of care, direct service, attitude / politeness and understanding / willingness. Through these dimensions, a holistic and individualized care tailored to the needs of the patient, is subjectively evaluated by the patient in accordance with the principles of nursing science and ethics. According to the results, the care and understanding / willingness are the main characteristics of nursing care in the hospital, which was positively evaluated by users of hospital services.

However, there is enough room for improvement which might be related to the need to recruit additional staff (nurses) to improve the levels of service. Also the satisfaction of hospital service users should be combined with the satisfaction of staff, as nurses are the ones who are in close and daily contact with patients; any dissatisfaction from their workplace has a direct impact on the patient .

Regarding the administration, the opinions are generally not good, because of problems related to staff shortages or deficiencies in general, which reduce significantly the quality of administrative services.

**General assessment of the services:**

According to the results, attendants were less satisfied with hospital services than what they expected. Evaluating hospital services before and after use, the final picture of the user is worse than expected. This finding indicates the existence of a deficit in the approach of the hospital users when they enter into it, but also in the hospital communication policy across society. What seems important regarding the patients' approach is that most users want detailed information for their problems. Patient satisfaction is directly related to "how" the service users will perceive the interest that the system "shows" for their problems.

Users also notice the low quality of the hospital infrastructure, observing serious deficiencies. However, human resources (personnel) of the hospital is positively evaluated by users of health services, which ultimately improves the overall image of the hospital. As shown by, the hospital infrastructure is the weak point in forming the final image of the attendants, while the human resources especially in nursing is one of the strong points of the hospital.

Finally, hospital users are generally satisfied with the hospital services. For this reason, all respondents would recommend the hospital to a friend with a similar problem.

**5. CONCLUSIONS**

In public hospitals, the importance of TQM and the continuous improvement of the quality are associated with the best response to the needs of citizens / customers, as well as more rational use of available resources in order to achieve increased productivity, efficiency and effectiveness. Therefore, there is reduction in operating costs, which is very important during recessions as the state is forced to cut health costs.

In conclusion, the quality of hospital services deviate from the expectations of patients. The perceived quality of hospital health services is below the expected quality that suits a public hospital. However, the problems can be divided into two

categories: the first category includes those arising from political and state decisions on public health, while the second category includes those which depend on the operation of the hospital's management.

The shortage of health workers covers all public hospitals in the country as a result of the current recruitment policy of the state apparatus, which in recent years has frozen these procedures because of the efforts of reducing public expenditure and health expenditure. Moreover, significant quality deficiencies are observed and logistics, are a phenomenon that also occurs in all public hospitals as a result of the financing of the state and of policy commissions of the competent central authorities for public hospitals and public health in general.

The shortage of health workers is common in all public hospitals in the country as a result of the current recruitment policy of the state apparatus, which in recent years has frozen these procedures because of the efforts of reducing public expenditure and health expenditure. Moreover, significant quality deficiencies in equipment and infrastructure are a phenomenon that also occurs in all public hospitals as a result of the reduced financing from the state. The problems arising from the operation of the hospital administration are mainly the responsiveness, the efficiency and the organization of human resources, which is the most valuable asset of any health unit.

A management method that is based on processes to achieve continuous improvement of hospital operation, through the monitoring and analysis of measurable results is suggested. This research can guide, the administration in order to improve the quality of the health services.

The TQM system achieves in the hospital:

- The adjustment of the policy and strategy of the hospital in current and future needs
- Administration and management based on facts and documented processes
- Continuous improvement based on measurable results
- The focus of the hospital workers on the demands and expectations of patients
- The continuous development of the hospital's human resources
- The effectiveness in achieving social work.

The continuous high quality health services focused on the patient / user is a necessity, according to the principles of TQM.

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