

Homebirth after Cesarean: The Myth and the Reality

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“Homebirth after cesarean” is a phrase that garners mixed reactions—most of them negative. “Why?” or “Are you insane?” they ask. The people who make these comments, however, usually have no idea about the realities of birth in the US.

My phone rang one afternoon. It was a woman looking for a care provider to attend the birth of her next child at home. I offered to send her the midwives list.

“I won’t go back to a hospital unless I am unconscious,” she told me.

I gave her the name of the one midwife in the area who attends women who have vaginal births after cesarean (VBAC) at home, wondering why the caller was so adamant about avoiding a hospital.

The next day a friend called and asked me to do a presentation at the next International Cesarean Awareness Network (ICAN) conference on homebirth after cesarean (HBAC).

“Sure,” I said. “No problem.” After I hung up and realized that I knew little about the issue, I thought what a coincidence it was that these two calls came in a day apart. But was it?

Why is this issue controversial? We used to think that women who have cesareans should continue to have them. Then, in part because of the women who wanted better births, VBAC became a reality in the 1980s after research showed that the risks for birthing vaginally were not as high as previously assumed. Under this backdrop, ICAN was formed.

More recently, flawed research reset the protocols and VBAC once again became rare. In the midst of this confusion women are seeking to have not just VBACs, but HBACs.

What’s going on? Has the world gone insane? On the contrary, women are simply learning late in the game to demand the type of birth they should have had in the first place. They are also learning that their chances of a successful VBAC in a hospital are slim. *So is it reasonable to have a homebirth after cesarean, or is the risk just too great?*

Cesarean vs VBAC

When I started to research my presentation, I found that no studies had been done on HBAC. Luckily, a sizable study on homebirth was recently published, as well as one on birth center VBACs. So essentially I had to extrapolate data from what was available to arrive at a conclusion. Why is this important?

Many women who want VBACs are so desperate to avoid a repeat cesarean that they choose unassisted homebirth, which we know can be more dangerous than a birth attended by a trained provider. Consequently, in order for midwives to make a decision as to whether or not to accept a VBAC patient for homebirth, we need to assess the real risks, based on what we know at this moment in time. We cannot wait for the perfect study.

I started with some basic facts and history about cesareans and VBACs. As of 2006 the national cesarean rate was 31.1%, an increase of about 5% per year since 1996.(1) Conversely, the VBAC rate has dropped below 10%, falling by 13% from 2003 to 2004.(2) Correspondingly the number of premature and low birth weight babies has increased significantly. Unfortunately, elective c-sections and an increase in the rate of inductions have also contributed to the rising prematurity rate.(3) Interestingly, the March of Dimes is trying to reduce the US prematurity rate, yet they haven't added reduction in cesareans and inductions as part of their project.

There is a cultural myth in this country that cesareans are just as safe, if not safer, than normal vaginal birth. However, a study by MacDorman et al, published in 2006, specifically looked at infant and neonatal mortality rates and found that the overall neonatal death rate for babies born by c-section is 2.9 times as high as that for babies born via vaginal birth, and 6.7 times higher if the cause of death was intrauterine hypoxia or birth asphyxia. (4) Additionally, maternal mortality is three times as high for women who have c-sections.(5)

Yet the attitude remains that birth by cesarean is safer than VBAC. The oddest part is that studies have shown repeatedly that VBACs are a safe viable option for the majority of moms who have had a previous cesarean. So what gives?

A number of factors have contributed to the decline of VBACs, most notably a study published in the *New England Journal of Medicine (NEJM)* that was touted as proving that VBACs are not safe.(6) Oddly enough, the study was misinterpreted by the editor of the *NEJM* and subsequently by the media. The study actually showed that inducing labor with synthetic prostaglandins in women who had had prior cesareans significantly increased the rate of uterine rupture. Instead of announcing that using prostaglandin gel is contraindicated in these women, they announced that VBAC is much riskier than previously thought. This led to the American College of Obstetricians and Gynecologists (ACOG—a professional association of obstetricians) to establish guidelines so strict that many hospitals stopped doing VBACs altogether.(7) Last but not least, insurance costs and medicolegal issues have also contributed to the decline of VBACs.

Uterine Rupture

I found that obstetricians' fear of uterine rupture was the greatest barrier to VBAC and is seemingly the pivotal excuse for denying them. Add to this a propensity of doctors and hospitals to set up impossibly strict protocols for women wanting VBACs, and we have a no-win situation for women. These protocols set up a cascade of failure regardless of what the woman wants. Ignorance and fear play a major factor in women's acceptance of these rules. As a result, VBAC "failure" is high in hospital settings. So what's a woman to do?

First, let's look at the research on uterine rupture. Studies by Lydon-Rochelle (8) and Delany (9) clearly showed that any form of induction increases the risk of uterine rupture. The well-known Landon (10) and Bujold (11) studies, which failed to control for induction of labor and may have had selection bias, also both showed a connection between induction and uterine rupture risk.

When I spoke with Dr. Landon at the 2007 ICAN conference he freely admitted this connection and

had even addressed it in a further study on VBAC after multiple cesareans, which was published in 2006. (12) In an e-mail communication, Dr. Bujold also agreed that induction of labor was found to increase the uterine rupture rate. (13) My conclusion: Avoid induction and you remove a major part of the risk.

Despite recent changes in care provider opinion regarding VBAC, the facts haven't changed. In women with lower transverse uterine incisions who are not induced, the chances of uterine rupture range from 0.2% to 0.5%. (14) The 2006 Landon study showed a 0.7% chance of uterine rupture in women with only one c-section and 0.9% in women with more than one c-section. (15) The Lieberman birth center study of VBAC (2004) showed that the combined uterine rupture and fetal/neonatal death rate among women with a single previous c-section and who were less than 42 weeks was 0.2%. (16) That study also found that "half the uterine ruptures and 57% of perinatal deaths involved the 10% of women who had had more than one previous cesarean delivery and no previous vaginal births, or who had reached a gestational age of 42 weeks+." (17)

At The Farm birth center, Ina May Gaskin (who screens carefully) had no ruptures in 2100 births. (18) The last study I looked at, the Johnson and Daviss homebirth study, didn't mention a uterine rupture rate. (19)

I identified six risk factors for uterine rupture:

- Previous infection of uterine scar site (weakens scar). Note: Use of catgut for suturing seems to contribute to a higher rate of infection. (20)
- Pregnancy less than 24 months after previous c-section. (21) Other studies have shown <18 months. (22)
- Induction of any kind—creates a 50% (or higher) increase in uterine rupture risk depending upon type of induction. (23)
- Placenta covering uterine scar. (24)
- Being 42 weeks + gestation. (25)
- More than one previous cesarean (without previous vaginal birth). (26)

Single vs. Double Closure

Next I looked at single versus double closure suturing of the uterine scar. This is a hotly debated issue for those who provide care for women planning a VBAC, to the point that some will not attend a VBAC in a woman with a single-layer suture. The only evidence I found that one is better than the other in regard to preventing future rupture is that single closures had a lower rate of infections, which can be a contributing factor in risk of rupture in future pregnancies. (27)

Gretchen Humphries, DVM, gave a fascinating lecture providing her analysis of the literature on this subject, which showed that the type of stitch and the material used—rather than the number of layers—may be the deciding factors. Apparently, preliminary data show that "if closure is done with synthetic suture in a non-interlocking pattern, the increased rupture risk doesn't appear to exist." (28) However, more research needs to be done in this area to confirm these conclusions.

General Cesarean Risks

Since we are talking about risk, I had to include the risks of c-sections to balance things out a bit.

Short-term risks for mother:

- Maternal death
- Thromboembolism
- Hemorrhage
- Infection
- Incidental surgical injuries
- Extended hospital stay
- Emergency hysterectomy
- Pain
- Poor birth experience

Long-term risks for mother:

- Adhesions
- Re-hospitalization
- Risk of future c-section
- Infertility
- Placenta accreta
- Placenta previa
- Uterine rupture

Risks for baby:

- Neonatal death
- Respiratory difficulties
- Asthma
- Iatrogenic prematurity
- Trauma
- Breastfeeding difficulties
- Dental disease(29)

We don't know true impact of this high rate of c-sections on the future of women and birth. Sadly, the increase in elective c-sections is now providing us with enough data to judge this, and the picture isn't good. Keep in mind that no studies exist on *totally natural* VBAC in a hospital setting.

Homebirth after Cesarean

So what does all of this mean for women who want a homebirth? As mentioned previously, several of the reasons for choosing HBAC over a hospital VBAC include: high failure rate of hospital VBACs, difficulty

finding a care provider to attend a VBAC, poor treatment, and trauma related to previous hospital experience.

I was honored to have Rochester midwife Meg Grindrod join me to speak about the reality of a practice that includes homebirth for women with prior cesareans. She talked about how common hospital interventions, such as electronic fetal monitoring (EFM), lead to a higher rate of c-section. With a rate of 99.8% false positives for non-reassuring fetal heart rates (30), EFM does not improve maternal or infant outcomes, but leads to more c-sections.

She talked about how VBAC labors are longer and how the hospital setting contributes to emotional dystocia. She also spoke briefly about the political and legal contributions and ramifications. Meg noted that the spiritual and emotional health of the family play the most important part and that removing these elements from birth in a hospital setting causes more harm than we know.

She believes that homebirth avoids repeat c-sections by removing the iatrogenic aspects of hospital birth, as well as emotionally and spiritually supporting mother/baby dyad.

According to 10+ years of studies, homebirths are as safe, if not safer, than hospital births.(31) However, since no studies are available specifically on homebirth after cesarean I had to extrapolate data from studies on hospital VBACs, general homebirth studies and one birth center VBAC study. To do so, I analyzed the three most recent and controversial studies—Pang 1996 (Washington study) (32), Lieberman, et al 2004 (birth center study) (33) and Johnson and Daviss 2005 (homebirth study).(34)

I found poor controls and great misinterpretation of the Washington study.(35) The data were taken from birth certificates, and the authors failed to control for unplanned or emergency births and planned home birth/deaths. (Some families that find out that their baby is likely to die during or immediately after birth, often due to congenital anomalies, choose a peaceful, family-centered homebirth/death.) The study should have included only data for low-risk women and planned homebirths. Although used as the defining study in the medical world, for our purposes those flaws invalidate it and remove the study from this discussion.

This left me with the homebirth and birth center studies, which I analyzed for a number of factors:

Statistics on transfer (home to hospital or birth center to hospital)

- Homebirth study—12.1% transfer rate.(36)
- Birth center study—24% transfer rate.(37)

We have to assume that transfer means a requirement of some sort of medical assistance. Note the doubled transfer rate for the birth center study. Why is that? We don't know. However, I did note that in the birth center study women with previous vaginal birth(s) who were planning a VBAC had one-third the transfer rate of those with no previous vaginal birth(s).(38) Unfortunately we don't know if any women in the homebirth study had prior cesareans; they may have. So I had no data available on comparison of transfer rate of VBACs in homebirth. Interestingly enough, the 12% transfer rate is comparable to other population studies.

Interventions

Next I looked at the individual rates of medical interventions and found that interventions occurred in homebirths at a rate of less than half that in the hospital.(39) This was “whether compared with a relatively low risk group (singleton, vertex, 37 weeks or more gestation) that will have a small percentage of higher risk births, or the general population having hospital births. Compared with the relatively low-risk hospital group, intended homebirths were associated with lower rates of medical interventions” [overall].(40) Unfortunately, the birth center study did not discuss specific interventions.

Incidence of complications

The birth center study had a 1.4% incidence of complications (uterine rupture and other adverse events), and 0.9% of that total were serious.(41) This number dropped to 0.2% when controlled for by eliminating women who were at greater than 42 weeks gestation and/or had had more than one previous c-section and no previous vaginal birth(s).(42)

Five minute Apgar scores lower than 7 were also assessed as a means of determining outcome.

- Homebirth study—1.3% 5-minute Apgar scores <7 (43)
- Birth center study—1.0% 5-minute Apgar scores <7 (44)

Keep in mind that Apgar scores do not necessarily indicate problems later in life (45); instead, they indicate the need for medical assistance at that moment in time. Midwife Grindrod mentioned that she likes to do a 10-minute Apgar score, which she finds indicative of problems or the need to transport.

Comparing studies when they control for different things and don't report on others is challenging. The homebirth study did not discuss particular adverse events or complications. The birth center study looked at only *certain* events: 1) maternal or perinatal death; 2) the need for hysterectomy; 3) five-minute Apgar score less than 7; 4) frequency of uterine rupture.(46)

Cesarean Section Rates

The cesarean section rate was low in both studies when compared to all other studies that have been reported.

- Homebirth study—3.7% (47)
- Birth center study—13% or lower (48)

The birth center study did not note the c-section rate for the 24% who were transferred to the hospital, but did mention that not all of those women had repeat c-sections. Having had a previous vaginal delivery was associated with a higher VBAC success rate: 94.4% vs 80.9% for those with no previous vaginal births. (49) Still, an 87% VBAC rate is exceptional in this day and age.

The cesarean rate for intended homebirths was 8.3% among primiparous women and 1.6% among multiparous women, with an average of 3.7.(50) We can extrapolate that a safe c-section rate would fall somewhere below 13%, but above 4%, which is consistent with the World Health Organization recommendation of a c-section rate around 10% or lower.(51)

Dr. Marsden Wagner discussed statistics from WHO (from a cross-section of countries around the world) noting that when the c-section rate (for all women) fell below 10% or rose above 15% the maternal

and infant mortality rates rose.(52) The number of women with high-risk pregnancies is higher in undeveloped countries, which would increase the need for cesareans.

Neonatal Mortality Rates

The authors of the homebirth study concluded that comparing neonatal mortality rates among all studies is difficult due to differing population sizes and study designs.(53) Among all studies (both in-hospital and out-of-hospital) I found the range of neonatal mortality rates to be 0.5% to 3.5% across the board.(54) Essentially this means that regardless of where a woman births, the chances of her baby dying are the same in both in-and out-of-hospital settings, removing the issue from this discussion.

“Given no differences in perinatal mortality it must be noted that the natural approach shows significant advantages with respect to lower maternity care cost as well as reduced mortality and morbidity from unnecessary cesareans and other obstetric interventions, and significant benefits from avoiding negative long-term consequences from unnecessary obstetric interventions and procedures. These advantages of the natural approach are of such a large order of magnitude as to raise serious doubts concerning the appropriateness of conventional ‘obstetric’ treatment for low-risk childbirth.”(55)

Maternal Mortality Rates

No maternal deaths were reported in either the homebirth study or the birth center study, although maternal death rates are known to be higher in the hospital setting.(56) Perhaps that is to be expected, as that is where high-risk moms should be. The biggest difference in VBAC versus cesarean is the maternal mortality rate: 36/100,000 cesarean vs 9/100,000 VBAC. Oddly enough, the authors of the birth center study, despite finding a high rate of vaginal births and very few uterine ruptures, “advise both birth centers and women with prior cesarean deliveries against attempting VBACs in any nonhospital setting.”(57)

What We Don’t Know

Is HBAC more successful than hospital VBAC? The birth center study showed an outstanding 87% success rate, but what defines success in HBAC?

In a casual analysis of statistics from an ICAN e-mail list I noted that among 74 women who planned an HBAC:

- 82% birthed at home
- 6% transported and had vaginal birth
- 11% transported and had another cesarean
- 0% ended up scheduling repeat cesarean

Among 64 women who planned a hospital VBAC:

- 65% had vaginal birth
- 31% had cesarean
- 2% ended up scheduling repeat cesarean

While not scientific, it does mirror the experiences of the local Rochester chapter of ICAN: Women

planning an HBAC are much more likely to have one than women planning a hospital VBAC.(58)

Identifying Uterine Rupture Signs and Symptoms

The ability to identify uterine rupture symptoms is a key element in assessing HBAC safety. In discussions with local midwives we identified several factors that should be established or assessed:

- One to one care during labor—allows the midwife to truly assess each individual woman and her labor
- Checking maternal pulse every 15 minutes—this can be an early signal of problems
- Monitor fetal heart rate regularly—every 30 minutes in early labor; every 15 minutes in active labor; after every push
- Mother's reported sensations (common hospital pain medications can mask symptoms of problems)
- Sudden hemorrhage or excessive blood loss early in labor

Conclusions

- No well structured studies on HBAC are currently available
- Further studies need to be done (using all of the referenced data in this article as a guideline)

However, HBAC seems to be a viable option at this point in time, if women are screened carefully for low risk points and risk factors (see sidebars). Midwife Grindrod made a point that these should be guidelines rather than rules and, more importantly, that they serve as guidelines for future research.

By teaching women to stay healthy and low-risk through education, nutrition, exercise, choosing birth place and care provider wisely, we can reduce the chances of medically necessary cesareans. All these factors have a significant impact not only on cesarean prevention but also on successful VBAC. If care providers assess each woman individually for risk factors and restrict VBACs based only on individual findings, HBAC is a healthy choice for many women who have previously had cesareans. Last, but not least: Avoid primary c-section!

We live in a time where birth should be the best of both worlds: Homebirth for most and the technology to prevent or to help those in trouble if necessary. The ability to help women stay healthy and low-risk, the knowledge to identify problems in advance (prevent or deal with them naturally) and the technology to safely deal with emergencies should create this best of all possible worlds, but it hasn't. The medical model is still at war with the midwifery model, and things are getting increasingly worse. As a result of the unnecessarily high cesarean rate, we now must deal with the issue of VBAC and an increase in the demand for HBAC. Frankly, if interventions and surgeries had not become so common we would still have a 10% or lower c-section rate and not be here today discussing VBAC, much less homebirth VBAC.

References:

1. Martin, J., et al. 2006. "Births: Final Data for 2004." *National Vital Statistics Report 55(1)*: 3. Center for Disease Control. 29 Sep 2006. www.cdc.gov/nchs/data/nvsr/nvsr55/nvsr55_01.pdf.
2. Zweifler, J., et al. 2006. *Vaginal Birth after Cesarean in California: Before and After a Change in Guidelines*. *Ann Fam Med* 4(3): 228–34; Martin et al.
3. Declercq, E., F. Menacker and M. Macdorman. 2006. *Maternal risk profiles and the primary cesarean rate in the United*

- States, 1991–2002. *Am J Public Health* 96(5): 867–72; Fogelson, N.S., et al. 2005. Neonatal impact of elective repeat cesarean delivery at term: a comment on patient choice cesarean delivery. *Am J Obstet Gynecol* 192: 1433–36; National Institutes of Health. 2002. Even Moderately Premature Birth Poses Risk for Developmental Delays. NIH News Release. 17 Jan 2002. www.nih.gov/news/pr/jan2002/nichd-15.htm.
4. MacDorman, M.F., et al. 2006. Infant and neonatal mortality for primary cesarean and vaginal births to women with "no indicated risk," United States, 1998–2001 birth cohorts. *Birth* 33(3): 175–82.
 5. Deneux-Tharoux, C., et al. 2006. Postpartum Maternal Mortality and Cesarean Delivery. *Obstet Gynecol* 108 (3, part 1): 541–48; Plante, L.A. 2006. Public Health Implications of Cesarean on Demand. *Obstet Gynecol Surv* 61(12): 807–15.
 6. McMahon, M.J., et al. 1996. Comparison of a trial of labor with an elective second cesarean section. *NEJM* 335(10): 689–95.
 7. International Cesarean Awareness Network. 2004. www.ican-online.org/. Accessed 12 Mar 2008.
 8. Lydon-Rochelle, M., et al. 2001. Risk of uterine rupture during labor among women with a prior cesarean section. *NEJM* 345(1): 3–8.
 9. Delaney, T., and D.C. Young. 2003. Spontaneous versus induced labor after a previous cesarean delivery. *Obstet Gynecol* 102(1): 39–44; Kieser, K. E., and T. F. Baskett. 2002. A 10-Year Population-Based Study of Uterine Rupture. *Obstet Gynecol* 100: 749–53.
 10. Landon, M.B., et al. 2004. Maternal and perinatal outcomes associated with a trial of labor after prior cesarean delivery. *N Engl J Med* 351(25): 2581–89.
 11. Bujold, E, et al. 2005. Maternal and Perinatal Outcomes Associated With a Trial of Labor after Prior Cesarean Delivery, *J Midwifery Womens Health*. 50(5): 363–64.
 12. Landon, M.B., et al. 2006. Risk of Uterine Rupture with a Trial of Labor in Women with Multiple and Single Prior Cesarean Delivery. *Obst Gynecol* 108(1): 12–20.
 13. E-mail correspondence with E. Bujold, Autumn 2006.
 14. "Risk of Uterine Rupture during Labor Higher for Women with a Prior Cesarean Delivery"; National Institutes of Health News Release, Jul 2001. www.nih.gov/news/pr/jul2001/ninr-04.htm. Accessed 23 Apr 2008; Gaskin, I.M. 2000. "Cytotec: Dangerous experiment or panacea?" *Salon Online Magazine*. <http://archive.salon.com/health/feature/2000/07/11/cytotec/index.html>. Accessed 20 Apr 2008.
 15. Landon, Risk of Uterine Rupture, 14.
 16. Lieberman, E., et al. 2004. Results of the national study of vaginal birth after cesarean in birth centers. *Obstet Gynecol* 104(5, Pt 1): 933–42.
 17. *Ibid.*, 937.
 18. Gaskin.
 19. Johnson, K.C., and B.A. Daviss. 2005. Outcomes of planned home births with certified professional midwives: large prospective study in North America. *BMJ* 330(7505): 1416–1419.
 20. Durnwald, C. 2003. Uterine rupture, perioperative and perinatal morbidity after single-layer and double-layer closure at cesarean delivery. *Am J Obstet Gynecol* 189(4): 925–29; Slome Cohain, J., 2004. *The Many Ways to Sew Up a Uterus*. *Midwifery Today* 70: 32.
 21. Bujold et al; Lieberman et al.
 22. O'Brien-Abel, N. 2003. Uterine Rupture during VBAC Trial of Labor: Risk Factors and Fetal Response. *J Midwifery Womens Health* 48(4): 249–57; Stamilio, D.M., et al. 2007. Risk of Uterine Rupture and Complications of Vaginal Birth After Cesarean Delivery. *Obstet Gynecol* 110: 1075–82.
 23. Lydon-Rochelle et al, 3; Delaney and Young; Landon et al, *Maternal and Perinatal Outcomes*; Bujold ; Landon et al *Risk of Uterine Rupture*, 14–15.
 24. Lieberman et al, 940.
 25. *Ibid.*, 938
 26. Landon et al, *Risk of Uterine Rupture*; Lieberman et al.
 27. Durnwald.
 28. Humphries, G. 2007. "One-layer vs. two-layers. Much ado about something?" *International Cesarean Awareness Network, 25th Annual Conference*, Apr 2007, Syracuse, New York.
 29. Bernstein, P.S. 2005. "Complications of Cesarean Deliveries" *Cesarean Risks*. *Medscape Today*. www.medscape.com/viewprogram/4546. Accessed 22 Apr 2008; "What Every Pregnant Woman Needs to Know About Cesarean Section." *The Childbirth Connection*. www.childbirthconnection.org/article.asp?ck=10164. Accessed 12 Mar 2008; Plante, L.A. 2006. CME: Public Health Implications of Cesarean on Demand. *Obstet Gynecol Surv* 61(12): 807.
 30. Nelson, K.B., et al. 1996. Uncertain Value of Electronic Fetal Monitoring in Predicting Cerebral Palsy. *NEJM* 334(10): 613–18.
 31. Weigers, T.A., et al. 1996. Outcome of planned home and planned hospital births in low risk pregnancies: prospective study in midwifery practices in The Netherlands. *BMJ* 313(7068): 1309–13; Schlenska, P. F. 1999 "Safety of Alternative Approaches to Childbirth." PhD dissertation, Stanford University. www.vbfree.org/docs/meadsum.html. Accessed 18 Feb 2007; Johanson, R., M. Newburn and A. Macfarlane. 2002. Has the medicalisation of childbirth gone too far? *BMJ* 324(7342): 892–95.
 32. Pang, J.W., et al 2002. Outcomes of Planned Home Births in Washington State: 1989-1996. *Obstet Gynecol* 100(2):

253–59.

33. Lieberman et al.

34. Johnson and Daviss.

35. Pang et al.

36. Johnson and Daviss, 1417.

37. Lieberman et al, 936.

38. *Ibid.*, 936.

39. Johnson and Daviss, 1417.

40. *Ibid.*

41. Lieberman et al, 937.

42. *Ibid.*

43. Johnson and Daviss, 1417.

44. Lieberman et al, 938.

45. The Apgar Score. 2006. American Academy of Pediatrics policy statement, *Pediatrics* 117(4): 1444–47.

<http://aappolicy.aapublications.org/cgi/content/abstract/pediatrics;117/4/1444>. Accessed 22 Apr 2008.

46. Lieberman et al, 938.

47. Johnson and Daviss, 1417.

48. Lieberman et al, 938

49. Lieberman et al, 936.

50. Johnson and Daviss, 1417.

51. World Health Organization. 1985. *Appropriate Technology for Birth*. *Lancet* 2(8452): 436–37; [Betrán, A.P., et al. 2007.](#)

[Rates of caesarean section: analysis of global, regional and national estimates. *Paediatr Perinat Epidemiol* 21: 98–113.](#)

52. Wagner, M. 2006. *Born in the USA: How a broken maternity system must be fixed to put women and children first*. Berkeley: University of California Press. p. 42, 46–47.

53. Johnson and Daviss, Table 4.

54. *Ibid.*

55. Schlenska, V.

56. "Cesarean Section Quadruples the Risk of Maternal Death" October 1, 2003. Coalition for Improving Maternity Services; www.motherfriendly.org/news/Sep2003/c-sec-maternal-death.pdf; ACOG. *Weighing the pros and cons of cesarean delivery*. ACOG News Release, 31 Jul 2003.

57. Lieberman et al, 941.

58. Compiled by Krista Cornish Scott, ICAN, LLL; Rochester, New York.

SIDEBAR

Risk Factors

- Previous infection of uterine scar site (weakens scar)
- Pregnancy less than 18–24 months after previous c-section
- Induction of any kind
- Placenta covering uterine scar
- 42 weeks+ gestation
- More than one previous cesarean (if no previous vaginal birth)

Low Risk Points

- General health
- Reproductive history
- Number of previous c-sections
- Previous vaginal births or no
- Time since last c-section
- Infection experience

