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Perceived Healthcare Service Quality and Patient Satisfaction at Al-Jumhouri Hospital Authority in Hajjah, Yemen: A Cross-Sectional Study

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Abstract

Background: *Patient feedback can inform service management in hospitals operating with constrained resources. This study assessed perceived healthcare service quality and patient satisfaction at Al-Jumhouri Hospital Authority in Hajjah, Yemen.*

Methods: *A cross-sectional questionnaire survey was conducted across internal medicine, surgery, emergency, and outpatient services from January 1 to March 5, 2026. Of 536 questionnaires received, 496 were analyzed. Quality and satisfaction scores used a 1–5 scale. Correlation, regression, screening sensitivity analyses, and exploratory measurement checks were performed.*

Results: *Mean quality was 4.05 (SD 0.54) and satisfaction 4.04 (SD 0.60). Responsiveness had the lowest domain mean. Quality and satisfaction were strongly associated (r = 0.934; 95% CI 0.922–0.944). Reinstating 23 response-pattern exclusions yielded r = 0.937 (95% CI 0.925–0.946; n = 519). The heterotrait–monotrait ratio was 1.009 (95% bootstrap CI 0.998–1.023), indicating overlapping item sets.*

Conclusion: *The findings provide a patient-reported departmental baseline and identify communication and timeliness as practical areas for service review. The association should be interpreted in the context of the shared questionnaire content.*

Keywords: *healthcare service quality, patient satisfaction, hospital administration, patient experience, cross-sectional study, Yemen.*

1. Introduction

Patients' evaluations provide information about how healthcare is delivered, including interactions with staff, access to services, and timeliness. These evaluations complement assessments of the structure, processes, and outcomes of care (Donabedian, 1988). Perceived service quality concerns judgments about attributes of care, whereas satisfaction reflects a broader appraisal of the care received, expectations, and patient characteristics (Batbaatar et al., 2017; Cronin & Taylor, 1992). Examining both can help hospital administrators connect patients' overall evaluations with specific features of service delivery.

In Yemen, conflict has disrupted health service delivery and fragmented health system governance (Dureab et al., 2021; Qirbi & Ismail, 2017). The World Health Organization has documented initiatives to improve quality and patient safety and mapped health facilities' operational status and resource availability (World Health Organization, 2023; World Health Organization Regional Office for the Eastern Mediterranean, 2023). Patient perspectives add information about day-to-day care to this wider picture of service capacity. Evidence from routine hospital departments is therefore relevant to understanding how patients experience care within these conditions.

Previous studies have examined inpatient satisfaction in public and private hospitals in Sana'a (Alemad, 2012) and the relationship between perceived quality and satisfaction in Qatar using SERVQUAL (Alrwashdh & Alishaq, 2023). A more recent study of public facilities in Yemen identified gaps between the importance and performance of service attributes from patient and provider perspectives (Hyzam et al., 2026). Together, these studies show the value of examining patient evaluations within the settings in which services are organized.

Departmental profiles can complement facility-level assessments by locating reported experiences within different points of hospital care.

The present study assessed perceived healthcare service quality and patient satisfaction across internal medicine, surgery, emergency, and outpatient services at Al-Jumhouri Hospital Authority in Hajjah. It described overall and domain-specific quality scores, characterized satisfaction, and estimated the association between the two scores. Secondary analyses examined departmental profiles, adjustment for participant characteristics, and sensitivity to scoring and questionnaire screening.

The study contributes a patient-reported baseline from four services within a Yemeni public hospital. Its administrative value lies in linking overall evaluations with identifiable features of care, such as timely service and communication. The combined presentation of domain scores, individual items, and department summaries allows managers to move from an overall rating to focused questions for local review. The sensitivity analyses further clarify the consistency of the observed association across analytic choices.

2. Materials and Methods

Study Design, Setting, and Period

An observational cross-sectional study was conducted at Al-Jumhouri Hospital Authority in Hajjah, Yemen, over 64 days, from January 1 through March 5, 2026. The study included the internal medicine, surgery, emergency, and outpatient departments. Relevant items from the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist guided the organization of the study report (von Elm et al., 2007).

Participants and Sampling

Patients aged 18 years or older attending the four departments during January 1–March 5, 2026 were eligible. Study size was determined by recruitment during the defined fieldwork period and subsequent screening, which yielded 496 questionnaires for the primary analysis.

Patients were selected systematically within each department, with every third patient approached after a random start. Counting restarted daily, with a starting position from 1 to 3 selected for each department using a random-number table prepared in advance. When a selected patient declined, counting continued and the next patient was selected at the same fixed interval. Patients were asked about prior participation to reduce duplicate enrollment.

Of 536 questionnaires received, 40 were excluded: six were incomplete, 11 had unresolved discrepancies in administrative field records, and 23 were excluded after review of response patterns (Figure 1). In the 513-record screening register, 47 questionnaires were flagged for response-pattern review; 41 were retained and six excluded after manual review. One of these six exceeded 15 consecutive identical responses in Excel column order; the other five were excluded for flat response patterns identified during review. The screening records accounted for the exclusions used in the study flow.

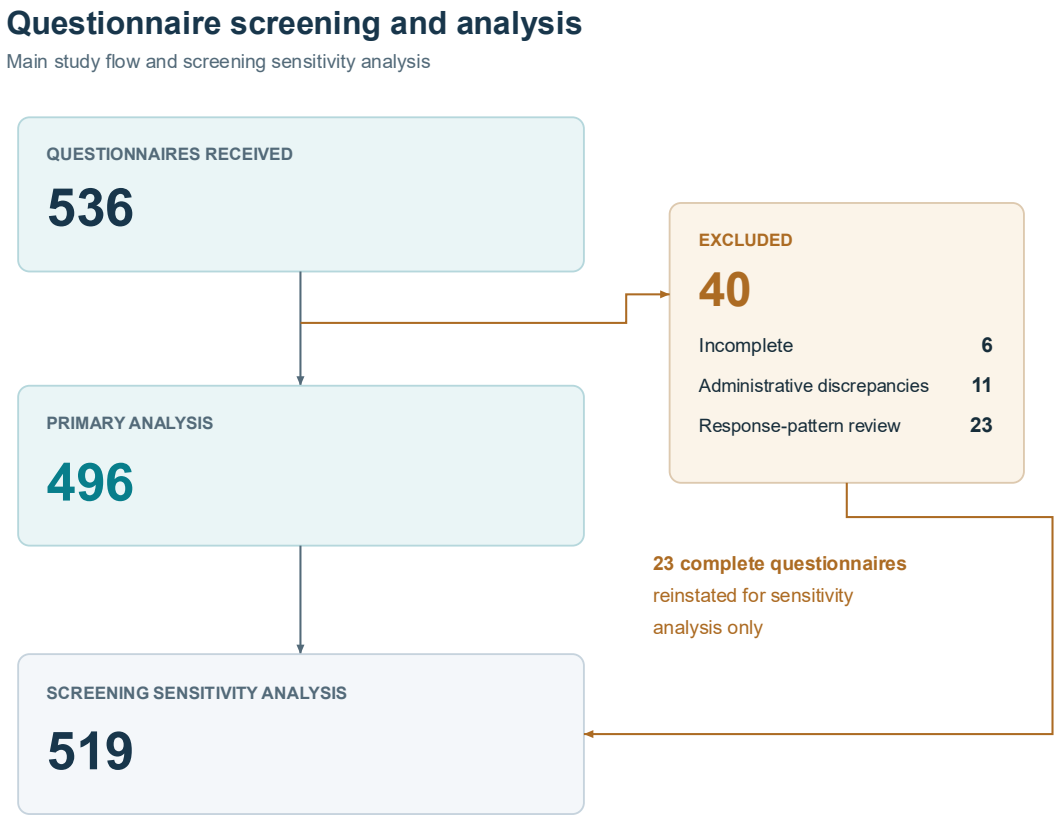


Figure 1. Questionnaire screening and analysis samples. Of 536 questionnaires received, 40 were excluded: six incomplete questionnaires, 11 with unresolved administrative discrepancies, and 23 after response-pattern review. The primary analysis included 496 questionnaires. A screening sensitivity analysis reinstated the 23 complete questionnaires excluded after response-pattern review, yielding 519 questionnaires. The three pilot questionnaires were separate from the main study. Counts describe questionnaires received, not all patients approached.

Questionnaire and Data Collection

An Arabic-language questionnaire was developed under academic supervision. Three academics, two in business administration and one in life sciences, reviewed its content and wording. A pilot involving three individuals informed rewording to improve clarity before fieldwork. Pilot responses were separate from the main study sample.

The questionnaire contained four descriptive variables and 44 items: 35 quality items covering reliability (10 items), tangibility (7), assurance (5), responsiveness (7), and empathy (6), and nine satisfaction items. Responses used a five-point frequency scale from 1 (never) to 5 (always). The five quality domains followed the SERVQUAL framework (Parasuraman et al., 1988). The locally developed instrument assessed perceived performance using those categories. This approach distinguished performance ratings from expectation–performance gap scores (Cronin & Taylor, 1992).

Four field researchers collected questionnaires after patients received care. They read the items aloud and explained them when assistance was needed. Patients selected their own responses; in documented companion-assisted cases, companions recorded the patients' answers. Field supervisors checked returned questionnaires for completeness before final screening. Documentation of recording assistance is summarized with the participant characteristics.

Score Construction and Statistical Analysis

Quality domain scores were calculated as the means of their constituent items. Overall quality was the equally weighted mean of the five domain scores; satisfaction was the mean of its nine items. An alternative quality score averaged all 35 items. Cronbach's alpha, calculated from unstandardized item covariances, summarized internal consistency for each domain, the 35 quality items, and satisfaction (Cronbach, 1951). Exploratory measurement checks examined item structure separately.

Categorical variables were summarized as counts and percentages, and scale scores as means and standard deviations. Pooled estimates represented the analyzed questionnaires without population weights. Pearson correlation and simple linear regression with an intercept examined the quality–satisfaction association, with satisfaction as the outcome. Correlation confidence intervals used Fisher's transformation; regression slope intervals used the t distribution. The significance level was two-sided 0.05. All 44 items and covariates were complete for the 496 analyzed questionnaires. Domain-specific correlations and item summaries were also calculated. Regression diagnostics included Cook's distance and leave-one-questionnaire-out estimates. A secondary model adjusted for age group, sex, education, department, and treatment history using categorical indicators and HC3 confidence intervals. Domain and departmental means and the within-questionnaire difference between tangibility and responsiveness were summarized with t-based 95% confidence intervals.

Sensitivity analyses used Spearman correlation, HC3 confidence intervals, alternative score definitions, and reinstatement of questionnaire exclusions. Scoring analyses retained the same 496 questionnaires. Items were selected for omission by reviewing their wording after the primary estimate was known and before calculating alternative correlations. Reinstating the 23 complete questionnaires excluded for response patterns yielded 519 questionnaires, scored using the original definitions. These analyses were exploratory, with confidence intervals unadjusted for multiple comparisons. The exploratory reduced satisfaction score used items 2, 6, and 8. In the four-item quality omission analysis, reliability item 4, tangibility item 4, assurance item 2, and empathy item 1 were omitted; satisfaction item 9 was omitted from the paired eight-item satisfaction score.

Questionnaire data were recorded in Excel. Analyses used custom scripts in Python 3.12.14 and NumPy 2.3.5 to calculate correlations, confidence intervals, regression estimates, and diagnostics. HC3 covariance estimates followed MacKinnon and White (1985). Parallel analysis and the heterotrait–monotrait ratio (HTMT) were used for exploratory measurement checks (Henseler et al., 2015; Horn, 1965). Parallel analysis used 1,000 item-wise permutations, and HTMT confidence intervals used 2,000 questionnaire-level bootstrap resamples.

Ethics Approval and Informed Consent

The research protocol, data collection instruments, and participant protection measures were approved by the Scientific Research Ethics Committee at Al-Manar College for Science and Technology under approval No. 102, dated March 1, 2025, before data collection began. The committee permitted verbal informed consent. The approval permitted companions to assist with recording answers when patients gave free verbal consent and had the

capacity to express their choices. College administrative letter No. 101 was issued on the same date, and separate stamped administrative permission was obtained from the hospital. The approval covered the fieldwork period from January 1 to March 5, 2026.

The study purpose and confidentiality were explained before questionnaire completion. Patients provided verbal informed consent, which was documented in the field records. Access to questionnaires and electronic data was restricted to the research team. In companion-assisted cases, field researchers and data collection supervisors directly checked that patients understood the study and could freely decide whether to participate before obtaining verbal consent and documenting the assistance.

3. Results

Participant Flow and Characteristics

Of 536 questionnaires received, 40 were excluded and 496 were analyzed. The sample comprised 115 questionnaires from internal medicine, 124 from surgery, 133 from emergency, and 124 from outpatient services (Table 1).

Table 1. Patient Characteristics

Variable	Category	Number	Percentage, %
Sex	Male	277	55.85
	Female	219	44.15
Age	<30 years	322	64.92
	30–39 years	112	22.58
	40–49 years	56	11.29
	50–59 years	0	0.00
	>59 years	6	1.21
Education	University	143	28.83
	Secondary	193	38.91
	Unable to read or write	160	32.26
Treatment history	Two or more visits	261	52.62
	First visit	235	47.38
Department	Internal medicine	115	23.19
	Surgery	124	25.00
	Emergency	133	26.81
	Outpatient	124	25.00

Percentages use N = 496. For 441 questionnaires (88.91%), patient consent was documented without a separate entry identifying who marked the answers. Companion recording of patient-selected answers was documented for 17 (3.43%); the recording method was undocumented for 38 (7.66%). Consent was documented separately from recording assistance. Age categories followed the source workbook; no questionnaire was coded in the 50–59 years category.

Quality and Satisfaction Scores

Mean quality was 4.045 (SD 0.545) and mean satisfaction was 4.042 (SD 0.601). Tangibility had the highest mean and responsiveness the lowest. Observed quality scores ranged from 2.399 to 5.000, and satisfaction scores from 1.444 to 5.000. Table 2 shows internal consistency and score summaries. Quality scores reached the maximum score of 5 in 4 of 496 questionnaires (0.81%), and satisfaction scores reached it in 18 of 496 (3.63%). The mean paired difference between tangibility and responsiveness was 0.096 points (95% CI, 0.062–0.131).

Table 2. Score Summaries and Internal Consistency

Scale	Items	Mean	SD	Alpha
Reliability	10	4.071	0.538	0.868
Tangibility	7	4.095	0.585	0.863
Assurance	5	4.048	0.599	0.813
Responsiveness	7	3.998	0.619	0.865
Empathy	6	4.014	0.592	0.814
Satisfaction	9	4.042	0.601	0.888
Quality: equal domain weights	5 domains	4.045	0.545	—
Quality: equal item weights	35	4.048	0.541	0.964

N = 496. Possible range, 1–5. SD, standard deviation. Alpha for the 35-item quality score was 0.964.

Associations Between Quality and Satisfaction

Overall quality correlated positively with satisfaction (r = 0.934; approximate 95% CI, 0.922–0.944). Exploratory domain correlations ranged from 0.852 to 0.882 (Table 3). Figure 2 shows the observed scores and fitted line.

Table 3. Correlations of Quality Domains with Satisfaction

Variable	Pearson r	*P*	95% CI
Reliability	0.882	<0.001	0.861–0.900
Tangibility	0.852	<0.001	0.826–0.875
Assurance	0.853	<0.001	0.827–0.876
Responsiveness	0.881	<0.001	0.859–0.899
Empathy	0.870	<0.001	0.847–0.890
Overall quality	0.934	<0.001	0.922–0.944

N = 496 for each correlation. Confidence intervals use Fisher's transformation. Domain estimates are exploratory.



Figure 2. Association between perceived healthcare service quality and patient satisfaction among 496 questionnaires. Quality was the equally weighted mean of the five domain scores; satisfaction was the mean of nine items. Both scores had a possible range of 1 to 5. Each point represents an observed questionnaire score pair. Transparency indicates overlapping points; no jitter was applied. The solid line represents the ordinary least-squares fit over the observed quality range. The shaded band is the pointwise, model-based 95% confidence interval for the mean fitted satisfaction score, not an individual prediction interval. Pearson r = 0.934 (Fisher-transformed 95% CI 0.922–0.944); slope = 1.030; R^2 = 0.872.

Regression and Sensitivity Analyses

The unadjusted slope from the simple regression was 1.030 (model-based 95% CI, 0.996–1.065; HC3 95% CI, 0.985–1.076). R^2 was 0.872. Spearman and Pearson correlations both rounded to 0.934. Correlations for alternative score definitions are shown in Table 4. When one questionnaire was omitted at a time, Pearson correlations ranged from 0.933 to 0.935. The adjusted quality coefficient was 1.029 (HC3 95% CI, 0.984–1.073; n = 496). After the 23 complete questionnaires excluded for response patterns

were reinstated, the correlation was r = 0.937 (95% CI, 0.925–0.946) among 519 questionnaires (table 4). Omitting four quality items (reliability 4, tangibility 4, assurance 2, and empathy 1) and satisfaction item 9 yielded r = 0.926 (95% CI, 0.912–0.938) among 496 questionnaires (Table 4). The 31-item quality score correlated with the three-item satisfaction score at r = 0.839 (95% CI, 0.811–0.863; n = 496). Alpha was 0.954 for the revised quality score and 0.782 for the three-item satisfaction score (Table 4).

The original quality score correlated with the three-item satisfaction score at 0.843 (95% CI, 0.815–0.866) and with the single item on willingness to continue receiving care at 0.689 (95% CI, 0.640–0.733).

After excluding assurance item 2 and empathy item 1, the revised quality score correlated with the original satisfaction score at 0.932 (95% CI, 0.919–0.943) and with the reduced three-item score at 0.840 (95% CI, 0.812–0.864) (Table 4).

Table 4. Primary and Sensitivity Correlations

Analysis	N	r (95% CI)
Primary analysis	496	0.934 (0.922–0.944)
Equal weight per quality item	496	0.934 (0.922–0.944)
Reduced satisfaction score	496	0.843 (0.815–0.866)
Willingness to continue care	496	0.689 (0.640–0.733)
Quality score without two items	496	0.932 (0.919–0.943)
Quality score without 2 items and 3-item satisfaction	496	0.840 (0.812–0.864)
Quality score without 4 items and 8-item satisfaction	496	0.926 (0.912–0.938)
Quality score without 4 items and 3-item satisfaction	496	0.839 (0.811–0.863)
Response-pattern exclusions reinstated	519	0.937 (0.925–0.946)

All estimates are Pearson correlations with approximate 95% confidence intervals. Scoring sensitivity analyses used 496 questionnaires. The screening sensitivity analysis included 23 additional complete questionnaires. Alternative score definitions and the screening sensitivity analysis were exploratory. For the row pairing the revised quality score with three satisfaction items, Cronbach's alpha was 0.954 for quality and 0.782 for satisfaction.

Exploratory Measurement Checks

Parallel analysis retained two components using either Pearson or polychoric item correlations. Both factors in the exploratory solution included quality and satisfaction items. HTMT between the pooled quality items and the satisfaction items was 1.009 (95% bootstrap CI, 0.998–1.023). Domain-level HTMT estimates ranged from 0.981 to 1.020.

The five domain means and their pointwise 95% confidence intervals are summarized in Figure 3.

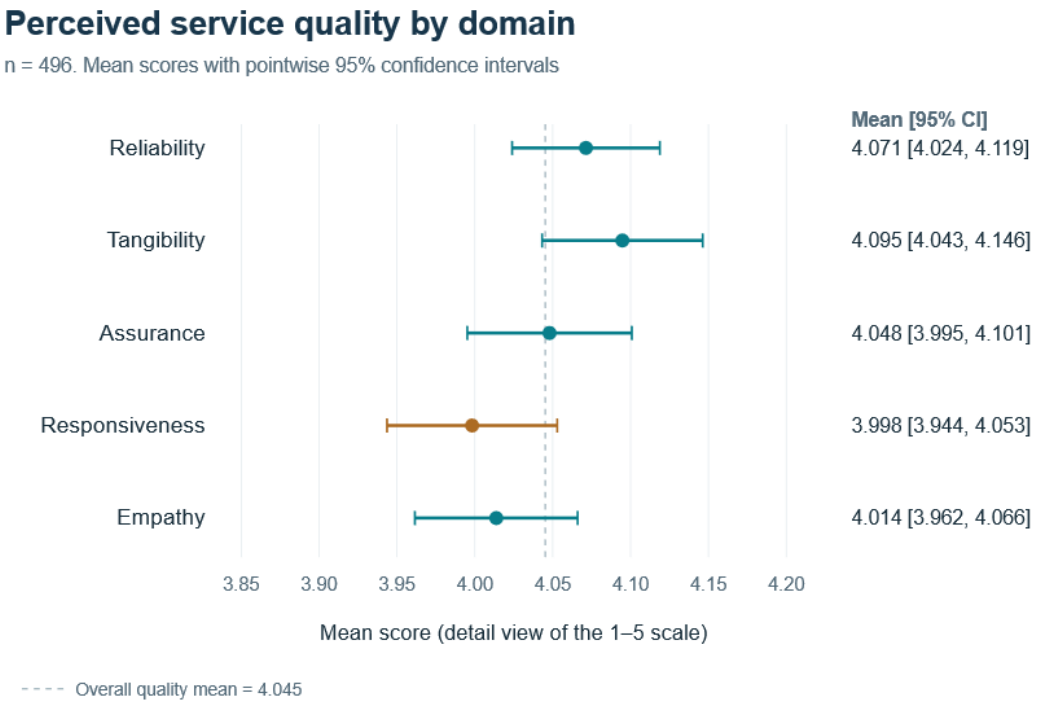


Figure 3. Mean perceived healthcare service quality scores by domain among 496 questionnaires. Points represent domain means and horizontal bars represent pointwise 95% confidence intervals calculated using the t distribution and the standard error of each mean. The axis displays a detail view of the possible 1–5 scale. The vertical reference line represents the overall quality mean of 4.045. Responsiveness is highlighted to identify the lowest descriptive domain mean; the color does not indicate a statistical significance test. Domain estimates are paired within questionnaires, so overlap of separate confidence intervals should not be used to test differences between domains.

4. Discussion

Across four hospital departments, patients reported mean quality and satisfaction scores close to 4 on the five-point scale. Higher quality scores were strongly associated with greater satisfaction, and the association persisted after adjustment for participant and departmental characteristics. These findings provide a coherent picture of patients' overall evaluations while the domain and item results identify specific features of care for administrative review.

The association is consistent with findings from Qatar (Alrwashdh & Alishaq, 2023) and complements Yemeni research using multicriteria assessment in private clinics (Al-Awlaqi & Aamer, 2020). At a rural hospital in Ibb, responsiveness and tangibility each correlated with satisfaction at r = 0.725 (Al-Asadi, 2026); corresponding domain-level correlations in Hajjah ranged from 0.852 to 0.882. A private-hospital study in Kathmandu, Nepal, reported an overall correlation of r = 0.719 (Neupane & Devkota, 2017). Differences in setting, instruments, and score definitions provide context for these estimates. Research in Pakistan also illustrates the use of SERVQUAL alongside a service improvement initiative (Shaikh et al., 2008). Collectively, these studies support attention to patients' assessments when reviewing healthcare delivery.

Responsiveness had the lowest domain mean in Hajjah. At the item level, ratings were lower for raising patients' morale (mean 3.839), observing working hours without delays (3.879), courtesy and respect (3.881), and prompt, accurate service (3.899). These items point to aspects of the care process that staff and managers can discuss directly. The paired tangibility–responsiveness difference of 0.096 points complements the item profile by showing the scale of the observed domain contrast. The practical relevance lies in the identifiable content of the items as well as their relative scores.

The department profiles extend this evidence across four service settings. Quality means ranged from 4.017 in outpatient services to 4.072 in internal medicine, and satisfaction means from 4.009 to 4.067 in the same departments. Surgery and emergency scores lay within these ranges. The profiles provide a common reference for discussions within departments and subsequent assessments using the same scoring definitions.

The association was consistent across the main robustness checks: reinstating response-pattern exclusions yielded r = 0.937, and removing one questionnaire at a time yielded correlations of 0.933–0.935. Content-based scoring revisions also retained positive associations. The combined revision of four quality items and the three-item satisfaction score yielded r = 0.839; the correlation with willingness to continue receiving care was 0.689. These alternatives address different aspects of patient evaluation. HTMT and exploratory factor results indicated overlap between the quality and satisfaction item sets, so the primary correlation is interpreted as an association between the observed questionnaire scores. Shared content and collection conditions are relevant to this interpretation (Podsakoff et al., 2003).

Implications for Healthcare Management

The results offer hospital administrators a structured starting point for reviewing patient-facing service processes. The item profile makes communication and timeliness concrete: staff can examine how patients are informed about delays, how next steps are explained, and how requests for help are handled. These topics can be incorporated into discussions with patients and frontline teams.

The findings also support a departmental approach to service review. Managers can examine each department's profile alongside its workflow, staffing arrangements, and service records to select feasible actions. Subsequent assessments using consistent questions and administration procedures could track whether ratings change following those actions. This use of patient feedback fits Donabedian's (1988) framework by linking experience reports with information about service processes. It creates a practical role for the survey as a baseline for local monitoring.

Comparable research highlights the value of combining patient ratings with other information for priority setting. The Yemeni public-facility study identified gaps in access and service processes using importance–performance assessment (Hyzam et al., 2026), whereas an Iranian teaching-hospital study emphasized tangibility (Izadi et al., 2017). For hospital management, these findings illustrate why service priorities should be grounded in local experience and operational context. In Hajjah, the contribution is a documented set of overall, departmental, and item-level ratings that can inform such a review.

Limitations

The study provides a detailed assessment of patient-reported service quality and satisfaction across four departments within a shared institutional setting. Its single-center, cross-sectional design and recruitment-based sample size define the context for interpretation and limit causal inference and broader generalization; departmental estimates were unweighted (Setia, 2016). Complementary sensitivity analyses examined the stability of the principal association under alternative scoring and screening decisions, including the expanded sample of 519 questionnaires. Measurement analyses also assessed overlap between quality and satisfaction items, informing interpretation of the observed association. Post-care administration, variation in recording assistance—with recording mode undocumented in 38 questionnaires—and unavailable non-response counts remain considerations that these analyses could not directly address. The frequency-based local instrument lacked a "not applicable" option, while clinical severity and waiting time were unmeasured potential confounders. Within these boundaries, the consistent principal association across the analyses performed strengthens the study's contribution as a departmental baseline for service review and subsequent research.

5. Conclusion

Among 496 patients across four departments at Al-Jumhouri Hospital Authority, perceived healthcare service quality was strongly associated with patient satisfaction. The association persisted in the 519-questionnaire sensitivity analysis and alternative scoring analyses. Responsiveness and specific aspects of communication and timeliness provide a focus for local service review. The study supplies a departmental baseline for hospital managers to use alongside operational evidence when planning and monitoring care delivery.

Abbreviations

CI, confidence interval; HC3, heteroscedasticity-consistent covariance estimator, type 3; HTMT, heterotrait–monotrait ratio; SD, standard deviation; STROBE, Strengthening the Reporting of Observational Studies in Epidemiology.

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Author Contributions

Abdulmalik Saleh Al-Haddad contributed to analysis and supervision. Osama Saleh Al-Haddad reviewed the study design and data collection instruments from a clinical perspective, assisted with the statistical analysis, and contributed to the clinical interpretation of the findings. Anhar Sadiq Shamhan contributed to study design, data collection, manuscript writing, and review. Omniah Lotf Al-Hatif, Hayat Radman Al-Qadami, and Khawla Ali Al-Abbasi contributed to study design and data collection.

Consent for Publication

Not applicable. No identifiable individual information, images, or recordings are included.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Al-Manar College for Science and Technology funded study implementation. In its capacity as funder, the college did not direct study design, data collection, analysis, interpretation, manuscript preparation, or the decision to submit. Academics affiliated with the college reviewed the questionnaire content in an academic capacity. The college's Scientific Research Ethics Committee approved the study. Five authors were affiliated with the college.

Data Availability

De-identified study data may be made available by the corresponding author upon a justified scientific request, subject to participant confidentiality.

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