Indications for caesarean section

Caesarean section (CS) describes a method of birth in which the baby is directly removed from the uterus through an incision made in the mother’s abdomen. Generally, this procedure is undertaken when vaginal delivery is likely to pose a risk to the health of the mother or neonate. However, elective caesarean delivery on maternal request may be performed on women without medical or obstetric indications (RANZCOG 2013).

There have been numerous CS classification systems proposed for different purposes, each tailored to the objectives of the target audience (Torloni et al. 2011). The four main types of classification systems are based on:

- **Indication**—Classifies CS based on medical indications for performing the procedure.
- **Degree of urgency**—Concerned with the time frames for performing CS so as not to compromise maternal and neonatal health.
- **Patient characteristics**—Based on maternal and pregnancy characteristics such as previous CS, parity, gestational age, onset of labour and fetal presentation.
- **Other systems**—Includes classification systems that specify characteristics of where, how and by whom the procedure was performed.

Of these systems, indication-based classifications are particularly common and could be implemented with relative ease; however, developing such a system can be hampered by inconsistent definitions, limited numbers of indications, and the absence of rules for classifying cases with multiple indications (Torloni et al. 2011).

Significance of caesarean section to morbidity and mortality

CS was originally intended as a life-saving procedure in cases where maternal or neonatal health would be compromised by vaginal birth. In recent decades, CS rates have increased worldwide with the most pronounced increases being observed in middle and high income countries (Betran et al. 2007; Villar et al. 2006). This is in contrast with the very low rates of CS observed in settings with low resource levels and limited access to obstetric care (Torloni et al. 2011). The increasing CS rate has become an area of concern and is particularly debated in relation to maternal risks, necessity, additional costs, and accessibility (Belizan et al. 2007; Betran et al. 2007).

Increasing CS rates in countries with limited access to obstetric care have been shown to be beneficial to maternal and neonatal mortality. Nonetheless, there is limited evidence to demonstrate that improved maternal and neonatal outcomes can be achieved through continued increases in CS rates (Althabe et al. 2006; Betran et al. 2007; Jonsdottir et al. 2009; Villar et al. 2006). Conversely, there is a growing body of evidence showing that increasing CS rates may be associated with adverse health outcomes for mother and child (Belizan et al. 2007; Villar et al. 2007; Villar et al. 2006). Additionally, some studies have reported that women who undergo CS are at increased risk of morbidity/mortality, psychological disorders, decreased fertility, and complications in future pregnancies, and may require additional maternal care resources (Brown et al. 2013; Lavender et al. 2012; McIntyre et al. 2011).
Various studies have shown that several conditions that contribute to maternal mortality have an increased incidence following a primary CS (D’Souza & Arulkumaran 2013; Gilliam et al. 2002; Hemminki et al. 2005). These include uterine rupture, placenta praevia, placenta accreta, abruptio placentae, and ectopic pregnancy. Interestingly, there are no randomised controlled trials comparing immediate risks from elective CS to those from planned vaginal delivery, making it difficult to understand the effect of each on maternal and perinatal morbidity and mortality (Lavender et al. 2012). Some studies have demonstrated that maternal morbidity is only marginally higher in women who opt for elective CS (3.9%) compared with vaginal delivery (3.2%) (Hannah et al. 2000). Another study reported that the risks of complication from emergency CS in labour (16.3%) and instrumental vaginal deliveries (12.9%) are roughly twice as high as for elective CS (7%) (Allen et al. 2003). However, most available studies do not separately classify elective and emergency CS, making it difficult to distinguish the relative contribution that each makes to maternal morbidity and mortality (D’Souza & Arulkumaran 2013).

While there are only marginal differences in the risk of complications between CS and vaginal delivery in the first pregnancy, it is apparent that CS has significant future reproductive consequences for the mother. Previous CS may be associated with future infertility, miscarriage, ectopic pregnancy, intrauterine growth restriction, and intrauterine growth dehiscence or rupture (D’Souza & Arulkumaran 2013). Although most studies make no distinction between maternal requests for CS and emergency CS, the potential risk of adverse future reproductive outcomes may be considered by some to outweigh the benefits of elective CS without medical indications (Gilliam 2006).

Equally concerning is the risk that CS presents to neonatal morbidity and mortality. Delivery by caesarean section is associated with increased respiratory morbidity (before 39 weeks), neonatal unit admission, neonatal stress, and fetal injury (D’Souza & Arulkumaran 2013; Lavender et al. 2009; NIH 2006). While vaginal delivery is also associated with risks to the neonate, there may be no additional benefit for low-risk women who are undergoing elective CS to prevent fetal injury (Badawi et al. 1998; D’Souza & Arulkumaran 2013; Hankins 2006). Despite this finding, there is limited evidence available concerning CS on maternal request, and studies on neonatal outcomes after CS do not typically consider maternal request to be a separate indication (D’Souza & Arulkumaran 2013).

**Maternal risk factors for caesarean section**

The underlying causes of increasing rates of CS globally is a subject that continues to be debated. The increasing rate of CS is usually attributed to maternal/obstetric characteristics, maternal request, or changes in obstetric practice (Prosser et al. 2014). Some of the commonly proposed causes include advancing maternal age, increased rates of elective CS without medical indications, increased rates of obesity, and ethical or litigious issues (Commonwealth of Australia 2009; Stavrou et al. 2011). However, several studies have suggested that changes in maternal/obstetric characteristics, maternal requests, or obstetric practice may be overstated and that the rise in CS cannot be attributed to any single cause (Prosser et al. 2014). Interestingly, studies comparing women with and without an ‘indicated medical risk’ for CS have reported that rates of primary CS are independent of the risk profile of mothers, and changes are similar to those observed for overall CS rates (Declercq & MacDorman 2005). Evidently, the only area of agreement regarding the causes of increasing CS rates is the lack of consensus on this subject.
There are numerous risk factors that have been reported as associated with higher rates of caesarean section. One study reported that the most important predictors of CS were clinical indications—of these, the most prominent were previous caesarean, fetal malpresentation, fetal distress, abruptio placentae/placenta praevia, and ante-partum haemorrhage (Stivanello et al. 2014). This is consistent with other studies, which reported that CS was strongly associated with previous CS, fetal malpresentation, and advanced maternal age (Patel et al. 2005). Interestingly, the study by Patel and others observed the same trends in women undergoing elective or emergency CS. Other studies have reported that the risk of CS was 50% higher in overweight women, and more than twice as high for obese women compared with women of normal body mass index (BMI) (Poobalan et al. 2009).

These findings are largely consistent with trends in the characteristics of mothers who give birth by CS in Australia (AIHW 2015a). In 2013, CS rates were higher with advancing maternal age—the rate for mothers aged younger than 20 years was 18% compared with 51% for mothers aged 40 and over. The most frequently reported reasons for caesarean section were previous caesarean section (33.6–42.6%), fetal distress (11.0–14.9%), malpresentation (8.3–11.5%) and antepartum haemorrhage (1.6–2.1%). ‘Other’ reasons for caesarean section (29.3–35.9%) included failure to progress/cephalopelvic disproportion, psychosocial/elective, and other reasons (AIHW 2015a). A limitation of these data is that differences in definitions and methods of data collection resulted in limited comparability across jurisdictions, while data for New South Wales, Victoria and Western Australia were not available. Therefore, it is difficult to draw any accurate conclusions regarding the reasons for performing caesarean section in Australia because data cannot be aggregated at the national level.

Prevalence/incidence, mortality and trends

In recent decades, rates of CS have continued to escalate in most Organisation for Economic Co-operation and Development (OECD) countries, with the average rate reported to be 27% in 2011 compared with 20% in 2000 (OECD 2013). With around 18.5 million CSs performed every year, CS is the most commonly performed major surgical procedure in many parts of the world (Gibbons et al. 2012). Of the OECD countries, the lowest CS rates were observed in the Nordic countries and the Netherlands (15–17% of live births). From 2000 to 2011 CS rates rose particularly quickly in Mexico and Turkey, with these countries having the highest rates of CS of the OECD countries in 2011 (49.0% and 46.2% respectively) (OECD 2013). This may be of concern given the WHO recommendation that the rate of CS should not exceed 10–15% of all births; however, there is little empirical evidence to justify an optimum level despite a growing body of research showing the negative effects of high CS rates (WHO 2009). Many countries have shown moderations in the growth of CS rates since 2005, including Australia, United States of America (USA), Canada and New Zealand. Some countries have had notable reductions in CS rates (particularly Italy and Korea) (OECD 2013).

At 32% in 2011, Australia lies toward the higher end of the spectrum of OECD countries with respect to CS rates when compared to the OECD average of 27% (OECD 2013). In Australia there are notable variations of CS rates between hospitals in the same jurisdiction. For instance, in Victoria the range of CS rates for standard primiparae in public hospitals ranged from 4.8% to 33% in 2010, and 0.0% to 50.0% in 2011 (Victorian Government Department of Health 2014). This trend is consistent with variations observed between hospitals and regions in other countries (Lavender et al. 2012; OECD 2013).
In 2013, there were 99,862 caesarean sections performed in Australia, one-third of all births (AIHW 2015a). According to the OECD, the CS rate in Australia has displayed an upward trend from 2000–2010; however, the most prominent increases were observed between 2000 and 2005 (when the rate went from 23.7% to 30.8%) with more moderate increases observed between 2005 and 2010 (30.8% to 32.2%) (OECD 2013).

In Australia there have also been changes in the population of women giving birth that coincide with rises in CS rates. Maternal age, parity and previous CS are important determinants of CS rates, and consistent changes and trends involving these determinants have been observed in Australia (AIHW 2015a). The CS rate remained largely unchanged in mothers aged under 20 years from 2007 to 2013 (about 18%); however, there was an increase in CS rate for mothers aged 40 years and over, with 46% in 2007 and 51% in 2013 (AIHW 2015a; Laws 2009). CS is more prevalent in women who are giving birth for the first time, with primiparous women having a CS rate three times (34%) that of their multiparous counterparts (10%) (AIHW 2015a). Additionally, previous CS is a strong determinant of the method of birth in future pregnancies. In 2013, most women who had a previous CS gave birth by CS (85%) in a subsequent pregnancy, while relatively smaller proportions of all births were attributed to instrumental (4%) and non-instrumental (12%) vaginal birth. These trends largely coincide among the different Australian jurisdictions and with CS rates reported elsewhere (AIHW 2015a; OECD 2013).

Consistent with international studies, rates of CS in Australia are notably higher in private hospitals than in public hospitals (OECD 2013). Around 1 in 3 women give birth in private hospitals—however, this sector accounts for a disproportionately high level of CS (44%) compared with public hospitals (29%) (AIHW 2015b). Although women giving birth in private hospitals tend to be older, this increased trend was observed across all age groups, and after adjusting for age differences these proportions were largely unchanged (40% in private and 30% in public hospitals) (AIHW 2014a).

Currently, the number of women requesting CS without medical indications is not known (Klein 2004, in Lavender 2012). A recent Cochrane review has highlighted the paucity of evidence relating to elective CS in the absence of any medical indications (Lavender 2012).

Data collection and analysis issues

The considerable debate on increasing rates of CS, and the impact of this on women, highlights the need for collecting consistent and accurate information about indications for CS (AIHW 2014b). To action an appropriate response to the increasing rates of CS, the first step will be to distinguish which groups of women are undergoing CS and to consistently identify the indications for which this procedure is being performed (Torloni et al. 2011). While the maternal characteristics of mothers undergoing CS are well reported in Australia, there is room for improvement in identifying the reasons for performing CS.

Currently, data on the reasons for performing CS are not consistently collected across jurisdictions, with some jurisdictions either not reporting these data at all or publishing data in an incomparable format. Data are only available for one-half of the Australian jurisdictions (Queensland, South Australia, Tasmania and the Northern Territory). No data are available for New South Wales and Victoria. As these data are not part of the NMDS, there are differences in collection and reporting between
jurisdictions, meaning they cannot be directly compared or aggregated at a national level to provide a broader picture of the reasons for performing CS in Australia. Further, the inclusion of several important indications, including elective CS, under a single ‘other’ category, complicates analysis of their relative contributions to the overall rate of CS.

Australian studies have shown the difficulties faced in finding reasons for the increasing rates of CS (O’Leary et al. 2007; Stavrou et al. 2011). For example, these studies reported increases in CS (primary, repeat, elective, and emergency) in the New South Wales and Western Australia datasets that could not be fully explained by known maternal or obstetric characteristics. Given the uncertainty regarding the causes of increasing CS rates, the authors have emphasised the importance of identifying and monitoring the reasons for performing CS in the future.

Data development undertaken through the National Maternity Data Development Project

Following stakeholder consultations in 2011–12 conducted as part of the National Maternity Data Development Project (NMDDP), the data item Indications for caesarean section was named as a high priority for national standardised collection (AIHW 2014b). The need for a standardised list of indications was highlighted as important as well as the need to reduce reliance on the ‘other’ and ‘social’ categories used in some jurisdictions.

This data item also received support from all jurisdictions to be moved forward for national standardisation, and it was subsequently included on the NMDDP priority data item list for data development. See Foundations for enhanced maternity data collection and reporting in Australia: National maternity data development project—Stage 1 (AIHW 2014b) for more information on the NMDDP priority data item list.

Data development began in 2013 and included consultation with a clinical and data reference group (CDRG), the NMDDP Advisory Group and jurisdictional stakeholders.

Two national health data standards were developed:

- Birth event—main indication for caesarean section, code N[N] (METeOR identifier 587046)
- Birth event—additional indication for caesarean section, code N[N] (METeOR identifier 587048).

(More information about METeOR, the AIHW’s metadata registry, is available on the AIHW website at <http://meteor.aihw.gov.au/content/index.phtml/itemId/181162>.)

A list of 19 indications was agreed on (see Appendix Table 1). To capture maternal request the CDRG specified the wording of the indication as ‘Maternal choice in the absence of any obstetric, medical, surgical, psychological indications’, with the aim that such purposeful articulation would guide clinicians to select this only after careful consideration. The guide for use included with the national standard specifies that maternal choice includes psychosocial indications. However, where the mother has a pathological fear of childbirth, this may be included under ‘Other obstetric, medical, surgical, psychological indications’.
The main indication is specified as the indication that the clinician attending the birth believes to be the primary reason for the caesarean section being performed. It should be determined at the time of delivery. Additional indications for caesarean section are conditional on there being more than one reason for which the caesarean section was performed. Up to two additional indications can be recorded.

The national data standards are included in the National Health Data Dictionary (AIHW 2012) and were included for the first time in the Perinatal Data Set Specification (DSS) 2014–15, for jurisdictions to collect from 1 July 2014 where feasible. While currently optional for collection, it is expected that the data elements will be included in a future Perinatal National Minimum Data Set (NMDS) making them mandatory items to collect once all jurisdictions are able to implement the necessary processes in their collections.

**Importance of national collection of these data items**

The benefits of CS are contingent on the frequency of, and the indications for, performing the procedure. Therefore, developing an understanding of the underlying causes of the increasing rates of CS is paramount to avoiding the excessive use of CS and the exposure of mothers and babies to unnecessary risk (OECD 2013). In the absence of a standardised and comprehensive classification system for CS, acquiring an understanding of the factors driving the global increases in CS rates is arduous. To implement an appropriate response to this public health concern, it will first be necessary to identify which groups of women are undergoing these procedures and the indications for which this procedure is performed (Torloni et al. 2011).

The NMDDP aims to fix this issue through inclusion of indications for CS as part of the Perinatal NMDS. When all jurisdictions implement the new national standards, collection and reporting of national data will help with monitoring maternal and perinatal outcomes associated with caesarean section. The data may lead to a better understanding of the determinants of increasing CS rates. This will be useful in informing clinical practice and assist in planning health service delivery.
## Appendix

### Table 1: Indications listed in *Birth event—main indication for caesarean section, code N[N] (METeOR identifier 587046)*

<table>
<thead>
<tr>
<th>Indications for caesarean section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal compromise</td>
</tr>
<tr>
<td>Suspected fetal macrosomia</td>
</tr>
<tr>
<td>Malpresentation</td>
</tr>
<tr>
<td>Lack of progress; less than or equal to 3 cm cervical dilatation</td>
</tr>
<tr>
<td>Lack of progress in the first stage; greater than 3 cm to less than 10 cm cervical dilatation</td>
</tr>
<tr>
<td>Lack of progress in the second stage</td>
</tr>
<tr>
<td>Placenta praevia</td>
</tr>
<tr>
<td>Placental abruption</td>
</tr>
<tr>
<td>Vasa praevia</td>
</tr>
<tr>
<td>Antepartum/intrapartum haemorrhage</td>
</tr>
<tr>
<td>Multiple pregnancy</td>
</tr>
<tr>
<td>Unsuccessful attempt at assisted delivery</td>
</tr>
<tr>
<td>Cord prolapse</td>
</tr>
<tr>
<td>Previous adverse perinatal outcome</td>
</tr>
<tr>
<td>Previous caesarean section</td>
</tr>
<tr>
<td>Previous severe perineal trauma</td>
</tr>
<tr>
<td>Previous shoulder dystocia</td>
</tr>
<tr>
<td>Other obstetric, medical, surgical, psychological indications</td>
</tr>
<tr>
<td>Maternal choice in the absence of any obstetric, medical, surgical, psychological indications</td>
</tr>
<tr>
<td>Not stated/inadequately described</td>
</tr>
</tbody>
</table>
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