

July 2023

SAFE CESAREAN DELIVERY CHECKLIST LANDSCAPE ANALYSIS



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ABBREVIATIONS

ACOG	American Congress of Obstetricians and Gynecologists
FIGO	International Federation of Gynaecology and Obstetrics
FOGSI	Federation of Obstetric and Gynaecological Societies of India
MAKLab	Measurement, Adaptive Learning, and Knowledge Management Lab
RCOG	Royal College of Obstetricians and Gynaecologists
SMFM	Society for Maternal-Fetal Medicine
SSC	Surgical Safety Checklist
WHO	World Health Organization

BACKGROUND & AIMS

Globally, about 140 million infants are born every year and 300,000 women die of pregnancy-related causes (Ritchie & Mathieu, 2023). According to the World Health Organization (WHO), the top three causes of maternal deaths include severe bleeding after childbirth, infections after childbirth, and high blood pressure during pregnancy (World Health Organization, 2023). The availability of high-quality, person-centered childbirth care is, therefore, critical for improving health outcomes for women and their newborns.

Cesarean delivery is the most common surgery worldwide and has risen globally; it now accounts for more than one in five (21%) of all childbirths and is expected to rise to nearly 29% of all childbirths by 2030 (Betran, Ye, Moller, Souza, & Zhang, 2021; World Health Organization, 2023). Cesarean births are the most common surgical procedure performed in many low- and middle-income countries. Many of these procedures are performed under difficult circumstances, by providers with limited surgical expertise, in fragmented health systems. In Africa, maternal mortality after cesarean is 50 times higher than in high-income countries and is largely driven by postpartum hemorrhage and anesthesia complications (Bishop et al., 2019).

This growing rate of cesarean births and mortality attributed to them underscores the need to ensure that known, evidence-based practices are integrated across the care pathway. Existing evidence suggests that communication failures are common in the operating room and often lead to increased complications, including infections (Pugel, Simianu, Flum, & Patchen Dellinger, 2015). Checklists are a simple tool that can be easily adapted to different contexts and implemented across a health system to help standardize medical processes such as surgery. In 2008, the WHO developed the Surgical Safety Checklist (SSC)—a 19-item checklist designed to reduce the rate of surgical complications (Fig. 1) (Haynes et al., 2009). The SSC is broadly applicable and intended to be used in a range of surgeries, and the use of the SSC has been shown to prevent communication failures and reduce complications (Pugel et al., 2015). The use of SSC has spread with great success, showing a reduction in major complications and 30-day mortality following its introduction and use as well as encouraging communication and teamwork (Braham, Richardson, & Malik, 2014).

Figure 1: The WHO Surgical Safety Checklist





Cesarean deliveries are a unique surgical procedure that includes two patients—the mother and the newborn—as well as their respective care teams. Therefore, additional considerations are required that are distinct from other surgical procedures (Combs, 2021). Compared to other operations, cesarean delivery has unique features that impact morbidity and mortality, including:

- Management decisions must weigh risks and benefits of both the woman and the newborn.
- Obstructed labor is often eclipsed by more urgent complications (hemorrhage, eclampsia, fetal distress, sepsis) in over-burdened, under-supported labor wards.
- Potentially life-threatening hemorrhage may occur due to the large cardiac blood volume that supplies the gravid uterus and placenta.
- Exposure of the surgical site to vaginal flora increases risk of postoperative infection.
- Neuraxial anesthesia (such as spinal block) is preferred over general anesthesia due to concerns of an increased risk of miscarriage, premature birth, low birth weight newborns and perinatal death secondary to the diffusion of anesthetic agents.

Failures in communication during handoffs between labor ward staff, operating room staff, and post-operative ward staff as well as between surgical staff once inside the operating room are often the root cause of catastrophic outcomes (Lingard et al., 2004). There are few existing checklists that are designed specifically for cesareans, and those that do exist are narrow in scope. The development of a safe cesarean checklist that encourages communication, builds a culture of safety, and guides health care providers through high-quality, person-centered care has the potential to reduce maternal and newborn morbidity and mortality globally.

MOMENTUM Safe Surgery in Family Planning and Obstetrics, a MOMENTUM project, assists country governments, institutions, organizations, and networks to build awareness of, equitable access to, and provision of high-quality surgical care. The project seeks to develop a safe cesarean checklist with partners in India. While the work will be India-focused, the team will plan design work to allow for later generalizability of the tool and adaptation of the checklist for additional contexts beyond India. The project engaged MAKLab, the Measurement, Adaptive Learning, and Knowledge Management Lab for MOMENTUM, to support this activity by conducting a landscape analysis of existing cesarean checklists and other relevant guidelines. This report describes existing resources and maps them to a cesarean care pathway to identify gaps and guide the design and content of the project's safe cesarean checklist.

METHODS

We began the landscape analysis by identifying existing checklists and guidelines. We first solicited input from experts to share relevant tools. Experts comprised practicing obstetricians as well as individuals engaged in the process of designing the WHO Safe Childbirth Checklist in 2015. We then conducted internet searches on Google, Google Scholar, and Pubmed. We included any global or regional checklists that were designed to be used in a clinical setting and were specifically designed for use during cesarean deliveries or had reference to cesarean deliveries. We also conducted a search for global or India-specific guidelines related to cesareans, specifically focusing on guidelines developed by the World Health Organization (WHO), The International Federation of Gynaecology and Obstetrics (FIGO), The International Confederation of Midwives, and Federation of Obstetric and Gynaecological Societies of India (FOGSI).

We added all identified checklists and guidelines to a spreadsheet and extracted the following information from each:

- Name of tool.
- Organization or developer.
- Stakeholders mentioned.
- Country/region.
- Type of resource (checklist—accountability, checklist—clinical decision aid, checklist—communication, guidelines).
- Point(s) in care pathway addressed by the checklist.
- Type of cesarean (scheduled, unscheduled, emergent).
- Information about the implementation or evaluation of the checklist.
- Additional notes.

The team simultaneously developed a care pathway for cesarean deliveries. We conducted an internet search for existing care pathways and found a paucity of relevant resources. As a result, we developed the care pathway directly in conversations with experts on the teams. The purpose of the care pathway is to identify critical moments in the provision of service delivery for a woman needing cesarean delivery so the team can identify where tools already exist and where the future checklist might provide the most value and fill critical gaps. The proposed care pathway includes the following points:

1. **Pre-admission counseling**—any counseling or decision-making that occurs prior to arrival and admission at the facility, including the decision for a scheduled cesarean section, family planning counseling, patient education, and discussions and management of medical comorbidities.
2. **Admission at facility**
 - a. **Triage assessment**—the decisions and assessments that take place after arrival at the hospital and prior to admission with disposition to home, hospital, or transfer.
 - b. **Admission**—the decision to admit the patient to the birth ward after triage assessment.
3. **Labor management**—the time from admission until cesarean delivery for unscheduled cesarean deliveries, including decisions around augmentation of labor and management of comorbidities.
4. **Decision for cesarean**—the considerations that take place for an unscheduled or emergent cesarean delivery. This decision might take place during admission to the facility or labor management. The decision for a scheduled cesarean is included under “pre-admission counseling.”
5. **Cesarean delivery**
 - a. **Preoperative**—the time from the decision for cesarean to entering the operating room. This may include pre-op huddle, bladder catheterization, dosing existing epidural, and clipping.
 - b. **Intraoperative**—the time from the moment the patient enters the operating room until they leave the operating room. This may include skin preparation, vaginal preparation, skin entry, uterine incision

and expansion, uterine repair and closure, fascia, subcutaneous tissue, and skin closure, counts, and immediate newborn care.

- c. **Postoperative**—the time from leaving the operating room through immediate recovery. This may include urinary drainage, venous thromboembolism prophylaxis, surgical site monitoring, promotion of skin-to-skin bonding, and monitoring of lochia.
6. **In-facility recovery**—the time from leaving postoperative recovery unit or operating theater (if there is no postoperative recovery unit) to patient discharge, including patient education, support of breastfeeding, anemia remediation, in-hospital mobilization, bladder function, and gastrointestinal function recovery.
7. **Discharge**—the time when a patient leaves the facility for home, including discussions of family planning, analgesia, wound care, symptom management, nutrition, mental health, and post-discharge physical activity.
8. **Post discharge**—follow up visits, including scheduled postpartum visit(s) and proactive outreach.

Finally, we used the care pathway to develop an ecosystem map of the identified tools. We mapped each tool by type and point on the care pathway to be able to visually identify areas of abundance and gaps.

SUMMARY OF FINDINGS

Type of Checklists

Each resource identified through the landscape analysis was classified as either a checklist or a guideline. Checklists may serve different purposes in cesarean delivery including facilitating communication across members of the care team, guiding decisionmaking around care, or ensuring accountability in completing critical steps in the care pathway. Thus, checklists were further categorized by purpose: communication, decision, or accountability. The definitions for each are presented in Box 1. For the purposes of categorizing resources, we considered the categories mutually exclusive though acknowledge that communication or decision-making checklists could serve a dual purpose of being accountability tools. Any checklist that did not include a communication or decision-making component was considered an accountability tool. We identified 15 checklists and six additional global or Indian guidelines related to cesarean deliveries. A list of all of the identified checklists and guidelines and the extracted information can be found in [Annex 1](#). Seven of these checklists were developed by professional organizations such as The American Congress of Obstetricians and Gynecologists (ACOG), the WHO, the Royal College of Obstetricians and Gynaecologists (RCOG), or the Society for Maternal-Fetal Medicine (SMFM). The remainder were developed by hospitals or groups of individuals in specific regions. Given the number of regional checklists identified, it's quite likely that there are many more cesarean checklists developed or in use in specific regions or hospitals that have not made their resources publicly available or that our search strategy was unable to locate.

Box 1: Definitions of resource categorizations

Checklist – a resource that is used in a clinical setting with distinct items that are intended to be reviewed by some or all of the medical team. We define three types of checklists:

Communication – a checklist that is intended to be read out loud or that prompts specific questions between specified members of the care team.

Decision aid – a checklist that uses the items to guide team members toward specific decisions related to care delivery, such as administering specific medications, making the decision for a cesarean, etc.

Accountability – a checklist that is intended to remind members of the care team of steps in the provision of care.

Guideline – a resource that provides summaries of evidence or best practices for a given medical field, procedure, or part of a procedure.

Of the 15 checklists, three were classified as communication checklists while two were classified as clinical decision aids, and 10 as accountability tools. Tools were classified as communication checklists if they specified which stakeholder should be communicating with whom and formatted items as questions; clinical decision aids comprise tools that specified how to provide care based on answers to the checklist items; and accountability tools included reminders of steps that should be completed or confirmed. There was significant overlap in the content in most of the communication and accountability tools, with heterogeneity in the way the tools were structured and framed. For example, the cesarean checklist developed by the Society for Maternal-Fetal Medicine (SMFM) (Fig. 2) was adapted from the SSC (Fig. 1) and specifies which provider should be asking questions of whom (Combs et al., 2021). By contrast, a cesarean checklist that was developed in Rwanda (Fig. 3) was also adapted from the SSC and includes similar content but does not specify who should be completing it, and the items are not framed as questions (Sun, Patauli, Bernstein, Goffman, & Nathan, 2021). Thus, many of the accountability tools could be adapted into communication tools with slight changes to framing or with specific instructions about implementation. This underscores the importance of discussing how a checklist will be implemented early in the design process and the ways that the design and structure can facilitate implementation. The appropriate team member to ask each question within a communication tool may differ across contexts, and adaptation at the country and facility level—including identification of the most appropriate

Figure 2: Excerpt from SMFM checklist

Briefing

Before initiation of anesthesia

Nurse to ask the patient:

- Please tell us your name, date of birth, and planned procedure. (Nurse: Confirm that wrist band and consent form match.)
- Do you have any allergies to medications? Latex? Other?

Nurse to ask the anesthesiologist :

- Is Anesthesia Safety Check complete (machine and med checks)?
- Are there any unusual concerns (BMI, difficult airway, etc)?
- Are any special procedures needed (central line, art line, etc)?

Figure 3: Excerpt from Rwanda checklist

NURSE: Name _____
Date/Time _____

Prior to starting surgery:

- Verify patient name
- Allergies
- Indication
- Fetal presentation: Cephalic / Breech / Transverse — back down / Transverse — back up
- Placentation: Anterior / Posterior / Lateral / Fundal / Previa
- High risk for maternal hemorrhage? (Multiple prior cesareans, chorioamnionitis, polyhydramnios, twin gestation, magnesium sulfate, prolonged Pitocin infusion)
 - Yes
 - 2 large bore IVs in patient with 500cc infusing now
 - Cytotec in the Salle d’Op
 - Ergometrine in the Salle d’Op
 - Oxytocin in the Salle d’Op
 - No
- Antibiotics given before skin incision
- Bladder foley placed
- Safety belt on patient’s leg, above knees
- Left lateral displacement
- Skin preparation
 - Wash
 - Betadine

team members for communication—should happen during early implementation, as was intended with the original SSC design.



Two of the identified checklists, both developed by ACOG, are specifically intended for use in scheduled cesareans (“Patient Safety Checklist: Scheduling planned cesarean delivery,” 2011; Patient Safety Checklist: Preoperative planned cesarean delivery,” 2011). The remainder are designed for use in both scheduled and unscheduled cesareans; although one, developed by SMFM, includes a separate checklist specific to time-critical emergency cesareans (Combs et al., 2021). Additionally, the First Cesarean Delivery Checklist is one of the two decision aids identified and is specific to a patient’s first cesarean section (Toumi et al., 2018).

Users

Given the number of individuals involved in cesarean deliveries across the care pathway and the importance of caring for both the mother and the newborn simultaneously, we extracted information about the individuals mentioned in each tool. Some tools clearly specified who should be speaking to whom in each step, while others did not. Seven of the checklists did not specifically note who should be involved in each step or instead referenced the “medical team” broadly without noting who on the team should be involved and when. Three of the checklists specifically mentioned the newborn team, and only one mentioned the birth companion. Many checklists reference the patient in asking for

the name and date of birth, but only two—the SMFM checklist and the WHO Safe Childbirth Checklist—engage the patient further. These two checklists include items for asking if the patient has questions or concerns and ensuring that the patient knows when to call for help if needed, respectively.

Development

Five of the checklists were adapted from the WHO SSC and utilized a similar structure with three pause points (Figure 1) (Combs et al., 2021; Mohammed et al., 2013; Boeckmann & Rodrigues, 2018; Sun et al., 2021; “AHS Safe Surgery Checklist (SSC) - C-section,” n.d.). Most of the identified checklists did not detail the process for development. Those that did most often used a Delphi process with experts in the field to converge upon checklist items. An article published on the SSC adaptation for cesarean deliveries in Brazil provided the greatest detail on development (Boeckmann & Rodrigues, 2018). They engaged in a four-step process that included adaptation of the SSC based on a review of the literature, an initial Delphi technique to assess various elements of the initial items in the checklist, an evaluation and brainstorming exercise with a surgical team, and finally a quantitative ranking of the different items’ importance.

Care Pathway

We developed an ecosystem map to demonstrate how identified checklists fit into the care pathway and visualize gaps in the care pathway that are not addressed by current tools ([Annex 2](#)). Most of the checklists and guidelines focus on intraoperative care. This is likely because many of the checklists were adapted from the WHO SSC which focuses on that time point. In adapting the SSC to cesarean deliveries, most checklists focused on this point in the care pathway. Only two of the identified checklists addressed moments in the care pathway prior to labor management or after cesarean delivery. One is the ACOG scheduling tool which is specific to pre-admission and the other is the Safe Childbirth Checklist which is the longest and most robust of the identified checklists but is not specific to cesarean deliveries. Four of the checklists have a specific focus on one area of the care pathway. These include the ACOG preoperative and ACOG scheduling checklists, the SMFM thromboembolism prophylaxis checklist, and the RAPID obstetric intubation checklists (Keough & Goel, 2020; Patient Safety and Quality Committee, Society for Maternal-Fetal Medicine, 2020; “Patient Safety Checklist: Preoperative planned cesarean delivery,” 2011; “Patient Safety Checklist: Scheduling planned cesarean delivery,” 2011; Combs et al., 2021). The global and Indian guidelines we identified focus primarily on preoperative care. The narrow focus of many of the checklists as well as the paucity of resources focused on moments of the care pathway prior to preoperative care show how cesarean deliveries are often conceptualized as de novo surgical procedures rather than an outcome of a longer care pathway and process. There is a need for resources that bridge a larger scope of the care pathway or call attention to moments or resources that exist prior to the cesarean delivery to sufficiently address the complexity of cesarean deliveries and the multiple, distinct decisions or indications that may result in the decision for a cesarean delivery and influence the way that care should be delivered.

Only two of the identified checklists addressed moments in the care pathway prior to labor management or after cesarean delivery.

Evaluation and Implementation

We identified very little information about the implementation of the included checklists. The only checklists that included implementation details were the Rwandan adaptation of the SSC and the WHO Safe Childbirth Checklist, though the latter is not specific to cesarean deliveries (Sun et al., 2021; “WHO Safe Childbirth Checklist Implementation Guide: Improving the quality of facility-based delivery for mothers and newborns,” 2015). Additionally, the SMFM checklist and the thromboembolism prophylaxis checklists provide suggestions for implementation but no details on actual implementation (Combs et al., 2021; Patient Safety and Quality Committee, Society for Maternal-Fetal Medicine, 2020).

There was also a paucity of evaluations of the identified checklists, with only six of the checklists providing findings of outcome or impact evaluations. One of the studies focused on communication about grade or urgency of cesarean deliveries and found that use of a checklist improved communication (Mohammed et al., 2013). Another was a retrospective chart review to determine how the decision aid may have avoided unnecessary cesarean deliveries had it been in use and was therefore a speculative approach (Toumi et al., 2018). The remaining four found increases in adherence to practices suggested in the checklists and/or improved maternal and/or newborn outcomes following implementation of the checklists (Sun et al., 2021; “WHO Safe Childbirth Checklist Implementation Guide: Improving the quality of facility-based delivery for mothers and newborns,” 2015; Alexander et al., 2019; Viroga, Vituriera, Artucio, & Lauría, 2017).



CONCLUSIONS

Our landscape analysis found that there are some checklists available that are specific to cesarean delivery; however, few address the important moments in care that occur before or after delivery, focus on communication between providers, or specifically name the myriad individuals present and participating in a cesarean delivery. This limited focus fails to address the ways that cesarean deliveries are unique surgical procedures which are highly dependent on the type and quality of care a patient receives earlier in the care pathway. However, we acknowledge that it can be challenging to address all points on the care pathway in a single tool, particularly those that address the decision for a cesarean because indications for cesarean deliveries differ considerably across countries. Checklists that address points of the care pathway prior to the cesarean section would therefore likely require significant time and guidance for local adaptation. Despite the focus of the identified checklists on the cesarean delivery component of the care pathway, we did not identify any communication tools or decision aids that addressed all three components of the delivery in a single tool (preoperative, intraoperative, and postoperative). This could be an area of opportunity for the team in the development of their checklist.

Limited focus fails to address the ways that cesarean deliveries are unique surgical procedures which are highly dependent on the type and quality of care a patient receives earlier in the care pathway.

There are likely many cesarean checklists in use that have been created and/or adapted locally by hospitals or small groups within a region but are not published or otherwise made accessible online. Therefore, we would suggest that the team looks for existing, local or facility-based checklists, other job aids, and guidelines in India prior to developing the new cesarean checklist. Additionally, there was significant heterogeneity in the way that the identified checklists were structured and little information available on intended use.

We would suggest that the team consults with end users in the development of the checklist to help inform both the design and content of the tool and engages in a process to identify relevant local medical guidelines in order to build a prototype that is specifically designed for the unique risks and complicating factors inherent in cesarean deliveries.

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