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Quality and Quantity Factors in the Mind of Hospital Decision Makers: A Framework Analysis

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Abstract

Background: Quantitative and qualitative factors are essential tools used by decision-makers to measure the effectiveness of their decisions. The present study was conducted with the aim of identifying key quantitative and qualitative factors for decision-making in a university teaching hospital.

Methods: In this qualitative study, interviews were conducted with 15 managers and physicians of hospitals, as well as top managers of the Mashhad University of Medical Sciences. The semi-structured interview guide was designed based on three in-depth interviews and the Newhouse model. The framework analysis and Atlas-Ti software were used to analyze the qualitative data.

Results: Eleven themes were identified (5 quantitative and 6 qualitative themes) as decision-making factors. Access to resources and where resources are consumed, Types, number of patients and efficiency of hospital facilities, employment and dismissal of employees, Optimal consumption of medical supplies and equipment, Maintenance of medical equipments, motivated and productive employees, perfect agent in the hospital-patient relationship, Evidence-based decision making, Organizational Commitment and Discipline, Reduce hospital complications, hospital's reputation.

Conclusion: These themes indicate that decision-makers mainly focus on specific factors in the quantitative and qualitative aspects of hospitals. By analyzing these factors, hospital decision-makers and policymakers can gain a better understanding of how hospital behavior is formed and identify areas for improvement.

Keywords: Decision makers, Organizational decision making, Teaching hospital, University Medical Center

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Introduction

In the field of hospital management, the measurement of performance is of paramount importance for the improvement of healthcare services. The performance of a healthcare organisation is frequently evaluated by a multitude of indicators, yet it is unfeasible to manage them all due to the limitation of resources (1). Quality and quantity indicators are employed to assess services provided by hospitals. These indicators encompass the dimensions of patient-centredness, effectiveness, efficiency, safety, financial, physical, patient experience, environmental, and functional (2, 3).

Hospital decision-makers play a pivotal role in the delivery of appropriate care, given their responsibility for decisions that affect the quality and quantity of services (4) Hospital decision-makers utilise both quality and quantity indicators to inform their decisions about resource allocation and service delivery, including the selection of patients, the quality of care or overtreatment, the containment of unnecessary costs and efficiency. For instance, if a hospital has a high bed occupancy rate but low patient satisfaction scores, decision-makers may allocate resources toward improving patient experience rather than

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Key Messages:

↑What is "already known" in this topic:

As evidenced by Newhouse's study, those responsible for decision-making within hospitals determine the hospital's behaviour by deciding on quantitative and qualitative indicators. In previous studies, a number of important indicators for hospital decision-making have been discussed, but not in exhaustive detail.

→What this article adds:

This study identifies the key quantitative and qualitative indicators for decision-making based on the opinions of hospital decision-makers, which can be used to determine hospital behaviour.

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increasing bed capacity (5). Therefore, the process of clustering indicators into shared categories is of fundamental importance in order to guarantee a systematic, reproducible, comparable, and universally shared evaluation (2).

In previous studies, a number of key indicators for decision-making in hospitals have been discussed. In Farrokhyar's study (6), the index of hospital special care beds distribution is identified, while in Kavosi's study (7), the service outsourcing index is specified. In his study, Sidin (8) identified a number of key indicators, including those related to human resources, management and organisation, equipment, facilities, and buildings. In Reofi's study (9), particular attention is paid to the following subject areas: governance and leadership, financing, human resources, technology, medicine, equipment, information systems, and service delivery. The study by Maleki (10) addresses the issue of reducing insurance deductions. In Ian Kirkpatrick's study (11), the following indicators are identified: allocation of resources, staff development, communication and priority setting, strategic decision-making, and quality and safety outcomes. In Waring's study (12), the following issues are addressed: increased care quality and safety, clinical involvement in healthcare management, governance responsibilities, volume and variety of clinical involvement. Similarly, in Waitzberg's study (5), the following indicators are discussed: selection of patients, quality of care or overtreatment, curbing unnecessary expenditures, and efficiency. Choi (13) presents a discussion on the quality of medical services, patient satisfaction, and hospital reputation.

The most significant challenge associated with the utilisation of quality and quantity factors in hospital decision-making is the identification of appropriate factors that accurately reflect the quality and quantity of healthcare services provided by hospitals. Previous research has devoted less attention to the pivotal factors in hospital decision-making.

Newhouse's model is a behavioural theory that defines the hospital's behaviour in two areas: quantity and quality. In each of these areas, it considers quantitative and qualitative indicators that are important to the hospital. The Newhouse model identifies three groups of decision-makers (doctors, managers and the board of directors) who make decisions by considering a level of quantity and quality indicators (14). Nevertheless, the model does not explicitly address the indicators employed in decision-making. Consequently, there is a knowledge gap in this regard. The objective of this qualitative study, based on the Newhouse Hospital Behaviour Model, was to gain a better understanding of the quantitative and qualitative key factors in decision-making in university teaching hospitals.

Methods

Setting

This Qualitative-exploratory study was conducted at Mashhad University of Medical Sciences. MUMS has 14 hospitals with almost 4148 beds. Out of this number, 13 hospitals are teaching (92.85% of total). Framework analysis is a hierarchical approach that is employed for the categorisation and organisation of data based on key themes, concepts and emergent classes (15). In this approach, in addition to data management, the researcher also deals with the descriptive and exploratory aspects of the research phenomenon (16).

Participants

Participants were selected using purposive and theory-based sampling methods (Newhouse model). Participants were selected from hospital managers (more than 5 years of managerial experience in a hospital), physicians (10 years of experience working in hospitals), and top management of Mashhad University of Medical Sciences (MUMS) (5 years of administrative experience in MUMS). Initially, a preliminary list of interviewees was prepared for each group, which was expanded using the snowball method. In the end, 15 people were interviewed, as data saturation was considered to have been reached (Table 1).

Data Sources

To gather data, the research team first developed an interview guide consisting of an introduction, main questions, and additional questions. The main questions were designed using an exploratory approach. The interview guide was refined multiple times during the study, based on the analysis of the interviews. The principal investigator HZ conducted all interviews. The main question of the interview was: When we talk about quality/quantity in the hospital, what do you think is important to you that decision making for that and do you make decisions for them? Either via phone or face-to-face approach before each

Table 1. Participants' demographic information

Demographic Variable		Number	Percentage
Gender	Female	2	13.33
	Male	13	86.67
Work experience	5-10	1	6.66
	11-20	7	46.67
	21-30	7	46.67
Job position	The hospital manager or head	6	40
	Hospital physician	5	33.33
	University managers	4	26.67
Education level	Bachelor degree	1	6.66
	PhD	2	13.33
	General Physician	4	26.68
	Specialist	2	13.33
	Sub-specialist	6	40

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interview, the study objectives to participants were explained. If the individual consented to participate in the study, a face-to-face appointment was arranged. All interviews were conducted and recorded at the participants' offices, with their permission, and lasted an average of 45 to 90 minutes. The interviews were conducted over a six-month period. The interviews were conducted until the point of information saturation, at which point no further information was forthcoming. Four supplementary interviews were conducted in instances where ambiguity or the emergence of a novel issue necessitated further inquiry.

Data Analysis

The 'framework analysis' method developed by Lacey was used for data analysis. This method consists of five steps of familiarization, identifying a thematic framework, indexing, charting, and mapping and interpretation (17). This approach is specifically designed for qualitative data analysis in policy-oriented studies. A contact and content summary form was developed for each interview during familiarization (18). The initial thematic framework was designed based on interviews, prior thoughts and literature (19), research questions, and a thematic guide. One of the researchers (HZ) initially indexed the transcribed interviews using Atlas-Ti software (19). Different sections of the data related to interviews were indexed based on thematic relationships through one or more codes. These codes were reviewed repeatedly by three members of the research group and were discussed for the final time in a session with all group members present. The viewpoints of the interviewees were compared for each issue using analytical tables. The relationships between themes and subthemes were also identified and analyzed. Whenever necessary, we referred to the implemented interviews and added relevant content to the analytical tables. In order to ensure the credibility of the study, the research group employed the criteria proposed by Guba and Lincoln (20), which include credibility, transferability, consistency or dependability, and confirmability. Various methods were used to increase data Credibility, such as allocating enough time, communicating and in-depth interviews with contributors, explaining the study objectives clearly, returning codes to contributors to verify their accuracy, and checking by supervisors. The next stage was the interpretation of the themes, which was conducted in a process similar to the indexing process described in the previous stage (18). The thematic framework was repeatedly reviewed and improved during the analysis process.

Results

The key quantitative and qualitative factors affecting decision-making in hospitals were identified in 11 main themes and 51 sub-groups (16 quantitative factors and 35 qualitative factors) (Table 2).

Theme I: Access to resources and where resources are consumed

The instability in financial resource provision poses limitations on hospital liquidity and can be mitigated by analyzing factors related to liquidity. Interviewees stated that "*One of our challenges in public hospitals is the shortages caused by cash*" (P1). Interviewees believed that insurance payments are effective in attracting money to the hospital. "*hospitals fail to meet insurance requirements and this leads to a shortage of funds to provide the necessary services*" (P10).

Participants expressed their views on prioritizing the allocation of financial resources, "*one important factor that I decide upon is the discussion of consumables in the hospital*" (P7). Participants highlighted that "*In public hospitals, the tariffs hardly match the expenses, making them unrealistic*" (P13).

Theme II: Types, number of patients, and efficiency of hospital facilities

Patient selection and hospital facility utilization are key concerns at the hospital level. Clarification of these factors will aid in improving healthcare delivery.

Interviewees stated that "*public hospitals have a significantly higher ratio of emergency patients to elective patients*" (P13).

The interviewees noted their opinion on the integration of hospital services, wherein they proposed "*the execution of novel and more lucrative tasks within hospitals*" (P2).

The interviewees involved in assessing healthcare volume stressed "*the importance of ensuring workload corresponds accurately to the number of patients or tasks being performed*" (P5).

Interviewees noted to increase in hospital facilities' efficiency "*The hospital's expenses significantly decreased because the night shift of the dialysis department was closed*" (P5).

Interviewees stated that "*we are responsible for decision-making related to the development of the physical area, encompassing renovation and reconstruction of hospital spaces*" (P7).

Theme III: Employment and dismissal of employees

Employment and dismissal policies in hospitals were highlighted by the participants in the study. "*Recruitment of personnel is a challenging task due to the hiring process*" (P13). Interviewees stated that "*upon entering the government system, employees are secured from being dismissed or demoted, leading managers to be constrained while handling their subordinates*" (P1).

Some respondents noted the limited autonomy in awarding staff rewards, stating: "*As a manager, I want to recognize and reward performance, which is cumbersome without full authority*" (P1) .

The interviewees reported outstanding employees' claims and stated that "*for 15 months, the ministry has not paid the hospital's technical right. Furthermore, professional right have been unpaid for several months*" (P14).

Theme IV: Optimal consumption of medical supplies and equipment

In the area of medical supplies and equipment consumption, interviewees stressed the significance of overseeing

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Table 2. The main themes and subgroups in decision-making in university teaching hospitals

Factor type	Themes	Subgroups
Quantity	Access to resources and where resources are consumed	Amount of cash
		Insurance reimbursement
		Prioritizing resource allocation
		Amount of donations
		Adapting the reimbursement to the cost
		Purchase of medical equipment
	Types, number of patients and efficiency of hospital facilities	Patient selection for hospitalization
		Variation of hospital services (scope)
		Higher level of hospital services (scale)
		The *efficiency* of care facilities
		Development of physical facilities for care
	Employment and dismissal of employees	Recruitment and firing of employees
		Employee compensation method
		Outstanding employee claims
	Optimal consumption of medical supplies	Optimal consumption of medical supplies and equipment
	Maintenance of medical equipment	Maintenance of medical equipment
Quality	Motivated and efficient employees	Employee welfare
		Match skills to occupations
		Recruitment
		Rewards and sanctions to employees
		Employee productivity
		Employee's health status
		Physician recruitment
	Perfect agent in the hospital-patient relationship	Patients disposed during 6-hour in emergency
		Irrational medicine prescription
		Supervision of clinical services
		Availability of medication and medical supplies for emergency
		Emergency capacity management
		Effectiveness of care procedures
		Visit length, quality, and satisfaction
	Evidence-based decision making	Selection of administrative level
		Selection of operational managers
		Analysis-based decision making
		Research development
	Organizational commitment and discipline	Organizational commitment
		Organizational discipline
	Reduce hospital complications	Hospital infection control
		Medical errors
	Hospital's reputation	Patient admission and discharge process
		Educational discipline
		Quality of basic amenities
		Hospital's beauty
		Access to hospital services
		Respect for dignity
		Number of complaints about hospital
		Going toward a smart hospital
		Brand of medical equipment
		Communication with the patient
		Food quality
		Quality of medical supplies
		Service delivery location

supplies and equipment. They noted that "*there are times when cost-reducing methods or methods to conserve raw materials must be utilized*" (P1). "*We presented the idea of doing something relevant to the doctor, given that the doctor performs a crucial role in cost increase and production*" (P13).

Theme V: Maintenance of medical equipments

A crucial aspect of delivering healthcare services to patients is the availability of reliable medical equipment. The significance of this notion has been highlighted by the contributors from a quantitative outlook. "*The shortage of oxygen generators during the COVID-19 pandemic compelled us to turn away patients on certain occasions*" (P8). Interviewees stated that "*continuous monitoring and periodic inspections and services were essential due to the rising equipment costs*" (P14).

Theme VI: Motivated and productive employees

Interviewees reported a lack of attention to employee welfare and stated that "*not much focus is given to this issue, despite facing a hundred percent inflation*" (P3). Regarding the Match skills to occupations, interviewees expressed that "*personnel should be trained and have sufficient skills commensurate with their department and patients*" (P10). In terms of attracting skilled personnel, interviewees explained that "*the method hinges on the rank of the staff, with the head of nursing jointly choosing*

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the nurse alongside the department head" (P12). The interviewees stated that "*we take actions regarding disciplinary measures and positive reinforcement*" (P10).

Within the domain of attracting and retaining skilled physicians, interviewees have emphasized: "*In our hospital, I have made a great effort to create a calm environment for professors, and to some extent, we have succeeded*" (P7).

Theme VII: Perfect agent in the hospital-patient relationship

Given the asymmetric flow of information between healthcare providers and patients, the status of the ideal hospital-patient relationship is crucial in delivering satisfactory healthcare services. The research reveals that emergency service provision and the availability of adequate facilities in this field are significant contributing factors.

"*It is expected that critically ill patients are examined by a physician promptly during emergencies*" (P1). "*The emergency department should have timely access to sufficient medication*" (P10).

The study findings have revealed subgroups which include irrational prescribing, effectiveness of therapeutic services, and supervision of clinical service delivery. "*When a patient visits a hospital, they are typically referred for two ultrasound scans. The first is performed by a resident, and a second scan by medical professionals*" (P8). "*Ensuring high-quality care is crucial, with department heads and relevant group managers serving as the primary decision-makers in this area*" (P7).

Theme VIII: Evidence-based decision making

The results of the study have shown that the decision-making process of managers with regard to the use of evidence in decision-making in relation to quality should be taken into account.

"*Someone who wants to lead these ten people has to have certain qualifications, work in a certain format, under certain conditions*" (P2). "*In most cases, the university decides on the selection of hospital managers, influential people, or department heads. Sometimes decisions are made by the university's head office or the deputy director of nursing*" (P7).

Regarding the development of research, the interviewees stated that "*research is particularly important in university hospitals*" (P14).

Theme IX: Organizational Commitment and Discipline

In the area of organizational commitment, respondents stated that "*at various levels in the University Hospital, it can almost be said that no one is committed to the hospital, except for a limited number of medical staff*" (P13). Interviewees complained about the lack of commitment from staff and referring patients outside the hospital. They said: "*There was the staff who delayed the patient's operation for various reasons so that they would get tired and send them to Dr. X who works in a private hospital* " (P1). In the area of organizational discipline, respondents stated that "*employees should know that the manager and the organization have a specific plan for the decisions of the organization and the hospital*" (P4).

Theme X: Reduce hospital complications

The status of control of hospital-acquired infections and the rate of medical errors are important factors in the evaluation of hospitals. The results of the current study also highlight these factors in the area of quality. "*Many people are involved in reducing infections in hospitals*" (P1). "*Patients who do not need to be admitted but are admitted to hospital are at risk of hospital-acquired infections*" (P5).

Theme XI: hospital's reputation

Consumers associate a hospital's reputation with the quality of healthcare provided. Reputation is composed of various elements (21).

In the domain of patient admittance and departure, interviewees have identified "*the processes involved to the patient includes admittance, diagnostic procedures, therapeutic interventions, discharge*" (P10).

Educational discipline has been recognized as a subgroup. "*The patient has abdominal pain, once the resident takes the history of the patient, once the intern takes the history*" (P8).

The findings of the study showed the responsiveness to non-clinical expectations of service recipients should be considered in the quality dimension: "*It is important to ensure that the sleeping arrangements and ventilation are suitable for the patients*" (P4). "*From a communication standpoint, I place great emphasis on establishing positive relationships with my patients and maintaining their respect*" (P3).

One participant stated that "*beautifying the hospital environment should be a priority*" (P4).

Concerning the trend towards intelligent healthcare facilities, respondents indicated that "*the implementation of software and information technology can help reduce expenses and address the problem of overcrowding*" (P11).

When considering where to deliver services, interviewees emphasized the significance of "*having a pharmacy and laboratory close to the emergency department for ensuring the appropriateness of the physical space*" (P10).

Discussion

This study presents a comprehensive framework that objectively describes the key quantitative and qualitative factors which impact decision-making in university teaching hospitals, from the perspective of decision-makers. Our research builds upon and references factors discussed in the NEWHOUSE article. Through our study, we identify 11 main factors divided into two categories: quantitative (5 factors) and qualitative (6 factors). We will now examine decision-making factors within university teaching hospitals from the viewpoint of decision-makers.

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Factors of quantity in decision-making in teaching hospitals

Based on the framework analysis conducted, and the perspective of key decision-makers, 5 priority factors were selected with a quantitative aspect for decision making in teaching hospitals. These five factors are as follows: Access to resources and where resources are consumed, type and number of patients and hospital facilities' efficiency, employment and dismissal of employees, optimal consumption of medical supplies, and maintenance of medical equipment.

Various studies have discussed prioritized factors in the "quantity-quality Newhouse model" which encompasses hospital costs, income, the number of hospitalized patients, and the length of stay. Comparing the present study with previous research, it is found that the factor for "Access to resources and where resources are consumed" is comparable to the factors of "hospital costs and hospital income." Similarly, the factor for "type, number of patients, and hospital facility efficiency" is comparable to the factor for "number of hospitalized patients and length of stay".

Harris (22) and Folland (23) raised pertinent factors for hospital decision-makers in this regard. These inputs to the hospital comprise beds and operating rooms, patient selection, service timing, equipment financing, consumables procurement and stocking, capacity utilization, and patient admission. Previous research has investigated significant factors for hospital decision-making, with a focus on quantitative factors. These have included financial resources and credit supply (10, 24), resource allocation (11), patient selection (5-6), service composition (12, 25), service volume (12), healthcare facility efficiency (5, 7), employment and dismissal of personnel (11, 25), consumable management (26, 27), and equipment (8, 9).

Factors of quality in decision-making in teaching hospitals

Based on the results of this study, key decision-makers identified 6 qualitative factors as a priority including motivated and productive employees, perfect agent in the hospital-patient relationship, evidence-based decision-making, organizational commitment and discipline, Reduce hospital complications, and the hospital's reputation.

The "quantity-quality model of Newhouse" has been discussed by various sources (23) as a way of understanding hospital behavior.

In these studies, priority qualitative factors for hospital decision-makers are discussed. These factors include the skills of physicians and nurses, the ratio of physicians to patients, the ratio of staff to patients, the hospital's therapeutic reputation, the quality of non-clinical services, the aesthetics of the hospital's physical structure, and the availability of diagnostic and care facilities (14, 23). A comparison of the aforementioned cases with the present study indicates that the matter of "motivated and efficient employees" is being scrutinized alongside the matter of "physicians' and nurses' skills". Furthermore, the "perfect agent in the hospital-patient relationship" encompasses "hospital care reputation, physician-patient ratio, and staff-patient ratio". The matter of the "hospital's reputation" is equivalent to the concerns regarding the quality of non-clinical services, the appeal of the hospital's physical structure, and the availability of diagnostic and therapeutic amenities within the hospital. Folland (23) and Doshmangir (24) identified important factors influencing hospital decision-makers, including hospital reputation, customer access or fixed facility, number of staff, staff-to-bed ratio, quality, honesty, product, and market structure. These factors align with the present study's findings. Other research has explored crucial decision-making matters in hospitals related to qualitative aspects, such as hospital reputation (13), human resources decision-making (8, 9), service quality (5, 11), or the quantity and quality of services (9, 25).

This study was conducted under specific limitations. To overcome these limitations, we compiled a preliminary list of key informants and employed snowball sampling to identify new participants. Furthermore, we standardized speech coding during interviews and carefully selected appropriate participants to minimize its negative impact. Also, we assured them of the confidentiality of their opinions.

Conclusion

The study has identified significant concerns regarding the quantitative and qualitative aspects of hospital activities. These concerns reveal that decision-makers concentrate primarily on particular areas in the quantitative and qualitative aspects of hospitals. For instance, understanding the funding factor, its allocation, the type factor, patient numbers, and medical facility efficiency assists the manager in making sound financial decisions, optimizing financial resources, and steering the hospital toward financial sustainability. The factors of Perfect agent in the hospital-patient relationship, Reduced hospital complications, and the Hospital's reputation assist the manager in assessing the quality of services offered by the hospital. This enables necessary improvements to be implemented in patient care and, subsequently, leads to increased patient satisfaction. The indices for motivated and efficient staff, employee recruitment and dismissal, organizational commitment, and evidence-based decision-making assist the manager in maximizing human resources, recognizing employee requirements, and enacting strategies and initiatives to retain and draw in effective personnel. The maintenance factor for medical equipment and the optimal factor for the consumption of medical supplies assist managers in enhancing healthcare technology and equipment and making sound decisions on future investments in these areas.

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Conflict of Interests

The authors declare that they have no competing interests.

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Authors' Contributions

HZN contributed to the conceptualization, methodology, data curation and manuscript review and editing. MY contributed to the conceptualization, methodology, data analysis and supervision. HE contributed to the conceptualization, methodology, project administration and manuscript review and editing. All authors read and approved the final manuscript.

Ethical Considerations

The manuscript states that the study had ethics approval from Mashhad University of Medical Sciences, code IR.MUMS.REC.1399.084, and that written informed consent was obtained from eligible participants who agreed to participate.

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Data Availability

The datasets used and/or analysed during the current study are available upon reasonable request.

AI Use Statement

The authors did not use artificial intelligence or AI-assisted technologies in the preparation of this manuscript.

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