Cesarean sections on the rise: Should we care?

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CESÁREA: UNA EPIDEMIA EN OBSTETRICIA

XVII CONGRESO REGIONAL
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Obstetrical consequences of cesarean section

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Objectives:

✓ Review the trend of cesarean section (C/S) in developed and developing countries

✓ Outline possible consequences (maternal and neonatal) of C/S’s

✓ Consider factors related to modifications of the risks of cesarean delivery

✓ Provide some guidelines for the counseling of patients requesting a cesarean delivery
Will not cover:

☑ Economical aspects of C/S vs VD (including reimbursement)

☑ Specific risks associated with VBAC vs repeat C/S

☑ Specific considerations of cesarean delivery on demand (cesarean section on maternal request)

☑ Legal considerations of C/S vs VD
For CME / disclosure purposes:

• No commercial affiliations to disclose

• Opinions expressed here do not reflect the positions of ACOG or SMFM

• Counsel against and discourage women from elective C/S but would perform them (based on autonomy)
Framing the issue:

- **Magnitude of the problem:** Epidemiology of C/S
- **The environment:**
  - Patients requesting C/S on demand
  - Physicians not refusing
  - Limited information to counsel
- **The comparison of CS and VD:**
  - Direct comparison
  - Indirect comparison
- **Counseling patients**
Obstetrical consequences of cesarean delivery

Framing the problem:

A- Epidemiology of cesarean section
Rates of Cesarean Section:

Cesarean delivery rates; 1970-2009

Scott et al. Obstet Gynecol 2011;118:342-50
It affects all races...

Figure 3. Cesarean delivery rates, by race and Hispanic origin of mother: United States, 1996, 2000, and 2007


Menacker F and Hamilton BE. Recent Trends in Cesarean Delivery in the United States NCHS Data Brief Number 35, March 2010
It affects women of all ages..

Figure 2. Cesarean delivery rates, by age of mother: United States, 1996, 2000, and 2007


Menacker F and Hamilton BE. Recent Trends in Cesarean Delivery in the United States. NCHS Data Brief Number 35, March 2010
Menacker F and Hamilton BE. Recent Trends in Cesarean Delivery in the United States
NCHS Data Brief Number 35, March 2010
Primary CS Rates in the US:

Singleton, Cephalic, Full Term, BW < 4000 g, No Reported Medical or Labor Complications

Vaginal: 18  Cesarean: 1

Duggar No. 19 Born in Emergency C-Section
Dec 11, 2009 10:33 AM CST
Cesarean section delivery among primiparous women in rural China: an emerging epidemic

Reija Klemetti, PhD; Xuan Che, MS; Yan Gao, MS; Joanna Raven, MCommH; Zhuochun Wu, MD, MPH; Shenglan Tang, PhD; Elina Hemminki, DrPH

Klemetti et al. Am J Obstet Gynecol 2010
Cesarean section rates: México; 1993-2006

Cesarean section rates:
México; 1993-2006

Nacional
Particular


26.9 29.3 31.4 31.6 32.6 33.6 33.8 34.7 28 36.9

36.9

26.9 29.3 31.4 31.6 32.6 33.6 33.8 34.7 28 36.9

0 10 20 30 40 50 60 70 80


Nacional
Particular

www.sinais.salud.gob.mx

Courtesy: Dr Gilberto Tena
Correlation between the gross national product per capita and caesarean section rates in 18 Latin American countries:

- Calculated an excess of over 850,000 C/S/year for Latin America

No medical justification exists for the finding that women with low obstetric risk, and presumably least likely to benefit from a C/S, had higher rates.

Other countries:

Tollanes MC. Økt forekomst av keisersnitt - årsaker og konsekvenser

Charanchakul B. Epidemic of Cesarean Section at the General, Private and
University Hospitals in Thailand
Is this a problem?

- It depends..
- Improvement in outcomes?
- What are the implications?
- What are the costs?
Is the rising C/S rate a problem?

**It should not be if:**

- Improves outcomes
- Has minor implications (benefits outweigh risks)
- It is a cost-effective (neutral) intervention

Will come back to the question...
Obstetrical consequences of cesarean delivery

Framing the problem:

B- The environment
“Before performing the procedure one has to allow the patient to make her last will and testament and give her time to prepare for her (own) death”

Friedrich Osiander, 1821

Courtesy: Tom Baskett; Dalhousie University
Comparison between cattle-horn deliveries, self performed and medical C/S:

- **Cattle-horn** (8 cases)
  - 6 mothers
  - 4 infants survived

- **Self-performed** (9 cases)
  - 6 mothers survived

- **Medical** (27 cases)
  - 5 mothers
  - 10 infants survived

*Courtesy: Tom Baskett; Dalhousie University*
A multifactorial problem..

The perception:

“Vaginal deliveries can be bad”

“Cesarean sections are safe”

1- Patients requesting C/S’s…
Attitude Toward Elective CS: Urogynecologist (80%) vs MFM (55%)

<table>
<thead>
<tr>
<th>Question</th>
<th>Total “Yes” Responses*</th>
<th>AUGS “Yes” Responses*</th>
<th>SMFM “Yes” Responses*</th>
<th>P†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you believe that a woman has the right to have an elective primary cesarean delivery in the absence of any medical or obstetrical indication?</td>
<td>578 (74.4)</td>
<td>263 (84.6)</td>
<td>315 (67.6)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>If you or your partner were pregnant for the first time, would you choose/recommend an elective cesarean delivery for yourself or your partner, assuming a term, uncomplicated, singleton, cephalic pregnancy?</td>
<td>185 (23.9)</td>
<td>141 (45.5)</td>
<td>44 (9.5)</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>


2- Physicians not refusing C/S’s...
Consultant’s response to maternal request:

Agree for C/S 3 - 31%

Recommend vaginal but agree for C/S 62 - 78%

Recommend vaginal and refer 7 - 24%
And more importantly....

3- Limited information to counsel...
OBJECTIVES:
- To assess, from randomised trials, the effects on perinatal and maternal morbidity and mortality, and on maternal psychological morbidity, of planned caesarean delivery versus planned vaginal birth in women with no clear clinical indication for caesarean section.

SELECTION CRITERIA:
- All comparisons of intention to perform caesarean section and intention for women to give birth vaginally; random allocation to treatment and control groups; adequate allocation concealment; women at term with single fetuses with cephalic presentations and no clear medical indication for caesarean section.

DATA COLLECTION AND ANALYSIS:
- We identified no studies that met the inclusion criteria.

MAIN RESULTS:
- There were no included trials.

AUTHORS' CONCLUSIONS:
- There is no evidence from randomised controlled trials, upon which to base any practice recommendations regarding planned C/S for non-medical reasons at term.
- In the absence of trial data, there is an urgent need for a systematic review of observational studies and a synthesis of qualitative data to better assess the short- and long-term effects of caesarean section and vaginal birth.

Publication status and date:
New search for studies and content updated (no change to conclusions), published in Issue 3, 2009.
Review content assessed as up-to-date: 27 April 2009.
newborns and half or more
privation. (Causation was
of dispute in many
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William Bramhall
Obstetrical consequences of cesarean delivery

C- The comparison of CS and VD
Vaginal delivery vs Cesarean delivery:
Two immediate questions:

1- What to compare?

2- How to compare?
What are the consequences of C/S and VD?

- Consequences ≠ complications (good or bad)
- For the mother / child / society (working force, cost, etc)
- Physical and psycho-social
- Depends of the analytic horizon (for how long we carry the analysis)
- Depends on the depth of the analysis (mortality, major or composite morbidities; minor morbidities)
Analytic horizon:
At discharge, 3 m, 1 year, 25 years...

VD vs C/S:
Major variables

VD vs C/S:
Minor and major variables

Length and depth of analysis:
Birth by cesarean section, allergic rhinitis, and allergic sensitization among children with a parental history of atopy.

- After adjustment for other covariates, children born by C/S had 2-fold higher odds of atopy than those born by VD (OR: 2.1; 95% CI, 1.1-3.9)
- In multivariate analyses birth by cesarean section was significantly associated with increased odds of allergic rhinitis but not with asthma.

A meta-analysis of the association between Caesarean section and childhood asthma.

- 23 studies were identified.
- The overall meta-analysis revealed an increase in the risk of asthma in children delivered by C/S (OR=1.22, 95% CI 1.14, 1.29)
Caesarean section is associated with an increased risk of childhood-onset type 1 diabetes mellitus: a meta-analysis of observational studies.


- 20 studies were identified.

- Overall, there was an increase in the risk of type 1 DM in children born by C/S (OR 1.23, 95% CI 1.15-1.32, p < 0.001)

- The increased risk of type 1 diabetes after Caesarean section was little altered after adjustment for gestational age, birth weight, maternal age, birth order, breast-feeding and maternal DM (adj OR 1.19, 95% CI 1.04-1.36, p = 0.01)
Cesarean versus Vaginal delivery: long term infant outcomes and the hygiene hypothesis

<table>
<thead>
<tr>
<th>Cesarean Delivery Associated Childhood Diseases&lt;sup&gt;1,2&lt;/sup&gt;</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Allergic Rhinitis</strong></td>
<td></td>
</tr>
<tr>
<td>All Cesareans</td>
<td>1.37 (1.14-1.63)</td>
</tr>
<tr>
<td>Repeat Cesareans Only</td>
<td>1.78 (1.34-2.37)</td>
</tr>
<tr>
<td><strong>Asthma</strong></td>
<td></td>
</tr>
<tr>
<td>All Cesareans</td>
<td>1.24 (1.01-1.53)</td>
</tr>
<tr>
<td>Female</td>
<td>1.53 (1.10-2.10)</td>
</tr>
<tr>
<td>Female &amp; Repeat Cesarean&lt;sup&gt;3&lt;/sup&gt;</td>
<td>1.83 (1.13-2.97)</td>
</tr>
<tr>
<td><strong>Celiac Disease</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.80 (1.13-2.88)</td>
</tr>
<tr>
<td><strong>Diabetes Mellitus (Type 1)</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.19 (1.04-1.36)</td>
</tr>
<tr>
<td><strong>Gastroenteritis</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.31 (1.24-1.38)</td>
</tr>
<tr>
<td><strong>Gastroenteritis AND Asthma</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.74 (1.36-2.23)</td>
</tr>
</tbody>
</table>

<sup>1</sup> Data from references 46, 47, 50
<sup>2</sup> Odds Ratio (OR) with 95% CI versus vaginal delivery
<sup>3</sup> Increase not appreciated for male fetuses
<sup>4</sup> requiring hospitalization

But we digress...

Neu J et al; Clin Perinatol 2011; 38 (2);321-331
**Maternal outcomes. (29 + TOTAL)**
- Mortality
- Anesthetic complications
- Hemorrhage and blood transfusion
- Hysterectomy
- Thromboembolism
- Surgical complications
- Breastfeeding
- Postpartum pain
- Psychological outcomes: postpartum depression
- Maternal length of stay
- Urinary incontinence
- Anorectal function
- Pelvic organ prolapse
- Sexual function

**Neonatal outcomes. (20 + TOTAL)**
- Fetal mortality
- Neonatal mortality
- Unexpected (iatrogenic) prematurity
- Respiratory morbidity
- Transition issues
- Neonatal asphyxia or encephalopathy
- Intracranial hemorrhage
- Facial nerve injury
- Brachial plexus injury
- Fetal laceration
- Neonatal length of hospital stay
- Long-term neonatal outcomes

**Relevant to subsequent cesarean delivery.**
- Subsequent fertility issues
- Subsequent uterine rupture
- Placenta previa
- Subsequent stillbirth

AHRQ Publication No. 06-E009
March 2006
Modifiers of outcomes C/S vs VD:

- Maternal BMI
- Fetal size
- Number of procedures
- Race/ethnicity
- Fetal gender
- Physician experience / specialty
- Parity
- Socioeconomics
- Delivery volume / level of perinatal care
- Pregnancy dating
- Type of labor (e.g. augmented)
- Maternal medical conditions
- Time of day of delivery
- Uterine incision
What now?

Back to COCHRANE 2009....
This review found no trials to help assess the risks and benefits of caesarean section when undertaken without a conventional medical indication (*).

The authors strongly recommend alternative research methods to gather data on the outcomes associated with different ways of giving birth.

* for cephalic presentations at term without previous C/S

_Caesarean section for non-medical reasons at term._
Lavender T et al;
A general overview of the task:

- **Google:**
  - Cesarean section: 2,690,000
  - Caesarean section: 2,130,000
  - Consequences of cesarean section: 119,000,000

- **Pubmed:** 17,427 citations on complications of cesarean section (405 about consequences)

- A randomized controlled trial of elective cesarean section versus vaginal delivery has not been (yet) performed (*)

* for cephalic presentations at term without previous C/S
Two important documents: (direct comparison)

Available at www.rcog.org

Available at http://consensus.nih.gov
Obstetrical consequences of cesarean section

The bottom line (from NIH and RCOG)
NIH State-of-the-Science Conference
March 27-29, 2006
Maternal Outcomes

- Length of stay (level II)
- Infection (level III)
- Anesthesia complications (level III)
- Subsequent previa (level III)

Favor attempted vaginal

- Hemorrhage (level II)
- Urinary incontinence (level III)
- Surgical and traumatic complications (level III)

Favor CS

Obstet Gynecol 2006;107:1386-97
NIH State-of-the-Science Conference
March 27-29, 2006

Neonatal Outcomes

- Respiratory morbidity (II)
- Iatrogenic prematurity (III)
- Length of stay (III)

Favors attempted vaginal

- Mortality (III)
- Intracranial hemorrhage, neonatal asphyxia, encephalopathy (III)
- Birth injury and laceration (III)
- Infection (III)

Favors CS

*Obstet Gynecol 2006;107:1386-97*
How many women does this affect, out of every 10,000 women?

<table>
<thead>
<tr>
<th>Health Event</th>
<th>Caesarean Section</th>
<th>Vaginal Birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain in the abdomen (tummy)</td>
<td>900</td>
<td>500</td>
</tr>
<tr>
<td>Bladder injury</td>
<td>10</td>
<td>0.3</td>
</tr>
<tr>
<td>Injury to the tube that connects the kidney and bladder</td>
<td>3</td>
<td>0.1</td>
</tr>
<tr>
<td>Needing further surgery</td>
<td>50</td>
<td>3</td>
</tr>
<tr>
<td>Hysterectomy (removal of the womb)</td>
<td>Up to 80</td>
<td>1 or 2</td>
</tr>
<tr>
<td>Admission to intensive care unit</td>
<td>90</td>
<td>10</td>
</tr>
<tr>
<td>Developing a blood clot</td>
<td>Between 4 and 16 overall (no detailed figures available)</td>
<td></td>
</tr>
<tr>
<td>Longer hospital stay</td>
<td>3 to 4 days</td>
<td>1 to 2 days</td>
</tr>
<tr>
<td>Returning to hospital afterwards</td>
<td>530</td>
<td>220</td>
</tr>
<tr>
<td>Death of the mother</td>
<td>0.82</td>
<td>0.17</td>
</tr>
<tr>
<td>Having no more children</td>
<td>4200</td>
<td>2900</td>
</tr>
<tr>
<td>In a future pregnancy, the placenta covers the entrance to the womb (placenta praevia)</td>
<td>40–70</td>
<td>20–50</td>
</tr>
<tr>
<td>Tearing of the womb in a future pregnancy</td>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td>In a future pregnancy, death of the baby in the womb before labour starts</td>
<td>40</td>
<td>20</td>
</tr>
</tbody>
</table>
How many women does this affect, out of every 10,000 women?

Less likely after caesarean section
Pain in the area between the vagina and anus (the perineum) 200
Bladder incontinence 3 months after the birth 450
Sagging of the womb (prolapse) through the vaginal wall\textsuperscript{a} 500 overall (no detailed figures available)

\textsuperscript{a} It is not clear whether the increased risk of these problems is a result of a caesarean section or because of the reasons for needing a CS.
Direct comparison: Is this analysis fair?

Technically not: We are including in the analysis of morbidity of C/S outcomes that were intended (and failed) to be vaginal deliveries.
# Maternal Risks

## Intent for C/S versus Vaginal Delivery

<table>
<thead>
<tr>
<th>Mortality</th>
<th>Vaginal C/S</th>
<th>Vaginal</th>
</tr>
</thead>
<tbody>
<tr>
<td>++</td>
<td>+++</td>
<td>+</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Morbidity</th>
<th>C/S</th>
<th>Vaginal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemorrhage</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Infectious</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Anesthetic</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Thromboembolic</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Surgical</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Placental</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Psychological</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Pelvic floor</td>
<td>+</td>
<td>++</td>
</tr>
</tbody>
</table>

(Courtesy: G Saade; UTMB-Galveston)
Obstetrical consequences of cesarean section

Since RCOG and NIH Consensus (2006)

*Indirect comparisons:*

- WHO Global survey: Souza et al; 2010 (some elective C/S’s)
- Pseudo-intent to treat (McDorman et al; 2008)
- Planned elective C/S (breech presentation) Liu et al; 2007
Caesarean section without medical indications is associated with an increased risk of adverse short term maternal outcomes: The 2004-2008 WHO Global Survey on Maternal and Perinatal Health

WHO Global Survey
- 3 Continents
- 24 Countries
- 373 Facilities
- Deliveries (n=290,610)

1% (0.01-2.1) C/S without medical indication
(highest in China)

Souza et al.
BMC Medicine 2010, 8:71
Prevalence of severe maternal outcomes: 3.7% deliveries

Compared to SVD, all other modes of delivery presented an association with

- Increased risk of death,
- Admission to ICU,
- Blood transfusion and
- Hysterectomy

ANTE C/S (NO medical indication):
- (Adj OR: 5.93, (95% CI: 3.88 to 9.05)

INTRA C/S (NO medical indication):
- (Adj OR: 14.29, (95% CI: 10.91 to 18.72)

Souza et al. BMC Medicine 2010, 8:71
Caesarean section without medical indications is associated with an increased risk of adverse short term maternal outcomes. 

Souza et al. BMC Medicine 2010, 8:71
### Severe perinatal outcomes:
(fetal death, neonatal mortality up to DOL7, ICU stay of > 6 days)

<table>
<thead>
<tr>
<th>Maternal outcomes</th>
<th>n/N (%)</th>
<th>Adjusted OR [95%CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spontaneous (reference)</td>
<td>5,820 / 20,5551 (2.83)</td>
<td>1</td>
</tr>
<tr>
<td>Operative</td>
<td>613 / 7,296 (8.4)</td>
<td>2.33 (2.07 to 2.62)</td>
</tr>
<tr>
<td>Antepartum without indications</td>
<td>22 / 1,735 (1.27)</td>
<td>1 (0.61 to 1.62)</td>
</tr>
<tr>
<td>Intrapartum without indications</td>
<td>32 / 950 (3.37)</td>
<td>2.48 (1.66 to 3.69)</td>
</tr>
<tr>
<td>Antepartum with indications</td>
<td>1,968 / 27,011 (7.29)</td>
<td>2.05 (1.9 to 2.22)</td>
</tr>
<tr>
<td>Intrapartum with indications</td>
<td>2,656 / 44,022 (6.03)</td>
<td>2.42 (2.27 to 2.58)</td>
</tr>
</tbody>
</table>

Caesarean section without medical indications is associated with an increased risk of adverse short term maternal outcomes.

Souza et al. BMC Medicine 2010, 8:71

Examine infant and neonatal mortality risks associated with primary C/S vs VD for singleton (37-41 weeks' gestation) with no indicated medical risks or complications.

Multivariable logistic regression was used to model neonatal survival probabilities as a function of delivery method, and socio-demographic and medical risk factors.

MacDorman et al; Birth 2006; 33:175-82
Birth 2008; 35:3-8.
# Neonatal Mortality: Application of an “Intention-to-Treat” Model

MacDorman et al. Birth 2008;35:3-8

## Table 1. Infant and Neonatal Deaths and Mortality Rates for Vaginal and Primary Cesarean Births to Women with No Documented Prior Risks\(^a\) with and without Reported Labor Complications and Procedures, United States, 1999–2002 Birth Cohorts (Rates per 1,000 Live Births)

<table>
<thead>
<tr>
<th>Rates and Deaths</th>
<th>Total Deliveries to Low-Risk Women</th>
<th>Total</th>
<th>Vaginal</th>
<th>Primary Cesarean with Labor Complications or Procedures</th>
<th>Primary Cesarean with No Labor Complications or Procedures</th>
<th>Ratio of Primary Cesarean with No Labor Complications or Procedures to Planned Vaginal Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rates</td>
<td>Infant</td>
<td>2.17</td>
<td>2.12</td>
<td>2.03</td>
<td>3.20</td>
<td>3.49</td>
</tr>
<tr>
<td></td>
<td>Total neonatal</td>
<td>0.75</td>
<td>0.72</td>
<td>0.63</td>
<td>1.69</td>
<td>1.73</td>
</tr>
<tr>
<td></td>
<td>Early neonatal</td>
<td>0.41</td>
<td>0.39</td>
<td>0.33</td>
<td>1.09</td>
<td>1.08</td>
</tr>
<tr>
<td></td>
<td>Late neonatal</td>
<td>0.34</td>
<td>0.33</td>
<td>0.30</td>
<td>0.60</td>
<td>0.65</td>
</tr>
<tr>
<td></td>
<td>Postneonatal</td>
<td>1.42</td>
<td>1.41</td>
<td>1.40</td>
<td>1.50</td>
<td>1.76</td>
</tr>
</tbody>
</table>

Number of deaths

- Infant: 17,412
- Total neonatal: 6,014
- Early neonatal: 3,314
- Late neonatal: 2,700
- Postneonatal: 11,395

Births: 8,026,415

7,755,236

7,138,068

617,168

271,179

\(^a\)Births to women with singleton, full-term (37–41 weeks’ gestation), vertex presentation infants with no medical risk factors or placenta previa reported on the birth certificate who have not had a previous cesarean.
CONCLUSIONS: (?)
Understanding the causes of these differentials is important, given the rapid growth in the number of primary cesareans without a reported medical indication.
Maternal mortality and severe morbidity associated with low-risk planned cesarean delivery versus planned vaginal delivery at term (Maternal Health Study Group of the Canadian Perinatal Surveillance System)

- Retrospective population-based cohort study of Canadian women (minus Quebec and Manitoba) delivered from April 1991 through March 2005

- Planned C/S group (46,766 women) vs. Planned VD group (2,292,420 women)

- Rates of severe morbidity (14-year period) were:
  - C/S: 27.3 and VD: 9.0, / 1000 dels respectively

Liu S; CMAJ 2007; 176 (4).
The planned C/S group vs planned VD had higher risks of:

- PP cardiac arrest (adj [OR] 5.1, 95% CI 4.1–6.3),
- Wound hematoma (OR 5.1, 95% CI 4.6–5.5),
- Hysterectomy (OR 3.2, 95% CI 2.2–4.8),
- Major puerperal infection (OR 3.0, 95% CI 2.7–3.4),
- Anesthetic complications (OR 2.3, 95% CI 2.0–2.6),
- Venous thromboembolism (OR 2.2, 95% CI 1.5–3.2),
- Hemorrhage requiring hysterectomy (OR 2.1, 95% CI 1.2–3.8), and
- Stayed in hospital longer (adj X delta: 1.47 d, 95% CI 1.46–1.49 d)

Lower risk of hemorrhage requiring blood transfusion (OR 0.4, 95% CI 0.2–0.8).

Liu S; CMAJ • February 13, 2007; 176 (4).
Interpretation:

- Although the absolute difference is small, the risks of severe maternal morbidity associated with planned cesarean delivery are higher than those associated with planned vaginal delivery.

- These risks should be considered by women contemplating an elective cesarean delivery and by their physicians.

*Liu S; CMAJ • February 13, 2007; 176 (4).*
C/S and CP rates; USA – 1970-2000:

Clark S, Hankins GDV. AJOG 2003
The pathology of placenta accreta, a worldwide epidemic.

Placenta percreta
(1 previous cesarean section)

40 yo; G3P1A1; Philippines
Abdominal pain and bleeding at 28 weeks
Possible placenta accreta per US and MRI
F/U US and MRI percreta to abdominal wall
Obstetrical consequences of cesarean section

(Selected) maternal morbidities

Cesarean section
Previa
Acreta
Hysterectomy
Complications
Death
Incidence of accreta has increased 10-fold in the past 50 years (~1 in 2500 pregnancies)

Has replaced uterine atony as the leading cause of PP hysterectomy, ranging from about 49% to 64% of cases

Blood transfusion rate of approximately 70% is needed

High maternal mortality rate (~ 6%)

Increased incidence of PTD and of SGA infants in accreta

Perinatal loss can be higher in developing countries

Obstetrical consequences of cesarean section

The likelihood increases in a dose-response fashion with the number of prior C/S’s:

- 1 C/S : 4.5 (95% CI: 3.6 – 5.5)
- 4 C/S’s : 44.9 (95% CI: 13.5 – 149.5)

Obstetrical consequences of cesarean section

Placenta previa accreta

X 8 since 1970’s

X 5 since 1980’s

Obstetrical consequences of cesarean section

**Peripartum hysterectomy**

<table>
<thead>
<tr>
<th>Cesarean Delivery</th>
<th>Accreta [n (%)]</th>
<th>Odds Ratio (95% CI)</th>
<th>Hysterectomy [n (%)]</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>15 (0.2)</td>
<td>–</td>
<td>40 (0.7)</td>
<td>–</td>
</tr>
<tr>
<td>Second</td>
<td>49 (0.3)</td>
<td>1.3 (.7–2.3)</td>
<td>67 (0.4)</td>
<td>0.7 (0.4–0.97)</td>
</tr>
<tr>
<td>Third</td>
<td>36 (0.6)</td>
<td>2.4 (1.3–4.3)</td>
<td>57 (0.9)</td>
<td>1.4 (0.9–1.2)</td>
</tr>
<tr>
<td>Fourth</td>
<td>31 (2.1)</td>
<td>9.0 (4.8–16.7)</td>
<td>35 (2.4)</td>
<td>3.8 (2.4–6.0)</td>
</tr>
<tr>
<td>Fifth</td>
<td>6 (2.3)</td>
<td>9.8 (3.8–25.5)</td>
<td>9 (3.5)</td>
<td>5.6 (2.7–11.6)</td>
</tr>
<tr>
<td>Six or more</td>
<td>6 (6.7)</td>
<td>29.8 (11.3–78.7)</td>
<td>8 (9.0)</td>
<td>15.2 (6.9–33.5)</td>
</tr>
</tbody>
</table>

CI, confidence interval.

Spontaneous hemoperitoneum from placenta acreta:
So, is this a problem?

YES !!

- ? (no) improvements in outcomes
- Morbidities increasing
- Health care costs increasing (data not shown)
Obstetrical consequences of cesarean section

Patient counseling:
Look for reasons:
- Ask why?
- Look for fears
  - Prior obstetrical history
  - Experiences or tales of family and friends
  - Pain? (Algophobia / Tokophobia)
- Inquire about family pressure

Address specific concerns

Consider referral for cognitive therapy (fear of childbirth)
CONCLUSIONS:

- Cesarean for no indication on the rise
- Insufficient data, more research
- Until evidence available, individualize
- **Not recommended for women desiring several children**
- Not performed < 39 weeks or documentation of lung maturity
- **Not motivated by availability of pain management**
- Maintain a Web site for up-to-date information
Cesarean Delivery on Maternal Request

Recommendations

• Cesarean delivery on maternal request should not be performed before gestational age of 39 weeks has been accurately determined unless there is documentation of lung maturity.

• Cesarean delivery on maternal request should not be motivated by the unavailability of effective pain management.

• Cesarean delivery on maternal request is not recommended for women desiring several children, given that the risks of placenta previa, placenta accreta, and gravid hysterectomy increase with each cesarean delivery.
Obstetrical consequences of cesarean section

In summary:
There are risks associated to any form of delivery.

The more interventions the greater the risk.

The risk of labor can be compounded by that of delivery (operative vaginal and abdominal).

The attributable risks of C/S are small but significant.

A C/S can be a marker of maternal / obstetric morbidity.
Summary - II: What the evidence does not tell us

- There are strong opinions on the relative benefits of C/S versus VD

- The information available is abundant but the one to individualize each case is limited

- Information (some) needs to be provided to patients requesting cesarean sections without medical indications
Summary - III: What should we do

- Cannot be passive in face of the C/S epidemic
- Take a proactive role at professional and societal (legislation, culture, public opinion) levels
- Share the available information with patients and families
- Come up with better ways at understanding human labor and delivery
- Autonomy needs to be respected
Serial evaluation of maternal descent and fetal head dimensions using MRI during labor: Report of the first case

Alfredo F. Gei MD, Aytekin Oto MD, Paige Weinman RN, Luis D Pacheco MD, Christopher Cassady MD

The Methodist Hospital in Houston (1); The University of Chicago (2); The University of Texas Medical Branch at Galveston (3,4); Texas Children’s Hospital of Houston (5)
A C/S should be performed when a clear benefit is anticipated, a benefit that might compensate for the higher costs and additional risks in the context of the specific setting where the operation is taking place.

This additional risk should be considered by health care professionals ("we do") and patients ("they should") when deciding the mode of delivery.

Souza et al. BMC Medicine 2010, 8:71
Rational use of C/S (resource):

“The main challenge related to C/S’s is making the best use of this procedure, which is certainly an important resource for the reduction of maternal mortality, but of which overuse may be associated with an increased risk of severe maternal (and neonatal) outcomes”

Souza et al. BMC Medicine 2010, 8:71
The future depends on what we do in the present

Mahatma Gandhi
More clearly than any other the physician should illustrate the truth of Plato’s saying that education is a life-long process

Sir William Osler

Our best wishes for a long, productive and fulfilling career
Obstetrical consequences of cesarean section