

**LONG-TERM CONSEQUENCES OF  
CAESAREAN SECTION**  
***THE MORBIDLY ADHERENT PLACENTA***

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# Talk outline – epidemiologic perspective

## ***I. Cesarean delivery rates: What is the global context?***

**Ireland amidst the madness**

## ***II. Mothers and Infants: What are the long term implications?***

**Review context of other morbidities**

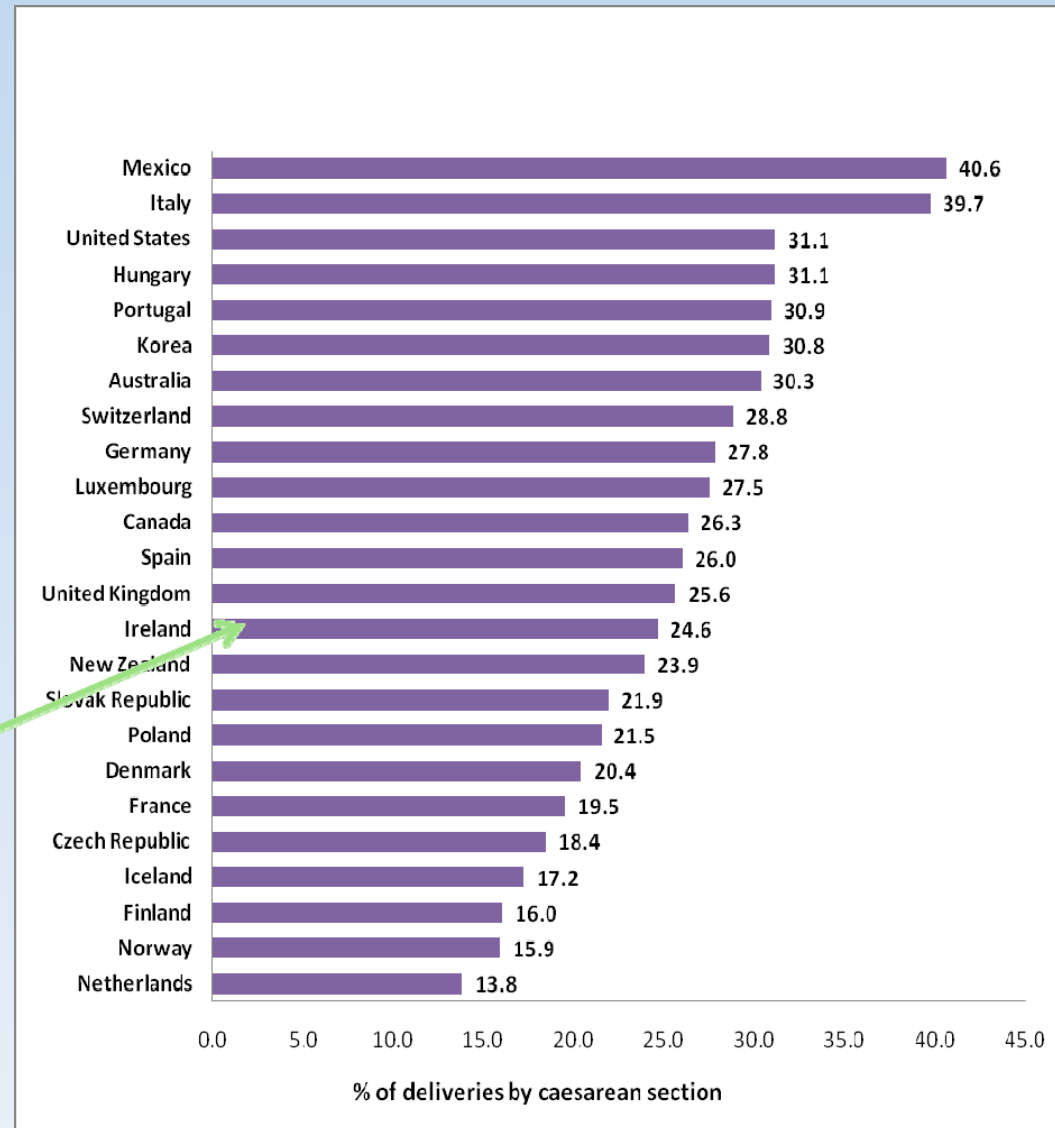
**Focus on morbidly adherent placenta**

## ***III. Summary***

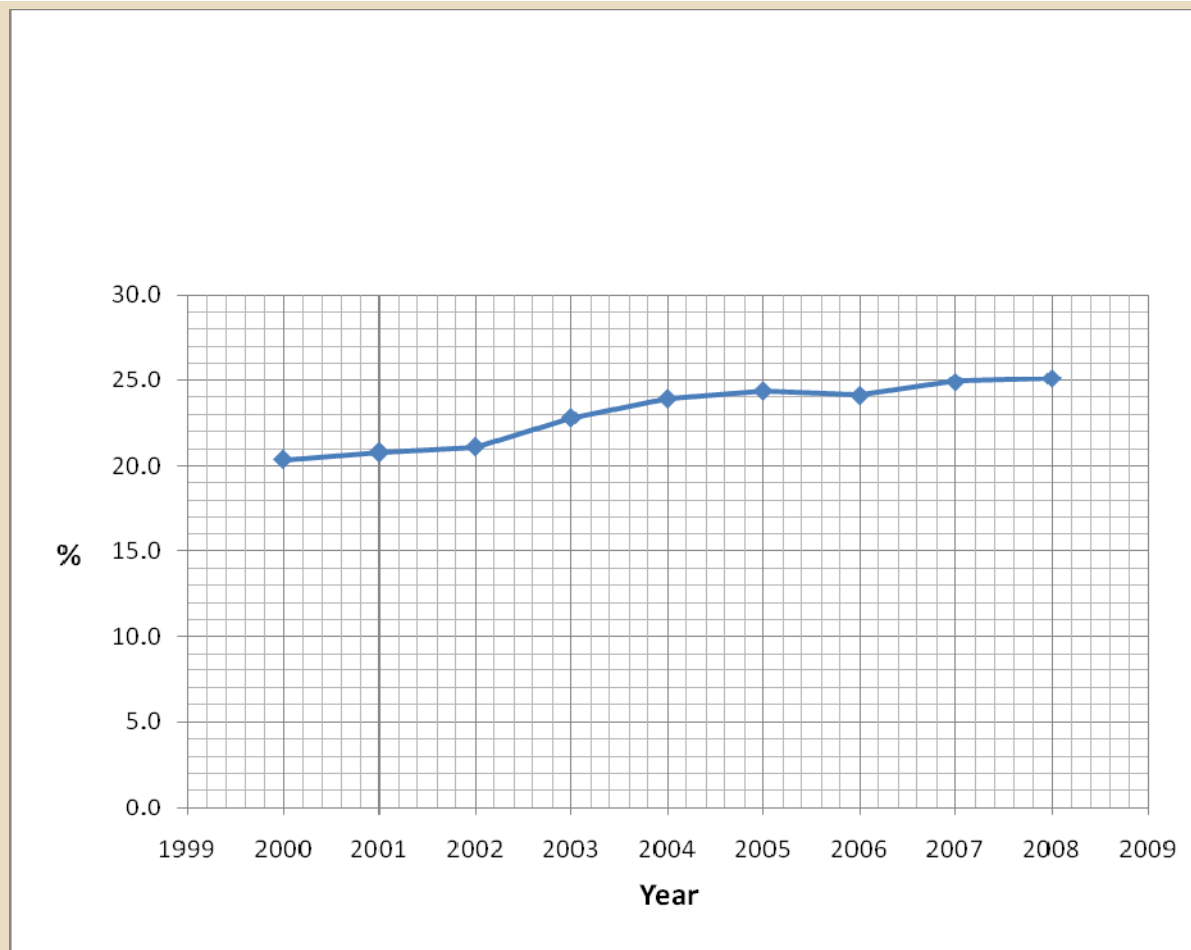
# I. Cesarean Delivery Rates, 2007

- ***Dramatic increase throughout the world except for Africa***
  - ▣ **26% Ireland**
  - ▣ **31% USA**
  - ▣ **46% China**

# CS rates among Organisation for Economic Co-operation and Development Countries, 2006



# Caesarean delivery rate for singleton births: Republic of Ireland, 2000-2008



*Department of Health and Children, 2009*

## II. Mothers and Infants

- *What are the long term health implications?*



# Reproductive Morbidity

- ***Subfertility***
- ***Abnormal placentation***
- ***Perinatal morbidity***
- ***Preterm birth***
- ***Small for gestational age***
- ***Stillbirth***

# Maternal morbidity

- ***Chronic pain***
- ***Infection***
- ***Major hemorrhage***
- ***Thromboembolism***
- ***Multiple Cesareans***
  - ***Abnormal placentation***
  - ***Surgical morbidity***



# Abnormal placentation

- Placenta accreta associated with increase maternal & fetal adverse outcomes
- Antepartum hemorrhage often leads to PTD and in some cases  $<$  blood flow to fetus
- In addition to hemorrhage, mother at  $>$  risk for complications of ERCS, placenta accreta and peripartum hysterectomy

*Placenta previa, placenta accreta, and vasa previa. Oyelese. Obstet Gynecol 2005*

*Pregnancy outcomes for women with placenta previa in relation to the number of prior cesarean deliveries. Grobman et al: Obstet Gynecol 2007*

*The frequency and complication rates of hysterectomy accompanying cesarean delivery. Shellhaas et al: Obstet Gynecol 2009.*

# Abnormal placentation - controversy

***“the increased risks of placenta previa and  
placenta accreta for pregnancies subsequent to  
elective primary  
or repeat cesarean delivery  
are issues of major concern  
that are difficult to quantitate”***

*Greene, N Engl J Med 2004*

# Abnormal placentation - *previa*

- **What is the risk for abnormal placentation in subsequent pregnancies in women with cesarean deliveries?**

## The association of placenta previa with history of cesarean delivery

*Ananth CV, Smulian JC, Vintzileos AM: Am J Obstet Gynecol 1997*

- Meta-analysis of 36 studies prior to 1996
- Assessed association between placenta previa and prior cesarean delivery
- 3.7 million pregnancies and 13,992 previas

The association of placenta previa with history of cesarean delivery  
*Ananth CV, Smulian JC, Vintzileos AM: Am J Obstet Gynecol 1997*

- **Women with  $\geq 1$  prior cesarean **2.6** times  $>$  risk for previa than those delivered vaginally**
- **Dose response with an **increasing** risk of previa with **increasing** numbers of cesareans in 4 studies that provided information on # CS**

## First-birth cesarean and placental abruption or previa at second birth

*Lydon-Rochelle M, Holt VL, Easterling TR et al: Obstet Gynecol 2001*

- **Retrospective cohort study in Washington State (n = 96,975 primips)**
- **Singleton live birth and a subsequent singleton birth between 1987 – 1996**
- **Women with a CS in first births**
  - **OR 1.4 (95% CI; 1.1 – 1.6) for placenta previa in next pregnancy compared to those with vaginal births**

Previous cesarean delivery and risks of placenta previa and placental abruption *Getahun D et al: Obstet Gynecol 2006*

- Retrospective cohort in Missouri (n=1 87,000) women with 2 or 3 births 1989 – 1997
- RR **1.5** (95% CI; 1.3 – 1.8) for previa in subsequent pregnancies in women with prior cesarean deliveries

The likelihood of placenta previa with greater numbers of cesarean deliveries and higher parity *Gilliam M: Obstet Gynecol 2002*

- **Case-control study among multips 1986-1989**
  - **Cases: 316 previa**
  - **Controls: 2051 no previa**
  
  - **OR 1.7 (95% CI; 1.12 – 2.64) for previa with hx 1 CS**
  - **OR 8.76 (95% CI; 1.58 – 48.53) for previa with hx  $\geq$  4 CS**



# Placenta Accreta

## Definition

- ❑ Placenta that is abnormally adherent to the uterus
- ❑ Increta: Invades the myometrium
- ❑ Percreta: Invades the serosa or adjacent organs
- ❑ Accreta: All of the above

*Oyalese and Smulian; Obstet Gynecol 2006;102:927*

# Placenta accreta – rates increasing

## □ Approximate rates

- 1960s                    1 in 30,000 deliveries
- 1985 – 1994    1 in 2,510 deliveries
- 1982 – 2002    1 in 533 deliveries

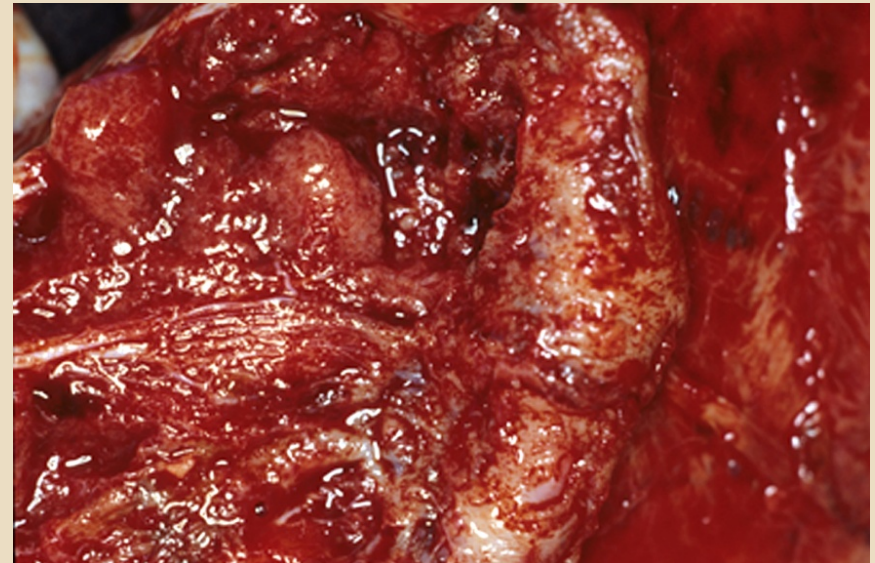
*Wu S et al: Abnormal placentation: 20 year analysis. AJOG 2005*

*Miller et al., AJOG 1997*

# Abnormal placentation – *placenta accreta*

**Most clinically significant long term maternal morbidity after CS occurs in subsequent pregnancies in women with placenta accreta**

**Placenta accreta spectrum includes *placenta accreta*, *increta* and *percreta***



# Abnormal placentation – *placenta accreta*

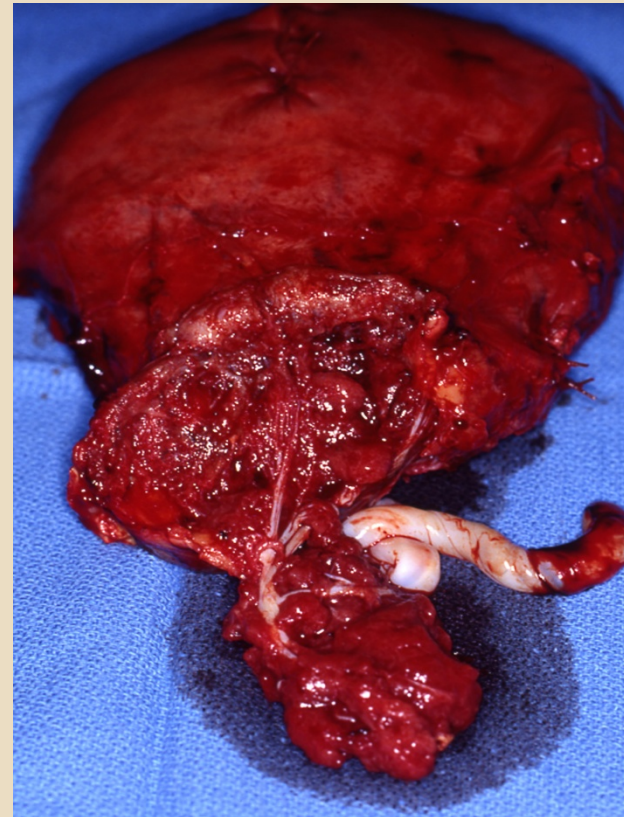
Morbidity from placenta accreta is substantial and includes problems associated with *massive bleeding* such as disseminated intravascular disease coagulation, multi-organ failure and death



# Abnormal placentation – *placenta accreta*

**In most cases, the only way to stop the bleeding is an often difficult *hysterectomy* that has its own set of complications as well as resulting in a loss of fertility**

***Placenta accreta* has now become the most common reason for cesarean hysterectomy in developed countries**

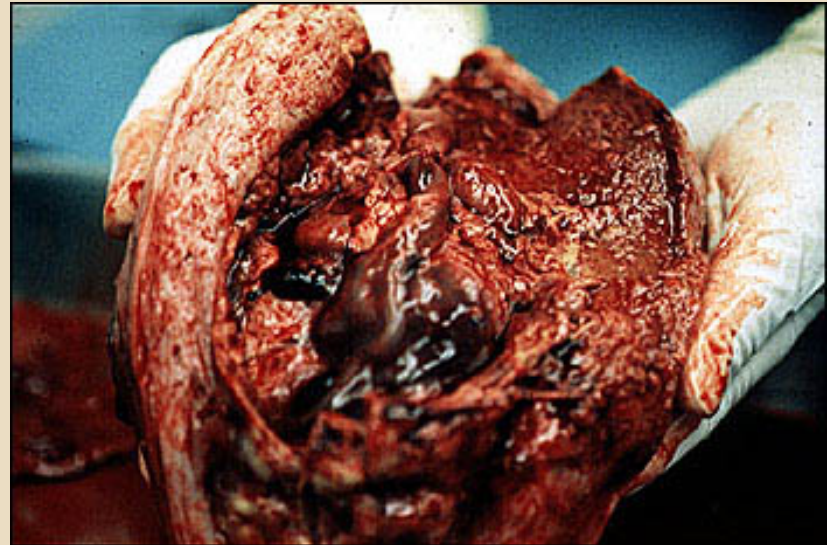


Shellhaas et al: *The frequency and complication rates of hysterectomy accompanying cesarean delivery.* *Obstet Gynecol* 2009

Flood et al: *Changing trends in peripartum hysterectomy over the past 4 decades.* *Am J Obstet Gynecol* 2009

# Placenta Accreta - Risk Factors

- ❑ Cesarean delivery
- ❑ Cesarean delivery
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- ❑ Cesarean delivery



# Placenta accreta

## research summary

- **Case series (n=76)**
  - **Blood transfusion required in over 80%**
  - **Transfusion of  $\geq 4$  units of packed red blood cells in over 40% of cases**

*Eller et al: Optimal management strategies for placenta accreta. BJOG 2009*

# Placenta accreta

research summary (cont)

- **Literature review**
  - **Average blood loss 3,000 – 5,000 mL at the time of delivery**
  - **Most common surgical complication cystotomy (often intentional)**
  - **Ureteral injury in 10 – 15% of cases**
  - **Less common injuries to bowel, pelvic nerves and large vessels and vesico-vaginal fistulas**

*Hudon L et al: Diagnosis and management of placenta percreta: a review. Obstet Gynecol Surv 1998*



# Placenta accreta

## research summary (cont)

- **Prospective cohort study 1999-2002 from NIH/MFM Cesarean Registry Study**
  - **19 Academic medical centers**
  - **378,168 births**
    - **57,068 CS**
    - **30,132 CS no labor**
  - **Daily ascertainment of CS**
  - **Trained study nurses**

# Placenta accreta and > number CS

## *Placenta Accreta among Women Who Had CS Without Labor*

CS#	N	Accreta
1	6,195	15 (0.2%)
2	15,805	49 (0.3%)
3	6,326	36 (0.6%)
4	1,457	31 (2.1%)
5	260	6 (2.3%)
≥ 6	89	6 (6.7%)

# Placenta accreta and > number CS

research summary

- **Combination of *placenta previa* and *prior cesarean delivery* dramatically increases the risk for *placenta accreta***

*Silver et al: Maternal morbidity associated with multiple cesarean deliveries. Obstet Gynecol 2006*

# Placenta accreta and > number CS

research summary

- **In the 723 women in the cohort with placenta previa**
  - **accreta occurred in 3%, 11%, 40%, 61% and 67% in those having their first, second, third, fourth, and fifth or greater CS respectively**

*Silver et al: Maternal morbidity associated with multiple cesarean deliveries. Obstet Gynecol 2006*

**Table. Placenta Previa and Placenta Accreta by Number of Cesarean Deliveries**

Cesarean Delivery	Previa	Previa:Accreta		No Previa‡:Accreta†	
		[n (%)]		[n (%)]	
First§	398	<b>13</b>	<b>(3)</b>	2	(0.03)
Second	211	<b>23</b>	<b>(11)</b>	26	(0.2)
Third	72	<b>29</b>	<b>(40)</b>	7	(0.1)
Fourth	33	<b>20</b>	<b>(61)</b>	11	(0.8)
Fifth	6	<b>4</b>	<b>(67)</b>	2	(0.8)
≥ 6	3	<b>2</b>	<b>(67)</b>	4	(4.7)

† Increased risk with increasing number of cesarean deliveries;  $P < .001$ .

‡ Percentage of accreta in women without placenta previa.

§ Primary cesarean.

# Placenta accreta – maternal *comorbidity*

## research summary (cont)

- ▣ **25 to 50% of women required admission to an intensive care**
- ▣ **Increased risk of thromboembolism, pyelonephritis, pneumonia, wound and pelvic infections, need for a second operation to control bleeding or treat infection**

*Silver et al: Maternal morbidity associated with multiple cesarean deliveries. Obstet Gynecol 2006*

# Accreta and Maternal Co-Morbidity

## NIH/MFM Cesarean Registry Study

Morbidity	No Accreta	Accreta
Cystotomy	0.15%	15.4%
Ureteral Injury	0.02%	2.1%
PE	0.13%	2.1%
Ventilator	0.3%	14%
ICU	0.8%	26.6%
Ex Lap	0.26%	5.6%

**This cohort is particularly informative because it includes only cesareans without labor, thereby excluding the morbidity associated with uterine rupture and emergency cesarean**

<b>Table. Odds Ratios With 95% Confidence Intervals for Placenta Accreta and Hysterectomy by Number of Cesarean Deliveries Compared With First Cesarean Delivery</b>								
<b>Cesarean Delivery</b>	<b>Accreta [n (%)]</b>		<b>OR (95% CI)</b>		<b>Hysterectomy [n (%)]</b>		<b>OR (95% CI)</b>	
<b>First*</b>	<b>15</b>	<b>(0.2)</b>	<b>–</b>		<b>40</b>	<b>(0.7)</b>	<b>–</b>	
<b>Second</b>	<b>49</b>	<b>(0.3)</b>	<b>1.3</b>	<b>(0.7–2.3)</b>	<b>67</b>	<b>(0.4)</b>	<b>0.7</b>	<b>(0.4–0.97)</b>
<b>Third</b>	<b>36</b>	<b>(0.6)</b>	<b>2.4</b>	<b>(1.3–4.3)</b>	<b>57</b>	<b>(0.9)</b>	<b>1.4</b>	<b>(0.9–2.1)</b>
<b>Fourth</b>	<b>31</b>	<b>(2.1)</b>	<b>9.0</b>	<b>(4.8–16.7)</b>	<b>35</b>	<b>(2.4)</b>	<b>3.8</b>	<b>(2.4–6.0)</b>
<b>Fifth</b>	<b>6</b>	<b>(2.3)</b>	<b>9.8</b>	<b>(3.8–25.5)</b>	<b>9</b>	<b>(3.5)</b>	<b>5.6</b>	<b>(2.7–11.6)</b>
<b>≥ 6</b>	<b>6</b>	<b>(6.7)</b>	<b>29.8</b>	<b>(11–78.7)</b>	<b>8</b>	<b>(9.0)</b>	<b>15.2</b>	<b>(6.9–33.5)</b>
OR, odds ratio; CI, confidence interval.								
*Primary cesarean delivery.								



# Placenta accreta – *perinatal morbidity*

- ▣ **Placenta accreta associated with increased perinatal morbidity**
- ▣ **most cases due to PTD**
  - **prompted by vaginal bleeding**
- OR**
- **desire to avoid vaginal bleeding and optimize surgical conditions**

# Placenta accreta – *perinatal morbidity*

- ▣ In fact, iatrogenic preterm birth is advised for antenatally diagnosed cases of accreta
- ▣ In some cases, bleeding may precipitate abruption and compromise of fetal blood flow

*Oyelese Y, Smulian JC: Placenta previa, placenta accreta, and vasa previa. Obstet Gynecol 2005*

*Eller AG, Porter TF et al: Optimal management strategies for placenta accreta. BJOG 2009*

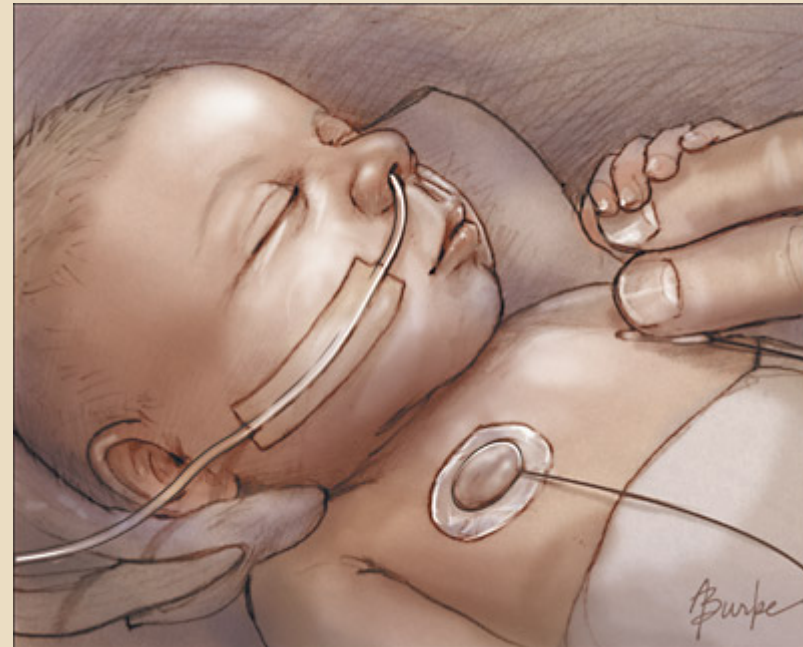
*Bauer ST, Bonanno C: Abnormal placentation. Semin Perinatol 2009*

# Placenta accreta

research summary (cont)

**Outcomes were improved with antenatal diagnosis and specialized care**

*Bauer ST, Bonanno C:  
Abnormal placentation. Semin  
Perinatol 2009*



# Summary

- **Diagnosis of and preparatin for placenta accreta essential**
- **Do not abandon QA programs to reduce primary cesarean section**
- **Establish an Irish Cesarean Section Registry**

# Acknowledgements

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