Evaluating Quality Improvement Initiatives in Operation Theatres and Labour Rooms: A Study of Budgam's Community Health Centres

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Abstract
Purpose: Quality Improvement (QI) initiatives are essential in Operation Theatres (OTs) and Labor Rooms (LRs) because they have a direct impact on maternal and neonatal outcomes as well as patient safety. Despite the existence of national quality standards and guidelines, evidence on their implementation level remains limited. This study aimed to assess the implementation, compliance, and effectiveness of QI initiatives in Operation Theatres (OTs) and Labor Rooms (LRs) across CHCs in District Budgam. **Methods:** A cross-sectional mixed-methods study was conducted across nine CHCs in Budgam. Facility audits, record reviews, and key informant interviews were conducted using a structured checklist adapted from the National Quality Assurance Standards (NQAS), the Kayakalp, and the LaQshya frameworks. Quantitative data were analyzed using descriptive statistics, while qualitative data were thematically analyzed. **Results:** Significant disparities were observed between FRU and non-FRU CHCs. FRUs reported higher delivery volumes (mean 198.3 vs. 6.7; $p<0.001$), greater staff training coverage (92.4% vs. 33.3%; $p=0.003$), and higher patient satisfaction. Infrastructure gaps, inconsistent infection prevention practices, limited staff availability, and partial adoption of safety checklists were noted across facilities. A strong inverse correlation was observed between staff training and surgical site infection rates ($r = -0.82$). No maternal or neonatal deaths were recorded during the study period. **Conclusion:** Despite the presence of national QI frameworks, implementation at the CHC level remains uneven. Strengthening infrastructure, workforce capacity, protocol adherence, and monitoring mechanisms is essential to improve the quality of care in OTs and LRs.
Keywords: Budgam, Community Health Centers, Labor Room, Operation Theatre, Quality Improvement, NQAS, LaQshya

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Introduction

Quality improvement (QI) in healthcare refers to systematic actions aimed at enhancing patient outcomes, safety, and overall efficiency in healthcare service delivery [1]. In critical hospital settings such as Operating Theatres (OT) and Labor Rooms (LR), QI initiatives are essential as they directly influence maternal and neonatal health outcomes, and overall patient safety [2], [3]. OTs and LRs are high-risk clinical areas where quality lapses directly influence surgical outcomes and maternal and neonatal mortality. In India, Community Health Centers (CHCs) form the backbone of secondary-level care, particularly in rural and semi-urban settings. District Budgam is served by nine CHCs, six of which serve as First Referral Units (FRUs) to provide comprehensive obstetric and surgical services [4], [5]. Despite national initiatives such as the National Quality Assurance Standards (NQAS), Kayakalp, and LaQshya, CHCs continue to face challenges related to infrastructure readiness, human resource shortages, infection control, and adherence to clinical protocols[6]. Evidence evaluating the combined implementation of these QI initiatives at the CHC level is limited, particularly in resource-constrained and geographically challenging settings. This study evaluates current QI practices in OTs and LRs across CHCs in District Budgam to identify implementation gaps and determine compliance with national quality standards.

Objectives

- To evaluate the current QI practices in OTs and LRs across CHCs in District Budgam
- To identify implementation gaps as well as to determine compliance with national quality standards.

Methods

Ethics statement

All study participants provided their voluntary informed consent. While collecting data, confidentiality was maintained. Ethics approval and permission for the study were obtained.

Study design and setting

A cross-sectional mixed-methods study was conducted between July and December 2025 across all nine CHCs in District Budgam.

Participants

Participants included surgeons, obstetricians, anesthetists, medical officers, nursing staff, and OT/LR support staff.

Data source/ measurement

A structured questionnaire and a standardized checklist adapted from NQAS, Kayakalp, and LaQshya were used to assess infrastructure, equipment availability, infection control practices, staff training, and patient safety protocols. Fifty-four key informant interviews were conducted with facility in-charges and hospital staff. Quantitative data were collected through record reviews, while qualitative insights were obtained through key informant interviews. Institutional records related to deliveries, cesarean sections, surgical site infections (SSI), and maternal and neonatal outcomes were also obtained [7].

Statistical methods

All analyses were performed using STATA. Qualitative data were analyzed thematically to identify recurring barriers and facilitators to QI implementation.[8]

Results

Comparison between FRU and Non-FRU CHCs

FRU CHCs demonstrated significantly higher service utilization and quality indicators compared to non-FRUs. Average six-month delivery volume in FRUs was 198.3 compared to 6.7 in non-FRUs ($p<0.001$). Staff training coverage was substantially higher in FRUs (92.4% vs. 33.3%, $p=0.003$), with corresponding higher patient satisfaction scores.

Table 1 Service utilization and quality indicators of health facilities

Indicator	FRU	Non-FRU	p-value
Avg. 6-Month Delivery Volume	198.3	6.7	<0.001
Staff Training Coverage (%)	92.4	33.3	0.003
Patient Satisfaction Score	4.3	3.1	0.02

Institutional Deliveries and Cesarean Sections

Service utilization varied markedly across CHCs. Institutional deliveries ranged from 1 at CHC Pakherpora to 540 at CHC Chadoora. Cesarean section services were largely concentrated in FRUs, with Chadoora (376), Beerwah (275), and Nagam (135) accounting for the majority. Non-FRU CHCs demonstrated limited or negligible surgical capability, indicating referral dependency.

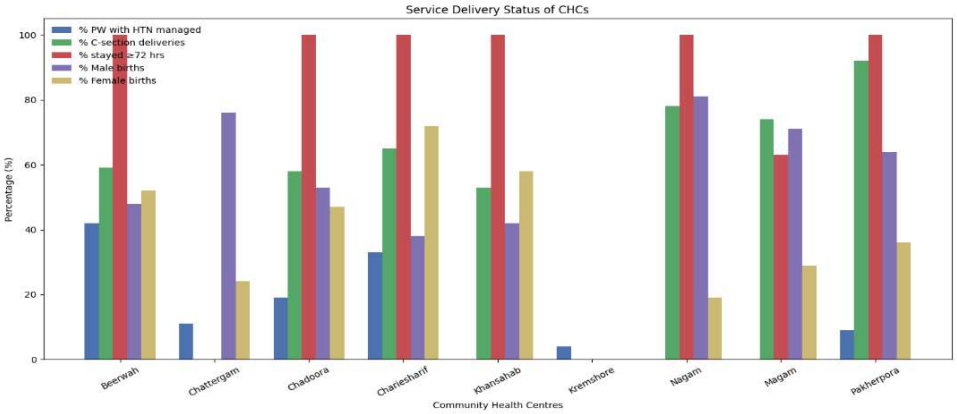

Figure 1 Institutional deliveries and C-section

Infrastructure and Equipment Availability

Infrastructure audits revealed critical gaps. Only four CHCs had fully functional OT equipment. Continuous power backup was available in five CHCs, while autoclave functionality was compromised in three facilities. Although Kayakalp cleanliness standards were largely met, consistent adherence to biomedical waste segregation and PPE use was lacking.

Table 2 Availability of infrastructure and equipment

Equipment	Available (n=9)	% Availability	% FRU CHCs (n=6)	% Non-FRU CHCs (n=3)
Medical Oxygen Plant	3	33.3%	50.0%	0.0%
Functional OT	7	77.8%	100.0%	33.3%
Anaesthesia Workstation	6	66.7%	83.3%	33.3%
Newborn Care Unit	7	77.8%	100.0%	33.3%

Infection Control and Clinical Outcomes

A strong negative correlation was observed between staff training coverage and SSI rates ($r = -0.82$). CHC Nagam recorded the highest SSI rate (2.9%), followed by CHC Chadoora (0.5%), despite high service volumes. No maternal or neonatal deaths were reported during the study period.

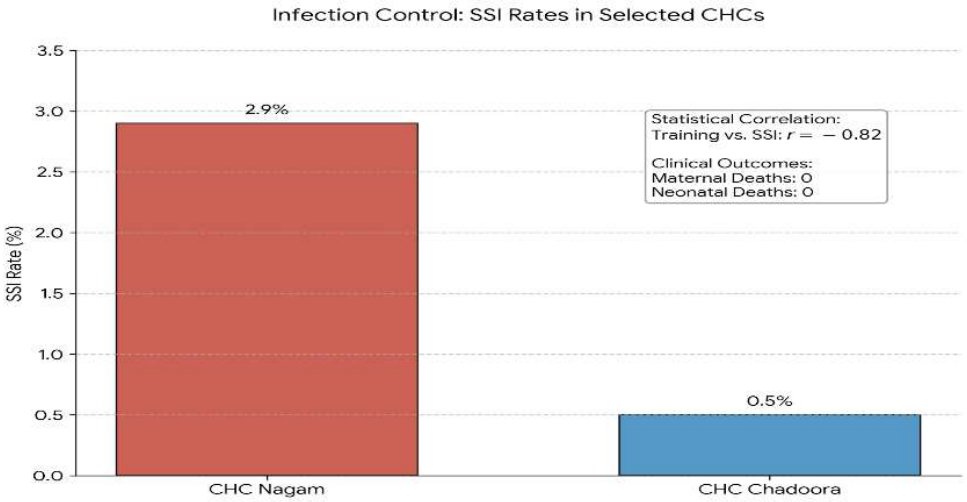

Figure 2 Infection control in selected CHCs

Human Resources and Training

Anesthetist availability was limited to four CHCs. Only three facilities had conducted LaQshya-related training within the preceding six months. Nursing staff reported a heavy workload and irregular rotation between OT and LR duties.

Patient Safety Practices

Routine use of surgical safety checklists was reported in only five CHCs. Emergency preparedness, including crash cart availability and sterilization turnaround time, was inconsistent, particularly in lower-performing facilities [9].

Patient Satisfaction Score

The highest patient satisfaction score was obtained from CHC Chariesharief (4.8), followed by CHC Pakherpora (4.6), CHC Nagam (4.16), and CHC Beerwah (4).

Performance in National QI Programs

NQAS: Only two CHCs had initiated structured internal assessments.

Kayakalp: Three CHCs achieved scores above 70%, though IPC-related domains scored poorly.

LaQshya: None of the CHCs had full LaQshya certification. However, partial implementation was observed, including the use of partographs, which was significantly higher in LaQshya-certified facilities (100% vs. 42.9%, $p<0.01$).

Qualitative Insights

Key informants identified motivation gaps, irregular refresher training, supply chain delays for IPC materials, and weak monitoring mechanisms as major barriers to effective QI implementation.

Results & Discussion

The study examines the findings and contextualizes them within broader healthcare quality standards and issues in secondary-level care. The debate focuses on the extent to which quality improvement (QI) efforts have been implemented in Ots and LRs in CHCs, the differences observed across facilities, and the significant gaps and challenges identified. Despite national efforts through NQAS, Kayakalp, and LaQshya, QI initiatives in CHCs have been implemented only partially and inconsistently [10]. While some CHCs (e.g., Chadoora, Beerwah, Nagam) had high delivery volumes and adequate infrastructure, others, such as Pakherpora and Chattergam, reported minimal service provision. This variation supports the issues highlighted in earlier studies, such as inconsistent resource allocation, staff shortages, and a lack of institutional QI monitoring processes. The limited implementation of LaQshya protocols, despite their critical role in ensuring maternal and neonatal safety, suggests that being designated as an FRU does not necessarily translate into high-quality service delivery. This is consistent with the WHO (2021) remark that "designation without adequate support and supervision rarely ensures functional improvement" [11]. The infrastructure assessment revealed significant deficiencies in quality improvement. Five CHCs were found to have non-functional essential equipment, including autoclaves and surgical lights, while unreliable power backup posed serious risks to surgical safety during emergencies. Additionally, despite having undergone Kayakalp training, several facilities lacked adequate practices for biomedical waste management. These infrastructural shortcomings align with findings from the Ministry of Health and Family Welfare's Public Health Infrastructure Report (2019), which highlighted structural limitations as a major impediment to effective service delivery at the CHC level, particularly in remote settings [12], [13]. Staff shortages, notably anesthetists and qualified OT nurses, emerged as a significant barrier to service quality. Only three CHCs had received LaQshya training in the previous six months, with very few facilities having designated a QI officer. This lack of capacity-building activities is consistent with findings from the National Health Mission (NHM) annual report, which stated that most states inadequately invest in refresher training and QI mentorship at the secondary care level [14]. In addition, interview findings indicated that staff often perceived QI activities as "additional burdens" rather than integral components of routine care. FRUs such as Chadoora and Beerwah demonstrated higher service delivery volumes and functional cesarean section capacity, whereas non-FRUs, including Charisharief and Chattergam, showed comparatively poorer performance. This disparity underscores the need for tier-specific QI frameworks rather than a uniform approach. Notably, certain FRUs also underperformed due to operational constraints, including shortages of surgical supplies, frequent staff rotation, and irregular internal audits. Furthermore, only half of the CHCs had adopted WHO-recommended surgical safety checklists, and infection prevention and control protocols were inconsistently implemented. Such a lack of standardization exposes patients to avoidable risks and ultimately undermines the objectives of quality improvement initiatives. Globally, adherence to surgical safety checklists has been shown to reduce perioperative mortality and complications significantly, and India's LaQshya program similarly prioritizes checklist-based safety standards as core performance indicators. However, on-the-ground implementation is lacking across Community Health Centers in Budgam. The study identified several system-level barriers, including the predominantly top-down introduction of QI strategies with limited engagement of frontline staff, the absence of real-time data monitoring and accountability mechanisms at the CHC level, and persistent resource constraints, particularly in non-FRUs. These observations are consistent with the WHO (2021) evaluation of QI implementation in low-resource settings, which emphasized the importance of decentralized decision-making and local ownership for sustainable quality improvement. Despite these challenges, certain facilities, notably CHC Nagam, demonstrated effective QI practices, characterized by high delivery volumes with low complication rates, routine use of partographs, well-maintained infrastructure, and motivated staff with clearly defined roles. Overall, the findings highlight both the strengths and limitations of QI initiatives in secondary care. While robust national frameworks exist, their success ultimately depends on contextual adaptation, active staff participation, real-time performance monitoring, and adequate infrastructural support.

Limitations of the Study

This study was limited to CHCs only and assessed the quality improvement measures in OTs and LRs only. While efforts were made to ensure data accuracy and comprehensive coverage, limitations may arise due to self-reported data, non-standardized recordkeeping, and staff resistance during interviews. Dependence on facility data and self-reporting raises the possibility of information bias. Manual validation was required due to limited digital record availability in some CHCs.

Recommendation:

Based on the study findings, evidence-based recommendations are proposed to strengthen the implementation of quality improvement initiatives in operating theatres and labor rooms across Community Health Centers in District Budgam. Priority should be given to strengthening infrastructure by ensuring the uninterrupted availability of essential OT and LR equipment, instituting regular preventive maintenance of biomedical devices, and ensuring power backup and water supply for surgical and obstetric services. Addressing human resource gaps is equally critical, alongside regular in-service and refresher training on NQAS, Kayakalp, and LaQshya guidelines, and structured staff rotation to maintain skill continuity. Institutionalization of QI processes should be embedded by mandating the consistent use of surgical safety checklists, strict adherence to infection prevention and control protocols, routine use of the partograph during labor, and the establishment of functional internal quality teams at each CHC.

Conclusion

Quality improvement initiatives in OTs and LRs at CHCs in District Budgam are unevenly implemented despite the availability of national frameworks. Addressing infrastructure deficiencies, strengthening human resources, institutionalizing clinical protocols, and enhancing monitoring mechanisms are essential to improve the quality of secondary-level maternal and surgical care.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Not Applicable.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author on reasonable request.

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