

# Quality improvement initiative to address bed shortage in the maternity ward at the National Referral Hospital

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## Abstract

**Background and Aims:** The shortage of beds at the maternity ward is ever increasing with an increasing trend in total birth and cesarean section deliveries thereby increasing the daily number of obstetric patients awaiting admission. This quality improvement (QI) project was conducted to mitigate the problem of bed shortage by implementing modified enhanced recovery after surgery in low-risk cesarean section mothers. We aimed to increase the process measure of second day postoperative discharge in low-risk cesarean section mothers admitted in the maternity ward from 0% to 25% over 2 months period. Simultaneously, the outcome measure of daily number of obstetric patients awaiting admission was assessed.

**Methods:** The study was conducted at the maternity ward, Jigme Dorji Wangchuck National Referral Hospital, Thimphu Bhutan. Fishbone analysis was used to analyze problems leading to delayed discharge. Interventions were discussed, implemented, and reviewed using Plan, Do, Study, and Act (PDSA) cycle over 8 week period from June 1 to July 31, 2021. Data were collected using the EXCEL sheet and analyzed using STATA 13. Process and outcome measures during the pre and postintervention period were analyzed. Descriptive statistics were used to express the results. Wilcoxon Signed-Rank test was used to determine the statistical significance at  $p < 0.05$ .

**Results:** The postintervention second day postoperative discharge increased to a median value of 65.5% (interquartile range [IQR]: 45–80) compared to the preintervention value of zero. The number of daily waiting obstetric patients decreased from the preintervention median value of 6.0 (IQR: 0–7) to the postintervention median value of 1.0 (IQR: 0–2) which was statistically significant at  $p = 0.0001$ .

**Conclusion:** QI initiative can address bed shortages by increasing the early postoperative discharge, thereby reducing the number of obstetric patients awaiting admissions. The outcome of this QI initiative can be used to provide evidence to modify the existing Standard Operating Procedures in our setup.

## KEYWORDS

EENC, ERAS, obstetrics, quality improvement

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## 1 | INTRODUCTION

### 1.1 | Problem statement

The maternity ward at Jigme Dorji Wangchuck National Referral Hospital (JDWNRH) currently has 36 beds. The average bed occupancy rate in the maternity ward ranges from 95% to 100% on a daily basis. The rising trend in the total number of deliveries and cesarean sections over the last 5 years against a fixed number of beds is a growing concern in terms of bed occupancy. The cesarean section rates over the last 5 years at the hospital have increased from 27% to 32%.<sup>1</sup> In 2020, data with the medical record section at the hospital showed 4241 deliveries out of which there were 1370 Cesarean sections resulting in a 32% cesarean section rate.<sup>1</sup> Although there is no global consensus on optimal timing on discharge following low-risk cesarean section, the current Standard Operating Procedure (SOP) at the Department of Obstetrics and Gynecology mandates discharge of cesarean section mothers only on the third postoperative day. Based on numerous published literature, we decided to shorten the postoperative hospital stay in low-risk cesarean section mothers through this quality improvement (QI) initiative. Mothers are registered in the waiting register maintained at the maternity ward and called for admission when there is a bed available. On average, six pregnant mothers per day are waiting for admission to the maternity ward although the waiting period varies depending on the daily bed status in the ward. This has led to a few adverse perinatal outcomes like intrauterine fetal death.

### 1.2 | Available knowledge

Enhanced recovery after surgery (ERAS) is patient-centered multi-disciplinary teamwork that aims to optimize patient health through early recovery after surgery. Although Brooten et al. in the early 1990s showed the overall benefits of ERAS in cesarean section deliveries, it was not widely adopted.<sup>2</sup> ERAS society guidelines have recommended comprehensive evidence-based several maternity care processes starting from preoperative, and intraoperative to the postoperative period that culminates in faster recovery and early hospital discharge without compromising maternal health.<sup>3,4</sup> As shown by Bowden et al. in their QI initiative on ERAS, the benefits are multiple; shorter length of hospital stay, reduction in complications, readmission, and healthcare expenditures.<sup>5</sup> Implementing Comprehensive ERAS in Obstetrics needs consensus from multiple stakeholders involving anesthesia, scrub nurses, obstetricians, and maternity care nurses which may not be always possible. Implementing ERAS, especially in a low resource setting has its own drawbacks and limitations in form of incoordination among stakeholders, resistance to change, inadequate human resources, and logistics.<sup>6</sup> Despite the challenges, modified ERAS has also proven beneficial in limited-resource settings. Only a few care flow processes in preoperative, intraoperative, or postoperative pathways were implemented based on the resources available.<sup>7-9</sup> These studies in low

resource settings have clearly demonstrated the benefits in terms of early hospital discharge, lesser postoperative complications, readmission, and greater patient satisfaction.

### 1.3 | Current practices

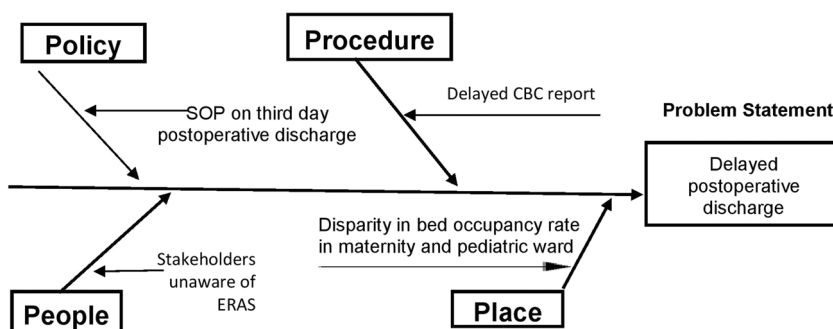
Mothers scheduled for elective cesarean section are admitted 1 day before the day of surgery. They are kept fasting overnight from 10 p.m. Prophylactic antibiotic Cefazolin 2 g is administered intravenously 30–60 min before skin incision. Cesarean section is performed under spinal anesthesia administered by Nurse Anesthetist or Anesthesiologist. Intraoperative management of nausea and vomiting, euolemia, and normothermia is left at the discretion of the anesthetist team. With published evidence of benefits to the mother–neonate dyad, Early Essential Newborn Care (EENC) is carried out routinely.<sup>10</sup> Mothers are kept nil orally for 6 h and maintenance intravenous fluids continued for 24 h. Postoperative analgesia is uniform with single-agent intramuscular Diclofenac or Pethidine. The urinary catheter is removed only 24 h after the surgery. Routine maternal and neonatal assessment is continued till the third postoperative day. In addition, a blood sample for complete blood count is sent to the laboratory on the second postoperative day. On the third postoperative day, the wound is inspected, and dressing is done before discharge. All these factors lead to delayed mobilization of the mother and, therefore, delayed discharge.

### 1.4 | Modified ERAS care processes

All mothers undergoing cesarean section received preloading with 1 L of intravenous normal saline. Prophylactic antibiotic Cefazolin 2 g is administered intravenously 30–60 min before skin incision. EENC was practiced as part of the modified ERAS bundle of care processes. Intraoperative multimodal analgesia in form of subcutaneous infiltration of the surgical wound with 0.5% bupivacaine 2 mg/kg body weight, intravenous Paracetamol 600 mg 6–8 hourly, and intramuscular Diclofenac 75 mg 8 hourly for 24 h were implemented. Postoperative fasting was reduced to 4 h and intravenous fluid was subsequently discontinued. The urinary catheter was removed 8–10 h after the surgery. First postoperative daycare comprised of an assessment of pallor, vitals, urinary and bowel habits, and removal of an intravenous cannula. The mother was also assessed for independent ambulation and breastfeeding. Analgesics were converted to oral Paracetamol and Ibuprofen depending on the requirement of the mother. On the second postoperative day, blood samples for complete blood count were collected and sent to the laboratory by the nurse on night shift duty to avoid delay in getting the report. Upon fulfilling the preset criteria of early discharge on the second postoperative day, the mother and neonate were deemed fit for early discharge by the doctor on duty (Table 1).

**TABLE 1** Discharge criteria in low-risk cesarean section

Fit for discharge	Unfit for discharge
<ul style="list-style-type: none"> <li>• Absence of fever at least for 24 h</li> <li>• Independent ambulation</li> <li>• Normal dietary, bowel, urinary functions</li> <li>• Healthy surgical wound</li> <li>• Vitals and complete blood count are normal</li> <li>• Neonate who is breastfeeding well</li> </ul>	<ul style="list-style-type: none"> <li>• Cesarean section under General Anesthesia</li> <li>• Any intraoperative or postoperative complications</li> <li>• Mothers not willing for early discharge</li> <li>• Residing away from the capital or those not having adequate social network or family support</li> <li>• Baby admitted in neonatal intensive care unit or those deemed unfit for discharge by the pediatric team due to other reasons</li> </ul>

**FIGURE 1** Fishbone analysis showing causes of delayed postoperative discharge in low-risk cesarean section

## 1.5 | Rationale

Despite the availability of evidence on numerous benefits of ERAS, our department and hospital at large have not adopted this practice. We wanted to generate our own local evidence on the feasibility and safety of implementing modified ERAS in obstetrics through this QI project.

## 1.6 | Aim statement

Using the SMART (Specific, Measurable, Achievable, Relevant, Time-bound) aim statement, we aimed to increase the second day postoperative discharge in low-risk cesarean section mothers admitted in the maternity ward from 0% to 25% over 2 months period.

## 2 | METHODS

### 2.1 | Design

Using the POCQI methodology, the study was conducted at the maternity ward, JDWNRH, Thimphu Bhutan. The QI team was formed comprising two consultants and three nursing staff from the maternity ward. Following the identification of the problem, fishbone analysis was used to identify the factors related to delayed discharge of low-risk cesarean section mothers (Figure 1). The factors identified and amenable to modification were people, procedure, and policy-related which are process indicators. People-related factors were a lack of awareness of ERAS among stakeholders-consultants,

residents, and nursing staff. Procedure-related to delayed discharge was delayed availability of complete blood count report before discharge. Policy related factor was the SOP adopted by the department for postoperative discharge on the third day. Place-related factor was the disparity in bed occupancy rate in maternity and pediatric ward. All operational definitions and discharge criteria to be used in the project were discussed and finalized at the team level. All data were listed according to the aim of the project. The process measure chosen was the second day postoperative discharge and the outcome measure was the daily number of obstetric patients awaiting admission to the maternity ward within 24 h of listing in the admission register. Modified ERAS was implemented as an evidence-based intervention to guide the process and outcome measures. Numerical data on the second day postoperative discharge and the obstetric patient awaiting admission were collected from the electronic database maintained at the maternity ward on a daily basis using the EXCEL data collection sheet and reviewed weekly. We agreed to convene and carry out Plan, Do, Study, and Act (PDSA) cycle over 8 weeks period from June 1 to July 31, 2021.

The baseline value on the second day postoperative discharge was assumed as zero based on the current practice of third day postoperative discharge. Postintervention process measure was calculated weekly and summarized as a run series chart. The baseline preintervention value of the daily number of obstetric patients waiting for admission was calculated from the preceding 4 weeks before the study. Postintervention changes in outcome measure were calculated and plotted weekly as a run series chart for the study period. Datasets were analyzed using STATA version 13 (Stata Corp). Data were expressed as median (interquartile range [IQR]). Wilcoxon Signed-Rank test was used to compare the difference in the daily number of obstetric patients waiting for admission during the

pre- and postintervention period.  $p < 0.05$  was used to determine the statistical significance.

## 2.2 | Possible change interventions

### 2.2.1 | PDSA 1

Before the rollout of the project, formulation and sensitization on the processes of care were done to all stakeholders. The operational definition of a low-risk cesarean section was agreed upon unanimously. Mothers undergoing cesarean section whether emergency or elective without any comorbid and obstetrical conditions and those without any intraoperative or postoperative morbidity to the mother and baby were considered as low-risk cesarean section. The consensus was reached among the consultants, residents, and the nursing staff to adopt a modified ERAS pathway as a doable and sustainable intervention in low-risk cesarean section mothers. The issue with the timeliness of the complete blood count report was agreed upon. The criteria for discharge were also discussed and unanimously accepted. As balancing measures, information on maternal or neonatal readmission to any healthcare center would be sought via telephonic follow-up 1 week following discharge. This follow-up would also provide us the feedback on any potential harm to the mother–neonate dyad resulting from the interventions. A weekly meeting was agreed upon by the team members to review the progress and challenges in the implementation of the strategy.

### 2.2.2 | PDSA 2

At the end of the first week, we convened the PDSA meeting. The second day postoperative discharge was found to be 45%. The newly recruited nursing staff were not trained on EENC and thus lacked skills. To this effect, re-enforcement of the change ideas was done by creating a WhatsApp forum. A video clip on EENC was posted in the forum and on-site skill development for new recruits was done by the senior staff. The administration of Paracetamol as IV bolus was changed to infusion by diluting 8 ml of distilled water as bolus injection was painful for the mothers.

### 2.2.3 | PDSA 3

The third PDSA meeting was conducted at the end of the second week. Despite the continuous practice of EENC at the operation theater and maternity ward, the second day postoperative discharge fell to 42%. The main reason for delayed discharge was from the pediatric side citing low breast milk production. A brief meeting was held with the residents from the pediatric department who carry out the postnatal ward round. A consensus was reached regarding the early discharge on issues like less breast milk production and low maternal confidence in breastfeeding. Such issues were to be

followed up at the lactation clinic in the next 24 h. The nursing staff who receive the baby in the operation theater and those involved in breastfeeding assessment were resensitized on the importance of EENC and nursing care in lactation using the WhatsApp forum.

### 2.2.4 | PDSA 4

The meeting conducted at end of the third week saw a steady rise in second day postoperative discharge at 64%. Although breastfeeding issues persisted, the “will of the mother” to stay a day in the hospital started as a reason for delayed discharge. As a gesture of encouragement and continued support, the progress of the QI was shared with stakeholders using the WhatsApp forum.

### 2.2.5 | PDSA 5

The meeting at the end of the fourth week saw a drastic improvement in the second day postoperative discharge at 67%. The meeting revealed that EENC could not be implemented during emergency cesarean sections performed during night hours due to the lesser number of nursing staff on duty. Subsequent PDSAs did not reveal any significant issues to be addressed. At the end of the project, we could achieve a nonrandom effect as plotted on the run chart.

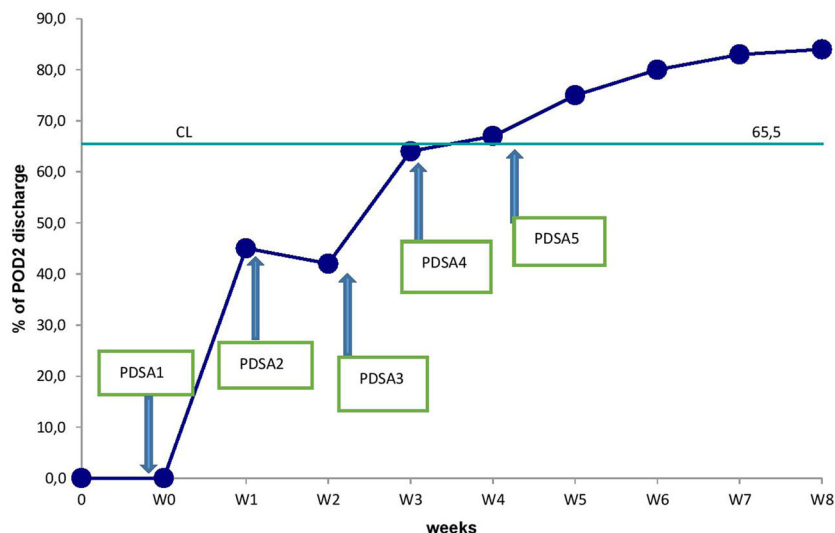
## 3 | RESULTS

The percentage of second day postoperative discharge was calculated against the total number of discharges of low-risk cesarean section mothers on a weekly basis and summarized in a run chart (Figure 2). The daily number of obstetric patients awaiting admission was calculated as a weekly average and presented as a run chart (Figure 3). Using the zero median value as a baseline, the postimplementation second day postoperative discharge increased to a median value of 65.5% (IQR: 45–80). The upward trend was noticed from the third week of the project. Compared to the pre-intervention, the daily number of obstetric patients awaiting admission decreased significantly for the first and second months respectively ( $p = 0.0002$ ,  $p = 0.0017$ ). Overall, the daily number of obstetric patients awaiting admission decreased from the pre-intervention median value of 6.0 (IQR: 0–7) to the postintervention median value of 1.0 (IQR: 0–2) which was statistically significant at  $p = 0.0001$ . The top reason for delayed discharge was breastfeeding issues which constituted about 65% (Figure 4).

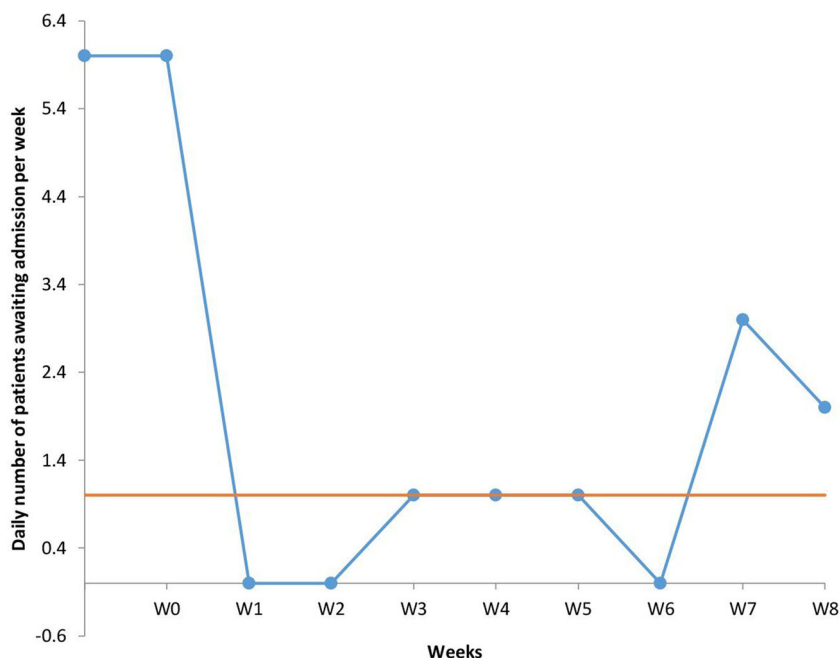
## 4 | DISCUSSION

Based on the SMART aim of the QI project, we could achieve the target over 8 week period. With the increase in the process measure following the intervention, there was a concomitant decrease in the

**FIGURE 2** Run chart showing percentage of the second day postoperative discharge in low-risk cesarean section



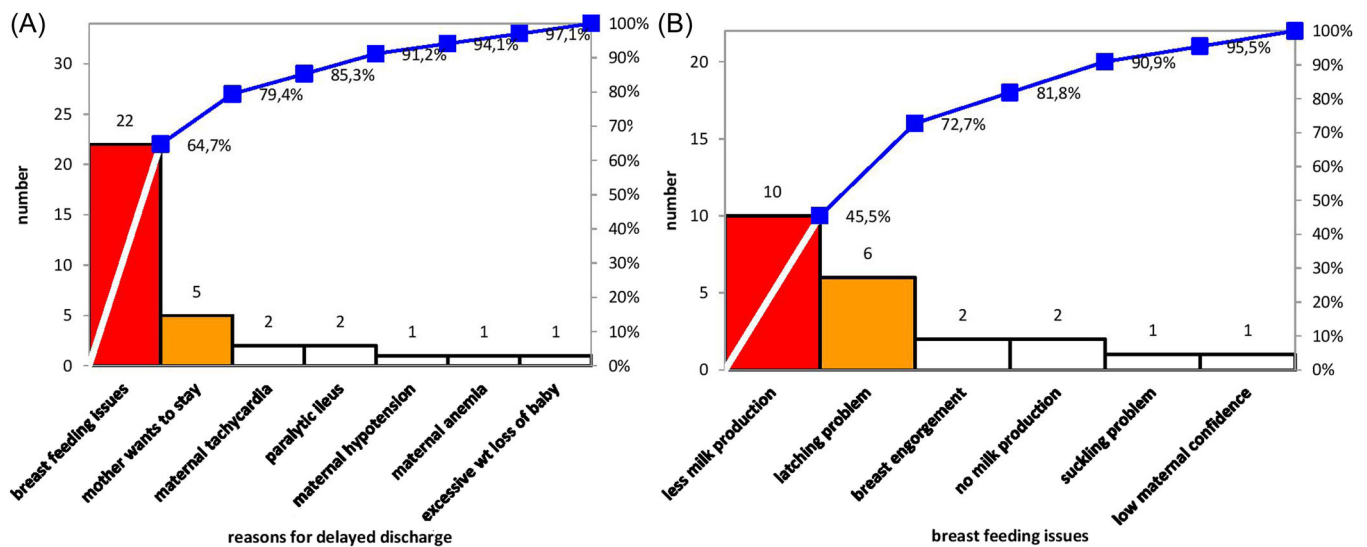
**FIGURE 3** Run chart showing daily number of obstetric patients awaiting admission



number of obstetric patients awaiting admission. The inverse relationship between the process and outcome measure indirectly addresses the bed shortage at the maternity ward. More obstetric patients awaiting admission could be accommodated as a result of creating empty beds in the ward through the implementation of ERAS. The issue of coaching on EENC for newly recruited nursing staff could not materialize due to Covid restrictions and safety protocol. EENC as part of modified ERAS could not be practiced uniformly especially at night hours due to limited nursing staff on duty. In addition, we did not implement the comprehensive ERAS bundle of care processes as this would involve a lot of stakeholders and might lead to resistance to change ideas. While we respected the “will of the mother” in her decision to stay longer in the ward, this also resulted in a greater contribution to delayed postoperative discharge. However, this very act has clearly demonstrated the

patient-centered care we offered to our mothers. Secondary outcome measures like mother’s satisfaction, readmission due to surgical site infections, and postdischarge neonatal issues were not assessed in our project.

Owing to the limitation of the time period, we could not proceed with further PDSA cycles to demonstrate the sustainability of this project. Led by the focal person from the Quality Assurance and Standardization Division (QASD) of the hospital, a meeting was convened at the end of the project. Progress and bottlenecks of the project were presented to the Medical Superintendent and stakeholders from the Department of Obstetrics and Gynecology, Pediatrics, and Nursing. Issues of sustainability and ideas to change were discussed. A consensus was reached to change the existing SOP on postoperative discharge, establishment of new SOP on breastfeeding issues, and follow-up of breastfeeding issues at the lactation



**FIGURE 4** Pareto chart showing (A) reasons for delayed postoperative discharge (B) types of breastfeeding issues

clinic. Ideas were also discussed on transferring the neonates with breastfeeding issues to a separate cubicle in the pediatric ward as its bed occupancy rate is low compared to ours. The meeting also endorsed the need for EENC coaching to be held every year for new nursing staff involved in mother and neonatal care.

Our project adhered to the six domains of healthcare as described by the Institute of Medicine. With due regard to the clinical, socioeconomic, and geographical factors, the safety of the mother–neonate dyad was assured through the discharge criteria and balancing measures we adopted. The effectiveness of the implementation of ERAS in obstetrics has been achieved through early mobilization and enteral feeding. Informed consent before cesarean section and the will to stay longer in the ward clearly demonstrated the patient-centered care we offered in our project. Although not analyzed, this QI project would possibly benefit the larger group of both obstetrics and gynecology patients in terms of last-minute cancellation of elective surgery due to bed shortage. The constitution of the kingdom of Bhutan mandates free and equitable healthcare to all its citizens at the cost of ever-increasing overall healthcare expenditure.<sup>11</sup> Studies have shown that hidden expenditure in the cesarean section was significantly associated with the length of hospital stay.<sup>12,13</sup> Given the shorter length of hospital stay, our project has the potential for efficient obstetric care services in terms of reducing overall healthcare expenditure.

## 5 | CONCLUSION

Simple and effective interventions like ERAS could be used as a QI initiative to address bed shortages by reducing the number of obstetric patients awaiting admissions. The outcome of this QI project can also be used to provide evidence to modify or frame SOPs in our setup. As a future scope, we recommend studies on healthcare cost analysis after the implementation of similar projects.

## AUTHOR CONTRIBUTIONS

**Sangay Tshering:** Conceptualization; data curation; formal analysis; investigation; methodology; project administration; software; supervision; validation; writing—original draft; writing—review and editing. **Namkha Dorj:** Conceptualization; data curation; formal analysis; investigation; methodology; project administration; software; supervision; validation; writing—original draft; writing—review and editing. **Renuka Monger:** Conceptualization; data curation; formal analysis; investigation; methodology; project administration; software; supervision; validation; writing—original draft; writing—review and editing. **Sonam Sonam:** Formal analysis; investigation; methodology; project administration; validation; writing—review and editing. **Nirmala Koirala:** Formal analysis; investigation; methodology; project administration; validation; writing—review and editing.

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## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## DATA AVAILABILITY STATEMENT

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

## ETHICS STATEMENT

Since this was a QI project, the ethical board granted review exemption vide order REBH/PO/2021/065 dated May 6, 2021. Permission and support were sought from the hospital administration



and the head of the Department of Obstetrics and Gynecology before initiating the project. We also agreed to inform the ethical board of any change in a clinical intervention intended or undesired outcome revealed through the PDSA cycle. Before surgery, counseling was given to all low-risk cesarean section mothers and their attendants at the time of taking consent for surgery. The expected benefit of the interventions to the mother-neonate dyad was explained. Mothers were encouraged to report any undesired outcome resulting from the interventions.

### TRANSPARENCY STATEMENT

All authors have read and approved the final version of the manuscript. Sangay Tshering has full access to all of the data in this study and takes complete responsibility for the integrity and accuracy of the data analysis. Sangay Tshering affirms that this manuscript is an honest, accurate, and transparent account of the study reported. No important aspects of this study have been omitted and any discrepancies have been explained.

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