Is It Feasible to Implement a Cesarean Indication Classification System? Findings from Five Countries

WHAT IS FISTULA?

A genital fistula is an abnormal opening in the upper or lower female genital tract that causes uncontrollable, constant leakage of urine and/or feces. Obstetric fistula is usually caused by several days of obstructed labor without timely medical intervention. Iatrogenic fistula is caused by surgical error, most often during cesarean section. Traumatic fistula is caused by injury–for instance, through sexual violence, female genital mutilation, or accidents.

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Background

Provision of quality and timely cesarean delivery services is an essential component of lifesaving emergency obstetric and newborn care (EmONC). Many women who need a cesarean section do not get one in time even if they can reach a health facility, due to staffing, supply, and other shortages at facilities or delays in clinical decision making—common problems in low-resource settings. Such gaps are implicated in the incidence of obstetric fistula (Loposso et al., 2015). Conversely, cesarean section performed without adequate clinical indication or indicated cesarean performed under conditions that do not support acceptable quality of care may increase the likelihood of complications and adverse outcomes for both mothers and their newborns (Souza et al., 2010). A substantial proportion of genital fistula cases are iatrogenic, often following cesarean section (Raassen, Ngongo, & Mahendeka, 2014).

Nearly 19% of births worldwide are by cesarean section. Cesarean rates are highest in Latin America and the Caribbean (40.5%) and lowest in Africa (7.3%) (Betrán et al., 2016). There has been much debate since the 1980s regarding appropriate cesarean rates, but many agree that population-level rates of less than 5% are too low (Cavallaro et al., 2013). Some have argued that optimal rates should not be specified until standardized indications for cesarean delivery are agreed upon (Stanton & Holtz, 2006).

There is renewed interest in improving maternal health management information systems (HMIS) (Langer, Horton, & Chalamilla, 2013). Regular review of trends in indications for cesarean section is recommended as a useful way to monitor changes at the facility level and to reinforce the appropriate use of cesarean delivery for valid clinical reasons, whether that means increasing or decreasing the number of procedures performed (CHERG & MHTF, 2010). From a quality improvement perspective, cesarean section indication data may yield more meaningful information than analysis of rates alone (CHERG & MHTF, 2010; Stanton, Ronsmans, & Baltimore Group on Cesarean, 2008). A facility-level HMIS that enables routine review of cesarean section indications could empower clinicians and managers to ensure the appropriateness of procedures.

The Fistula Care Project at EngenderHealth, predecessor to the current Fistula Care *Plus* Project, conducted a study in 2009 and 2010 to assess the feasibility of using an indications-based cesarean section classification system. This study applied the classification system proposed by the Initiative for Maternal Mortality Program Assessment (Immpact) and the International Federation of Gynecology and Obstetrics (FIGO) (Stanton, Ronsmans, & Baltimore Group on Cesarean, 2008). The system is described in the box on page 4. Notably, this system divides indications into those that are necessary to save the mother's life ("absolute maternal") and those that are not. In a

Figure 1. Immpact/FIGO indications correlated with Fistula Care and AMDD data collection tools and other indications found in patient files, by absolute maternal, nonabsolute, and other indication groupings

Immpact/FIGO	Fistula Care Tool	AMDD Tool	"Other" Country Additions from Fistula Care Record Review
ABSOLUTE MATERNAL INDICATIONS			
Obstructed labor (including severe deformed pelvis and failed trial of labor)	Obstructed labor; deformed pelvis; failed trial of labor		Big baby; failed trial of previous scar; retracted/contracted pelvis; immature pelvis; dystocia; obstructed labor due to poor descent; big baby breech presentation; asymmetric pelvis
Major antepartum hemorrhage and grade 3 or 4 placenta previa	Major antepartum hemorrhage and grade 3 or 4 placenta previa	Placenta previa	Complete previa
Malpresentation (including transverse; oblique; and brow)	Malpresentation (including transverse; oblique; and brow)	Breech footing/ malpresentation	Persistent occiput posterior; unstable lie; prolapse of hands of both twins; arm prolapse; arm presentation in lateral position; neglected shoulder; twins blockage; both-arms presentation; hand presenting in a cephalic position; cephalic presentation with two hands presenting; face presenting with anterior position of the chin
Uterine rupture	Uterine rupture		Baby or part of baby in abdominal cavity; signs of pending uterine rupture; abdominal pregnancy
Not listed	Cephalopelvic disproportion (CPD)	Listed with prolonged labor	Borderline pelvis; hydrocephalus; small mother
NONABSOLUTE INDICATIONS			
Failure to progress in labor, including prolonged labor	Failure to progress in labor; prolonged labor	CPD/prolonged labor	Cervical dystocia; delayed second stage; uterine inertia; failed dilation; obstructed labor, dynamic
Failed induction	Failed induction	Failed induction	
Previous cesarean delivery	Previous cesarean delivery; uterine scar from other previous surgery	Previous scar	
Genito-urinary fistula or third-degree tear repair	Vesico-vaginal fistula postrepair; vesicovaginal fistula	Vesico-vaginal fistula	Previous repair of uterine prolapse; history of vesico-vaginal fistula; history of treated cystocele; history of treated prolapse
Antepartum hemorrhage; excluding those for absolute indications and including abruptio placentae	Antepartum hemorrhage; excluding those for absolute indications and including abruptio placentae	Placenta abruptio	Antepartum hemorrhage, nonspecific; retro placental hematoma; retro placental hematoma/hemorrhage and acute renal failure
Maternal medical diseases	Maternal medical disease		Prevention of mother-to-child transmission of HIV; cardiopathy; cerebral malaria; sickle cell disease
Severe pre-eclampsia or eclampsia	Eclampsia/severe pre-eclampsia	Eclampsia/severe pre-eclampsia	Pregnancy-induced hypertension
Psychosocial indications; including maternal request, "precious" pregnancy	Psychosocial/maternal/ family request; precious baby	Maternal distress	Maternal anxiety; bad obstetric history; prolonged subfertility; previous perinatal death; previous stillbirth (precious baby)
Fetal compromise (including fetal distress; cord prolapse; and severe intrauterine growth retardation)	Fetal distress; cord prolapse/ presentation; severe intrauterine retardation	Fetal distress; cord prolapse	Retained twin; irregular fetal heart rate
Breech presentation	Breech presentation	Breech with footling/ malpresentation	Retained head; breech presentation on a primigravida, fully dilated but breech not descending; breech on primiparous
OTHER			
Not listed on FIGO list	Multiple gestation	Multiple gestation	Three feet presenting on twins pregnancy; twins; with 1st presenting breech
Not listed on FIGO list	Other indications	Not listed on AMDD Tool	38 other indications that could not be classified into one of the precoded categories (e.g., oligohydramnios, prelabor rupture of membranes [PROM]/ruptured membranes)

2011 systematic review of 27 cesarean section classification systems, the Immpact/FIGO system was characterized as conceptually easy to understand and useful for low- and middle-income countries (Torloni et al., 2011).

Since the review by Torloni et al., there has been significant movement toward international adoption of the Robson 10-group classification system for cesarean sections, which categorizes women by their obstetric characteristics. In 2015, the World Health Organization issued a statement on cesarean section rates, proposing the Robson system "as a global standard for assessing, monitoring, and comparing caesarean section rates within health care facilities over time, and between facilities" (WHO & HRP, 2015). Despite this shift, the results of the Fistula Care Project study remain relevant as global guidelines for the Robson system are developed and as any cesarean section classification system is applied. This brief describes key findings of the study and implications for tracking cesarean section trends.

Methods

A retrospective record review was carried out in 2009 and 2010 in five countries, at nine facilities supported by the Fistula Care Project to strengthen provision of safe and timely cesarean sections and improve use of data for decision making. Data were collected as part of a larger study on the quality of cesarean section record keeping (Landry et al., 2014). Study sites included one private rural hospital in Bangladesh; two faith-based rural hospitals in Uganda; and six urban government facilities in Guinea (n=2), Mali (n=1), and Niger (n=3). All participating study sites were referral centers, offering round-the-clock comprehensive EmONC services to large urban or rural catchment areas. The records of women undergoing an emergency or nonemergency cesarean section in 2008 were examined. Researchers drew a random sample of 350 cesareans performed in 2008 from each facility's operating room registers; for sites where fewer than 350 cesareans occurred in 2008, all cases were reviewed.

Research teams, comprising a physician and a research assistant, collected data using a key informant interview guide and a patient record review form. The form included 24 precoded cesarean delivery indication categories adapted and expanded from the Averting Maternal Death and Disabilities (AMDD) needs assessment guidelines for EmONC, as well as space for a second indication, if applicable (AMDD, 2009).

Indications were reviewed and recoded following data entry. First, indications classified as "other" were either recoded to one of the 24 precoded indications or were left as "other, not enough information." For example, "big baby" and "contracted pelvis" were recoded to obstructed labor. Some indications were then combined into a single category, using the Immpact/FIGO classification system. For example, failed trial of labor and deformed pelvis (two separate indications on the data collection form) were grouped with obstructed labor. In the final recoding for absolute maternal and nonabsolute categories, we added cephalopelvic disproportion (CPD) to the absolute maternal indication group, because it was impossible to determine the severity of CPD from the patient file data. Our final list of primary indications for analysis consisted of 15 indication groupings, plus an "other, not enough information" category. Figure 1 illustrates these indications.

Figure 2. Cesarean section rates at study sites, 2008[1]
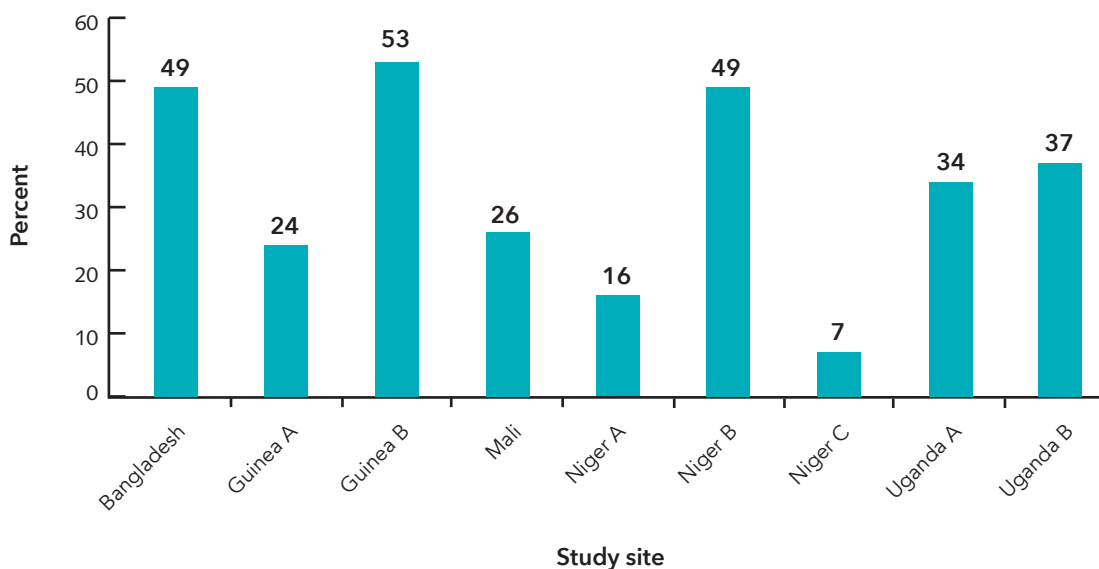
[1]Study sites are anonymized, identified only by country and letter, for those countries with more than one site.

Results

Record Keeping and Reporting

The 2008 cesarean section rates at these facilities ranged from 7% (at Niger C) to 53% (in Bangladesh) (see Figure 2, page 3). For comparison, estimated national cesarean rates for similar time periods were 2% or less in Guinea, Mali, and Niger; 5% in Uganda; and 17% in Bangladesh (Wang et al., 2011; NIPORT, Mitra and Associates, & Macro International, 2012; and UBOS & ICF International, 2012). All facilities used paper-based record-keeping systems, with multiple registers for recording service statistics. Cesarean section indications were recorded in operating theater registers and patient records. A total of 2,941 cesarean section records were reviewed; nearly all (99%) included at least one indication. Most key informant physicians reported being aware of various cesarean section indication classification systems, but no site had a formally documented system in place. While most key informants said monthly HMIS reports are submitted on the number and type of deliveries, no site had undertaken any formal review of cesarean indications prior to this study. With the exception of those in Bangladesh, the key informants thought it would be feasible and useful to apply the Immpact/FIGO system to review cesarean indication trends on a quarterly or annual basis.

Indications in Patient Records

We found a wide range of terminology for cesarean section indications in patient records. In addition to the 24 indications listed on the data collection tool, 72 other indications were recorded, 38 of which ended up being recoded as "other, not enough information." Providers used diverse terminology for common indications; for example, 11 separate terms were used for malpresentation.

The most commonly recorded indications from across all of the African sites were obstructed labor, uterine rupture, severe pre-eclampsia/eclampsia, malpresentation, previous cesarean delivery, and fetal compromise. Uterine rupture was the reported indication for one-fifth of all cesareans at one site in Niger (see Table 1). CPD was recorded as the primary indication for 11% of the cases at two sites (Mali and Uganda A) and for 5–6% of all cases at the remaining seven sites.

More than half of cesareans at five of the nine sites were in the absolute maternal indication category. The proportion of absolute indications varied by site. For example, at both sites in Guinea, more than 50% of cesarean sections were due to obstructed labor; in Niger, cesareans due to ruptured uterus ranged from 10% to 20% at the three sites.[1] The highest proportions of cesareans for nonabsolute indications were in Bangladesh (55%) and at Uganda A (63%). Fetal compromise, failure to progress in labor/prolonged labor, previous cesarean, and severe pre-eclampsia or eclampsia were the leading nonabsolute indications, with variations in the proportions between sites. The number of cesarean sections categorized as "other, not enough information" was 5% or less across all study sites in Africa. However, one-third of all of cesareans reviewed in Bangladesh fell into this category.

The Immpact/FIGO Cesarean Section Classification System

The Initiative for Maternal Mortality Program Assessment (Immpact) and the International Federation of Gynecology and Obstetrics (FIGO) proposed an indications-based cesarean section classification system in 2008 (Stanton, Ronsmans, & Baltimore Group on Cesarean, 2008). This Immpact/FIGO system classifies cesarean section indications into two groups: absolute maternal and nonabsolute. This proposed classification is hierarchical, prioritizing cesareans done for absolute maternal indications (i.e., to save a woman's life) over those performed to save the life of the newborn. The nonabsolute category covers a range of conditions, both maternal and fetal, that are not considered immediately life-threatening to the mother. The purpose of this system is to encourage and standardize monitoring and analysis of cesarean sections across service delivery settings, as part of quality improvement initiatives, and to facilitate their inclusion in national HMIS. The system was proposed as a simple grouping of indications that could provide reliable, timely information, to help health care managers take action and to aid in decision making about resource allocations for maternal and newborn services. The grouping of indications is not designed for prospective clinical decision making.

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[1] Surgery for ruptured uterus was recorded as cesarean section, when technically uterine rupture should have been recorded as laparotomy in the theater registers.

Table 1. Percentage distribution of cesarean section indications, by Immpact/FIGO absolute and nonabsolute classification and by study site

	Bangladesh	Guinea A	Guinea B	Mali	Niger A	Niger B	Niger C	Uganda A	Uganda B
Primary indication	n=350	n=277	n=376	n=269	n=299	n=349	n=324	n=348	n=349
Absolute maternal	**11.1**	**81.6**	**77.7**	**46.1**	**55.5**	**50.7**	**47.8**	**34.5**	**52.1**
Obstructed labor (including severe deformed pelvis and failed trail of labor)	2.0	59.2	52.7	16.4	10.4	16.0	9.3	14.9	30.9
Uterine rupture	0.3	7.2	11.4	10.0	20.7	9.5	14.2	0.3	0.3
Malpresentation (including transverse, oblique, and brow)	2.0	4.3	4.8	4.8	12.4	10.9	9.6	5.5	10.6
Major antepartum hemorrhage and grade 3 or 4 placenta previa	1.4	4.7	4.0	3.7	5.4	9.7	9.6	2.3	4.6
Nonabsolute	**54.9**	**17.3**	**21.8**	**48.7**	**38.8**	**44.1**	**49.7**	**62.9**	**45.6**
Fetal compromise (including fetal distress, cord prolapse, severe intrauterine growth retardation)	18.3	5.1	7.2	12.3	10.0	6.0	16.4	14.9	7.2
Failure to progress in labor (prolonged labor)	5.1	2.5	0.3	8.6	9.0	5.7	7.4	19.5	16.3
Previous cesarean	11.4	0.7	11.4	3.0	3.7	5.2	2.5	18.7	10.9
Severe pre-eclampsia or eclampsia	11.1	0.0	0.3	13.4	7.4	17.2	14.2	1.7	2.0
Antepartum hemorrhage, excluding absolute indications, including abruptio placentae	1.4	8.7	0.3	5.2	0.7	6.9	5.9	2.6	0.0
Breech presentation	4.6	0.0	0.5	5.6	3.0	2.3	0.9	3.7	1.7
Psychosocial, including maternal request, and precious pregnancy	2.3	0.4	0.5	0.4	2.7	2.3	0.3	0.6	2.6
Genito-urinary fistula or third-degree tear repair	0.0	0.0	1.3	0.4	2.0	0.3	1.2	0.0	2.0
Maternal medical disease	0.3	0.0	0.0	0.0	0.3	0.3	0.6	1.1	1.4
Failed induction	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.0	1.4
Other[1]	**33.1**	**1.1**	**0.5**	**4.8**	**5.4**	**3.7**	**2.5**	**2.6**	**2.3**
Information missing	**0.9**	**0.0**	**0.0**	**0.4**	**0.3**	**1.4**	**0.0**	**0.0**	**0.0**

[1] Includes multiple gestation

Discussion

Overview

Cesarean section indications were found in client records from all sites; however, a wide range of terminology was used across sites to describe indications. None of the study sites used any formally documented cesarean section classification system. Key informants were unanimous about the need for each client record to include a clearly documented, standardized indication to facilitate monitoring of trends and clinical audits. While many of the key informants thought a simple indication-oriented classification, such as the Immpact/FIGO system, was reasonable and feasible to use, this could prove challenging to implement because of the wide range of terminologies used.

Nonstandard Terms

Study findings suggest that clinicians do not use standard terms when describing the reasons for cesarean section. This is especially true for indications such as obstructed labor, prolonged labor, and malpresentation. The range of overlapping terminologies found in this study is similar to the multiple codes listed in World Health Organizations International Classification of Disease codes for causes of prolonged and obstructed labor (WHO, 2011), highlighting the need for simplified, standardized global terminology to describe these common conditions. A diagnosis of "obstructed labor" implies a degree of neglect at some level, and obstetric clinicians might be reluctant to use the term if a laboring woman was in their care. Moreover, the use of differing obstetric terms may derive from clinicians' diverse training backgrounds. Consistency in terminology is essential to ensuring that reviews are comparable across time and location. A standardized classification system for cesarean indications would facilitate routine collection and analysis of trends at the facility level and integration into national HMIS. CPD provides a notable example of the challenges in consistent application of indications (see box).

Insights from Indications Review

Conducting periodic reviews of cesarean indications (and other related care during delivery) as part of routine monitoring can help facilities identify gaps and deficiencies in the quality of care, so that appropriate remedial action can be taken. For example, uterine rupture represented nearly 10% or more of all primary indications at all sites in West Africa, suggesting late access to skilled attendance and EmONC in and around these facilities. As a result of this study, maternity management staff at Niger A, where ruptured uterus was the leading indication (21%), have worked with referral health centers to improve partograph use and raise awareness in communities about danger signs during pregnancy and about the importance of seeking care at

Ambiguous Indications— the Example of CPD

CPD is not listed as an indication under the Immpact/FIGO system. That group considered the term CPD alone to be a vague "umbrella" term and thus not useful for the proposed classification system. They proposed adopting more specific terminology (i.e., severe deformed pelvis) under the obstructed labor indication in the absolute category. However, Stanton and Ronsmans (2008) did list major CPD as an absolute maternal indication in a letter to the editors of the *Bulletin of the World Health Organization* calling for better understanding of unmet need for cesarean section by defining which procedures are done for absolute life-threatening conditions.

We chose to include CPD in the absolute maternal indication group in our analysis because it is a potentially life-threatening condition that often results in obstructed labor. However, we had no way to determine the severity of CPD from client records.

In this study, CPD was recorded by health personnel in the patient registers as a primary indication, ranging from 5% to 11% across facilities. Published studies report rates of CPD ranging between 7% and 54% in Sub-Saharan Africa (Shah et al., 2009) and 1–15% in Southeast Asia (Festin et al., 2009). Some studies combined CPD with prolonged labor (Kim et al., 2012) or combined CPD and prolonged labor within obstructed labor (Chu et al., 2012). In this analysis, we included in the definition of CPD cases that were recorded as borderline pelvis (n=10), hydrocephalus (n=1), and small mother (n=1).

Future guidance on standardizing indication terminology for cesarean section should work toward a more specific definition of CPD.

a health facility. Our analysis of indications also yielded insights that are masked by institutional cesarean rates alone at three sites. The Bangladesh site, Guinea B, and Niger B had relatively similar institutional cesarean rates in 2008 (49%, 53%, and 49%, respectively) but very different indication profiles: Most of the cesarean sections done at the Guinea and Niger sites were categorized as absolute maternal indications, compared with only 11% of procedures at the Bangladesh site.

Complementing Information on Obstetric Characteristics

Much consensus building would be required before any indication classification system could be useful for monitoring trends across settings. A global, universal indication language would require agreement among national health systems. These challenges are among the reasons that woman-based, or obstetric characteristic–based, systems have become more widely used and endorsed by the WHO. The Robson classification system in particular is easy to apply using information that is readily available in patient records (Betrán et al., 2014). Such classification provides comprehensive information on who is getting cesarean sections. Indications review can, however, provide additional information about why cesarean sections are occurring, particularly at the health facility level. Such indications review can also complement routine use of woman-based classification systems such as Robson, for example by allowing comparisons of indications among relatively homogeneous groups of women (Torloni, 2011).

Recommendations for Action

Based on the findings of this study, several changes and actions are recommended:

- Client records should be designed to capture the complexity of clinical decision making (e.g., the fact that often a number of factors might "add up" to a potentially life-threatening situation) and enable service quality assessment.

- Strengthening patient record keeping should be an important component of processes for quality improvement and HMIS strengthening in low-resource settings (Pirkle, Dumont, & Zunzunegui, 2012).

- Priority should be given to developing tools that facilitate data extraction and synthesis from patient records.

- Periodic reviews (quarterly/annually) of cesarean indications should be a core component of quality improvement efforts in safe motherhood and fistula prevention programs, complementing routine classification using the Robson system.

Conclusion

At the time of the study, this was the first known attempt to apply the proposed Immpact/FIGO classification system to existing data. Study results suggest that increased standardization in indicator terminology is needed to enable meaningful monitoring and comparison of trends using any indication system. Nearly all files included in this review had a recorded indication; however, many indications were difficult to categorize because of the limited information included. Analysis of these data was also complex because of the varying terminology across settings. Nonetheless, the majority of providers showed interest in adopting an indication-based classification system, because they thought it would be relatively easy to implement.

Access to quality cesarean sections is a cornerstone of fistula prevention. Documenting and reviewing cesarean indications and trends by applying a consistent system can be an effective part of quality assurance within health facilities and systems, complementing classification based on obstetric characteristics. Through this review, we are able to offer a preliminary glossary of terms used to describe reasons for undertaking cesarean sections and some evidence that indications-based analysis can inform local action to overcome access delays.

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The Fistula Care *Plus* Project at EngenderHealth works to prevent fistula from occurring, treats and cares for women with fistula, and assists in their rehabilitation and reintegration. Fistula Care *Plus* partners with ministries of health, nongovernmental organizations, United Nations agencies, faith- and community-based organizations, and others, including more than 30 sites providing surgical fistula repair in Sub-Saharan Africa and South Asia. For more information about fistula and the Fistula Care *Plus* project, visit www.fistulacare.org.

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