Healthcare Management Practices and Pilgrim Satisfaction in a Hajj-Season Hospital: Mediation by Staff Training and Service Quality and Moderation by Pilgrimage-Specific Factors

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ABSTRACT:

This study investigated the integration of evidence-based samples of staff and pilgrim perspectives on the integration of healthcare management practices at a Hajj-season tertiary hospital to patient satisfaction. The study employed a cross sectional, dual sample design in the 2026 season at King Salman bin Abdulaziz Medical City, Madinah, Saudi Arabia. A 200 clinical and administrative staff completed an instrument measuring management practices, staff training, service quality and staff perceived satisfaction. A multilingual service quality measure was completed by three hundred and eighty-four pilgrims, which included measures of perceived service quality, level of pilgrim satisfaction, and four pilgrimage-specific moderators: cultural-linguistic competence, religious sensitivity, information accessibility, and surge-capacity management. Partial least squares (PLS) structural equation modeling was used to estimate the model and bootstrapped indirect effects were calculated, along with a two-stage approach to interaction terms. The reliability and validity of all constructs were consistent with convention. For the staff sample, management practices accounted for the training and service quality and the mediators accounted for 76.6 percent of the management effect on the satisfaction, resulting in a partial complementarity. In the pilgrim sample, service quality was a significant predictor of satisfaction, while three of four pilgrimage-specific factors enhanced this association, but surge-capacity management did not. The most important, but lowest-scoring, feature of the pilgrimage was information accessibility, which was also the most practical. The results suggest that management practices were achieved through the service process and that pilgrim satisfaction was dependent upon service to meet cultural, religious and informational needs.

Keywords: patient satisfaction; healthcare management; service quality; mediation; moderation; Hajj; Saudi Arabia

Introduction

Satisfaction is increasingly becoming a key indicator of health-system performance globally, and has moved from a secondary focus to a primary one. The patient experience and quality of care is explicitly included as a national objective in Saudi Vision 2030 in the Kingdom of Saudi Arabia (Kingdom of Saudi Arabia, 2016; Kingdom of Saudi Arabia, Ministry of Health, 2024). For hospitals to reach these goals, they must continually position their operations strategy around a patient-centered care model. But non-routine, high-pressure situations such as hospitals when it comes to serving the annual Hajj and Umrah pilgrimages severely test the capacity of a health system to make good on these pledges.

King Salman bin Abdulaziz Medical City (KSAMC) is a pivotal point in this medical system for mass-gatherings in Madinah. The vast numbers of pilgrims that visit the hospital during the two seasons of pilgrimage are highly diverse and multilingual. There are very high peaks of patient demand, placing exceptional strain on clinical and administrative resources (Hick et al., 2010). In mass gathering medicine, the impact of management decisions is usually immediately apparent, as the hospital has to manage the emergency response while maintaining the quality of the care encounter in its daily operations (Memish et al., 2019). Under heavy surge situations, hospital administrators need to make quick and critical decisions about resource distribution, coordination of operations, and staffing. The key issue that this study asks is how these high-level management decisions affect the satisfaction of visitors to the site receiving care under such unusual conditions.

Although there has been significant research on service quality and patient satisfaction in the conventional hospital setting (Al-Borie & Damanhouri, 2013; Naidu, 2009; Parasuraman et al., 1988), little work has been done on the mechanisms and contextual conditions that stimulate the relationship between service quality and patient satisfaction in mass gatherings. Patient satisfaction is not directly affected by management practices, but is mediated by intermediate organizational processes. Moreover, within the framework of a pilgrimage, the perception of caring is not determined only by clinical outcomes, but rather by specific cultural, linguistic, religious and informational filters that are unique to the pilgrimage. (Campinha-Bacote, 2002; Padela et al., 2012).

To portray this complexity, the present study uses a dual sample design, which considers the care ecosystem from two converging perspectives. Staff side, the study looks at the upstream-to-outcome mechanism: that is, do intervening processes (staff training and service quality) mediate the relationship between satisfaction and the outcome or are they distinct from it, and can be measured? On the pilgrim side, the study focuses on the downstream conditional relationship (whether the relationship between perceived service quality and pilgrim satisfaction is moderated by the cultural-linguistic competence, religious sensitivity in care, information accessibility and surge-capacity management of the pilgrim).

Combined design: The design was created by merging the evidence that came from the healthcare providers and the pilgrims to get a 360-degree view of the same issue. It transcends the associative description of the management and clearly describes how it is transmitted to the patient, and what is unique in the environment which affects the intensity with which the care is experienced and appreciated by the pilgrim.

Research Problem

Evidence from the Saudi hospitals has looked at service quality, the ability of the workforce and patients' satisfaction, but most have used a one-sample design which describes association rather than modelling the mechanism by which management relates to the patient. Moreover, hospitals that cater to the pilgrimage are located in the domain of mass gathering medicine, which has already tackled risk and emergency response more than the quality of the care encounter from the pilgrim side. The main research problem is the insubstantiality of the relationship between the integrated mechanism understanding, which

is the role of training and service quality in the staff dimension of the relationship of management effect to satisfaction, and whether the service-quality-to-satisfaction relationship in the pilgrim dimension is conditional on some pilgrim-related factors.

Hypotheses

Based on the theoretical framework and the structural model proposed, the following hypotheses are formulated:

- **H1:** Healthcare management practices have a significant positive effect on staff training.
- **H2:** Healthcare management practices have a significant positive effect on service quality.
- **H3:** Staff training has a significant positive effect on service quality.
- **H4:** Staff training and service quality significantly mediate the relationship between healthcare management practices and staff-perceived patient satisfaction.
- **H5:** Pilgrim-perceived service quality has a significant positive effect on pilgrim satisfaction.
- **H6:** Pilgrimage-specific factors (cultural-linguistic competence, religious sensitivity, information accessibility, and surge-capacity management) significantly moderate the relationship between perceived service quality and pilgrim satisfaction.

Research Objectives

1. To examine the mechanism by which healthcare management practices affect patient satisfaction through the mediating roles of staff training and service quality.

2. To investigate whether the relationship between perceived service quality and pilgrim satisfaction is conditional (moderated) by pilgrimage-specific factors.

3. To identify actionable areas for improving the pilgrim experience in Hajj-season hospitals.

Significance of the Study

This study brings the service-quality to satisfaction relationship established in patient populations in general to the pilgrimage context, which is unique and has not been quantified as thoroughly as in general populations. The study not only demonstrates that information access is the least effective part of the current experience, it also shows that it is also a critical dependency for the ROI of service quality – it is not just a side issue to be addressed. In practice, it enables hospital leaders to have a clear direction to ensure that upstream management choices align with the patient-experienced quality in the event of mass gatherings or crisis conditions, thereby contributing directly to the objectives of Saudi Vision 2030.

Study Limitations

1. **Cross-sectional design:** The paths describe associations rather than strict temporal sequences.

2. **Unlinked dual samples:** The staff and pilgrim models are parallel; their convergence is treated as triangulation rather than a single integrated participant-level model.

3. **Single-site context:** The estimates describe one hospital during one season, meaning multi-site replication is necessary to generalize the findings.

Definitions of Key Terms

- **Healthcare Management Practices:** The structural and operational decisions made by hospital administration, encompassing strategic management, operational coordination, resource allocation, and quality governance.
- **Service Quality:** The evaluation of the hospital's service delivery across five dimensions: tangibles, reliability, responsiveness, assurance, and empathy (based on the SERVQUAL model).
- **Pilgrimage-Specific Factors:** Contextual elements unique to the Hajj/Umrah environment, specifically cultural-linguistic competence, religious sensitivity in care, information accessibility, and surge-capacity management.

- **Mediation:** The mechanism through which an independent variable (management practices) influences a dependent variable (satisfaction) via an intervening variable (training or service quality).
- **Moderation:** A condition where the strength or direction of the relationship between two variables (service quality and satisfaction) changes depending on the level of a third variable (e.g., information accessibility).

Theoretical Framework and Literature Review

This study exists at the interface of three areas of literature, but all of these are complimentary and distinct from each other: healthcare quality management, human capital and training evaluation, and cross-cultural care in mass-gathering medicine. The study brings together these domains, creating a dual perspective approach to understanding the internal organizational mechanisms (staff side) and the external contextual factors (pilgrim side) that underpin patient satisfaction in a high pressure environment of the hospital.

Theoretical Framework: Structure-Process-Outcome and Human Capital Theories

The basic framework of this study is based on Donabedian's (1988) triad of structure-process-outcome for evaluating healthcare quality. Structure is defined as the organizational and managerial arrangements (e.g., methods of healthcare management, resources made available); process as the provision of healthcare services, in terms of the quality of care provided, and the interactions between staff and patients (e.g., training of staff, application of training in the provision of service); and outcome as the final effects on the patient (e.g., level of satisfaction). Donabedian's logic suggests that structural management choices have only indirect impact on patient outcomes, via numerous intervening operational processes.

To complement this, the study is based on the Resource Based View (RBV) of the firm (Barney, 1991; Wernerfelt, 1984) and Human Capital Theory (Becker, 1964). These theories place staff training not only as a cost but as an important tool for helping organisations turn human resource investment into real organisational capability and performance. The management practices (structure) invest in the training of staff (human capital development) which results in better quality of the work force, which in turn leads to improved service quality (process) resulting in improved patient satisfaction (outcome) in a hospital during the Hajj season.

Healthcare Management Practices and Service Quality

In the public-service and health-care literatures, there is ample evidence on the connection between healthcare management and service quality. Organizational performance and service excellence (Boyne, 2003; Walshe & Smith, 2016) are driven largely by effective management practices including strategic leadership, operational coordination and quality governance. The leadership and management styles have a significant impact on the level of staff morale, the efficiency of the work process and ultimately the quality of care provided (Aboshaiqah et al., 2014).

Service quality, which is often assessed by the SERVQUAL dimensions of tangibles, reliability, responsiveness, assurance and empathy (Parasuraman et al., 1988), is a good indicator of patient satisfaction (Cronin & Taylor, 1992; Naidu, 2009). The scale has been extensively validated for use in hospitals (Babakus & Mangold, 1992). In the Kingdom of Saudi Arabia, empirical research has consistently shown that perceived service quality has been identified as an important factor impacting patient satisfaction in healthcare services ranging from primary to tertiary care (Al-Borie & Damanhouri, 2013; Almoajel et al., 2014; Ghazwani & Sirelkhatim, 2019). These studies, however, provide a strong association between management, service quality and satisfaction, but these factors are typically regarded as being associated directly without examining the intervening factors.

The Mediating Role of Staff Training

Management determines the direction and it's the employee that is the one implementing the service encounter. Training-evaluation

frameworks provide the theoretical underpinnings for the understanding of the relationship between training and transfer of training (Goldstein & Ford, 2002; Kirkpatrick & Kirkpatrick, 2006). Training helps to equip clinical and administrative staff with the ability to handle complex patient needs and directly improve perceived service quality. Moreover, the patients' satisfaction can be directly affected by their trust and empathy that can be facilitated by well-trained staff members (Al-Ahmadi, 2009).

Although literature has highlighted the significance of HRD in the healthcare sector in Saudi Arabia (Al-Hanawi et al., 2019), the majority of studies have been based on single-sample designs which only describe association but do not model the association between HRD in the management system and patient satisfaction in the service system through training. To remedy this, this study takes the complementary role of staff training and service quality at the management-satisfaction link.

Cross-Cultural Care and Pilgrimage-Specific Moderators

Assessment of healthcare from the pilgrim's point of view is not just a clinical calculation, it is a cultural, linguistic and religious construct. The theory of cross-cultural care suggests that cultural competence and cultural humble, which occur at the point of care, are what influence whether the clinical services received are respectful and responsive (Campinha-Bacote, 2002; Tervalon & Murray-García, 1998; Like, 2011). Religious accommodation like respecting prayer times, dietary restrictions and modesty requirements has been shown to be a crucial aspect of comprehensive care for Muslim groups in particular (Padela et al., 2012). During the special period of the Hajj and the Umrah, pilgrims come from all over the world and have different cultural and linguistic expectations. Thus, cultural-linguistic competence, religious sensitivity in care and information accessibility are important moderators. They are not just background demographics, they also influence the quality of the relationship between the objective quality of the service offered by the hospital and the degree of satisfaction experienced by the pilgrim. The positive relationship between service quality and satisfaction is stronger if it is provided in an culturally and religiously sensitive way.

Mass-Gathering Medicine and the Research Gap

The hospitals that provide services to the pilgrimage are part of a specialty known as mass-gathering medicine (Memish et al., 2019). Traditionally, epidemiology, emergency response and infrastructure surge-capacity management (Hick et al., 2010) have been emphasized in this discipline. Surge-capacity management is definitely a precondition for care to be maintained in an extreme surge of volume but, from a pilgrim's subjective perspective, the literature largely neglects the quality of the care encounter in day-to-day experience.

The fundamental research gap this study sought to fill was the lack of a mechanism model that integrates both perspectives, i.e., machine and human. The extent of the management impact on satisfaction is less clear when performed through the staff side's training and service quality, and the conditions under which the service-quality-to-satisfaction relationship are performed on the pilgrim side is also not known. The dual sample design approach used in this study brings in a way to connect internal management aspects with the experience of the pilgrim in the extraordinarily challenging environment of mass-gathering medicine, which is not possible in mon-sample studies.

Method

Research Methodology

Design and Setting

The study design was a cross sectional, dual sample, quantitative method to address the provider and receiver perspectives in the same healthcare ecosystem. The study was carried out in King Salman bin Abdulaziz Medical City (KSAMC) in Madinah, Saudi Arabia, during the high demand period of Umrah and Hajj in 2026. The KSAMC is a principal tertiary level hospital, Mass Gathering Response Hospital and also

offers comprehensive outpatient, inpatient, Emergency and specialized pilgrimage health services. This study was reported following Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cross sectional studies. The dual-sample approach was purposefully selected to overcome the multi-stakeholder nature of mass-gathering medicine: to test a mediation model (staff perspective) and a moderation model (pilgrim perspective) in the same high-pressure operational context.

Sampling and Participants

Target Population: The target population included clinical staff and administrative staff who delivered or facilitated direct care to pilgrims during the data collection time period. The purposive sampling technique was used to ensure that the participants had first-hand experience of the surge conditions of the pilgrimage season. Twenty hundred staff took part in the final sample. The demographic makeup of the hospital was very representative of the hospital's workforce with 64% female, with the professional breakdown consisting of nurses (41%), physicians, allied health professions, pharmacists, administrative and support staff. Besides, 61.5% of them were of Saudi citizenship, and 78.5% had previous experience working during the Hajj season, which brought the staff perspectives in line with the relevant context. The sample size of 200 was considered to meet the "10-times rule," and was sufficient for the statistical power of the complex model used in the study, which is Partial Least Squares Structural Equation Modeling (PLS-SEM) (Hair et al., 2022).

Pilgrim Sample: People who were cared for at KSAMC during the study. Adults (age 18 and up) who had finished their clinical encounter, and who were able to give informed consent were included. The last sample of the pilgrims was 384 individuals. Demographically, 50.3% were female. In terms of religious composition, there were 233 pilgrims who were performing Umrah and 151 pilgrims who were performing Hajj, 66.4% from whom were for the first time. The cohort was quite diverse with the biggest national group coming from Saudi Arabia, Pakistan, Indonesia, India and Egypt. The instrument was translated into five languages so as to ensure inclusivity at which 97.8% of the respondents were covered. The two samples (staff and pilgrims) were completely independent of each other and were not connected through a participant key so that the analysis is performed as two parallel models.Instruments and Measures

All constructs were measured using five-point Likert agreement scales (ranging from 1 = Strongly Disagree to 5 = Strongly Agree).

Staff Instrument: The staff questionnaire measured four primary constructs. Healthcare management practices were assessed using 16 items distributed across four sub-dimensions: strategic management, operational coordination, resource allocation, and quality governance. Staff training was measured using 10 items evaluating the relevance, transfer, and adequacy of training, aligning with established training-evaluation frameworks (Goldstein & Ford, 2002; Kirkpatrick & Kirkpatrick, 2006). Service quality was evaluated using 15 items adapted from the validated SERVQUAL instrument, covering the five core dimensions: tangibles, reliability, responsiveness, assurance, and empathy (Parasuraman et al., 1988; Babakus & Mangold, 1992). Finally, staff-perceived patient satisfaction was measured using 4 items. This was treated strictly as a proxy for the downstream construct in the management mechanism, rather than a substitute for actual pilgrim-reported satisfaction.

Pilgrim Instrument: The pilgrim questionnaire measured perceived service quality (10 items) and pilgrim satisfaction (4 items). Crucially, it also measured four pilgrimage-specific contextual constructs: cultural-linguistic competence (3 items), religious sensitivity in care (3 items), information accessibility (3 items), and surge-capacity management (1 global item assessing overall crowd and resource flow).

Translation and Cultural Adaptation: Given the multilingual nature of the pilgrim sample, a rigorous forward and back-translation protocol was followed to ensure conceptual equivalence

across languages (Brislin, 1970). Bilingual healthcare experts translated the instruments into Urdu, Bahasa Indonesia, Hindi, and Arabic, followed by an independent back-translation into English. Discrepancies were resolved through committee consensus. A pilot test was conducted with 30 staff and 30 pilgrims to ensure clarity, cultural appropriateness, and readability before full deployment.

Data Collection Procedure

The data were collected in synchrony with the peak operational days of the 2026 season to get a true sense of surge. Staff surveys were sent electronically using secure hospital tablets at a time that would not interfere with clinical work. Paper-based multilingual booklets were used to conduct the pilgrim surveys in waiting rooms and post-discharge lounges, with trained research aides that spoke multiple languages, who were bilingual and trained to explain questions without influencing the answers.

Data Analysis

The two models were estimated using the method of Partial Least Squares Structural Equation Modeling (PLS-SEM) by SmartPLS software. PLS-SEM was chosen instead of covariance-based SEM for the following reasons: (1) highly appropriate for complex predictive models with multiple constructs, (2) robust to non-normal agreement-scale data, and (3) suitable for exploratory and theory-building research contexts (Hair et al., 2022).

The analysis was conducted in two steps. The measurement model was first evaluated to ensure reliability and validity. Cronbach's alpha and Composite Reliability (CR) were used to evaluate the internal consistency. The Average Variance Extracted (AVE) was greater than 0.50, in order to confirm the convergent validity. To ensure that the measures are discriminating, both the criterion suggested by Fornell and Larcker (1981) and the more stringent heterotrait-monotrait ratio (HTMT) criterion of Henseler et al. (2015) were both satisfied, with the HTMT values all being below the conservative HTMT threshold of 0.85.

Secondly, the structural model was evaluated. Indirect effects were tested for the staff mediation model using a bootstrapping procedure with 5,000 subsamples to obtain robust 95% confidence intervals. The variance accounted for (VAF) was computed to measure the mediated effect of the total effect (Tucker & Adams, 2001). In the pilgrim moderation model, interaction terms were tested in two stages to avoid potential multicollinearity problems and the practical significance of the interaction effects was assessed using effect sizes (f2f2) (Dawson, 2014).**Ethical Considerations**

The study was approved and granted full ethical clearance by the Lincoln University College Ethics Committee (LUC/DVCECA/23042026/019, 23 April 2026) and the KSAMC Local Research Ethics Committee (log 2026-4-1-K-064, 27 April 2026; National Committee of Bioethics registration H-03-M-111). There were no compulsory or non-compulsory elements of the participation and anonymity were maintained. All staff and all pilgrims who have the ability to read and write have signed informed consent forms. Witnessed thumbprint consent was used for those with limited literacy, and a verbal explanation of the study in their native language was provided. There was an explanation of the participant's right to leave the program at any time without any impact on service or employment. The data were collected and kept on secure, encrypted servers, to which only the main research team had access and had their own password.

Finding

Measurement Model

All constructs met conventional measurement standards across both samples. Cronbach's alpha ranged from .712 to .926, composite reliability from .839 to .938, and average variance extracted from .575 to .755. Discriminant validity held: all heterotrait-monotrait ratios were below .85, and each construct's square root of average variance extracted exceeded its inter-construct correlations. Mean staff agreement was moderate to high (management practices 3.77; staff training 3.89; service quality 3.87; staff-perceived

satisfaction 3.82). Among the pilgrimage-specific constructs in the pilgrim sample, religious sensitivity scored highest (mean 4.15) and information accessibility lowest (mean 3.57), with the widest dispersion.

Staff Model: Mediation

Table 1 summarises the staff structural model. Management practices predicted staff training (β = .579, t = 10.12) and service quality (β = .628, t = 15.01). Staff training predicted service quality weakly but significantly (β = .137, p = .044). Training (β = .338) and service quality (β = .402) both predicted satisfaction. The model explained 33.5% of variance in training, 39.4% in service quality, and 51.6% in satisfaction. Both indirect paths were significant: through training, β = .195 (95% CI [.125, .277]); through service quality, β = .252 (95% CI [.177, .340]). The mediators carried 76.6% of the total management effect, a pattern of complementary partial mediation.

Table 1 Staff model: structural paths and mediation (n = 200)

Path	Estimate	Result
Management → Staff training	β = .579, t = 10.12	Supported
Management → Service quality	β = .628, t = 15.01	Supported
Staff training → Service quality	β = .137, p = .044	Supported (marginal)
Staff training → Satisfaction	β = .338	Supported
Service quality → Satisfaction	β = .402	Supported
Indirect via staff training	β = .195 (.125–.277)	Supported
Indirect via service quality	β = .252 (.177–.340)	Supported
Mediated share (VAF)	76.6%	Partial mediation

Pilgrim Model: Direct Effect and Moderation

Pilgrim-perceived service quality predicted pilgrim satisfaction (β = .464, t = 10.46), explaining 21.5% of variance. Table 2 reports the moderation tests. Three of the four moderators were significant. Cultural-linguistic competence (β = .250, f^2 = .107), religious sensitivity (β = .242, f^2 = .101), and information accessibility (β = .241, f^2 = .090) each strengthened the relationship between service quality and satisfaction. Surge-capacity management did not (β = −.031, p = .548). The three significant interactions were of similar, modest magnitude, and they shared a common character: each was a condition of how care was received rather than a feature of the clinical service itself.

Table 2 Pilgrim model: moderation of the service-quality → satisfaction path (n = 384)

Moderator	Interaction	Result
Cultural-Linguistic Competence	β = .250, f^2 = .107	Supported
Religious Sensitivity in Care	β = .242, f^2 = .101	Supported
Information Accessibility	β = .241, f^2 = .090	Supported
Surge-Capacity Management	β = −.031, p = .548	Not supported

Discussion

Both parts of the study indicate the same picture at different angles. There was a high degree of indirect management impact on satisfaction, with about three-quarters of this impact coming through staff training and service quality. For a hospital, this was the lever – management mostly by improving the service process, and to a lesser degree the training that was used during the service process. This pattern of logic was in harmony with Donabedian's (1988) logic of structure/process/outcome, and with the evidence of management practice affecting outcomes in public-service and healthcare organisations (Mosadeghrad, 2014; Boyne, 2003; Walshe & Smith, 2016). The conditional relationship between service quality and satisfaction was found on the pilgrim side. Satisfaction was greater with the same clinical service when provided with cultural and linguistic competence, when provided with religious sensitivity, and when the information was accessible. These were not background factors, but rather they determined the amount of benefit a pilgrim received from receiving care. The finding was able to extend the relationship between service quality and satisfaction for general patients (Naidu, 2009; Tucker & Adams, 2001) into the pilgrimage context and provided empirical evidence for cross-cultural care theory in a context where rarely is it quantified (Campinha-Bacote, 2002; Tervalon & Murray-García, 1998; Like, 2011). The most actionable finding was that information accessibility had the greatest impact on satisfaction and the lowest score for all factors associated with the pilgrimage. The area with the most potential for improvement was also one that would have an impact on the return; this meant that information and communication was identified as a priority for action, not a side issue. The model for the staff side was weakest linking training to service quality. The gains to service quality were much less from training than from management, so at this site gains to service quality were more likely to be achieved through decisions on operations and resources than through training alone. Nevertheless, training under surge conditions had an immediate impact on satisfaction and continued to be the main mechanism through which workforce capabilities are developed (Becker, 1964; Goldstein & Ford, 2002; Al-Ahmadi, 2009) and was identified as a supporting lever. Surge-capacity management didn't moderate the pilgrim relationship. The most likely interpretation is that surge capacity is an antecedent condition, not an amplifier: the lack of capacity leads to a deterioration of service quality, which does not affect the slope of the service quality relationship with satisfaction. This is consistent with the mass gathering health literature which views surge capacity as a prerequisite for the maintenance of health care during periods of high mass influx (Memish et al., 2019; Hick et al., 2010). These claims were limited by three restrictions. First, the design was cross-sectional, so that the paths were not indicative of temporal sequence, but instead association. Second, the two samples were not tied to the same participants – the staff model and the pilgrim model are parallel, with the convergence of the relationship between service quality and satisfaction being considered as a triangulation. Thirdly, the study was single-site; further research is warranted that replicates the findings across multiple sites. The instruments used in this study are bilingual and multilingual, the sampling is stratified, and the reporting is conservative, which helps bring the study closer to the Saudi tertiary-hospital context (Al-Hanawi et al., 2019).

Conclusion

This study was able to successfully map the journey from upstream healthcare management to downstream pilgrim satisfaction in the extreme operational setting of a tertiary hospital during the Hajj season. The research used a dual-sample design to offer a 360-degree perspective of the care ecosystem and showed that managing practices doesn't impact patient satisfaction in isolation. The role of the indirect effects of the management was overwhelming from the staff perspective, with about 75% of the effects mediated via staff training and, most prominently, service quality. This finding indicates that, under mass-gathering surge conditions, management means optimizing the

service process and operational workflows, not by direct, unmediated means.

The study showed that pilgrim's value for high service quality is much dependent on the situation, or as seen from the pilgrim point of view. This clinical service demonstrated the highest levels of satisfaction in a culturally-linguistically competent and culturally-different environment and with a high level of religious sensitivity and information. Most importantly, management of surge capacity was identified as a core precondition to care instead of a moderating amplifier. The most pertinent conclusion that could be drawn from this two-way view is the importance of information accessibility. It is the lowest-scoring aspect of the pilgrimage experience and the most important moderator of satisfaction, making it the best opportunity for immediate management intervention.

Theoretically this study is an extension of Donabedian's (1988) structure-process-outcome framework as validated in the context of the non-routine, high-pressure environment of mass gathering medicine in order to explain the mechanisms of quality. In addition, it's a rare empirical quantification of cross-cultural care theory (Campinha-Bacote, 2002; Tervalon & Murray-García, 1998) in a pilgrimage context. The study illustrates the importance of cultural and religious accommodations as important moderators, and that they are not just "soft skills" on the edges, but key factors that will influence the return on investment for enhancing service quality.

The results provide a clear evidence-based roadmap for hospital administrators gearing up for pilgrimage season. First, the investments that hospitals can make in information accessibility, including using multilingual digital signage, real-time translation technologies and clear, culturally responsive patient navigation guides at the point of care, need to be made a priority. Secondly, management should emphasize operational and resource decisions that directly improve the service process; training is more effective at improving service quality during a surge than operational or resource decisions are. Third, culturally and religiously appropriate care needs to be part of routine practice and not be done on an ad hoc basis, as part of routine practice and as part of clinical care. In order to achieve these macro-level goals for patient experience and quality of care, which are part of Saudi Vision 2030 (Kingdom of Saudi Arabia, 2016; Kingdom of Saudi Arabia, Ministry of Health, 2024), it is necessary to implement these micro-level operational improvements.

This study has shed light upon the current understanding, however, it is limited in scope and has suggested some avenues for further investigation. The cross-sectional design is limited to observing associations at one point in time, and further research using longitudinal designs is needed to better observe the dynamic effects of management interventions on satisfaction over time, in the context of the pilgrimage surge. Moreover, the single site context restricts the generalizability of the findings and results of the study; it is recommended to replicate the study in other major hospitals that receive pilgrims in Makkah and Madinah. Lastly, since the samples from staff and pilgrim were independent, parallel models were used for the analysis. Future studies should employ linked, dyadic data (which would link specific healthcare providers to specific pilgrims treated by those providers) to examine these mediation and moderation pathways in one, integrated structural model. Nevertheless, this study does offer a ground-level, empirically based knowledge of healthcare management during the extraordinary circumstances of mass gathering medicine and will inform the science of healthcare delivery, as well as the experience of the pilgrim.

Author Contribution Statement

Rayan Talat Karali (RTK): Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Writing – Original Draft, Writing – Review & Editing, Visualization, Validation. Farra Aidah Jumuddin (FAJ): Supervision, Conceptualization, Methodology, Writing – Review & Editing, Validation. Both authors read and approved the final manuscript

and take responsibility for the content of the publication.

Conflict of Interest

The authors declare no conflict of interest.

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Declaration of Generative AI and AI-assisted Technologies in the Writing Process

During the preparation of this work the authors used a generative AI assistant to improve the language, clarity, readability and structure of the manuscript and to assist with formatting and reference styling. After using this tool the authors reviewed and edited the content and take full responsibility for the content of the publication. The study design, data collection, statistical analysis, interpretation of results and all scholarly conclusions are the authors' own.

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