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**Date:** 02 Jun 2017

**Sources:** Medline, Embase, Cinahl, PubMed.

## Valsalva Manoeuvre vs. Spontaneous Pushing in Second Stage Labour

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### **Evidence Summary:**

There is inconclusive evidence as to whether spontaneous or directed pushing achieves optimal outcomes for women in terms of on duration of second stage labour, perineal lacerations and rates of episiotomy or spontaneous vaginal delivery. This is the case for women labouring with or without the use of epidural analgesia. For infants there is also no difference in terms of outcomes; apgar scores <7 or admission to neonatal intensive care.

Until further high-quality studies are available, women should be encouraged to push and bear down according to their comfort and preference.

**Source:** [Lemos A, Amorim MMR, Dornelas de Andrade A, de Souza AI, Cabral Filho JE, Correia JB. Pushing/bearing down methods for the second stage of labour. \*Cochrane Database of Systematic Reviews\* 2017, Issue 3. Art. No.: CD009124. DOI:10.1002/14651858.CD009124.pub3.](#)

## **1. Methods of pushing during vaginal delivery and pelvic floor and perineal outcomes: a review.**

**Author(s):** de Tayrac, Renaud; Letouzey, Vincent

**Source:** Current opinion in obstetrics & gynecology; Dec 2016; vol. 28 (no. 6); p. 470-476

**Publication Date:** Dec 2016

**Publication Type(s):** Journal Article

Available in full text at [Current Opinion in Obstetrics and Gynecology](#) - from Ovid

**Abstract:****PURPOSE OF REVIEW** Over the past 20 years, several randomized studies have compared Valsalva and spontaneous pushing techniques during vaginal delivery. This review summarizes current medical knowledge concerning their maternal and fetal consequences, focusing on pelvic and perineal outcomes.**RECENT FINDINGS** We selected nine randomized controlled trials comparing Valsalva and spontaneous pushing, and a secondary analysis of a randomized controlled trial comparing different methods of perineal protection. Two trials showed that spontaneous pushing reduces the risk of perineal tears, but no firm conclusions can be drawn given the heterogeneity and inconsistent results of these studies. Conflicting results have been reported regarding the duration of the second stage of labor. Pushing technique does not seem to affect episiotomy, instrumental delivery or cesarean rates. Maternal satisfaction seems to be better after spontaneous pushing. Spontaneous pushing appears to have no adverse effects on neonatal well being, and one study showed a significant improvement in prenatal fetal parameters during the expulsive phase.**SUMMARY** Valsalva and spontaneous pushing techniques currently appear comparable in terms of duration, pelvic floor, perineal, and neonatal outcomes. In the absence of strong evidence in favor of either technique, the decision should be guided by patient preference and the clinical situation. Additional, well-designed randomized controlled trials are required.

**Database:** Medline

## **2. Effect of the type of maternal pushing during the second stage of labour on obstetric and neonatal outcome: a multicentre randomised trial-the EOLE study protocol.**

**Author(s):** Barasinski, Chloé; Vendittelli, Françoise

**Source:** BMJ open; Dec 2016; vol. 6 (no. 12); p. e012290

**Publication Date:** Dec 2016

**Publication Type(s):** Journal Article

Available in full text at [BMJ Open](#) - from ProQuest

Available in full text at [BMJ Open](#) - from National Library of Medicine

**Abstract:****INTRODUCTION**The scientific data currently available do not allow any definitive conclusion to be reached about what type of pushing should be recommended to women during the second stage of labour. The objective of this trial is to assess and compare the effectiveness of directed open-glottis pushing versus directed closed-glottis pushing. Secondary objectives are to assess, according to the type of pushing: immediate maternal and neonatal morbidity, intermediate-term maternal pelvic floor morbidity, uncomplicated birth, and women's satisfaction at 4 weeks post partum.**METHODS AND ANALYSIS**This multicentre randomised clinical trial compares directed closed-glottis pushing (Valsalva) versus directed open-glottis pushing during the second stage of labour in 4 hospitals of France. The study population includes pregnant women who received instruction in both types of pushing, have no previous caesarean delivery, are at term and have a vaginal delivery planned. Randomisation takes place during labour once cervical dilation  $\geq 7$  cm. The principal end point is assessed by a composite criterion: spontaneous delivery without perineal lesion (no episiotomy or spontaneous second-degree, third-degree or fourth-degree lacerations). We will need to recruit 125 women per group. The primary analysis will be by intention-to-treat

analysis, with the principal results reported as crude relative risks (RRs) with their 95% CIs. A multivariate analysis will be performed to take prognostic and confounding factors into account to obtain adjusted RRs. **ETHICS AND DISSEMINATION** This study was approved by a French Institutional Review Board (Comité de Protection des Personnes Sud Est 6: N°AU1168). Results will be reported in peer-reviewed journals and at scientific meetings. This study will make it possible to assess the effectiveness of 2 types of directed pushing used in French practice and to assess their potential maternal, fetal and neonatal effects. Findings from the study will be useful for counselling pregnant women before and during labour. **TRIAL REGISTRATION NUMBER** Agence nationale de sécurité du médicament et des produits de santé (ANSM): 150099B-22 and IDRCB: 2014-A01920-47. ClinicalTrials.gov: NCT02474745. Pre-result stage.

**Database:** Medline

### **3. Spontaneous Pushing in Lateral Position versus Valsalva Maneuver During Second Stage of Labor on Maternal and Fetal Outcomes: A Randomized Clinical Trial.**

**Author(s):** Vaziri, Farideh; Arzhe, Amene; Asadi, Nasrin; Pourahmad, Saeedeh; Moshfeghy, Zeinab

**Source:** Iranian Red Crescent medical journal; Oct 2016; vol. 18 (no. 10); p. e29279

**Publication Date:** Oct 2016

**Publication Type(s):** Journal Article

Available in full text at [Iranian Red Crescent Medical Journal](#) - from Free Access Content

Available in full text at [Iranian Red Crescent Medical Journal](#) - from National Library of Medicine

**Abstract:** **BACKGROUND** There are concerns about the harmful effects of the Valsalva maneuver during the second stage of labor. **OBJECTIVES** Comparing the effects of spontaneous pushing in the lateral position with the Valsalva maneuver during the second stage of labor on maternal and fetal outcomes. **METHODS** Inclusion criteria in this randomized clinical trial conducted in Iran were as follows: nulliparous mothers, live fetus with vertex presentation, gestational age of 37 - 40 weeks, spontaneous labor, and no complications. The intervention group pushed spontaneously while they were in the lateral position, whereas the control group pushed using Valsalva method while in the supine position at the onset of the second stage of labor. Maternal outcomes such as pain and fatigue severity and fetal outcomes such as pH and pO<sub>2</sub> of the umbilical cord blood were measured. **RESULTS** Data pertaining to 69 patients, divided into the intervention group (35 subjects) and control group (34 subjects), were analyzed statistically. The mean pain ( $7.80 \pm 1.21$  versus  $9.05 \pm 1.11$ ) and fatigue scores ( $46.59 \pm 21$  versus  $123.36 \pm 43.20$ ) of the two groups showed a statistically significant difference ( $P < 0.001$ ). Moreover, the mean duration of the second stage in the intervention group was significantly higher than that in the control group ( $76.32 \pm 8.26$  minutes versus  $64.56 \pm 15.24$  minutes,  $P = 0.001$ ). The umbilical cord blood pO<sub>2</sub> levels of both groups showed a statistically significant difference ( $28.29 \pm 11.76$  versus  $18.83 \pm 9.86$ ,  $P < 0.001$ ), whereas their pH levels were not significantly different ( $P = 0.10$ ). **CONCLUSIONS** Spontaneous pushing in the lateral position reduced fatigue and pain severity of the mothers. Also, it did not worsen fetal outcomes. Thus, it can be used as an alternative method for the Valsalva maneuver.

**Database:** Medline

#### 4. Management of Spontaneous Labour at Term in Healthy Women

**Author(s):** Lee L.; Dy J.; Azzam H.

**Source:** Journal of Obstetrics and Gynaecology Canada; Sep 2016; vol. 38 (no. 9); p. 843-865

**Publication Date:** Sep 2016

**Publication Type(s):** Article

**Abstract:**Objective The purpose of this guideline is to provide guidance for the intrapartum management of spontaneous labour, whether normal or abnormal, in term, healthy women, and to provide guidance in the management of first and second stage dystocia to increase the likelihood of a vaginal birth and optimize birth outcomes. Evidence Published literature was retrieved through searches of PubMed and the Cochrane Library in October 2011 using appropriate, controlled vocabulary (e.g., labour pain; labour, obstetric; dystocia) and key words (e.g., obstetric labor, perineal care, dysfunctional labor). When appropriate, results were restricted to systematic reviews, randomized control trials/controlled clinical trials, and observational studies. Results were limited to the last 10 years. Searches were updated on a regular basis and incorporated in the guideline up to June 15, 2015. Values The quality of evidence in this document was rated using the criteria described in the Report of the Canadian Task Force on Preventive Health Care (Table 1). Summary Statements 1. The duration of the first stage of labour increases with maternal age and body mass index. (II-2)2. In low-risk nulliparous women in the active phase of labour (i.e., equal to or greater than 4 cm dilatation), progress of cervical dilatation greater than or equal to 0.5 cm/hour is considered normal. (II-2)3. Each labour unit should have a guideline for opioid use during labour that includes the method of action, average and maximum doses, route of administration, possible maternal and fetal side effects, precautions, and opioid antagonists and resuscitative measures for each drug. (III)4. Epidural analgesia provides the most effective pain relief for women in labour. The timing of initiation of labour epidural is dependent on the woman's choice once the diagnosis of labour has been established. (I)Recommendations 1. Health care providers should delay term labour admission to the birthing unit until active labour (i.e., equal to or greater than 4 cm dilatation) is established. (II-2A)2. Documentation and communication of labour progress are important aspects of labour management. Labour and delivery units should establish local policy regarding labour documentation, including partogram use and its application in labour management. (III-A)3. Women should be informed of the benefits of upright positioning in labour and encouraged and assisted to assume whatever positions they find most comfortable. (I-B)4. Women who are at low risk of requiring general anesthesia should have the choice to eat or drink as desired or tolerated in labour. (I-A)5. Continuous labour support is recommended for all women in active labour. Each labour unit should aim to provide the opportunity for each woman to receive continuous 1-to-1 labour support. (I-A)6. Amniotomy and oxytocin, in addition to other measures, should be considered once a diagnosis of dystocia has been made in either the first or second stage of labour. (I-B)7. Women and health care providers should have information about coping strategies for early labour and mechanisms for accessing support from caregivers. (III-A)8. When appropriate, health care providers should support women in their choice of analgesic options in labour. These may include pharmacological and non-pharmacological measures. (III-A)9. Each woman should be provided with evidence-based information about labour analgesia options prior to the onset of labour and offered ample opportunity to discuss the risks and benefits of each option available at her planned site of delivery. (III-A)10. The use of meperidine as labour analgesia should be avoided due to its long-acting active metabolites and negative effects on neonatal behaviours. (II-2B)11. Low-dose epidural, when available, is preferred over high-dose epidural for labour analgesia and in promoting mobility in labour. (I-A)12. Women who receive an epidural should be encouraged to maintain mobility and flexibility in positions of comfort throughout labour. (I-B)13. Once an epidural has been established, the infusion should be continued until completion of the third stage of labour. (I-A)14. Pushing, as a component of second stage progress, may commence when the cervix is fully dilated, the presenting part is confirmed to be engaged, and the woman feels an urge to push. (III-A)15. Delayed pushing is

preferred when the woman has no urge to push, particularly if the presenting part is above station +2 and/or in a non-occiput anterior position, assuming the fetus does not display abnormal monitoring and the pregnant woman's status is satisfactory. (I-A)16. Delay of pushing according to parity and the presence or absence of an epidural should follow the time limits described in the text unless there are extenuating circumstances. (II-2B)17. The method of pushing, spontaneous or directed with Valsalva manoeuvre, should be chosen using the woman's own preference. Directed pushing may assist with the final expulsion of the head. (II-2B)18. Avoid the use of routine episiotomy in spontaneous vaginal births. (I-A)19. Prophylactic oxytocics should be given after the delivery of the baby. (I-A)20. In term and preterm infants who do not require neonatal resuscitation, delayed umbilical cord clamping for 60 seconds is recommended irrespective of the mode of delivery. (I-B)21. Dystocia should not be diagnosed prior to the onset of the active phase of the first stage of labour or before the cervix is at least 4 cm dilated. (II-2D)22. Oxytocin augmentation should be titrated to avoid tachysystole or excessive uterine activity and to produce a uterine contraction pattern of 4 to 5 contractions in 10 minutes (200 Montevideo units). A minimum of 4 to 6 hours of adequate uterine activity may be required to achieve the desired response. (I-A) It is recommended that every obstetrical unit have an identified and accessible protocol that includes a starting dose, increment interval, and maximum dose. Consistent use of 1 standard approach to oxytocin administration in any 1 obstetrical unit should be considered. (III-A)23. Operative delivery less than 2 hours after commencing pushing is not recommended, provided maternal status and fetal surveillance are normal. (III-D)24. When the second stage exceeds the recommended time limits (see text), consideration should be given to expediting delivery. Extending these time limits may be appropriate in the presence of continued descent of the head, satisfactory maternal and fetal status, and imminent vaginal birth. (II-2B)25. High-dose oxytocin regimens have been shown to decrease labour duration compared with low-dose regimens. The lowest dose needed to produce normal progress is recommended to reduce the risk of tachysystole or excessive uterine activity and to create a uterine contraction pattern of 3 to 5 contractions or 200 or more Montevideo units every 10 minutes. (I-A) Copyright © 2016 The Society of Obstetricians and Gynaecologists of Canada/La Société des obstétriciens et gynécologues du Canada

**Database:** EMBASE

## **5. Pushing/bearing down methods for the second stage of labour.**

**Author(s):** Lemos, Andrea; Amorim, Melania M R; Dornelas de Andrade, Armele; de Souza, Ariani I; Cabral Filho, José Eulálio; Correia, Jailson B

**Source:** The Cochrane database of systematic reviews; Oct 2015 (no. 10); p. CD009124

**Publication Date:** Oct 2015

**Publication Type(s):** Research Support, Non-u.s. Gov't Meta-analysis Journal Article Review

Available in full text at [Cochrane Library, The](#) - from John Wiley and Sons

**Abstract:**BACKGROUND Maternal pushing during the second stage of labour is an important and indispensable contributor to the involuntary expulsive force developed by uterus contraction. Currently, there is no consensus on an ideal strategy to facilitate these expulsive efforts and there are contradictory results about the influence on mother and fetus.OBJECTIVES To evaluate the benefits and possible disadvantages of different kinds of techniques regarding maternal pushing/breathing during the expulsive stage of labour on maternal and fetal outcomes.SEARCH METHODSWe searched the Cochrane Pregnancy and Childbirth Group's Trials Register (28 January 2015) and reference lists of retrieved studies.SELECTION CRITERIA Randomised and quasi-randomised assessing the effects of pushing/bearing down techniques (type and/or timing) performed during the second stage of labour on maternal and neonatal outcomes. Cluster-RCTs were eligible for inclusion but none were identified. Studies using a cross-over design and those published in abstract form only were not eligible for inclusion.We considered the following comparisons.Timing of pushing: to compare pushing, which begins as soon as full dilatation has been determined versus pushing which begins after the urge to push is felt.Type of pushing: to compare pushing techniques that involve the 'Valsalva Manoeuvre' versus all other pushing techniques.DATA COLLECTION AND ANALYSISTwo review authors independently assessed trials for inclusion and risk of bias. Two review authors independently extracted data. Data were checked for accuracy.MAIN RESULTSWe included 20 studies in total, seven studies (815 women) comparing spontaneous pushing versus directed pushing, with or without epidural analgesia and 13 studies (2879 women) comparing delayed pushing versus immediate pushing with epidural analgesia. The results come from studies with a high or unclear risk of bias, especially selection bias and selective reporting bias. Comparison 1: types of pushing: spontaneous pushing versus directed pushingOverall, for this comparison there was no difference in the duration of the second stage (mean difference (MD) 11.60 minutes; 95% confidence interval (CI) -4.37 to 27.57, five studies, 598 women, random-effects,  $I(2) = 82\%$ ;  $T(2) = 220.06$ ). There was no clear difference in perineal laceration (risk ratio (RR) 0.87; 95% CI 0.45 to 1.66, one study, 320 women) and episiotomy (average RR 1.05 ; 95% CI 0.60 to 1.85, two studies, 420 women, random-effects,  $I(2) = 81\%$ ;  $T(2) = 0.14$ ). The primary neonatal outcomes such as five-minute Apgar score less than seven was no different between groups (RR 0.35; 95% CI 0.01 to 8.43, one study, 320 infants), and the number of admissions to neonatal intensive care (RR 1.08; 95% CI 0.30 to 3.79, two studies,  $n = 393$ ) also showed no difference between spontaneous and directed pushing and no data were available on hypoxic ischaemic encephalopathy.The duration of pushing (secondary maternal outcome) was five minutes less for the spontaneous group (MD -5.20 minutes; 95% CI -7.78 to -2.62, one study, 100 women). Comparison 2: timing of pushing: delayed pushing versus immediate pushing (all women with epidural)For the primary maternal outcomes, delayed pushing was associated with an increase of 54 minutes in the duration of the second stage of labour (MD 54.29 minutes; 95% CI 38.14 to 70.43; 10 studies, 2797 women, random-effects;  $I(2) = 91\%$ ;  $T(2) = 543.38$ ), and there was no difference in perineal laceration (RR 0.94; 95% CI 0.78 to 1.14, seven studies, 2775 women) and episiotomy (RR 0.95; 95% CI 0.87 to 1.04, five studies, 2320 women). Delayed pushing was also associated with a 20-minute decrease in the duration of pushing (MD -20.10; 95% CI -36.19 to -4.02, 10 studies, 2680 women, random-effects,  $I(2) = 96\%$ ;  $T(2) = 604.37$ ) and an increase in spontaneous vaginal delivery (RR 1.07; 95% CI 1.03 to 1.11, 12 studies, 3114 women).For the primary neonatal outcomes, there was no difference between groups in admission to neonatal intensive care (RR 0.98; 95% CI 0.67 to 1.41, three studies,  $n = 2197$ ) and five-minute Apgar score less than seven (RR 0.15; 95% CI 0.01 to 3.00, three studies,  $n = 413$ ). There were no data on hypoxic ischaemic encephalopathy. Delayed pushing was associated with a greater incidence of low umbilical cord blood pH (RR 2.24; 95% CI 1.37 to 3.68) and increased the cost of intrapartum care by CDN\$ 68.22 (MD 68.22, 95% CI 55.37, 81.07, one study, 1862 women).AUTHORS' CONCLUSIONSThis review is based on a total of 20 included studies that were of a mixed

methodological quality. Timing of pushing with epidural is consistent in that delayed pushing leads to a shortening of the actual time pushing and increase of spontaneous vaginal delivery at the expense of an overall longer duration of the second stage of labour and double the risk of a low umbilical cord pH (based only on one study). Nevertheless, there was no difference in the caesarean and instrumental deliveries, perineal laceration and episiotomy, and in the other neonatal outcomes (admission to neonatal intensive care, five-minute Apgar score less than seven and delivery room resuscitation) between delayed and immediate pushing. Furthermore, the adverse effects on maternal pelvic floor is still unclear. Therefore, there is insufficient evidence to justify routine use of any specific timing of pushing since the maternal and neonatal benefits and adverse effects of delayed and immediate pushing are not well established. For the type of pushing, with or without epidural, there is no conclusive evidence to support or refute any specific style or recommendation as part of routine clinical practice. Women should be encouraged to bear down based on their preferences and comfort. In the absence of strong evidence supporting a specific method or timing of pushing, patient preference and clinical situations should guide decisions. Further properly well-designed randomised controlled trials are required to add evidence-based information to the current knowledge. These trials should address clinically important maternal and neonatal outcomes and will provide more complete data to be incorporated into a future update of this review.

**Database:** Medline

## **6. Labor down or bear down: a strategy to translate second-stage labor evidence to perinatal practice**

**Author(s):** Osborne K.; Hanson L.

**Source:** The Journal of perinatal & neonatal nursing; Apr 2014; vol. 28 (no. 2); p. 117-126

**Publication Date:** Apr 2014

**Publication Type(s):** Review

Available in full text at [Journal of Perinatal and Neonatal Nursing](#) - from Ovid

**Abstract:** Scientific evidence supports spontaneous physiologic approaches to second-stage labor care; however, most women in US hospitals continue to receive direction from nurses and birth attendants to use prolonged Valsalva bearing-down efforts as soon as the cervix is completely dilated. Delaying maternal bearing-down efforts during second-stage labor until a woman feels an urge to push (laboring down) results in optimal use of maternal energy, has no detrimental maternal effects, and results in improved fetal oxygenation. Although most commonly used with women who are undergoing epidural anesthesia, laboring down is just one component of physiologic second-stage labor care that can be used to achieve optimal maternal and neonatal outcomes for women with or without an epidural. Prior efforts to translate evidence regarding second-stage labor care to practice have not been successful. In this article, the scientific evidence for second-stage labor care and previous efforts at clinical translation are reviewed. The Ottawa Hospital Second Stage Protocol is presented as a model with potential to allow translation of evidence to practice. Recommendations to enhance widespread adoption of evidence-based practice are provided, including improved collaboration between nurses and birth attendants.

**Database:** EMBASE

## **7. Supporting women in the second stage of labour.**

**Author(s):** Holvey, Nicola

**Source:** British Journal of Midwifery; Mar 2014; vol. 22 (no. 3); p. 182-186

**Publication Date:** Mar 2014



**Publication Type(s):** Academic Journal

Available in print at [Patricia Bowen Library and Knowledge Service West Middlesex university Hospital](#) - from British Journal of Midwifery

Available in full text at [British Journal of Midwifery](#) - from EBSCOhost

**Abstract:** This article endeavours to evaluate and critique the evidence and the associated limitations with many studies that look at time limits during the second stage of labour. It also seeks to examine the consequences of using delayed spontaneous pushing versus the Valsalva manoeuvre, in conjunction with time restraints in relation to maternal morbidities and neonatal complications. It discusses how midwives can best support and empower women in the second stage of labour and how information giving can lead to empowerment, informed decision making and woman's autonomy.

**8. Spontaneous pushing to prevent postpartum urinary incontinence: a randomized, controlled trial.**

**Author(s):** Low, Lisa Kane; Miller, Janis M; Guo, Ying; Ashton-Miller, James A; DeLancey, John O L; Sampselle, Carolyn M

**Source:** International urogynecology journal; Mar 2013; vol. 24 (no. 3); p. 453-460

**Publication Date:** Mar 2013

**Publication Type(s):** Research Support, N.i.h., Extramural Randomized Controlled Trial Journal Article

Available in full text at [International Urogynecology Journal](#) - from Springer Link Journals

Available in full text at [International Urogynecology Journal](#) - from ProQuest

**Abstract:** **INTRODUCTION AND HYPOTHESIS** The risk for urinary incontinence can be 2.6-fold greater in women after pregnancy and childbirth compared with their never-pregnant counterparts, with the incidence increasing with parity. We tested the hypothesis that the incidence of de novo postpartum urinary incontinence in primiparous women is reduced with the use of spontaneous pushing alone or in combination with perineal massage compared with women who experienced traditional directed pushing for second-stage management. **METHODS** This was a prospective clinical trial enrolling and randomizing 249 women into a four-group design: (1) routine care with coached or directed pushing, (2) spontaneous self-directed pushing, (3) prenatal perineal massage initiated in the third trimester, and (4) the combination of spontaneous pushing plus perineal massage. Self-report of incontinence was assessed using analysis of variance (ANOVA) and covariance (ANCOVA) models in 145 remaining women at 12 months postpartum using the Leakage Index, which is sensitive to minor leakage. **RESULTS** No statistical difference in the incidence of de novo postpartum incontinence was found based on method of pushing (spontaneous/directed) (P value = 0.57) or in combination with prenatal perineal massage (P value = 0.57). Fidelity to pushing treatment of type was assessed and between-groups crossover detected. **CONCLUSIONS** Spontaneous pushing did not reduce the incidence of postpartum incontinence experienced by women 1 year after their first birth due to high cross-over between randomization groups.

**Database:** Medline

**9. Effects of a pushing intervention on pain, fatigue and birthing experiences among Taiwanese women during the second stage of labour.**

**Author(s):** Chang, Su-Chuan; Chou, Min-Min; Lin, Kuan-Chia; Lin, Lie-Chu; Lin, Yu-Lan; Kuo, Su-Chen

**Source:** Midwifery; Dec 2011; vol. 27 (no. 6); p. 825-831

**Publication Date:** Dec 2011

**Publication Type(s):** Comparative Study Journal Article



Available in print at [Patricia Bowen Library and Knowledge Service West Middlesex university Hospital](#) - from Midwifery

**Abstract:**OBJECTIVE To evaluate maternal labour pain, fatigue, duration of the second stage of labour, the women's bearing-down experiences and the newborn infant Apgar scores when spontaneous pushing is used in an upright position. DESIGN Quasi-experimental study. SETTING Medical centre in Taichung, Taiwan. PARTICIPANTS 66 Women giving birth at the hospital, with 33 primigravidas assigned to each group. INTERVENTIONS During the second stage of labour, the women in the experimental group pushed from an upright position and were given support to push spontaneously; the women in the control group pushed from a supine position and were supported via Valsalva pushing. OUTCOME MEASURES Pain scores were recorded at two evaluation time points: at 10 cm of cervical dilation and one hour after the first pain score evaluation. One to four hours after childbirth, the trained nurses collected the fatigue and pushing experience scores. FINDINGS The women in the experimental group had a lower pain index (5.67 versus 7.15,  $p = 0.01$ ), lower feelings of fatigue post birth (53.91 versus 69.39,  $p < 0.001$ ), a shorter duration of the second stage of labour (91.0 versus 145.97,  $p = 0.02$ ) and more positive labour experiences (39.88 versus 29.64,  $p < 0.001$ ) compared with the control group. There was no significant difference in the Apgar score for newborn infants during either the first minute (7.70 versus 7.73,  $p = 0.72$ ) or the fifth minute (8.91 versus 8.94,  $p = 0.64$ ). KEY CONCLUSION The pushing intervention during the second stage of labour lessened pain and fatigue, shortened the pushing time and enhanced the pushing experience. IMPLICATIONS FOR PRACTICE Pushing interventions can yield increased satisfaction levels for women giving birth.

**Database:** Medline

## 10. Effect of spontaneous pushing versus Valsalva pushing in the second stage of labour on mother and fetus: A systematic review of randomised trials

**Author(s):** Prins M.; Boxem J.; Hutton E.; Lucas C.

**Source:** BJOG: An International Journal of Obstetrics and Gynaecology; May 2011; vol. 118 (no. 6); p. 662-670

**Publication Date:** May 2011

**Publication Type(s):** Review

Available in full text at [BJOG: An International Journal of Obstetrics and Gynaecology](#) - from John Wiley and Sons

**Abstract:**Background Valsalva pushing is frequently used in the second stage of labour, but the evidence for this pushing technique is not clear. Objectives To critically evaluate any benefit or harm for the mother and her baby of Valsalva pushing versus spontaneous pushing in the second stage of labour. Search strategy Electronic databases from MEDLINE, EMBASE, CINAHL, and the Cochrane Central Register of Controlled Trials were systematically searched (last search May 2010). The reference lists of retrieved studies were searched by hand and an internet hand search of master theses and dissertations was performed. No date or language restriction was used. Selection criteria Randomised controlled trials that compared instructed pushing with spontaneous pushing in the second stage of labour were considered. Studies were evaluated independently for methodological quality and appropriateness for inclusion by two authors (MP and JB). Data collection and analysis The primary outcome was instrumental/operative delivery. Other outcomes were length of labour, any perineal repair, bladder function, maternal satisfaction. Infant outcomes included low Apgar score  $<7$  after 5 minutes, umbilical arterial pH  $<7.2$ , admission to neonatal intensive care unit and serious neonatal morbidity or perinatal death. Main results Three randomised controlled studies covering 425 primiparous women met the inclusion criteria. Women who used epidural analgesia were excluded in all three studies. No statistical difference was identified in the number of

instrumental/operative deliveries (three studies; 425 women; relative risk 0.70; 95% CI 0.34-1.43), perineal repair, postpartum haemorrhage. Length of labour was significantly shorter in women who used the Valsalva pushing technique (three studies; 425 women; mean difference 18.59 minutes; 95% CI 0.46-36.73 minutes). Neonatal outcomes did not differ significantly. Urodynamic factors measured 3 months postpartum were negatively affected by Valsalva pushing. Measures of first urge to void and bladder capacity were decreased (one study; 128 women; mean difference respectively 41.50 ml, 95% CI 8.40-74.60, and 54.60 ml, 95% CI 13.31-95.89). Authors' conclusion The evidence from our review does not support the routine use of Valsalva pushing in the second stage of labour. The Valsalva pushing method has a negative effect on urodynamic factors according to one study. The duration of the second stage of labour is shorter with Valsalva pushing but the clinical significance of this finding is uncertain. The primary studies are sparse, diverse and some flawed. Further research seems warranted. In the meantime supporting spontaneous pushing and encouraging women to choose their own method of pushing should be accepted as best clinical practice. © 2011 RCOG.

**Database:** EMBASE

## **11. Perineal care.**

**Author(s):** Kettle, Chris; Tohill, Susan

**Source:** BMJ clinical evidence; Apr 2011; vol. 2011

**Publication Date:** Apr 2011

**Publication Type(s):** Journal Article Review

Available in full text at [BMJ Clinical Evidence](#) - from National Library of Medicine

**Abstract:**INTRODUCTIONOver 85% of women having a vaginal birth suffer some perineal trauma. Spontaneous tears requiring suturing are estimated to occur in at least a third of women in the UK and US, with anal sphincter tears in 0.5% to 7% of women. Perineal trauma can lead to long-term physical and psychological problems.METHODS AND OUTCOMESWe conducted a systematic review and aimed to answer the following clinical questions: What are the effects of intrapartum surgical and non-surgical interventions on rates of perineal trauma? What are the effects of different methods and materials for primary repair of first- and second-degree tears and episiotomies? What are the effects of different methods and materials for primary repair of obstetric anal sphincter injuries (third- and fourth-degree tears)? We searched: Medline, Embase, The Cochrane Library, and other important databases up to March 2010 (Clinical Evidence reviews are updated periodically, please check our website for the most up-to-date version of this review). We included harms alerts from relevant organisations such as the US Food and Drug Administration (FDA) and the UK Medicines and Healthcare products Regulatory Agency (MHRA).RESULTSWe found 38 systematic reviews, RCTs, or observational studies that met our inclusion criteria. We performed a GRADE evaluation of the quality of evidence for interventions.CONCLUSIONSIn this systematic review we present information relating to the effectiveness and safety of the following interventions: active pushing, spontaneous pushing, and sustained breath-holding (Valsalva) method of pushing; continuous support during labour; conventional suturing; different methods and materials for primary repair of obstetric anal sphincter injuries; episiotomies (midline and mediolateral incisions); epidural analgesia; forceps; methods of delivery ("hands-on" method, "hands poised"); water births; non-suturing of muscle and skin (or perineal skin alone); passive descent in the second stage of labour; positions (supine or lithotomy positions, upright position during delivery); restrictive or routine use of episiotomy; sutures (absorbable synthetic sutures, catgut sutures, continuous sutures, interrupted sutures); and vacuum extraction.

**Database:** Medline

## **12. Effects of valsalva manoeuvre on maternal and fetal wellbeing.**

**Author(s):** Martin CJH

**Source:** British Journal of Midwifery; May 2009; vol. 17 (no. 5); p. 279-285

**Publication Date:** May 2009

**Publication Type(s):** Academic Journal

Available in print at [Patricia Bowen Library and Knowledge Service West Middlesex university Hospital](#) - from British Journal of Midwifery

Available in full text at [British Journal of Midwifery](#) - from EBSCOhost

**Abstract:**The aim of this article is to relate basic findings from research papers to identify the effects that valsalva manoeuvre ('purple pushing') has upon maternal and fetal wellbeing. Analysis of 16 papers revealed four main consequences from purple pushing. These include: an increase in fetal distress; maternal distress; and perineal trauma, when compared with spontaneous pushing. Valsalva manoeuvre also makes little difference to length of second stage. Key conclusions from this literature review are that women should be encouraged to push instinctively, which often embraces natural vocalization. Restrictions of time should not be imposed when mother and fetus are well. Awaiting instinctive behaviour reduces the incidence of urinary system, pelvic floor and perineal trauma. These findings should facilitate midwives to critically understand research that underpins the Royal College of Midwives (2007) second stage of labour guidelines.

**Database:** CINAHL

## **13. Effects of pushing techniques in birth on mother and fetus: A randomized study**

**Author(s):** Yildirim G.; Beji N.K.

**Source:** Birth; Mar 2008; vol. 35 (no. 1); p. 25-30

**Publication Date:** Mar 2008

**Publication Type(s):** Article

Available in full text at [Birth: Issues in Perinatal Care](#) - from EBSCOhost

Available in full text at [Birth](#) - from John Wiley and Sons

**Abstract:**Background: The Valsalva pushing technique is used routinely in the second stage of labor in many countries, and it is accepted as standard obstetric management in Turkey. The purpose of this study was to determine the effects of pushing techniques on mother and fetus in birth in this setting. Methods: This randomized study was conducted between July 2003 and June 2004 in Bakirkoy Maternity and Children's Teaching Hospital in Istanbul, Turkey. One hundred low-risk primiparas between 38 and 42 weeks' gestation, who expected a spontaneous vaginal delivery, were randomized to either a spontaneous pushing group or a Valsalva-type pushing group. Spontaneous pushing women were informed during the first stage of labor about spontaneous pushing technique

(open glottis pushing while breathing out) and were supported in pushing spontaneously in the second stage of labor. Similarly, Valsalva pushing women were informed during the first stage of labor about the Valsalva pushing technique (closed glottis pushing while holding their breath) and were supported in using Valsalva pushing in the second stage of labor. Perineal tears, postpartum hemorrhage, and hemoglobin levels were evaluated in mothers; and umbilical artery pH, Po<sub>2</sub> (mmHg), and Pco<sub>2</sub> (mmHg) levels and Apgar scores at 1 and 5 minutes were evaluated in newborns in both groups. Results: No significant differences were found between the two groups in their demographics, incidence of nonreassuring fetal surveillance patterns, or use of oxytocin. The second stage of labor and duration of the expulsion phase were significantly longer with Valsalva-type pushing. Differences in the incidence of episiotomy, perineal tears, or postpartum hemorrhage were not significant between the groups. The baby fared better with spontaneous pushing, with higher 1- and 5-minute Apgar scores, and higher umbilical cord pH and Po<sub>2</sub> levels. After the birth, women expressed greater satisfaction with spontaneous pushing. Conclusions: Educating women about the spontaneous pushing technique in the first stage of labor and providing support for spontaneous pushing in the second stage result in a shorter second stage without interventions and in improved newborn outcomes. Women also stated that they pushed more effectively with the spontaneous pushing technique. © 2008, Copyright the Authors.

**Database:** EMBASE

#### **14. Just take a deep breath...a review to compare the effects of spontaneous versus directed Valsalva pushing in the second stage of labour on maternal and fetal wellbeing.**

**Author(s):** Bosomworth A; Bettany-Saltikov J

**Source:** MIDIRS Midwifery Digest; Jun 2006; vol. 16 (no. 2); p. 157-165

**Publication Date:** Jun 2006

**Publication Type(s):** Academic Journal

Available in print at [Patricia Bowen Library and Knowledge Service West Middlesex university Hospital](#) - from MIDIRS Midwifery Digest

**Abstract:**Background: This work was undertaken as part of a Bachelors degree in Midwifery. The main focus of this article is around the methods used to review and synthesise the literature in order for it to be useful in practice. Management of the second stage of labour for women without epidural analgesia varies considerably. The Valsalva manoeuvre was introduced into obstetrics as a way of reducing the duration of the second stage in order to limit the exposure of the fetus to the perceived risks of this stage of labour. Aims: This review aimed to compare the effects of directed Valsalva pushing with spontaneous pushing on: duration of the second stage, mode of delivery, perineal outcome, Apgar scores, cord blood pH and fetal heart rate. Electronic resources and hand searching were undertaken for quantitative research carried out on women without epidural analgesia. No restrictions were made based on parity or gestation, however all included studies involved women at 37-42 weeks gestation. Main results: Ten studies were included in the review--three randomised controlled trials (including one pilot study), five non-randomised controlled trials (including one pilot study), one retrospective analysis and one controlled trial using intra-subject replication. Very few statistically significant results were reported and it would appear that directed Valsalva pushing has no effect on the mode of delivery. Although directed Valsalva pushing may shorten the second stage of labour, the results were inconclusive and contradictory. The outcome most affected by directed Valsalva pushing was perineal integrity, with significantly poorer outcomes being reported in terms of severity and frequency of perineal tears. In considering fetal wellbeing, no differences were found between directed Valsalva pushing and spontaneous pushing for Apgar scores or umbilical cord blood pH values. The effect of directed Valsalva pushing on the fetal heart rate is inconclusive but there is some evidence to suggest that it may increase risk of late

decelerations. **Conclusions:** The routine use of directed Valsalva pushing does not appear to confer any-significant benefits or risks in terms of duration of the second stage, mode of delivery, Apgar scores or cord blood pH values. There is a significant trend towards poorer perineal outcomes when directed Valsalva pushing is used. Directed Valsalva pushing may be a cause of late decelerations in the fetal heart rate. Given its lack of benefits and potential risks, the practice of directing women to use Valsalva pushing should be discouraged.

**Database:** CINAHL

### **15. A randomized trial of coached versus uncoached maternal pushing during the second stage of labor.**

**Author(s):** Bloom SL; Casey BM; Schaffer JI; McIntire DD; Leveno KJ

**Source:** American journal of obstetrics and gynecology; Jan 2006; vol. 194 (no. 1); p. 10-13

**Publication Date:** Jan 2006

**Publication Type(s):** Journal Article; Randomized Controlled Trial; Research Support, N.I.H., Extramural

**PubMedID:** 16389004

**Abstract:** **OBJECTIVE:** The objective of this study was to compare obstetrical outcomes associated with coached versus uncoached pushing during the second stage of labor. **STUDY DESIGN:** Upon reaching the second stage, previously consented nulliparous women with uncomplicated labors and without epidural analgesia were randomly assigned to coached (n = 163) versus uncoached (n = 157) pushing. Women allocated to coaching received standardized closed glottis pushing instructions by certified nurse-midwives with proper ventilation encouraged between contractions. These midwives also attended those women assigned to no coaching to ensure that any expulsive efforts were involuntary. **RESULTS:** The second stage of labor was abbreviated by approximately 13 minutes in coached women (P = .01). There were no other clinically significant immediate maternal or neonatal outcomes between the 2 groups. **CONCLUSION:** Although associated with a slightly shorter second stage, coached maternal pushing confers no other advantages and withholding such coaching is not harmful.

**Database:** PubMed

### **16. Effects of immediate versus delayed pushing during second-stage labor on fetal well-being: a randomized clinical trial.**

**Author(s):** Simpson KR; James DC

**Source:** Nursing research; 2005; vol. 54 (no. 3); p. 149-157

**Publication Date:** 2005

**Publication Type(s):** Clinical Trial; Journal Article; Randomized Controlled Trial; Research Support, Non-U.S. Gov't

**PubMedID:** 15897790

Available in full text at [Nursing Research](#) - from Ovid

**Abstract:** **BACKGROUND:** Although there are two methods of caring for women with epidural anesthesia during second-stage labor (coached closed-glottis pushing immediately at 10-cm cervical dilation or delayed pushing until the woman feels the urge to push, passive fetal descent, and encouragement of open-glottis pushing when the woman has the urge to push), there are limited

data concerning which method is most optimal for fetal well-being.OBJECTIVE: To evaluate effects on fetal well-being, as measured by fetal oxygen saturation, of two different methods of second-stage labor nursing care for women with epidural anesthesia.METHODS: Forty-five nulliparous women who had progressed to the second stage were randomized to 1 of 2 groups (immediate or delayed pushing). Fetal oxygen saturation was continuously monitored and values at 10 cm, initiation of pushing and immediately prior to birth, as well as the amount of time that fetal oxygen saturation values were abnormal (RESULTS: There was a significant difference between groups in fetal oxygen desaturation during the second stage (immediate: M = 12.5; delayed: M = 4.6)  $F(1, 43) = 12.24$ ,  $p = .001$ , and in the number of  $\geq 2$ -min epochs of fetal oxygen saturation  $< 30\%$  during second-stage labor than the immediate pushing method; thus, delayed pushing is more favorable for fetal well-being as measured by fetal oxygen saturation.

**Database:** PubMed

### **17. A randomized trial of the effects of coached vs uncoached maternal pushing during the second stage of labor on postpartum pelvic floor structure and function.**

**Author(s):** Schaffer, J I; Bloom, S L; Casey, B M; McIntire, D D; Nihira, M A; Leveno, K J

**Source:** American journal of obstetrics and gynecology; May 2005; vol. 192 (no. 5); p. 1692-1696

**Publication Date:** May 2005

**Publication Type(s):** Research Support, N.i.h., Extramural Randomized Controlled Trial Clinical Trial Journal Article Research Support, U.s. Gov't, P.h.s.

**Abstract:**OBJECTIVEThe purpose of this study was to determine if refraining from coached pushing during the second stage of labor affects postpartum urogynecologic measures of pelvic floor structure and function.STUDY DESIGNNulliparous women at term were randomized to coached ( $n = 67$ ) vs uncoached ( $n = 61$ ) pushing. At 3 months' postpartum women underwent urodynamic testing, pelvic organ prolapse examination (POPQ), and pelvic floor neuromuscular assessment.RESULTSUrodynamic testing revealed decreased bladder capacity (427 mL vs 482 mL,  $P = .051$ ) and decreased first urge to void (160 mL vs 202 mL,  $P = .025$ ) in the coached group. Detrusor overactivity increased 2-fold in the coached group (16% vs 8%), although this difference was not statistically significant ( $P = .17$ ). Urodynamic stress incontinence was diagnosed in the coached group in 11/67 (16%) vs 7/61 (12%) in the uncoached group ( $P = .42$ ).CONCLUSIONCoached pushing in the second stage of labor significantly affected urodynamic indices, and was associated with a trend towards increased detrusor overactivity.

**Database:** Medline

### **18. Pushing in labor: performance and not endurance.**

**Author(s):** Buhimschi, Catalin S; Buhimschi, Irina A; Malinow, Andrew M; Kopelman, Jerome N; Weiner, Carl P

**Source:** American journal of obstetrics and gynecology; Jun 2002; vol. 186 (no. 6); p. 1339-1344

**Publication Date:** Jun 2002

**Publication Type(s):** Journal Article

**Abstract:**OBJECTIVEIt is believed that delivery is faster if women are instructed to voluntarily bear down in synchrony with their uterine contractions. Confronted by the large variance in the duration of the second stage of labor, many clinicians attribute a "fast" or a "short" expulsion time solely to the patient's willingness to cooperate or to the strength of epidural anesthesia if it is a factor. Yet, knowledge of pushing performance and the factors affecting it remain limited. We investigated the

maternal, fetal, and labor characteristics that influence the maternal "pushing performance" and sought to design a predictive index that prospectively identified "high" versus "low" pushing performers. **STUDY DESIGN** Intrauterine pressure (IP) was prospectively measured during the second stage of labor in 52 women recruited at one North American hospital. Recordings were begun after documentation of full cervical dilatation and descent of the fetal head to +2 station (on a -3/+3 scale). Each woman acted as her own control, received epidural anesthesia, and was alert and responsive throughout the study. Pushing (closed glottis technique) was performed in a standardized fashion. Multivariate analysis with linear regression was applied to identify significant associations between maternal, fetal, or labor characteristics as the independent variables and the percent increase in IP consequent to active pushing as the dependent variable. **RESULTS** Women in labor increase their IP 62% by actively pushing with a contraction during the second stage. A scattergram of the individual percent increase above the baseline IP integral revealed that for some women, pushing more readily increased their IP than it did for others (range, 0% to 192%). The percent increase was best calculated by a linear combination of myometrial thickness, estimated fetal weight, the maternal body mass index, and the obstetric need for labor augmentation ( $P = .007$ ,  $r = 0.52$ , power = 0.975). A 66% change in IP provided the best separation between high and low pushing performance. Myometrial thickness provided the single strongest contribution to the regression equation's predictive value ( $P = .01$ ,  $r = -0.36$ ). A myometrial thickness of 6 mm had a specificity of 88% (but only 53% sensitivity) for the identification of women able to increase their IP by 66% over baseline. **CONCLUSIONS** In women in labor who have received epidural anesthesia, the efficiency with which maternal expulsive efforts are converted into increased IP is directly related to the patient's body mass index but inversely related to myometrial thickness, the sonographic estimate of fetal weight, and the need for labor augmentation.

**Database:** Medline

## 19. Pushing techniques in the second stage of labour.

**Author(s):** Thomson, A M

**Source:** Journal of advanced nursing; Feb 1993; vol. 18 (no. 2); p. 171-177

**Publication Date:** Feb 1993

**Publication Type(s):** Comparative Study Randomized Controlled Trial Clinical Trial Journal Article

Available in full text at [Journal of Advanced Nursing](#) - from EBSCOhost

**Abstract:** It is routine to require women to 'take a deep breath in, hold it and push' in the second stage of labour, but there is no scientific evidence to support this practice. In a randomized controlled trial of spontaneous ( $n = 15$ ) versus directed ( $n = 17$ ) pushing in the second stage, no adverse effects of spontaneous pushing on the woman or baby were found. There was a negative correlation between the length of the second stage and the venous cord blood pH at delivery in the directed pushing group, suggesting that a long second stage was disadvantageous to the fetus when the woman was using a directed pushing technique. No such association was found in the spontaneous pushing group, despite the fact that the women in this group had a significantly longer mean second stage.

**Database:** Medline



**20. The effect of maternal bearing-down efforts on arterial umbilical cord pH and length of the second stage of labor**

**Author(s):** Paine L.L.; Tinker D.D.

**Source:** Journal of nurse-midwifery; 1992; vol. 37 (no. 1); p. 61-63

**Publication Date:** 1992

**Publication Type(s):** Article

**Abstract:** This study was conducted to compare two types of maternal bearing-down techniques as they relate to the fetal and maternal outcomes of arterial umbilical cord blood pH and length of the second stage of labor. A convenience sample was drawn from the laboring women at a 305-bed medical center who met specific inclusion criteria. Women self-selected to one of two bearing-down groups: spontaneous or Valsalva. Subjects were given specific instructions for the chosen method. The Valsalva group was comprised of 14 subjects, and the spontaneous group was comprised of 16 subjects. The groups were found to be comparable after analysis of several variables. Results of statistical analysis using t-test indicated that, in this small sample, there is no relationship between the second stage bearing-down method and arterial umbilical cord blood pH or length of the second stage of labor. These findings support the conclusions of several studies: using the spontaneous bearing-down method does not have a deleterious effect upon the mother or the fetus. Several recommendations are made for future research based on methodological issues raised during this study.

**Database:** EMBASE



## Strategy 215190

#	Database	Search term	Results
1	Medline	("Valsalva maneuver*" OR "Valsalva manoeuvre*").ti,ab	3176
2	Medline	exp "VALSALVA MANEUVER"/	3789
3	Medline	(1 OR 2)	5361
5	Medline	(spontaneous* ADJ3 push*).ti,ab	45
6	Medline	(3 AND 5)	5
7	Medline	(Valsalva).ti,ab	8525
8	Medline	(5 AND 7)	9
9	EMBASE	(Valsalva).ti,ab	11214
10	EMBASE	exp "VALSALVA MANEUVER"/	7328
11	EMBASE	(9 OR 10)	14164
12	EMBASE	(spontaneous* ADJ3 push*).ti,ab	39
13	EMBASE	(11 AND 12)	9
14	EMBASE	(spontaneous*).ti,ab	399499
15	EMBASE	exp "LABOR STAGE 2"/	1666
16	EMBASE	(11 AND 14 AND 15)	19
17	CINAHL	(Valsalva).ti,ab	717
18	CINAHL	exp "VALSALVA'S MANEUVER"/	352
19	CINAHL	(17 OR 18)	869
20	CINAHL	(spontaneous* ADJ2 (push* OR 34	

		"bearing down")).ti,ab	
21	CINAHL	(19 AND 20)	10
22	CINAHL	("purple pushing").ti,ab	1
23	CINAHL	(instinct*).ti,ab	381
24	CINAHL	(19 AND 23)	3
25	EMBASE	(instinct*).ti,ab	2309
26	EMBASE	(11 AND 25)	0
27	Medline	(spontaneous*).ti,ab	324696
28	Medline	(3 AND 27)	293
29	Medline	(7 AND 27)	364
30	Medline	((labor* OR labour*) AND (second OR 2nd)).ti,ab	26510
31	Medline	exp "LABOR STAGE, SECOND"/	1200
32	Medline	(30 OR 31)	26941
33	Medline	(29 AND 32)	25
34	Medline	(28 AND 32)	20
35	Medline	(33 OR 34)	27
36	Medline	(3 AND 32)	48
37	PubMed	(Valsalva).ti,ab	11037
38	PubMed	(spontaneous*).ti,ab	374799
39	PubMed	((labor* OR labour*) AND (second OR 2nd)).ti,ab	3161
40	PubMed	(37 AND 38 AND 39)	3

41	PubMed	(labor* OR labour*).ti,ab	545248
42	PubMed	(37 AND 38 AND 41)	44
43	PubMed	("closed glottis pushing").ti,ab	10
44	PubMed	("self directed" ADJ3 push*).ti,ab	4
45	Medline	("self directed" ADJ3 push*).ti,ab	1
46	Medline	("self directed").ti,ab	3283
47	Medline	(3 AND 46)	0
48	Medline	(7 AND 46)	0
49	Medline	("closed glottis pushing").ti,ab	9
50	EMBASE	("self directed").ti,ab	4240
51	EMBASE	(11 AND 50)	0
52	EMBASE	("closed glottis pushing").ti,ab	9