

Original Research Article

A study using patient feedback to predict the effects of quality improvement initiatives in a tertiary care cancer hospital of India

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ABSTRACT

Background: Patient feedback is increasingly recognized as an important indicator of healthcare quality and quality improvement (QI), but evidence from tertiary cancer hospitals in India remains limited. Aim was to assess whether patient feedback predicts perceived QI effectiveness and identify key influencing factors.

Methods: A descriptive cross-sectional study was conducted among 872 patients at a tertiary care cancer hospital (March-August 2023). Data were collected using a standardised 21-item questionnaire and analysed using descriptive statistics, correlation, and regression analysis.

Results: Overall patient satisfaction was high (94%). Patient satisfaction showed a strong positive correlation with perceived QI effectiveness ($r=0.701$, $p<0.001$) and explained 49.2% of its variation. Service quality ($\beta=0.730$, $p<0.001$) and staff behaviour and communication ($\beta=0.333$, $p<0.001$) were significant positive predictors, while infrastructure satisfaction showed a negative association ($\beta=-0.183$, $p<0.001$). Together, predictors explained 73.7% of the variation in perceived QI effectiveness.

Conclusions: Patient feedback is a strong predictor of perceived QI effectiveness. Service quality and staff communication strongly influence patient perceptions, highlighting the value of integrating patient feedback into routine QI strategies.

Keywords: Healthcare management, Oncology hospital, Patient feedback, Patient satisfaction, Quality improvement, Service quality

INTRODUCTION

Background of the study

Patient feedback has become a key component of healthcare quality management, offering direct insight into patient perceptions and guiding quality improvement (QI) initiatives.¹ Patient-reported experience measures assess both clinical and non-clinical aspects of care, such as communication, timeliness, safety, and the physical environment, and are increasingly used in performance evaluation and decision-making.² In a tertiary care hospital, where treatment is complex and emotionally demanding, patient perspectives are particularly

important, as care outcomes extend beyond clinical indicators alone.³

Patient satisfaction and service quality in hospitals

Patient satisfaction is a key indicator of healthcare quality, reflecting perceptions of communication, clinical care, safety, and system efficiency. Studies show it is closely linked with perceived outcomes, treatment adherence, and trust in healthcare providers.^{1,4} In complex hospital settings, it also reflects organizational performance and service responsiveness.⁵ Studies in India highlight the importance of patient experience data in evaluating healthcare delivery, with communication,

waiting time, staff attitude, and infrastructure identified as key predictors of patient satisfaction.^{6,7} Research in oncology settings further shows that cancer patients particularly value clear information, empathetic communication, coordinated care, and psychological support.⁸

These findings align with the aim of this study, which examined patient satisfaction and its predictive role. They also support hypothesis H1, suggesting that patient satisfaction is a significant predictor of the effectiveness of QI activities.

Quality improvement initiatives in tertiary care settings

Quality improvement (QI) in hospitals includes approaches such as Lean Healthcare, Six Sigma, PDCA cycles, and accreditation programs like NABH and JCI to improve safety, efficiency, and patient experience.^{9,10} In tertiary care settings, QI focuses on areas such as treatment coordination, diagnostic turnaround time, infection control, and patient communication. However, operational improvements may not always match patients' perceptions of improvement.¹¹

These are comparable to hypothesis H1a-H1c that examine how the behaviour of staff, aspects of service quality, and infrastructure can forecast the extent to which patients believe QI to be effective. This difference in point of view should be considered in a tertiary care hospital where the demands and emotional stress are high.

Predictive use of patient feedback

Recent studies highlight the use of patient feedback not only for measuring satisfaction but also for predicting healthcare outcomes and decision-making using regression and machine-learning models.^{12,13}

Research shows that patient feedback can help identify areas needing QI interventions, such as reducing waiting times, improving communication, and enhancing staff responsiveness.¹⁴ It is also associated with higher perceived organizational quality, patient loyalty, and future care-seeking behaviour.¹⁵ Despite this global trend, predictive use of patient feedback remains limited in Indian hospitals. This gap supports the present study's aim of assessing whether patient feedback can predict perceived QI effectiveness and provides the basis for H₁.

Theoretical framework

There are three theoretical hypotheses that support this study:

SERVQUAL model

This model presents Cronbach's Alpha analysis to assess the internal consistency of the questionnaire items and determine the reliability of scales measuring patient

satisfaction, service quality, and perceived QI effectiveness.

Donabedian's structure-process-outcome (SPO) model

Donabedian's model explains healthcare quality through structure (infrastructure), process (service delivery), and outcomes (patient results). Studies highlight the importance of QI initiatives in tertiary care settings.¹⁶ This framework supports H1b and H1c by linking infrastructure and service processes with perceived improvement.

Patient-centred care model

This framework highlights communication, respect, shared decision-making, and emotional support as key determinants of patient experience.¹⁷ Positive provider interactions improve perceived outcomes and patient satisfaction, supporting H1a.¹⁸ It also supports the role of staff behaviour, communication, safety, punctuality, and infrastructure in predicting QI effectiveness.

The study was guided by the SERVQUAL model, Donabedian's structure-process-outcome model, and the patient-centred care framework. Based on these theories, patient satisfaction, staff behaviour and communication, service quality, and infrastructure satisfaction were hypothesized to influence perceived effectiveness of quality improvement initiatives.

Research gap

Despite extensive research on patient satisfaction and QI, gaps remain in the predictive use of patient feedback, particularly in Indian tertiary care hospitals. Limited studies have applied factor analysis and regression modelling to identify predictors of perceived QI effectiveness, and findings on infrastructure satisfaction remain inconsistent. This study addressed these gaps by testing H₁, H_{1a}, H_{1b}, and H_{1c} in a tertiary care hospital setting.

Problem statement

Although hospitals widely implement QI programs such as PDCA cycles, Lean methods, and accreditation activities, few use patient feedback as a data-driven tool to predict perceived QI effectiveness. Most evaluations focus on process and clinical indicators, particularly in Indian tertiary care hospitals. Consequently, hospital management may face challenges in identifying improvements that meaningfully enhance patient experience.

Research significance

Showing that regular patient feedback can reliably reflect the success of QI initiatives would support its inclusion in QI cycles and governance dashboards. This could help

tertiary care hospitals in India align services with patient expectations, strengthen patient-centred care, and guide performance and accreditation policies. Identifying key factors, such as staff communication or infrastructure, would also help managers prioritize targeted improvements.

Research objectives

To investigate how patient feedback predicts quality improvement effectiveness and to prescribe specific interventions.

Hypotheses

Main hypothesis (H₁)

H₁: Patient satisfaction significantly predicts the perceived effectiveness of quality improvement initiatives in the tertiary care hospital.

Sub-hypotheses (dimension-wise)

These allow regression testing for specific predictors.

H1a: Staff behaviour and communication have a significant positive effect on the perceived effectiveness of QI initiatives.

H1b: Service quality dimensions (timeliness, safety, information clarity, and support) significantly predict the perceived effectiveness of QI initiatives.

H1c: Infrastructure and facility-related satisfaction significantly influence patients perceived improvement due to QI initiative.

METHODS

Research design

The study used a descriptive and predictive cross-sectional quantitative design. This design was suitable for assessing patient satisfaction at a single point in time and examining its relationship with perceived quality improvement outcomes. Cross-sectional quantitative methods are commonly used to study patient experience and service quality in healthcare settings.¹

Study setting

This study was conducted in an Indian tertiary care hospital, and it was an appropriate location to examine patient-oriented quality indicators. Tertiary care centers offer complex services, and here the input of the patients is required in the assessment of the quality of treatment.¹⁹

Study population and sample size

The study population included patients receiving inpatient (IPD) and outpatient (OPD) services at a tertiary care hospital for a period of 6 months. A total of 872 patients participated in the study, with 94% reporting satisfaction and 6% expressing dissatisfaction. Similar sample sizes have been considered adequate in studies on patient satisfaction and predictive modelling.²⁰

Inclusion criteria

The inclusion criteria required participants to be 18 years of age or older, while those under 18 years were eligible if accompanied by a guardian. Participants must have received inpatient or outpatient care or counselling at the hospital during the study period, been in good health and able to complete the questionnaire, and provided informed consent after fully understanding the study.

Exclusion criteria

Participants were excluded if they were too unwell or unable to respond due to medical or cognitive impairment, refused or withdrew consent, or submitted blank questionnaires that could not provide meaningful data for analysis. These criteria helped ensure that the patient-reported experiences collected were reliable, credible, ethical, and methodologically sound. Additionally, hospital workers or attendants were not permitted to engage in conversations with patients without their consent.

Sampling technique

Convenience and purposive sampling were used to recruit eligible participants available during data collection. Non-probability sampling is commonly used in hospital-based research because it is practical and suitable for collecting real-time patient experiences.²¹

Data collection tool

Data was collected using a standardised questionnaire with four sections: demographics, patient satisfaction measured on a 5-point Likert scale, service quality characteristics, and perceptions of QI effectiveness. The questionnaire was based on the SERVQUAL dimensions, widely used to assess healthcare service quality and patient experience.²

Variables

The independent variables were patient satisfaction and service quality ratings, while the dependent variable was perceived QI effectiveness.

Earlier empirical research was helpful in justifying the use of patient satisfaction attributes as predictors of the service improvement outcomes.²⁰

Data collection procedure

Data was collected on-site through questionnaires administered after outpatient consultation or at inpatient discharge. Participation was voluntary, and patients were informed about the study purpose. Real-time feedback collection helped reduce recall bias and improve accuracy of patient-reported experiences.

Statistical tools

The data were examined employing the following statistical methodologies:

Descriptive statistics to describe participant characteristics and responses.

Reliability testing using Cronbach's Alpha as proposed by Nunnally.²²

Correlation analysis to evaluate relationships between variables.

Multiple regression to find factors that affect how people think about the success of quality improvement.

RESULTS

Reliability statistics

The internal consistency of the 21-item patient feedback questionnaire was assessed using Cronbach's Alpha. The questionnaire demonstrated acceptable reliability, with a Cronbach's Alpha value of 0.778, exceeding the recommended threshold of 0.70. This indicates that the instrument had satisfactory internal consistency and was suitable for subsequent statistical analyses.

Construct validity of the questionnaire

The construct validity of the questionnaire was assessed using exploratory factor analysis. The data were suitable for factor analysis, as indicated by an adequate Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (0.720) and a statistically significant Bartlett's test of sphericity ($\chi^2=1531.497$, $df=3$, $p<0.001$). These findings support the construct validity of the questionnaire and its suitability for subsequent statistical analyses.

Respondent demographics

Table 1, Figure 1 provides an overview of the demographic data of the 872 respondents. The data presents that the study population represents each age group, particularly the age group of 31-45 and 46-60. The sample was 51.0% females, a small bit higher than 46.9% males. The 2.1% who believe in the other gender also exists. The highest number of people who responded are outpatients (65.3%), indicating that the hospital has a considerable number of outpatients. The majority of

respondents who responded (40.8%) indicated that they had one to three visits to seek treatment, and 19.2% of them were first-time visitors. Such diversity of the population ensures that there are points of view and assist us in knowing the level of satisfaction of various classes of patients.

Table 1: Demographic profile of respondents (n=872).

Variables	Categories	Frequency	Percent
Age (in years)	Below 18	185	21.2
	18-30	168	19.3
	31-45	162	18.6
	46-60	181	20.8
	Above 60	176	20.2
Gender	Male	409	46.9
	Female	445	51.0
	Other	18	2.1
Type of patients	Inpatient	303	34.7
	Outpatient	569	65.3
Duration of treatment	First visit	167	19.2
	1-3 visits	356	40.8
	4-6 visits	225	25.8
	More than 6 visits	124	14.2

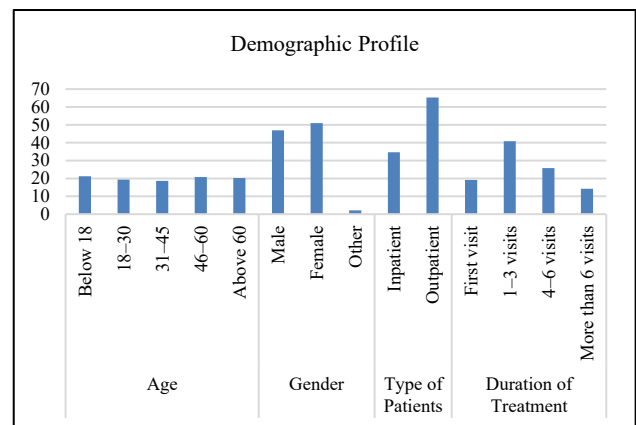


Figure 1: Graphical presentation of demographic profile.

Descriptive statistics on patient satisfaction levels, service quality dimension scores and perceived effectiveness of QI initiatives

The descriptive statistics indicate generally high patient satisfaction across most service areas. Service quality dimensions such as timeliness, safety, communication, staff behaviour, and infrastructure showed good overall performance, though some moderate gaps remained. Patients also reported positive perceptions of current QI initiatives, particularly in cleanliness, staff attentiveness, waiting time, diagnostic access, and clarity of information. Overall, the findings highlight both strengths and areas requiring improvement in hospital service delivery.

Table 2: Descriptive statistics for patient satisfaction items, service quality dimensions and perceived effectiveness of quality improvement initiatives.

Descriptive statistics	N	Min	Max	Mean	SD
Descriptive statistics for patient satisfaction items					
I am satisfied with the overall services provided by the hospital	872	1.00	5.00	3.8739	0.74554
The admission/registration process was smooth and efficient	872	1.00	5.00	3.4644	1.09843
The billing and payment process was hassle-free	872	1.00	5.00	3.6078	0.82433
Doctors clearly explained my diagnosis and treatment	872	1.00	5.00	2.8291	1.26941
Nursing staff were polite, supportive, and attentive	872	1.00	5.00	3.7810	0.68372
Hospital staff responded promptly to my concerns	872	1.00	5.00	3.8991	0.64211
I felt respected and treated with dignity throughout my visit	872	1.00	5.00	3.9209	0.64960
The hospital environment was clean and hygienic	872	1.00	5.00	3.6353	1.11458
Waiting areas were comfortable	872	1.00	5.00	3.3349	1.16010
Medical equipment and facilities were adequate and modern	872	1.00	5.00	3.6961	0.90316
Valid N (listwise)	872				
Descriptive statistics service quality dimensions					
Waiting time for consultation was reasonable	872	1.00	5.00	3.3303	1.14949
Diagnostic services (lab, scans) were delivered on time	872	1.00	5.00	3.8165	0.72723
Safety protocols were followed during my treatment	872	1.00	5.00	3.8750	0.73721
I felt physically comfortable during procedures and hospital stay	872	1.00	5.00	3.9278	0.62336
I received clear instructions for medication and follow-up	872	1.00	5.00	3.9736	0.57939
Staff effectively guided me through treatment procedures	872	1.00	5.00	3.4644	1.09843
Valid N (listwise)	872				
Descriptive statistics for perceived effectiveness of quality improvement initiatives					
Cleanliness and sanitation in hospital areas	872	1.00	5.00	3.6078	0.82433
Behaviour and responsiveness of staff	872	1.00	5.00	2.8291	1.26941
Waiting time and service speed	872	1.00	5.00	3.8750	0.73721
Availability of diagnostic services	872	1.00	5.00	3.9278	0.62336
Clarity and transparency of information	872	1.00	5.00	3.9736	0.57939
Valid N (listwise)	872				

Table 3: Correlation between patient satisfaction and perceived effectiveness of quality improvement initiatives.

Correlations			
		Patient satisfaction	Perceived effectiveness of quality improvement initiatives
Patient satisfaction	Pearson correlation	1	0.701**
	Sig. (2-tailed)		0.000
	N	872	872
Perceived effectiveness of quality improvement initiatives	Pearson correlation	0.701**	1
	Sig. (2-tailed)	0.000	
	N	872	872

**Correlation is significant at the 0.01 level (2-tailed).

Table 2 presents the descriptive statistics of patient satisfaction measures. Overall satisfaction was high (mean=3.87), with positive scores for staff respect, responsiveness, and nursing support. Lower scores for admission procedures (3.46), billing (3.60), and clarity of diagnosis explanations (2.83) indicate areas needing improvement in communication and administrative processes.

Table 2 shows generally good service quality, with high scores for medication instructions (3.97), physical comfort (3.93), safety protocols (3.88), and diagnostic timeliness (3.81). However, waiting time for consultation (3.33) and counselling during treatment (3.46) were lower, indicating delays and communication gaps. Overall, service quality is strong but affected by operational and communication issues.

Table 4: Simple linear regression predicting perceived effectiveness of quality improvement initiatives from patient satisfaction (H₁).

Predictors	B	SE	β	t	P value
Constant	0.894	0.095	—	9.373	<0.001
Patient satisfaction	0.763	0.026	0.701	29.010	<0.001

Model Statistics: R=0.701; R²=0.492; Adjusted R²=0.491; Standard Error of the Estimate =0.321; F(1, 870) =841.575; p<0.001.

Table 5: Multiple linear regression predicting perceived effectiveness of quality improvement initiatives (H_{1a}–H_{1c}).

Predictors	B	SE	β	t	P value
Constant	0.157	0.074	—	2.123	0.034
Staff behaviour and communication	0.288	0.018	0.333	16.196	<0.001
Service quality dimensions	0.785	0.024	0.730	32.888	<0.001
Infrastructure and facility-related satisfaction	-0.135	0.015	-0.183	-8.820	<0.001

Model Statistics: R=0.859; R²=0.737; Adjusted R²=0.736; Standard Error of the Estimate =0.23128; F(3,868) =811.010; p<0.001.

Table 2 shows patients' perceptions of QI practices. Higher scores for diagnostic services (3.93), clarity of information (3.97), and reduced waiting time (3.88) indicate perceived improvements in service processes. Lower ratings for staff behaviour and responsiveness (2.83) highlight gaps in interpersonal care, while cleanliness and sanitation were moderate (3.60). Overall, improvements are more evident in systems and infrastructure than in staff-patient interaction.

Hypothesis testing results

Main hypothesis (H₁)

H₁- patient satisfaction significantly predicts the perceived effectiveness of quality improvement initiatives in the tertiary care hospital.

This hypothesis examined whether overall patient satisfaction is a significant predictor of perceived effectiveness of QI activities, based on the assumption that higher satisfaction with hospital services following QI interventions is associated with a greater perception of improvement.

Table 3 shows a strong positive correlation between patient satisfaction and perceived QI effectiveness ($r=0.701$, $p<0.001$), indicating a statistically significant relationship. This suggests that higher patient satisfaction is associated with a stronger perception of QI effectiveness. The result is statistically significant, providing initial support for H₁.

Table 4 presents the results of the simple linear regression analysis examining the effect of patient satisfaction on perceived effectiveness of quality improvement initiatives. The regression model was statistically significant [$F(1,870) =841.575$, $p<0.001$] and explained 49.2% of the variance in perceived QI effectiveness ($R^2=0.492$). Patient satisfaction was a significant positive

predictor of perceived QI effectiveness ($B=0.763$, $\beta=0.701$, $t=29.010$, $p<0.001$), indicating that higher patient satisfaction was associated with greater perceived effectiveness of quality improvement initiatives. These findings support H₁.

The regression coefficients indicate that patient satisfaction significantly predicts perceived QI effectiveness ($\beta=0.701$, $t=29.010$, $p<0.001$). The unstandardized coefficient ($B=0.763$) suggests that a one-unit increase in satisfaction is associated with a 0.763 increase in perceived QI effectiveness. This confirms patient satisfaction as a strong and statistically significant predictor, providing clear support for H₁.

Sub-hypotheses (dimension-wise)

H_{1b}- service quality dimensions (timeliness, safety, information clarity, and support) significantly predict the perceived effectiveness of QI initiatives.

H_{1c}- infrastructure and facility-related satisfaction significantly influence patients' perceived improvement due to QI initiatives.

A multiple linear regression analysis was performed to examine the influence of staff behaviour and communication, service quality dimensions, and infrastructure satisfaction on perceived effectiveness of quality improvement initiatives.

Table 5 presents the results of the multiple linear regression analysis. The overall regression model was statistically significant [$F(3,868) =811.010$, $p<0.001$] and explained 73.7% of the variance in perceived QI effectiveness ($R^2=0.737$). Service quality dimensions emerged as the strongest positive predictor ($B=0.785$, $\beta=0.730$, $p<0.001$), followed by staff behaviour and communication ($B=0.288$, $\beta=0.333$, $p<0.001$). Infrastructure and facility-related satisfaction showed a significant negative association with perceived QI

effectiveness ($B=-0.135$, $\beta=-0.183$, $p<0.001$). These findings support H_{1a} , H_{1b} , and H_{1c} .

DISCUSSION

This study indicates that patient feedback is a strong predictor of perceived effectiveness of QI initiatives in a tertiary care hospital. The overall satisfaction rate (94%) reflects good performance across most service areas. Regression results show that patient satisfaction explains 49.2% of the variation in perceived QI effectiveness, supporting H_1 . This suggests that positive patient experiences are closely linked to higher perceived effectiveness of quality improvement efforts.

The multiple regression results show that service quality has the strongest positive effect on perceived QI effectiveness ($\beta=0.730$), indicating that how care is delivered strongly shapes patient perceptions. Staff behaviour and communication also show a significant positive influence ($\beta=0.333$), highlighting the role of interpersonal care in patient-centered outcomes. In contrast, infrastructure satisfaction has a negative coefficient ($\beta=-0.183$), suggesting that rising patient expectations may influence how facility-related improvements are perceived despite ongoing enhancements.

Overall, patient feedback is an effective indicator of service quality and a useful measure of QI effectiveness. The findings support its integration into continuous quality improvement (QI) cycles to ensure that hospital improvements remain aligned with patient needs and expectations.

Comparison with existing studies

The findings of this study are consistent with national and international literature linking patient satisfaction with perceived service quality and healthcare improvement. Similar to Doyle et al, a strong association was observed between patient satisfaction and perceived quality outcomes, indicating that satisfaction is a key indicator of service effectiveness.¹ The importance of service quality dimensions also aligns with Nguyen et al, who highlighted timeliness, communication clarity, and safety as key determinants of perceived quality of care.⁴

The significant role of staff behaviour and communication is consistent with Pramesh et al, who found that cancer patients place high importance on effective provider communication, thereby supporting the relevance of H_{1a} in this study.¹⁹

The findings of the study are consistent with the study by Berger et al, who reported that efficient service processes significantly enhance patients perceived quality improvement.¹⁴ Accordingly, the strong influence of service quality dimensions (H_{1b}) is well supported by existing literature.

Similar studies have also reported a negative coefficient for infrastructure satisfaction. For example, Renedo and Marston found that improvements in clinical processes and communication can raise patient expectations regarding infrastructure and facilities, creating a perception gap.²³ This is consistent with H_{1c} , suggesting that while infrastructure influences perceptions of QI, more substantial improvements may be required for patients to perceive meaningful change.

Finally, the predictive use of patient feedback aligns with recent evidence supporting data-driven quality improvement. Studies by Friedel et al and Bari et al emphasized that patient experience data can guide policymaking and identify priority areas for improvement.^{12,13} The present study adds to this evidence by applying predictive modelling in an Indian tertiary care hospital, where such research remains limited.

This study examined the relationship between patient feedback and perceived effectiveness of QI initiatives in a tertiary care hospital in India. Using a structured questionnaire administered to 872 patients, it assesses patient satisfaction, service quality, and perceived improvements in care. The findings may help hospital managers prioritise patient-centred QI initiatives.

The study has some limitations. Being conducted in a single hospital, the findings may not be generalizable to other settings. The cross-sectional design limits causal interpretation. As the data were self-reported, responses may be influenced by personal bias or emotional state. The absence of qualitative data also limited deeper exploration of patient experiences and expectations.

CONCLUSION

The study demonstrates that patient feedback is a reliable predictor of QI effectiveness in a tertiary care hospital. Overall patient satisfaction was high (94%), particularly regarding safety, staff attention, and diagnostic timeliness. The strong association between patient satisfaction and perceived QI effectiveness supports H_1 , with satisfaction explaining nearly half of the variation in perceived improvement.

Service quality dimensions such as timeliness, safety, clarity of instructions, and support were the strongest predictors of perceived QI effectiveness, while staff behaviour and communication also showed significant influence. Although infrastructure satisfaction was significant, its negative coefficient suggests unmet patient expectations regarding facilities. Overall, the findings highlight the value of patient feedback as both an evaluative and predictive tool for patient-centred QI initiatives.

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Ethical approval: The study was approved by the Institutional Ethics Committee. Ethical procedures were followed as per the principles of the Declaration of Helsinki (World Medical Association, 2013)

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