



Original Article

Vaginal birth after cesarean section—The world trend and local experience in Taiwan



Hsiu-Ting Tsai, Chia-Hsun Wu*

Department of Obstetrics and Gynecology, MacKay Memorial Hospital, Taipei, Taiwan

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ABSTRACT

Objective: The trend of increasing cesarean section rates had evoked worldwide attention. Many approaches were introduced to diminish cesarean section rates. Vaginal birth after cesarean section (VBAC) is a route of delivery with diverse agreements. In this study, we try to reveal the world trend in VBAC and our experience of a 10-year period in a medical center in northern Taiwan.

Materials and methods: This is a retrospective study of all women who underwent elective repeat cesarean delivery or trial of labor after cesarean (TOLAC) following primary cesarean delivery by a general obstetrician–gynecologist in the Tamshui Branch of MacKay Memorial Hospital (Taipei, Taiwan) between 2006 and 2015. We excluded cases of preterm labor, two or more cesarean deliveries, and major maternal diseases. We compared the characteristics and outcomes between these groups.

Results: We included 400 women with subsequent pregnancies who underwent elective repeat cesarean delivery or TOLAC during the study period. Among the study population, 112 women were excluded and 11 underwent repeat VBAC. A total of 204 (73.65%) cases underwent elective repeat cesarean delivery and 73 (26.35%) chose TOLAC. The rate of successful VBAC among the women who chose TOLAC was 84.93%. **Conclusion:** With respect to maternal and fetal safety, and success rates and adverse effects of VBAC, the results of this study are promising and compatible with the global data. It shows that a trial of VBAC can be offered to pregnant women without contraindications with high success rates.

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Introduction

The trend of increasing cesarean section (CS) rates had evoked worldwide attention for both healthcare workers and general population. Many articles revealed the trend of a steady rise of CS rates globally in the past 2 decades [1,2]. According to the World Health Organization (WHO) recommendation, CSs should be performed only when medically necessary [3]. Unfortunately, this recommendation fails to reverse the increasing trend of CS rates. Among the group of cesarean deliveries, repeated CS due to prior ones account for a remarkable proportion [4]. Vaginal birth after cesarean section (VBAC) is an alternative to repeated CSs. It peaked during the mid-1990s along with a lower total CS rate. A dramatic drop of the percentage of VBAC since that point of time accompanied with a steady increase of CS rates was explored till the present time [5]. Several national medical associations have provided

practice guidelines for VBAC. However, the evidence is inconsistent and the effect on VBAC rates is unclear [6]. The rates of successful VBAC in the United States are between 38.5% and 69.8%, as revealed by a 10-year survey [7]. In this article, we review the current recommendations and guidelines for VBAC, and the result of our 10 years' experience of VBAC in a medical center of northern Taiwan.

Materials and methods

This is a retrospective study with a chart review of all women who underwent elective repeat cesarean delivery (ERCD) or trial of labor after cesarean (TOLAC) following primary cesarean delivery by a general obstetrician–gynecologist in the Tamshui Branch of MacKay Memorial Hospital (Taipei, Taiwan) between January 2006 and December 2015. During the first prenatal visit and prenatal care in the third trimester, the doctor explained the cons and pros of TOLAC to the patients and queried about their decision to proceed with TOLAC. The patients chose their delivery modes. Those patients were divided into two groups, ERCD and TOLAC. We excluded patients with preterm labor (gestational age < 37 weeks),

* Corresponding author. Department of Obstetrics and Gynecology, MacKay Memorial Hospital, 92, Section 2, Chung-Shan North Road, Taipei, Taiwan.

E-mail address: mtgwu@ms62.hinet.net (C.-H. Wu).

two or more CSs, a history of myomectomy, previous CS via classical or inverted-T methods, maternal major brain lesions, maternal major cardiac diseases, and maternal severe pelvic trauma history. The characteristics, delivery mode, and maternal and fetal outcomes were compared between the two groups. In addition, we calculated the selective rates of TOLAC and the rates of successful VBAC in those who chose TOLAC. We analyzed parameters of success and failure of TOLAC between the two groups.

We used the program of IBM SPSS Statistics version 22 for data analysis. A Student *t* test was used to compare these parameters between the groups. Significant differences are identified when *p* < 0.05.

Our study was approved by the institutional review board of MacKay Memorial Hospital and the institutional review board number was 16MMHIS036e.

Results

We collected data of 400 pregnant women who underwent ERCD or TOLAC during the study period. Among the study population, 112 women were excluded. Eleven women underwent repeat VBAC. A total of 204 cases (73.65%) underwent ERCD and 73 (26.35%) chose TOLAC. The rate of successful VBAC among the women who chose TOLAC was 84.93%. Among those with successful TOLAC, 31 women underwent vacuum-assisted vaginal deliveries and another 31 had spontaneous vaginal deliveries (Figure 1).

Table 1 presents the characteristics of subsequent pregnancy of women who underwent ERCD or chose TOLAC. Women who had a TOLAC represented a significantly higher gestational age at delivery, a longer interval from previous delivery, more multiparity, a higher number of prior vaginal deliveries, lower rates of persistent position of the fetal head, and a higher 1-minute Apgar score. Regarding the incidence of postpartum hemorrhage, birth weight over 4000 g, and neonatal intensive care unit or NBC (newborn center) admission, there were no significant differences between the ERCD and TOLAC groups. Furthermore, there were no significant differences in fetal birth weight and 1-minute Apgar scores. No uterine rupture occurred in these two groups.

Table 2 presents the characteristics of women in subsequent pregnancy with successful or failed TOLAC. Women who had a successful VBAC were characterized with lower fetal birth weight and higher 1-minute Apgar scores. The rate of spontaneous delivery

Table 1
Characteristics of women, and maternal and neonatal outcomes in subsequent pregnancy between choices of ERCD and TOLAC.

Characteristics of women, & maternal & neonatal outcomes in subsequent pregnancy	ERCD (n = 204)	TOLAC (n = 73)	p
Maternal age (y)	32.65 ± 4.30	32.93 ± 4.64	0.116
Maternal age >35 y (n)	56 (27.45)	16 (21.92)	0.178
BMI (kg/m ²)	23.09 ± 4.57	22.68 ± 3.50	0.242
Obesity, BMI >30 kg/m ² (n)	16 (7.84)	2 (2.74)	0.065
Gestational age at delivery (wk)	38.16 ± 2.59	39.43 ± 1.31	<0.001*
Time from previous delivery (y)	3.82 ± 2.75	4.60 ± 3.53	0.027*
Parity (n)	1.05 ± 0.25	1.21 ± 0.45	<0.001*
History of vaginal delivery (n)	10 (4.90)	12 (16.44)	<0.001*
Pregestational diabetes (n)	2 (0.98)	1 (1.37)	0.392
Chronic hypertension (n)	5 (2.45)	3 (4.11)	0.447
GDM (n)	3 (1.47)	1 (1.37)	0.475
Preeclampsia (n)	4 (1.96)	1 (1.37)	0.373
Postpartum hemorrhage (n)	5 (2.45)	2 (2.74)	0.447
Dehiscence or rupture of uterine scar (n)	0 (0.00)	0 (0.00)	
Persistent occiput-posterior position (n)	19 (93.14)	2 (2.74)	0.034*
Neonatal outcome			
Birth weight (g)	3159.62 ± 418.15	3241.26 ± 404.13	0.075
>4000 g (n)	7 (3.43)	1 (1.37)	0.184
1-min Apgar score ≤6 (n)	0 (0)	1 (1.37)	0.047*
NBC or NICU admission (n)	4 (1.96)	2 (2.74)	0.348

Data are presented as mean ± SD or *n* (%). BMI = body mass index; ERCD = elective repeat cesarean delivery; GDM = gestational diabetes mellitus; NBC = newborn center; NICU = neonatal intensive care unit; SD = standard deviation; TOLAC = trial of labor after cesarean. **p*-value < 0.05, statistical significance.

during successful TOLAC was 50.00%. The rate of operative vaginal delivery using the vacuum-assisted method among those undergoing VBAC was 50.00%. The major causes of operative vaginal delivery were poor maternal expulsive force, fetal distress (3 cases; 9.68%), and prolonged second stage (1 case; 3.23%). Eleven women (15.07%) had failed TOLAC and underwent repeat cesarean deliveries. The causes of failed TOLAC were as follows: intolerable labor pain in three cases, fetal distress in two cases, prolonged labor (latent phase) in two cases, and prolonged labor (active phase) in four cases. There was no significant difference in the rates of postpartum hemorrhage and neonatal intensive care unit or NBC admission of the newborn. In addition, there was no case of uterine rupture during TOLAC.

Discussion

According to the WHO statement, the international healthcare community has considered the ideal rate for CSs to be between 10% and 15% [3]. CS rates vary tremendously in different countries and regions. China and Mexico have the highest CS rates, with nearly half of all pregnancies ending up with cesarean deliveries [2,8–11]. By contrast, the Netherlands, Finland, Iceland, and Norway have low and stable CS rates. According to categorized grouping data of the United Nations in 2014, CS rates were 7.3% in Africa, 19.2% in Asia, 25.0% in Europe, 40.5% in Latin America and the Caribbean, 32.3% in Northern America, and 31.1% in Oceania, and 18.6% was global average rate. It also showed that there is a trend of rising CS rates all over the world with a few exceptions [1]. The data in Taiwan, provided by the Health Promotion Administration, Ministry of Health and Welfare, also demonstrate a similar trend (Figure 2).

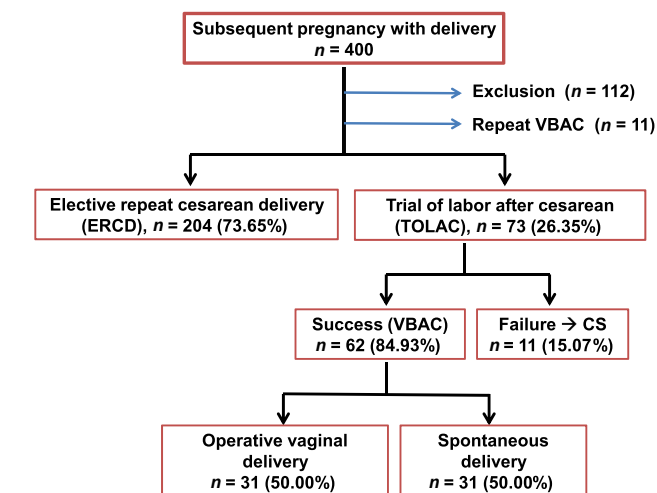


Figure 1. Selection of the study group. CS = cesarean section; ERCD = elective repeat cesarean delivery; TOLAC = trial of labor after cesarean; VBAC = vaginal birth after cesarean.

Table 2

Characteristics of women, and maternal and neonatal outcomes in subsequent pregnancy between women who had successful and failed TOLAC.

Characteristics of women, & maternal & neonatal outcomes in subsequent pregnancy	Success of TOLAC (n = 62)	Failure of TOLAC (n = 11)	p
Maternal age (y)	31.98 ± 4.40	30.545 ± 6.53	0.410
Maternal age >35 y (n)	12 (19.35)	2 (18.18)	0.464
BMI (kg/m ²)	22.54 ± 3.28	23.43 ± 4.68	0.222
Obesity, BMI >30 kg/m ² (n)	1 (1.61)	1 (9.09)	0.083
Gestational age at delivery (wk)	39.31 ± 0.99	39.43 ± 1.31	0.361
Time from previous delivery (y)	4.41 ± 3.49	5.66 ± 3.71	0.142
Parity (n)	1.21 ± 0.45	1 ± 0	0.064
History of vaginal delivery (n)	12 (19.35)	0 (0.00)	0.057
Pregestational diabetes (n)	1 (1.61)	0 (0.00)	0.338
Chronic hypertension (n)	3 (4.84)	0 (0.00)	0.232
GDM (n)	1 (1.61)	0 (0.00)	0.338
Preeclampsia (n)	1 (1.61)	0 (0.00)	0.338
Postpartum hemorrhage (n)	2 (3.23)	0 (0.00)	0.276
Dehiscence or rupture of uterine scar (n)	0 (0.00)	0 (0.00)	
POP position (n)	2 (3.23)	0 (0.00)	0.276
Meconium stain (n)	9 (14.51)	1 (9.09)	0.318
Mode of vaginal delivery (n)			
Spontaneous delivery	31 (50.00)	N/A	
Operative vaginal delivery	31 (50.00)	N/A	
Fetal distress	3 (9.68)	N/A	
Prolonged second stage	1 (3.23)	N/A	
Poor maternal expulsive force	27 (87.09)	N/A	
Third- or fourth-degree perineal laceration (n)	8 (12.90)	N/A	
Epidural anesthesia (n)	11 (17.74)	N/A	
Cause of failure of TOLAC			
Intolerable labor pain	N/A	3 (27.27)	
Fetal distress	N/A	2 (18.18)	
Prolonged labor (latent phase)	N/A	2 (18.18)	
Prolonged labor (active phase)	N/A	4 (36.36)	
Neonatal outcome			
Birth weight (g)	3206.61 ± 379.79	3470.40 ± 477.6	0.020*
>4000 g (n)	0 (0.00)	1 (9.09)	0.008*
1-min Apgar score	9.18 ± 0.69	8.73 ± 0.79	0.027*
≤6 (n)	1 (9.09)	0 (0.00)	0.350
NBC or NICU admission (n)	2 (3.22)	0 (0.00)	0.276

Data are presented as mean ± SD or n (%).

BMI = body mass index; GDM = gestational diabetes mellitus; POP = persistent occiput posterior; N/A = not applicable; NICU = neonatal intensive care unit; SD = standard deviation; TOLAC = trial of labor after cesarean.

*p-value < 0.05, statistical significance.

If the varieties of CS rates were focused on individual caregiver, it also revealed the huge range of difference [12,13]. Medical indications for CS are very subjective and culture bound. Many medical interventions, such as labor induction and routinely applied continuous electronic fetal heart rate monitoring, cause higher CS rates [14]. The impact of financial consideration and insurance coverage also play roles of nonmedical indications of CS [15–17].

The advance of modern medical aids improves most aspects of obstetric care. However, regarding CS rates, most obstetricians fail to fulfill the recommendation of the WHO. Based on this situation, a considerable number of studies investigating the reduction in CS rates were conducted [3,12,18–23]. VBAC was once considered one of the solutions. However, the decrease in trials of VBAC in the past 2 decades contributes to the failure of this attempt [5,24]. The percentage of women trying VBAC varies due to multiple factors, but the service provider's choice seems to be the most determinant factor [25]. Basically, the individuals' variation comes from the ongoing debate about VBAC. Uncertainty about the rates of successful VBAC is one of the major concerns for both caregivers and pregnant women. Individual factors, including the indication of prior CS, a history of prior vaginal birth, maternal factors, and the

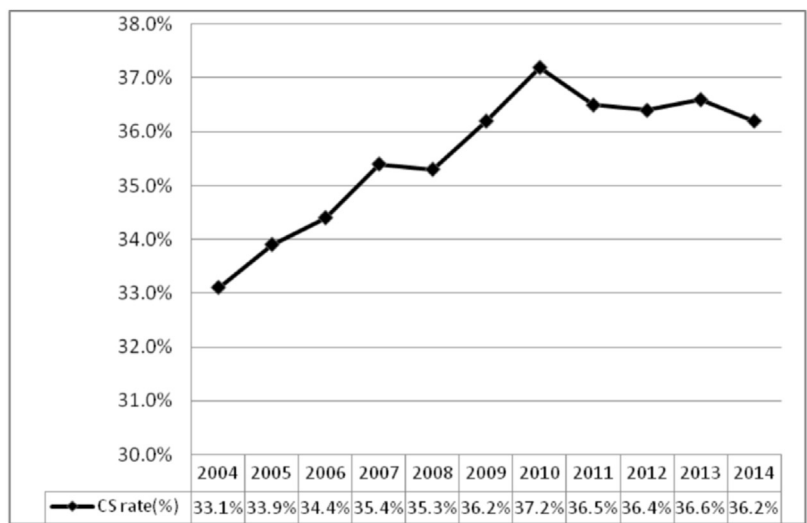
current pregnant status, affect the success rates. Many studies were conducted to investigate the predicting factors and rates of successful VBAC [26]. Another medical factor evoking hesitation about VBAC in both sides of participants is the consideration of safety. The impact of risks versus benefits on maternal and fetal aspects has been well investigated [27–31].

Fear of medical malpractice issues might be a nonmedical factor in the reduction of VBAC. A study showed that 30% of the obstetrician members of the American College of Obstetricians and Gynecologists (ACOG) stopped trying VBAC because of medical litigation [15]. According to the statement of the National Institutes of Health, nonmedical factors influencing VBAC rates include professional liability concerns among physicians and hospitals, the nature and extent of informed decision making, provider and birth-setting issues, health insurance status, insurance reimbursement, and patient and provider preferences [5].

Developing guidelines for clinical practice to ensure the provision of high-quality care, with a view to improve clinical outcomes and diminish individual variations, are hence emphasized [32].

The ACOG held a consensus development conference on VBAC in March 2010 and then introduced their guidelines in August 2010 [33]. In the United Kingdom, two guidelines were introduced by the Royal College of Obstetricians and Gynaecologists and National Institute of Clinical Excellence [34,35]. The Society of Obstetricians and Gynaecologists of Canada offered revised guidelines in 2005 [36].

According to a practice bulletin from the ACOG in 2010, most women with one previous cesarean delivery with a low transverse incision are candidates for and should be counseled about VBAC, and should be offered TOLAC. This statement clearly declared an evidence-based advisory to healthcare providers to offer this message to pregnant women. For those who are good candidates for TOLAC, success rates according to a prior indication of CS are as follows: 75% (malpresentation), 60% (fetal distress), and 54% (failure to progress or CPD (cephalopelvic disproportion)). The risk of uterine rupture compared with repeat elective CS is slightly increased, from 0.4–0.5% up to 0.7–0.9%. This increment of uterine rupture rates does not imply significantly higher rates of blood transfusion, hysterectomy, or severe maternal morbidity and mortality. Those women who underwent two previous low transverse cesarean deliveries may still be considered candidates for TOLAC. The risk of uterine rupture increased markedly in high-risk groups, including those with previous classical or T incision, prior uterine rupture, or extensive transfundal uterine surgery. They are generally not considered candidates for TOLAC. Those women in whom vaginal delivery is otherwise contraindicated (e.g., those with placenta previa) are not generally candidates for planned TOLAC. Induction of labor and pain control during labor can be considered general rules for management of labor. Only a concern regarding induction of labor is avoidance of hyperstimulation with misoprostol. Women with twin pregnancies with one previous low transverse cesarean delivery, who are otherwise appropriate candidates, are also good for TOLAC. In the practice guidelines, a recommendation based on consensus and expert opinion (level C) states the following: a trial of labor after previous cesarean delivery should be undertaken at facilities capable of emergency deliveries. This statement aroused a fear of malpractice among many healthcare givers and facilities, thus diminishing the percentage of TOLAC. Regarding the barriers that women face in gaining access to clinicians and facilities that are able and willing to offer a trial of labor, the National Institutes of Health recommend that the ACOG and the American Society of Anesthesiologists reassess this requirement with specific reference to other obstetric complications of comparable risk and risk stratification, and in light of limited physician and nursing resources.



CS = cesarean section.
 Note. Resource: Health Promotion Administration, Ministry of Health and Welfare, Taiwan, R.O.C.

Figure 2. Cesarean rates in Taiwan.

Although the ACOG preserve their guideline on this issue, they now couch this statement by stating that “When resources for immediate cesarean delivery are not available, the College recommends that healthcare providers and patients considering TOLAC discuss the hospital’s resources and availability of obstetric, pediatric, anesthetic and operating room staffs. Respect for patient autonomy supports that patients should be allowed to accept increased levels of risk, however, patients should be clearly informed of such potential increase in risk and management alternatives”.

Conclusion

The trend of increasing CS rates has drawn attention of both medical staff and general population for decades. Under this situation, obstetric groups of many nations and regions introduce their alert and recommendations to convert this trend. Unfortunately, this end up with ongoing increment of CS rates globally. The advance of modern medical aids improves most aspects of obstetric care. However, most obstetricians fail to fulfill the recommendation of the WHO regarding CS rates. VBAC was once considered one of the solutions. However, the trials of VBAC dropped dramatically since the mid-1990s, which was accompanied by a rapid increase in CS rates. The percentage of trying VBAC varies due to multiple factors, but the service provider’s choice seems to be the most determinant factor. Many obstetricians totally avoid a trial of VBAC. In this article, we introduce our 10 years’ experience of trying VBAC. The result is promising and compatible with global data. It shows that practice of delivery on the population here in Taiwan, trial of VBAC can be safely offered to pregnant women without contraindication with high successful rates.

Conflict of interest

There is no conflict of interest. According to our study, during the first prenatal visit and prenatal care in the third trimester, the doctor explained the cons and pros of TOLAC to the patients and

queried about their decision to proceed with TOLAC. The patients chose their delivery modes.

References

- [1] Betrán AP, Ye J, Moller AB, Zhang J, Gülmezoglu AM, Torloni MR. The increasing trend in caesarean section rates: global, regional and national estimates: 1990–2014. *PLoS One* 2016;11:e0148343. <http://dx.doi.org/10.1371/journal.pone.0148343>.
- [2] Niino Y. The increasing cesarean rate globally and what we can do about it. *BioSci Trends* 2011;5:139–50.
- [3] WHO news release. Caesarean sections should only be performed when medically necessary. Geneva. 10 April 2015.
- [4] Lobel M, DeLuca RS. Psychosocial sequelae of cesarean delivery: review and analysis of their causes and implications. *Soc Sci Med* 2007;64:2272–84.
- [5] Cunningham FG, Bangdiwala S, Brown SS, Dean TM, Frederiksen M, Rowland Hogue CJ, et al. National Institutes of Health Consensus Development conference statement: vaginal birth after cesarean: new insights, March 8–10, 2010. *Obstet Gynecol* 2010;115:1279–95.
- [6] Foureur M, Ryan CL, Nicholl M, Homer C. Inconsistent evidence: analysis of six national guidelines for vaginal birth after cesarean section. *Birth* 2010 Mar;37(1):3–10.
- [7] Uddin SFG, Simon AE. Rates and success rates of trial of labor after cesarean delivery in the United States, 1990–2009. *Matern Child Health J* 2013;17:1309–14.
- [8] Chen Y, Wu L, Zhang W, Zou L, Li G, Fan L. Delivery modes and pregnancy outcomes of low birth weight infants in China. *J Perinatol* 2016;36:41–6. <http://dx.doi.org/10.1038/jp.2015.137>.
- [9] Xie RH, Gaudet L, Krewski D, Graham ID, Walker MC, Wen SW. Higher cesarean delivery rates are associated with higher infant mortality rates in industrialized countries. *Birth* 2015;42:62–9. <http://dx.doi.org/10.1111/birt.12153>.
- [10] Long Q, Klemetti R, Wang Y, Tao F, Yan H, Hemminki E. High caesarean section rate in rural China: is it related to health insurance (new co-operative medical scheme)? *Soc Sci Med* 2012;75:733–7. <http://dx.doi.org/10.1016/j.socscimed.2012.03.054>.
- [11] Meng Q, Xu L, Zhang Y, Qian J, Cai M, Xin Y, et al. Trends in access to health services and financial protection in China between 2003 and 2011: a cross-sectional study. *Lancet* 2012;379:805–14. [http://dx.doi.org/10.1016/S0140-6736\(12\)60278-5](http://dx.doi.org/10.1016/S0140-6736(12)60278-5). Erratum in: *Lancet* 2012;380:888.
- [12] Duckworth S. Should maternal choice be an indication for caesarean section? *Int J Surg* 2008;6:277–80.
- [13] Childbirth connection. What every pregnant woman needs to know about cesarean section. 2nd revised ed. New York, NY: Childbirth Connection; 2006. p. 12, 20, 21–25.
- [14] Souza JP, Gülmezoglu A, Lumbiganon P, Laopaiboon M, Carroli G, Fawole B, et al. 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. *BMC Med* 2010;8:71.
- [15] Grant D. Physician financial incentives and cesarean delivery: new conclusions from the healthcare cost and utilization project. *J Health Econ* 2009;28: 244–50.
 - [16] Sakala C. Midwifery care and out-of-hospital birth settings: how do they reduce unnecessary cesarean section births? *Soc Sci Med* 1993;37:1233–50.
 - [17] Stafford RS. Cesarean section use and source of payment: an analysis of California hospital discharge abstracts. *Am J Public Health* 1990;80:313–5.
 - [18] Arrieta A. Health reform and cesarean sections in the private sector: the experience of Peru. *Health Policy* 2010;99:124–30.
 - [19] Abdel-Aleem H, Shaaban OM, Hassanin AI, Ibraheem AA. Analysis of cesarean delivery at Assiut University Hospital using the Ten Group Classification System. *Int J Gynaecol Obstet* 2013;123:119–23. <http://dx.doi.org/10.1016/j.ijgo.2013.05.011>.
 - [20] Renfrew MJ, McFadden A, Bastos MH, Campbell J, Channon AA, Cheung NF, et al. Midwifery and quality care: findings from a new evidence-informed framework for maternal and newborn care. *Lancet* 2014;384:1129–45. [http://dx.doi.org/10.1016/S0140-6736\(14\)60789-3](http://dx.doi.org/10.1016/S0140-6736(14)60789-3).
 - [21] Khunpradit S, Tavender E, Lumbiganon P, Laopaiboon M, Wasiak J, Gruen RL. Non-clinical interventions for reducing unnecessary caesarean section. *Cochrane Database Syst Rev* 2011;6:CD005528. <http://dx.doi.org/10.1002/14651858.CD005528.pub2>.
 - [22] Hartmann KE, Andrews JC, Jerome RN, Lewis RM, Likis FE, Nikki McKoy J, et al. Strategies to reduce cesarean birth in low-risk women. No. 80. AHRQ Publication No. 12(13)-EHC128-EF. Rockville, MD: Agency for Healthcare Research and Quality; October 2012.
 - [23] American College of Obstetricians and Gynecologists, Society for Maternal-Fetal Medicine. Obstetric care consensus. Safe prevention of the primary cesarean delivery. 2014.
 - [24] Sakala C. Medically unnecessary cesarean section births: introduction to a symposium. *Soc Sci Med* 1993;37:1177–98.
 - [25] Metz TD, Stoddard GJ, Henry E, Jackson M, Holmgren C, Esplin S. How do good candidates for trial of labor after cesarean (TOLAC) who undergo elective repeat cesarean differ from those who choose TOLAC? *Am J Obstet Gynecol* 2013 Jun;208(6):458.e1–6.
 - [26] Melamed N, Segev M, Hadar E, Peled Y, Wiznitzer A, Yogev Y. Outcome of trial of labor after cesarean section in women with past failed operative vaginal delivery. *Am J Obstet Gynecol* 2013;209. 1.e1–7.
 - [27] Lnadno MB, Hauth JC, Leveno KJ, Spong CY, Leindecker S, Varner MW, et al. Maternal and perinatal outcomes associated with a trial of labor after prior cesarean delivery. National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network *N Engl J Med* 2004;351: 2581–9.
 - [28] Smith GC, Pell JP, Cameron AD, Dobbie R. Risk of perinatal death associated with labor after previous cesarean delivery in uncomplicated term pregnancies. *JAMA* 2002;287:2684–90.
 - [29] Tan PC, Subramaniam RN, Omar SZ. Labour and perinatal outcome in women at term with one previous lower-segment caesarean: a review of 1000 consecutive cases. *Aust N Z J Obstet Gynaecol* 2007;47:31–6.
 - [30] Signore C, Hemachandra A, Klebanoff M. Neonatal mortality and morbidity after elective cesarean delivery versus routine expectant management: a decision analysis. *Semin Perinatol* 2006;30:288–95.
 - [31] Hook B, Kiwi R, Amini SB, Fanaroff A, Hack M. Neonatal morbidity after elective repeat cesarean section and trial of labor. *Pediatrics* 1997;100:348–53.
 - [32] Roper William L, Winkenwerder William, Hackbarth Glenn M, Krakauer Henry. Effectiveness in health care: an initiative to evaluate and improve medical practice. *N Engl J Med* 1988;319:1197–202.
 - [33] American College of Obstetricians and Gynecologists. ACOG practice bulletin vaginal birth after previous cesarean delivery. *Obstet Gynecol* 2010;116(2 Part 1):450–63.
 - [34] Royal College of Obstetricians and Gynaecologists. Birth after previous caesarean birth. Green-top guideline no. 45. London: RCOG; 2007.
 - [35] National Institute for Health and Clinical Excellence. Caesarean section. NICE clinical guideline 132. Manchester: NICE; 2011.
 - [36] Society of Obstetricians and Gynaecologists of Canada. Vaginal birth after practice guideline no. 68. Ottawa, ON: SOGC; December 1997. *J Obstet Gynaecol Can* 2005;27:164–74.