Appendix G Evidence tables

Caesarean Section (update)

What are the risks and benefits of planned CS compared with planned vaginal birth for both women and babies?

Study details	Participants	Interventions	Outcomes	Results	Comments
Authors MacDorman,M.F., Declercq,E., Menacker,F., Malloy,M.H. **Year of publication** 2008 **Country** USA **Ref ID** 51996 **Design** Retrospective cohort study **Aim of study** To examine infant and neonatal mortality by method of delivery for women with no documented antenatal risk for caesarean delivery	**Inclusion Criteria** All women with singleton pregnancy, term (37 - 41 weeks), vertex birth and with no reported medical risk factors, placenta praevia or prior caesarean section **Exclusion Criteria** Women with medical risk factors including anaemia, cardiac disease, acute or chronic lung disease, diabetes, genital herpes, chronic hypertension, pregnancy associated hypertension, eclampsia, hydraminous/oligohydraminos, hemogloninopathy, incompetent cervix, previous infants >4000 g, previous preterm or small for gestational age infants, renal disease, rhesus sensitisation, uterine bleeding and other reported on the birth certificate. **Demographics - Total**	**Experimental** Planned caesarean section **Comparator** Planned vaginal birth (including CS with labour complications) **Method** Neonatal mortality by mode of delivery examined in all US live births and infant deaths for 1999 to 2002 (based on the birth and death certificates). The study used an " intention to treat" methodology to examine neonatal mortality risk by mode of delivery for low risk women. Logistic regression analysis was used, controlling for maternal age, parity, race, education, smoking, infant gestational age and birth weight.	**Maternal outcomes** Not reported **Neonatal outcomes** Neonatal mortality **Dichotomous** **Continuous**	**Outcomes** Neonatal Mortality Rates (per 1000 live births) Planned Vaginal Birth Vaginal = 0.63 Primary CS with labour complications = 1.69 Total (Vaginal + Primary CS with labour complications) = 0.72 Planned CS Primary CS with no labour complications = 1.73 Neonatal mortality rate for planned CS (no complication) compared with planned vaginal birth : 2.42 Number of deaths Planned Vaginal Birth	**Funding** Not reported **Limitations** Data for the study was collected from birth certificates. There are concerns about poor reporting and the accuracy of reporting of specific data items on the birth certificates. **Other information** The reason for the planned caesarean section was not reported

	Total = 8,026,415 Planned vaginal delivery (including EmCS and assisted deliveries): n = 7,755,236 Caesarean with no reported labour complications or procedures: n = 271,179			Actual vaginal birth = 4,500/7,138,068 Primary CS with labour complications = 1,046/617,618 Total (Vaginal birth + Primary CS with labour complications) = 5546/7,755,686 <u>Planned CS</u> Primary CS with no labour complications = 469/271,179 <u>Adjusted OR (95% CI)</u> <u>*</u>Model 1 (Dependent variable = total neonatal mortality) Planned Vaginal Birth = 1.00 Planned CS with no labour complications = 2.34 (2.31 - 2.58) <u>*</u>Model 2 (Dependent variable = neonatal mortality excluding congenital anomalies) Planned Vaginal Birth = 1.00 Planned CS with no labour complications = 1.93 (1.67 - 2.24)	

				*Model 3 (Dependent variable = total neonatal mortality excluding congenital anomalies and events with Apgar score < 4) Planned Vaginal Birth = 1.00 Planned CS with no labour complications = 1.69 (1.35 - 2.11) * all models adjusted for maternal age, race/ethnicity, education, parity, smoking, infant birth weight and gestational age. **Results 2** **Results 3**	

Study details	Participants	Interventions	Outcomes	Results	Comments
Authors Dahlgren,L.S., von,Dadelszen P., Christilaw,J., Janssen,P.A., Lisonkova,S., Marquette,G.P., Liston,R.M. **Year of publication** 2009 **Country** Canada **Ref ID** 59939 **Design** Prospective cohort study **Aim of study** To assess the birth outcomes of women undergoing low risk pre labour caesarean section (for breech presentation) with those women intending to have a vaginal delivery	**Inclusion Criteria** Healthy nulliparous women at term (37 - 41 completed weeks gestation) with live born singleton neonates with cephalic presentation (for spontanous labour group) delivered in British Columbia between 1st April 1994, and 31st March 2002, representing fiscal years 1994-1995 to 2001-2002. **Exclusion Criteria** Women with major maternal and fetal complications such as diabetes, hypertention, intrauterine growth restriction, congenital anomalies, oligohydraminous or stillbirth Women who had their labour induced **Demographics - Total** Infants born to women in the spontanous labour (SL) group had younger mothers (mean 27.14 years [SD 5.61] vs. mean 29.1 years [SD 5.53]; p<0.001) who were more likely to be a single parent and less likely to be obese (p<0.001). Infants from SL group were born at a slightly later gestational age (mean 38.56 weeks [SD 0.91] vs. mean 39.29 weeks [SD	**Experimental** CS group: Women undergoing prelabour caesarean section because of breech presentation **Comparator** SL group: Women at term with anticipated vaginal delivery (spontaneous vaginal birth + assisted vaginal birth + emergency caesarean section) **Method** The data for the study was obtained from the British Columbia Perinatal Database Registry. The database included antenatal, intrapartum, immediate postpartum and newborn data on all births occurring after 20 weeks gestation in British Columbia . A population-based study was conducted comparing maternal and neonatal morbidity and mortality in nulliparous women delivering by planned CS because of breech presentation (CS group) compared with nulliparous women who planned a vaginal birth (SL group). As there was no variable for caesarean section on maternal request, the CS for breech presentation was identified as an appropriate surrogate group.	**Maternal outcomes** Maternal death Infection (wound and postpartum infection) Injury to bladder, ureta, genital tract Iatrogenic surgical injury Postpartum blood transfusion Deep vein thrombosis Pulmonary embolism Hysterectomy Anaesthesia complication **Neonatal outcomes** Neonatal respiratory morbidity (intermittent positive pressure via mask, transient tachypnea, endotracheal tube, pneumonia) Apgar score < 7 at 5 mins Hypoxic-ischemic encephalopathy (CNS depression, seizures) Neonatal mortality Intracranial haemorrhage	**Outcomes** <u>Maternal</u> Total CS n = 1046 Total SL n = 38021 (spontaneous vaginal delivery [SVD] n= 24089 + operative vaginal delivery [OVD] n = 8352 + emergency caesarean section n = 5580) <u>Maternal death</u> CS = 0 (0) SL = 0 (0) RR (99% CI) NC <u>Infection (wound and postpartum infection)</u> CS = 11 (1.06%) SL = 293 (0.77%) [SVD = 73, OVD = 49, EmCS = 171] RR 1.36 (99% CI 0.75 to 2.4) <u>Injury to bladder or ureter</u> CS = 0 (0) SL = 53 (0.14%) [SVD = 37, OVD = 8, EmCS= 8]	**Funding** Not reported **Limitations** **Other information** Indication for planned caesarean section: breech presentation

	1.11]; p<0.001) and had higher birth weights (mean 3531.4 g [SD 441.85] vs. mean 3383.8 g [SD 415.96]; p<0.001) compared with those born by caesarean section. No significant differences were observed between the two groups in maternal smoking habit.		Any life threatening complication **Dichotomous** **Continuous**	RR (99% CI) NC <u>Laceration of cervix</u> CS = 0 (0) SL = 108 (0.28%) [SVD = 59, OVD = 37, EmCS= 12] RR (99% CI) NC <u>Laceration of vagina</u> CS = 0 (0) SL = 213 (0.56%) [SVD = 121, OVD = 87, EmCS = 5] RR (99% CI) NC <u>Iatrogenic surgical injury</u> CS = 0 (0) SL = 27 (0.07%) [SVD = 0, OVD = 2, EmCS= 25] RR (99% CI) NC <u>Postpartum blood transfusion</u> CS = 3 (0.29) SL = 123 (0.32) [SVD = 62, OVD = 36, EmCS= 25] RR 0.89 (99% CI 0.2 - 3.99) <u>Deep vein thrombosis</u>	

				CS = 0 (0) SL = 3 (0.01%) [SVD = 0, OVD = 0, EmCS= 3] RR (99% CI) NC <u>Pulmonary embolism</u> CS = 0 (0) SL = 1 (0%) [SVD = 0, OVD = 0, EmCS= 1] RR (99% CI) NC <u>Anaesthesia complication</u> CS = 4 (0.38%) SL = 117 (0.31%) [SVD = 33, OVD = 50, EmCS= 34] RR 1.24 (99% CI 0.34 - 4.59) <u>Hysterectomy</u> CS = 1 (0.10%) SL = 4 (0.01%) [SVD = 1, OVD = 0, EmCS= 3] RR 9.09 (99% CI 0.51 - 161.68) <u>Neonatal</u>	

				Neonatal mortality SC = 0 (0) SL = 38 (0.10%) [SVD = 18, OVD = 9, EmCS= 11] Neonatal repiratory morbidity (intermittent positive pressure via mask, transient tachypnea, endotracheal tube, pneumonia) SC = 126 (0) SL = 4383 (11.5%)* [SVD = 2270, OVD = 1250, EmCS= 863] RR 1.04 (95% CI 0.88 - 1.23) Apgar <7 in 5 mins SC = 0 (0) SL = 182 (0.48%)* [SVD = 91, OVD = 53, EmCS= 38] HIE (CNS depression, seizures, pH <7) SC = 2 (0.20%)* SL = 89 (0.23%)* [SVD = 33, OVD = 32, EmCS= 24] RR 0.81 (95% CI 0.22 -	

				3.00)* <u>Intracranial haemorrhage</u> SC = 0 (0) SL = 10 (0.03%) * calculated by NCC-WCH technical team **Results 2** **Results 3**	

Study details	Participants	Interventions	Outcomes	Results	Comments
Authors Allen,V.M., O'Connell,C.M., Baskett,T.F. **Year of publication** 2006 **Country** Canada **Ref ID** 65698 **Design** Retrospective cohort study **Aim of study** To assess the risk of maternal mortality and morbidity associated with caesarean deliveries performed at term without labour compared with morbidity associated with spontaneous labour	**Inclusion Criteria** Live born singleton infant at term (37-42 weeks) born to a nulliparous woman **Exclusion Criteria** Major fetal abnormality Labour was induced Non vertex presentation with spontaneous labour Pre-existing maternal disease Fetal growth restriction Pregnancy complications, such as pregnancy induced hypertension or premature rupture of membranes **Demographics - Total** Caesarean birth without labour n = 721 Spontaneous onset of labour (SVD) including assisted birth and emergency Caesarean section (EmCS) n = 17,714 No significant differences observed between the two groups in mean number of cigarettes smoked per day and mean neonatal birth weight. Significant differences observed between the two groups in mean maternal age	**Experimental** Caesarean birth without labour **Comparator** Spontaneous onset of labour (including EmCS, SVD and assisted birth) **Method** Data from this study was gathered from the Nova Scotia Perinatal Database (clinically oriented computerised database) which encoded information on pregnancy outcomes. Maternal data, consisting of information from pregnancies to Nova Scotia residents, was obtained between January 1, 1988 and December 31, 2001.	**Maternal outcomes** Blood transfusion Wound infection (abdominal or episiotomy) Early PPH (> 500ml within the first 24 hours postpartum) Intraoperative trauma (laceration of the uterine artery, bladder, bowl or ureter; or severe extention of the uterine incision) Puerperal febrile morbidity (> 38ºC on two or more occasions in any 48 hour period, excluding the first 24 hours after birth) **Neonatal outcomes** Not reported **Dichotomous** **Continuous**	**Outcomes** <u>Blood transfusion n (%)</u> Planned CS = 2/721 (0.3%) Planned SVD = 73/17,714 (0.4%) [SVD = 38, assisted birth = 27, EmCS = 8] RR 0.7 (95% CI 0.2 to 2.7) <u>Wound infection n (%)</u> Planned CS = 11/721 (1.5%) Planned SVD = 157/17,714 (9%) [SVD = 55, assisted birth = 70, EmCS = 32] RR 1.7 (95% CI 0.9 to 3.2) <u>Early PPH n (%)</u> Planned CS = 28/721 (3.8%) Planned SVD = 1098/17,714 (6.2%) [SVD = 640, assisted birth = 346, EmCS = 111] RR 0.6 (95% CI 0.4 to 0.9*) <u>Intraoperative trauma n (%)</u> Planned CS = 1/721 (0.1%) Planned SVD = 51/17,714	**Funding** Not reported **Limitations** **Other information** Reason for caesarean section without labour: breech presentation (86%), fetal distress (4.2%), dystocia without labour (5.1%), malpresentation (1.1%), maternal herpes simplex virus infection (0.4%), diseases of the cervix (0.1%), and other (2.6%)

	(CS without labour = 27.3 [SD=27.3] vs. spontaneous onset of labour = 25.39 [SD=5.1])*, mean maternal weight at delivery (CS without labour = 81.6 [SD=15.2] vs. spontaneous onset of labour = 78.5 [SD=12.9])* and mean gestational age at delivery (CS without labour = 39.3 [SD=1.2] vs. spontaneous onset of labour = 39.8 [SD=1.2])*. *p<0.001			(0.3%) [SVD = 8, assisted birth = 5, EmCS = 38] RR 0.5 (95% CI 0.1 to 3.5) <u>Puerperal febrile morbidity n (%)</u> Planned CS = 8/721 (1.1%) Planned SVD = 89/17,714 (0.5%) [SVD = 26, assisted birth = 14, EmCS = 49] RR 2.2 (95% CI 1.1 to 4.5*) *p < 0.05 **Results 2** **Results 3**	

Study details	Participants	Interventions	Outcomes	Results	Comments
Authors Deneux-Tharaux,C., Carmona,E., Bouvier-Colle,M.H., Breart,G. **Year of publication** 2006 **Country** France **Ref ID** 66173 **Design** Nested case-control study **Aim of study** To assess the risk of postpartum maternal death directly associated with caesarean as compared with vaginal delivery	**Inclusion Criteria** Women who died within 42 days postpartum between 1996 to 2000. **Exclusion Criteria** Pregnancy did not result in birth (ectopic pregnancy, abortion) Death after a multiple birth Deaths due to chronic conditions present before pregnancy (including diseases of the circulatory system, haematologic diseases, diseases of the respiratory system, mental disorders, diseases of the digestive system, neoplasms, and chronic infection) Deaths due to the obstetric conditions that developed during the pregnancy but before the delivery (including hypertensive disorder in pregnancy, haemorrhage due to placenta praevia or accreta and abruptio placenta, amniotic fluid embolisms, cerebral venous thrombosis, intracerebral hemorrhage, chorioamnionitis) Deaths due to the chronic condition that developed	**Experimental** Cases (maternal deaths) **Comparator** Controls (all births) **Method** Data for the cases was extracted from French Confidential Enquiry on Maternal Deaths between 1996 to 2000 Data for the controls was extracted from 1998 National Perinatal Survey sample; births from one week of all maternity units in France n = 10,244	**Maternal outcomes** Mortality rate **Neonatal outcomes** Not reported **Dichotomous** **Continuous**	**Outcomes** <u>Maternal death</u> <u>Total Vaginal birth + Intrapartum CS</u> Total n = 49/8951 (0.5%)* <u>Vaginal birth</u> n = 22/1446 (1.5%)* <u>Intrapartum CS</u> n = 13/709 (1.8%)* <u>Prepartum CS</u> n = 9/737 (1.2%)* RR 0.44 (95% CI 0.22 - 0.89)* * calculated by technical team NCC-WCH **Results 2** **Results 3**	**Funding** Not reported **Limitations** Potential bias in selection criteria for cases and controls. Women with life threatening morbidity should have been excluded from both groups however these could not be identified based on the information available for controls. **Other information**

	during and after the delivery Deaths in women who were hospitalised during pregnancy **Demographics - Total** Cases (maternal deaths) total n = 65 (term = 58) Controls (all births) total n = 10,244 No significant differences observed between the two groups in maternal nationality and the hospital in which they gave birth (size of maternity unit and status of maternity unit, i.e. whether it was public or private). Compared with controls, cases were significantly older ($p < 0.01$) and more likely to be multiparous ($p < 0.01$).				

Study details	Participants	Interventions	Outcomes	Results	Comments
Authors Geller,E.J., Wu,J.M., Jannelli,M.L., Nguyen,T.V., Visco,A.G. **Year of publication** 2010 **Country** USA **Ref ID** 66256 **Design** Retrospective cohort study **Aim of study** To assess differences in neonatal outcomes between planned vaginal birth and planned caesarean birth	**Inclusion Criteria** Planned caesarean and planned vaginal births at term to low risk, nulliparous women **Exclusion Criteria** Multiparity Multiple gestation Delivery at less than 37 weeks Any major maternal co-morbidity (diabetes, hypertension, inflammatory disorder and others) Any major fetal anomaly or co-morbidity **Demographics - Total** Total neonates n = 4048 Planned caesarean birth n = 180 Planned vaginal birth n = 3,869 Infants born by planned vaginal birth had younger mothers (25.1 ± 6.1 years vs. 28.4 ± 6.3 years; p < 0.001) who were more likely to be Hispanic and less likely to be white or Asian (p < 0.001). Infants born by planned vaginal birth were born at a slightly later gestational age compared to those born by	**Experimental** Planned CS **Comparator** Planned vaginal birth **Method** Data on neonatal birth outcomes was collected from Perinatal and Neonatal Database between 1995 and 2005. 6,111 met maternal inclusion criteria and 4,084 met the neonatal inclusion criteria. Subjects were divided to two groups: Group1: planned CS (n = 180) Group 2: planned vaginal birth (n = 3868) Planned vaginal birth was defined as the intention to deliver by the vaginal route, regardless of actual route of delivery. Planned CS was defined as the intention to deliver by CS before onset of labour, despite actual route of delivery. Planned vaginal birth was used as a proxy for CDMR (caesarean delivery on maternal request).	**Maternal outcomes** Not reported **Neonatal outcomes** NICU admission Oxygen resuscitation 1 min Apgar ≤ 5 5 min Apgar ≤ 5 Length of stay (days) Composite of respiratory morbidity (no further details reported) Composite of neurological morbidity (no further details reported) **Dichotomous** **Continuous**	**Outcomes** Total number of planned vaginal births = 3868 (including induction of labour [IoL] n = 1030) Total number of planned caesarean section = 180 <u>NICU admission n (%)</u> <u>Planned CS</u> 25/180 (13.9%) <u>Planned vaginal birth</u> 244/3868 (6.3%) [IoL n = 68] p < 0.001 OR 0.42 (95 % CI 0.27 - 0.65) Adjusted for maternal age, race and chorioamnionitis <u>Oxygen resuscitation n (%)</u> <u>Planned CS</u> 16/180 (9.0%) <u>Planned Vaginal birth</u> 151/3868 (3.9%) [IoL n = 44] p = 0.001	**Funding** Not reported **Limitations** **Other information** <u>Most common indications for planned caesarean birth n (%):</u> Breech presentation = 124 (68.9%) Fetal macrosomia = 14 (7.9%) History of myomectomy = 8 (4.5%) Abnormal fetal lie = 5 (2.8%) Other = 26 (14.4%) The rate of documented CDMR was 3 (1.7%) of all planned caesarean section. Note: these were all calculated by NCC-WCH technical team

	planned caesarean (39.4 ± 1.2 weeks vs. 38.7 ± 1.1 weeks; p<0.001). No significant differences observed between the two groups in maternal obesity (weight > 200 lbs)			OR 0.41 (95 % CI 0.24 - 0.71) <u>1 min Apgar ≤5 n (%)</u> <u>Planned CS</u> 7/180 (4.0%) <u>Planned Vaginal birth</u> 349/3868 (9.0%) [IoL n = 98] p = 0.02 OR 2.41 (95 % CI 1.12 - 5.18) <u>5 min Apgar ≤5 n (%)</u> <u>Planned CS</u> 1/180 (0.6%) <u>Planned Vaginal birth</u> 48/3868 (1.2%) [IoL n = 12] p = 0.72 RR 2.41 (95 % CI 0.30 to 16.13) <u>Length of stay (days)</u> <u>Planned CS</u> 3.2 ± 0.7 <u>Planned Vaginal birth</u>	

				2.6 ± 1.1 [IoL n = 3.2 ± 1.3] p < 0.001 OR 0.62 (95 % CI 0.51 to 0.74) <u>Composite of respiratory morbidity n (%)</u> <u>Planned CS</u> 5/180 (2.8%) <u>Planned Vaginal birth</u> 88/3868 (2.3%) [IoL n = 29] p = 0.66 OR 0.81 (95% CI 0.32 to 2.01) <u>Composite of neurological morbidity n(%)</u> <u>Planned CS</u> 0/180 (0.0%) <u>Planned Vaginal birth</u> 10/3868 (0.3%) [IoL n = 2] p = 1.00	

				Results 2 **Results 3**	

Study details	Participants	Interventions	Outcomes	Results	Comments
Authors Liu,S., Liston,R.M., Joseph,K.S., Heaman,M., Sauve,R., Kramer,M.S., Maternal Health Study Group of the Canadian Perinatal Surveillance System. **Year of publication** 2007 **Country** Canada **Ref ID** 66737 **Design** Retrospective cohort study **Aim of study** To compare the risks of low risk, elective caesarean with those of planned vaginal birth among healthy women at term	**Inclusion Criteria** All births that took place at Canada's acute care Hospitals (except those in the provinces of Quebec and Manitoba) from 1st April 1991 to 31st March 2005 (98% of all deliveries took place in the study jurisdictions during the 14 year period) **Exclusion Criteria** Previous caesarean section Multiple pregnancy Preterm birth (< 37 weeks gestation) Any medical risk factors or obstetric complications Women who experienced labour in planned caesarean group **Demographics - Total** Total hospital deliveries n= 3,600,398 Total included in the study n = 2,339,186 (representing about 65% of all hospital deliveries) Planned caesarean section n = 46766 Planned vaginal birth n = 2,292,420 (SVD = 77.9%, instrumental vaginal birth	**Experimental** Planned caesarean section: Healthy women with a singleton pregnancy and no previous caesarean sections who underwent CS (caesarean sections for breech presentation were used as a surrogate for planned elective low risk caesarean). **Comparator** Planned vaginal birth (including SVD, instrumental vaginal and unplanned caesarean delivery) **Method** Data on all births (from all Canada's acute care hospitals except two) that occurred from 1st April 1991 to 31st March 2005 were gathered for the study using CIHI's (Canadian Institute for Health Information) Discharge Abstract Database. Data available from the CIHI's database included sex, age at the date of admission, home postal code, province of residence, date and status of discharge, principle diagnosis, up to 15 secondary diagnoses and up to 10 diagnostic, therapeutic, and surgical procedures.	**Maternal outcomes** Maternal mortality (in hospital death only) Infection (major puerperal infection) PPH requiring blood transfusion PPH requiring hysterectomy Any hysterectomy Deep vein thrombosis Uterine rupture Anaesthesia complication Hospital stay Assisted ventilation or intubation Acute renal failure Cardiac arrest Obstetric shock **Neonatal outcomes** **Dichotomous** **Continuous**	**Outcomes** Maternal mortality (in hospital death only): events/total n (per 1000) Planned CS 0/46,766 (0) Planned vaginal birth 41/2,292 420 (0.02) Adjusted OR = NC Mortality rate = 1.8 per 100,000 births p = 0.87 Mortality rate for women with emergency caesarean section = 9.7 per 100,000 birth Infection (major puerperal infection): events/total n (per 1000) Planned CS 281/46766 (6.0) Planned vaginal birth 4833/2,292,420 (2.1) Adjusted OR 3.0 (95 % CI 2.7 to	**Funding** **Limitations** **Other information** Caesarean sections for breech presentation were used as a surrogate for planned elective low risk caesarean

	=13.9%, emergency caesarean = 8.2%)			3.4) Absolute risk difference per 1000 births = 4.3 (3.6 to 5.1) <u>PPH requiring blood transfusion: events/total n (per 1000)</u> <u>Planned CS</u> 11/46766 (0.2) <u>Planned vaginal birth</u> 1500/2,292,420 (0.7) Adjusted OR 0.4 (95 % CI 0.2 to 0.8) Absolute risk difference per 1000 births = -0.4 (95 % CI-0.5 to -0.1) Rate for women with emergency caesarean section = 0.6 per 1000 birth <u>PPH requiring hysterectomy: events/total n (per 1000)</u> <u>Planned CS</u> 12/46,766 (0.3) <u>Planned vaginal birth</u> 254/2,292 420 (0.1)	

				Adjusted OR 2.1 (95 % CI 1.2 to 3.8) P = 0.005 Absolute risk difference per 1000 births = 0.1 (95% CI 0.02 to 0.3) Rate for women with emergency caesarean section = 0.8 per 1000 births <u>Any hysterectomy: events/total n (per 1000)</u> <u>Planned CS</u> 27/46766 (0.6) <u>Planned vaginal birth</u> 367/2,292,420 (0.2) Adjusted OR 3.2 (95 % CI 2.2 to 4.8) Absolute risk difference per 1000 births = 0.4 (95 % CI 0.2 to 0.6) <u>Deep vein thrombosis: events/total n (per 1000)</u> <u>Planned CS</u> 28/46766 (0.6) <u>Planned vaginal birth</u>	

				623/2,292,420 (0.3) Adjusted OR 2.2 (95 % CI 1.5 to 3.2) Absolute risk difference per 1000 births = 0.3 (95 % CI 0.1 to 0.6) <u>Uterine rupture: events/total n (per 1000)</u> <u>Planned CS</u> 7/46766 (0.2) <u>Planned vaginal birth</u> 660/2,292,420 (0.3) Adjusted OR 0.5 (95 % CI 0.2 to 1.0) P = 0.048 Absolute risk difference per 1000 births = -0.2 (95 % CI -0.2 to 0.0) Uterine rupture rate for women with emergency caesarean section = 2.3 per 1000 birth <u>Anaesthesia complication: events/total n (per 1000)</u> <u>Planned CS</u>	

				247/46766 (5.3) Planned vaginal birth 4793/2,292,420 (2.1) Adjusted OR 2.3 (95 % CI 2.0 to 2.6) Absolute risk difference per 1000 births = 2.7 (95 % CI 2.2 to 3.4) Hospital stay: length in days (SD) Planned CS 3.96 (1.36) Planned vaginal birth 2.56 (1.36) Adjusted mean difference 1.47 (95 % CI 1.46 to 1.49) p < 0.001 Assisted ventilation or intubation: events/total n (per 1000) Planned CS 6/46766 (0.1) Planned vaginal birth	

				133/2,292,420 (0.05) Adjusted OR 2.0 (95 % CI 0.9 to 4.5) Absolute risk difference per 1000 births = 0.1 (95 % CI 0.0 to 0.2) <u>Acute renal failure: events/total n (per 1000)</u> <u>Planned CS</u> 2/46766 (0.04) <u>Planned vaginal birth</u> 45/2,292,420 (0.02) Adjusted OR 2.2 (95 % CI 0.5 to 9.0) Absolute risk difference per 1000 births = 0.02 (95 % CI -0.01 to 0.2) <u>Cardiac arrest: events/total n (per 1000)</u> <u>Planned CS</u> 89/46766 (1.9) <u>Planned vaginal birth</u> 887/2,292,420 (0.4)	

				Adjusted OR 5.1 (95 % CI 4.1 to 6.3) Absolute risk difference per 1000 births = 1.6 (95 % CI 1.2 to 2.1) Cardiac arrest rate for women with emergency caesarean section = 2.6 per 1000 birth <u>Obstetric shock</u> <u>Planned CS</u> 3/46766 (0.1) <u>Planned vaginal birth</u> 435/2,292,420 (0.2) Adjusted OR 0.4 (95 % CI 0.1 to 1.1) P=0.07 Absolute risk difference per 1000 births = -0.1 (95 % CI -0.2 to 0.02) Rate for women with emergency caesarean section = 0.4 per 1000 birth	

				Odds ratios were adjusted for maternal age, year of birth, province of hospital delivery, first delivery at ≥ 35 yr of age and grand multiparity (≥5 previous viable pregnancies). **Results 2** **Results 3**	

Study details	Participants	Interventions	Outcomes	Results	Comments
Authors Schindl,M., Birner,P., Reingrabner,M., Joura,E., Husslein,P., Langer,M. **Year of publication** 2003 **Country** Austria **Ref ID** 67252 **Design** Prospective cohort study **Aim of study** To investigate birth experience and medical outcome in women with elective CS compared with women with intended vaginal birth	**Inclusion Criteria** Women with an uncomplicated singleton pregnancy at gestational week 38 who intended to give birth vaginally Women with the intention of having an elective CS birth **Exclusion Criteria** Women aged < 19 years Inability to complete the questionnaires Severe internal problems (e.g. HELLP syndrome, distinguished by haemolysis, elevated liver enzymes and low platelets) **Demographics - Total** Out of 1787 pregnant women who met the inclusion criteria, 1050 completed the questionnaires. 251 (23.9%) women sent back the completed questionnaires at 4 months postpartum. Women were divided to 3 groups: Group 1: women with an uncomplicated singleton pregnancy who intended a vaginal birth (n = 903) Group 2: pregnant women with a medical reason for	**Experimental** Women with no medical indication who demanded a CS based on individual psychological reasons (CS on demand) **Comparator** Women with an uncomplicated singleton pregnancy who intended a vaginal birth **Method** Pregnant women were recruited from the outpatient department of an academic hospital in Vienna, from December 1998 to December 1999. On even days all women in gestational week 38 who intended to give birth vaginally were recruited and on odd days, women who intended to deliver by elective CS were recruited. With assistance, women completed the questionnaires at 38 weeks of pregnancy and on the third day postpartum and 4 months postpartum. Four questionnaires were completed by women: 1) A semi-structured interview about personal birth expectations 2) The Zerren test, which quantifies momentary personal feeling	**Maternal outcomes** Median pain level Expectations and experience **Neonatal outcomes** Not reported **Dichotomous** **Continuous**	**Outcomes** <u>Median pain level</u> (Note: the higher the score, the more pain was experienced) <u>Before birth</u> Planned vaginal birth (vaginal birth, assisted vaginal delivery and emergency CS) (n = 903) Average score = 7.3 CS on demand (n= 44) Score = 1 <u>3 days postpartum</u> Planned vaginal birth (vaginal birth, AVD and emergency CS) (n = 903) Average score = 5.2 CS on demand (n= 44) Score = 4.5 <u>4 months postpartum</u> Planned vaginal birth (vaginal birth, AVD and emergency CS) (n = 903) Average score = 0.17 CS on demand n= 44 Score = 0	**Funding** Study was supported by a grant from the "Medizinisch-wissenshaftlicher Fonds" of the Lord Mayer of Vienna **Limitations** **Other information**

	primary CS (n = 103) Group 3: women with no medical indication who demanded a CS based on individual psychological reasons (n = 44) The median age was significantly lower in women with planned vaginal birth (median 28 years, range 15-43 years) compared to CS on demand (median 32 years, range 17 - 44 years; p < 0.05). The number of previous births was significantly higher for women who gave birth in the CS on request group compared with women who were in the vaginal birth group (p = 0.001)	3) A visual analog scale (VAS) for momentary pain level 4) A modified version of a birth experience questionnaire by Salmon and Drew. This test analyses personal attitudes and feelings toward birth		Expectations and experience (median result of Salmon test) (Note: The higher the score , the more negative birth was experienced) Before birth Planned vaginal birth (vaginal birth, AVD and emergency CS) (n = 903) Average score = 3.4 CS on demand (n= 44) Score = 10 3 days postpartum Planned vaginal birth (vaginal birth, AVD and emergency CS) (n = 903) Average score = 16.8 CS on demand (n = 44) Score = 10 4 months postpartum Planned vaginal birth (vaginal birth, AVD and emergency CS) (n = 903) Average score* = 12.3	

				CS on demand (n= 44) Score* = 5.5 * Data extracted from a poorly presented graph. **Results 2** **Results 3**	

Study details	Participants	Interventions	Outcomes	Results	Comments
Authors Geller,E.J., Wu,J.M., Jannelli,M.L., Nguyen,T.V., Visco,A.G. **Year of publication** 2010 **Country** USA **Ref ID** 109146 **Design** Retrospective cohort study **Aim of study** To assess differences in maternal outcomes between planned vaginal birth and planned CS in term low risk primiparous women	**Inclusion Criteria** Term, low risk, primiparous women **Exclusion Criteria** Multiple gestation Multiparity (any prior birth before 20 weeks gestation) Gestational age less than 37 weeks Any major maternal morbidity (hypertension, cardiovascular disease, arrhythmia, thrombophlebitis, pulmonary embolism, sickle cell trait or disease, hepatitis, gall bladder disease, pancreatitis, kidney disease, severe preeclampsia or HELLP syndrome, diabetes mellitus, multiple sclerosis disorder, substance abuse, malignancy, diethylstilbestrol exposure, other congenital abnormalities of genitourinary tract). Major fetal anomalies that might affect management of labour and route of delivery (including intra uterus growth restriction, placental insufficiency, poly hydraminus, neural tube defect, chromosomal abnormality, viral disease, fetal alcohol	**Experimental** Planned vaginal birth **Comparator** Planned CS **Method** A university hospital's database was searched for delivery outcomes. Subjects were divided into two groups: planned vaginal birth and planned caesarean section. This was based on intent to deliver vaginally or by caesarean, despite actual route of delivery. Planned vaginal birth included successful vaginal birth and those with caesarean section that intended to have a vaginal birth. Planned caesarean section included unlaboured and laboured caesarean deliveries and vaginal birth who previously intended to have a caesarean.	**Maternal outcomes** Primary outcomes were chorioamnionitis, postpartum hemorrhage, and transfusion. Chorioamnionitis was defined as a temperature of 38.0 degrees or more. Postpartum haemorrhage was defined as a blood loss of at least 500 ml during vaginal birth or 1000 ml during caesarean birth. Transfusion was defined as administration of at least 1 U of packed red blood cells. Secondary outcomes were also measured. **Neonatal outcomes** Not reported **Dichotomous** **Continuous**	**Outcomes** <u>Maternal morbidity outcomes :</u> <u>Chorioamnionitis</u> Planned vaginal = 636/3868 (16.5%) [IoL n = 212] planned CS = 1/180 (0.6%) p < 0.001** Odds ratio 34.85 (95% CI 4.87 to 249.25) <u>Postpartum haemorrhage</u> Planned vaginal = 231/3868 (6.0%) [IoL n = 70] planned CS = 2/180 (1.1%) p < 0.007** Odds ratio 5.59 (95% CI 1.38 to 22.68) <u>Uterine atony</u> Planned vaginal = 247/3868 (6.4%) [IoL n = 74] planned CS = 1/180 (0.6%) p < 0.002** Odds ratio 12.08 (95% CI 1.69	**Funding** Not reported **Limitations** **Other information** The most common indication for planned CS was breech presentation (68.9%), followed by fetal macrosomia (7.9 %), history of myomectomy (4.5 %), and other abnormal fetal lie (2.8%). The rare occurrence of documented caesarean delivery on maternal request was 1.7%. Women in planned CS group were found to be slightly older (25 ± 6.1 vs. 28 ± 6.3; p < 0.001) and gave birth at an earlier gestational age than those in the planned vaginal birth group (39.4 ± 1.2 vs. 38.7± 1.1; p < 0.001).

	syndrome, Rh isommunization and other fetal anomaly and blood incompatibility) **Demographics - Total** Total deliveries between 1995 and 2005 = 26356 (n = 11011 primiparous) n = 4048 met the inclusion criteria Planned vaginal deliveries = 3868 (n = 2528 had vaginal birth, n = 1340 ended up with CS) Planned caesarean deliveries = 180 (proxy for caesarean delivery on maternal request [CDMR] n = 180 all gave birth by CS)			to 86.60) <u>Prolonged rupture of membranes</u> Planned vaginal = 667/3868 (17.5%) [IoL n = 197] planned CS = 4/180 (2.2%) p < 0.00** Odds ratio 9.24 (95% CI 3.42 to 24.97) <u>Length of hospital stay (days, mean ± SD)</u> Planned vaginal = 2.6 ± 1.1 [IoL: 3.2 ± 1.3] Planned CS = 3.2 ± 0.7 p < 0.00* Mean difference = 1.58 (95% CI 1.27 to 2.17) * Student t-test ** Pearson chi-squared test There were no statistically significant differences in transfusion rates. **Results 2** **Results 3**	

Study details	Participants	Interventions	Outcomes	Results	Comments
Authors Homer,C., Kurinczuk,J., Spark,P., Brocklehurst,P., Knight,M. **Year of publication** 2011 **Country** UK **Ref ID** 109213 **Design** Prospective cohort study **Aim of study** To compare the outcomes of planned vaginal versus planned caesarean delivery in a cohort of extremely obese women (body mass index > 50 kg/m2).	**Inclusion Criteria** Pregnant women who at any point in their pregnancy had a BMI ≥ 50kg/m ^{2} and had data available on mode of birth and urgency of caesarean section. **Exclusion Criteria** Not reported **Demographics - Total** n = 591 extremely obese women delivered in the UK between September 2007 and August 2008 Women in planned CS group were significantly older (p = 0.001), of higher parity (p < 0.001) and more likely to have essential hypertension (p = 0.004), composite antenatal risk factors* (p < 0.001), previous CS (p < 0.001), a multiple pregnancy (p = 0.001) or current gestational diabetes (p = 0.001). No statistically significant difference was observed between the two groups in ethnicity, socioeconomic status, body mass index, previous medical condition (asthma, endocrine disorders, diabetes, mental health, polycystic ovarian syndrome, gestational diabetes, pre-eclampsia, pregnancy	**Experimental** Planned vaginal birth **Comparator** Planned caesarean section **Method** Women with extreme obesity were identified through the UK Obstetrics Surveillance System (UKOSS) between September 2007 and August 2008. Women were divided into two groups based on the planned mode of birth. Women who had an induction of labour and gave birth vaginally were included in the planned vaginal group and women who gave birth by CS without labour were included in the planned CS group. A multivariable logistic regression model was used to examine predictive factors for CS. Outcomes were compared between the two groups in a multivariable model, adjusting for potential confounders (pre-existing: diabetes, asthma, hypertension or endocrine disorder; current: gestational diabetes, pre-eclampsia or thromboembolic event in their pregnancy, previous CS) Neonatal outcomes were	**Maternal outcomes** Failure or problems with regional anaesthesia Prospective wound infection or other wound complication Intensive care unit admission Major maternal morbidity **Neonatal outcomes** Neonatal death Neonatal intensive care unit admission **Dichotomous** **Continuous**	**Outcomes** <u>Caesarean delivery</u> Vaginal n = 127/417 (30.5%) Caesarean n = 174/174 (100%) <u>General anaesthesia for delivery</u> Vaginal n = 22 (30.5%) Caesarean n = 15 (100%) Unadjusted odds ratio 0.59 (95% CI 0.30 to 1.17) Adjusted odds ratio 0.55 (95% CI 0.26 to 1.16)* <u>Failure or problems with regional anaesthetia</u> Vaginal n = 22 (30.5%) Caesarean n = 15 (100%) Unadjusted odds ratio 0.59 (95% CI 0.30 to 1.17) Adjusted odds ratio 0.55 (95% CI 0.26 to 1.16)* <u>Postoperative wound infection or other wound complication (denominator is women who had a caesarean delivery)</u>	**Funding** Funded by Policy Research Programme in the Department of Health. One of the authors was funded by the National Coordinating Centre for Research Capacity Development of the National Institute for Health Research **Limitations** **Other information**

	induced hypertension and thromboebolic event). *composite score including one or more of the following: pre-existing diabetes, asthma, hypertension or endocrine disorder and/or current gestational diabetes, pre-eclampsia or a thromboebolic event in their current pregnancy.	adjusted for preterm birth. A sensitivity analysis was conducted to explore the outcomes in the group of women who had no reported antenatal and medical complications by repeating the comparison of outcomes excluding women with any known complication. All analysis were carried out using STATA 10 software.		Vaginal n = 33 (26.2%) Caesarean n = 38 (22.4%) Unadjusted odds ratio 1.23 (95% CI 0.72 to 2.11) Adjusted odds ratio 1.20 (95% CI 0.68 to 2.13)* <u>Intensive care unit admission</u> Vaginal n = 9 (2.2%) Caesarean n = 6 (3.5%) Unadjusted odds ratio 0.61 (95% CI 0.22 to 1.75) Adjusted odds ratio 0.62 (95% CI 0.19 to 2.07)* <u>Major maternal morbidity (composite score including one or more of the following: intra-operative or postpartum haemorrhage, thromboembolic event, septicaemia, septic shock and/or admission to an intensive care unit)</u> Vaginal n = 18 (4.3%)	

				Caesarean n = 11 (6.3%) Unadjusted odds ratio 0.67 (95% CI 0.31 to 1.45) Adjusted odds ratio 0.53 (95% CI 0.23 to 1.24)* <u>Neonatal outcomes</u> <u>Neonatal death</u> Vaginal n = 2 (0.5%) Caesarean n = 1 (0.6%) Unadjusted odds ratio 0.85 (95% CI 0.08 to 9.4) Adjusted odds ratio 1.08 (95% CI 0.09 to 13.2)* <u>Neonatal intensive care unit admission</u> Vaginal n = 34 (8.3%) Caesarean n = 27 (3.5%) Unadjusted odds ratio 0.61 (95% CI 0.22 to 1.75)	

				Adjusted odds ratio 0.62 (95% CI 0.19 to 2.07)* * Adjusted for presence of one or more of the following: pre-existing diabetes, asthma, hypertension or endocrine disorder and/or gestational diabetes, pre-eclampsia or a thromboembolic event in their current pregnancy, previous CS. Neonatal outcomes also adjusted for preterm delivery (gestation < 37 completed weeks at birth) **Results 2** **Results 3**	

Caesarean Section (update)

What is the accuracy of imaging techniques (colour-flow ultrasound and MRI) for diagnosis of a morbidly adherent placenta in pregnant women who have had a previous caesarean section and are currently diagnosed with placenta praevia?

Bibliographic details	Number of Participant Participant Characteristics	Test characteristics	Outcome measures to be used	Results	Reviewer comment
Authors Shih,J.C., Palacios Jaraquemada,J.M., Su,Y.N., Shyu,M.K., Lin,C.H., Lin,S.Y., Lee,C.N. **Year of publication** 2009 **Country of publication** Taiwan **Ref ID** 77821 **Sub-type** **Aim of study** To introduce additional criteria for the diagnosis of placenta accreta using 3 dimensional (3D) power Doppler complementary to grey scale and colour Doppler techniques, and to compare their diagnostic performance based on receiver-operative characteristics (ROC) curve analysis.	**Inclusion Criteria** Pregnant women diagnosed with placenta praevia who had complete imaging using all diagnostics techniques (grey scale, colour Doppler, and 3D power Doppler), and had full availability of delivery information **Exclusion Criteria** Not reported **Demographics - Total** Total N = 170, had at least one CS n=72 **Cases** Pregnant women with persistent placenta praevia (after 28 weeks gestation) between December 2000 and September 2007 were prospectively enrolled for the study. For each woman the placenta was scanned using both grey scale ultrasound and colour flow mapping. All women participating in the study gave birth by CS. Definite	**Index Test** Grey scale criteria Colour Doppler criteria Power Doppler sonography criteria **Reference Test** Operative findings +/or histology reports/lab findings and post CS examination	Sensitivity (detection rate) Specificity Positive Predictive value (PPV) Negative predictive value (NPV) Positive Likelihood Ratio (+LR) Negative likelihood Ratio (-LR)	Total N= 170 n = 72/170 had at least one previous CS n = 39/170 had confirmed placenta accreta at the time of CS The mean gestational age at sonographic diagnosis of placenta accreta and delivery was 30 ± 2.2 and 34.3 ± 1.7 weeks respectively. Caesarean delivery was performed in 38/39 women who had antenatal confirmed placenta accreta. <u>Diagnostic accuracy for placenta accreta and placenta praevia (at least one criterion) (women with prior CS)</u> <u>Grey-scale criteria</u> Total n = 72	**Funding** Supported by a grant from National Science Council of Taiwan **Limitations** Not clear if the same sonographer performed the three different ultrasounds and whether he/she was blinded to the result of grey scale or colour Doppler when interpreting the result of the 3D power Doppler. Withdrawals from the study were not explained **Other information** Ultrasound examinations were performed using a 3D ultrasound system equipped with a 4 - 8 MHz transabdominal transducer (Voluston 730, GE Medical Systems, Zipf, Austria)

	diagnosis of placenta accreta was made at birth when myometrium was seen to be invaded by the placenta and the pathological examination of the removed uterus showed the villi attached to the myometrioum without intervening decidua (accreta), invading into the myometrium (increta) or reaching the serosa (percreta)			True positive = n = 36* True negative = n = 26* False negative = n = 2* False positive = n = 8* Sensitivity (detection rate %) = 95 (95% CI 87 to 101)* Specificity % = 76 (95% CI 62 t0 90)* +PPV % = 81 (95% CI 70 to 93)* -NPV % = 92 (95% CI 83 to 102)* +LR % = 402 (95% CI 218 to 741)* -LR % = 6.8 (95% CI 1.7 to 26)* <u>Colour Doppler criteria</u> True positive = n = 35 True negative = n = 24 False negative = n = 3 False positive = n = 11 Sensitivity (detection rate %) = 92 (95% CI 83 to 100)*	

				Specificity % = 68 (95% CI 53 to 83)* +PPV % = 76 (95% CI 63 to 88)* -NPV % = 89 (95% CI 77 to 100)* <u>3D power colour sonography criteria</u> True positive = 38 True negative = 29 False negative = 0 False positive = 5 Sensitivity (detection rate %) = 100 (95% CI 100 to 100)* Specificity % = 85 (95% CI 73 to 97)* +PPV % = 88 (95% CI 78 to 97)* -NPV % = 100 (95% CI 100 to 100)* +LR = 6.80 (95% CI 3.02 to 15.27)* -LR = NC	

Bibliographic details	Number of Participant Participant Characteristics	Test characteristics	Outcome measures to be used	Results	Reviewer comment
Authors Warshak,C.R., Eskander,R., Hull,A.D., Scioscia,A.L., Mattrey,R.F., Benirschke,K., Resnik,R. **Year of publication** 2006 **Country of publication** USA **Ref ID** 77841 **Sub-type** Retrospective cohort study **Aim of study** To determine the precision and reliability of ultrasonography and magnetic resonance imaging (MRI) in diagnosing placenta accreta	**Inclusion Criteria** Pregnant women with anterior, low anterior placenta and placenta praevia who had at least one previous CS. Inclusion was limited to those for whom complete information was available regarding the clinical and pathological diagnosis. Pelvic sonography scans were preformed by registered sonographers using both Grey Scale and colour Doppler ultrsonography, and perinatal or radiology department interpreted all scans. **Exclusion Criteria** Women with posterior and fundal placenta were excluded **Demographics - Total** Total =453 **Cases** Pregnant women with a diagnosis of placenta praevia and low lying placenta who had a previous CS were identified from an obstetrics and radiology database between January 2000 and 2005 at the University of California, San Diego Medical Centre. During that period n = 42 women were referred for	**Index Test** Colour Doppler and Grey scale ultrasonography. Magnetic Resonance Imaging (MRI) scans All studies considered to be suggestive but not inclusive underwent MRI evaluation. **Reference Test** Operative findings +/or histology reports/lab findings and post CS examination	Sensitivity (detection rate) Specificity Positive Predictive value (PPV) Negative predictive value (NPV) Positive Likelihood Ratio (+LR) Negative likelihood Ratio (-LR)	<u>Diagnostic accuracy for placenta accreta:</u> <u>MRI</u> The mean gestational age at diagnosis with MRI was 28 weeks (range 18-37 weeks ± SEM = 0.71) n = 40 Sensitivity (detection rate) = 88.46% (95% CI 80 to 100) Specificity = 100% (95% CI 76 to 100) +PPV = 100% (95% CI 85 to 100) -NPV = 82.35% (95% CI 56 to 96) +LR = infinity -LR = 0.115 (95% CI 0.039 to 0.33) Total no = 40 True positive = 23 False positive = 0 True negative = 14	**Funding** Not reported **Limitations** Both scans performed by registered sonographers and members of the perinatal or radiological faculty interpreted all scans. Not clear if they were blinded to the results of the other scan. **Other information** The equipment used included Siemens Sonoline Elegra (Siemens, Issaqua, WA) and GE Voluson 730 (GE Electronic Medical systems, Milwauke, WI) with 3.5 or 5 MHz curvilinear, sector, and endovaginal transducers. Magnetic resonance imaging scans were performed on Siemens Magnetom Symphony 1.5 Tesla scanner (Siemens Medical Solutions, Malvern, PA) equipped with high performance gradients and phase-array coils. Women were placed on the scan table head first in whatever position they found most comfortable or turned toward a left lateral position. If the appearance of the placenta was suspected for

	MRI scans to further evaluate a positive ultrasound scan or because the ultrasound findings were not conclusive for placenta accreta. Two (n = 2) women who were unable to tolerate the procedure because of claustrophobia were excluded from study.			False negative = 03 <u>Ultrasonography (colour Doppler or Grey Scale)</u> The mean gestational age at diagnosis with ultrasound was 25 weeks (range 11-37 weeks ± SEM = 0.84) Sensitivity (detection rate)= 76.92% (95% CI 60 to 88) Specificity = 96.13% (95% CI 93 to 97) +PPV = 65.21% (95% CI 49 to 78) -NPV = 97.78% (95% CI 95 to 98) +LR = 19.9 (95% CI 11.94 to 33.15) -LR = Ultrasonography = 0.24 (95% CI 0.135 to 0.42) Total no = 453 True positive = 30 False positive = 16 True negative = 9 False negative = 398	placenta accreta, a gadolinium enhanced MR series was then required. The dose of the gadolinium used was up to 0.1 mM/kg.

Bibliographic details	Number of Participant Participant Characteristics	Test characteristics	Outcome measures to be used	Results	Reviewer comment
Authors Twickler,D.M., Lucas,M.J., Balis,A.B., Santos-Ramos,R., Martin,L., Malone,S., Rogers,B. **Year of publication** 2000 **Country of publication** USA **Ref ID** 77837 **Sub-type** **Aim of study** To evaluate the use of Doppler colour flow mapping (CFM) in pregnant women with prior CS to predict myometrial invasion when the implantation site was in potential proximity to a hysterectomy scar.	**Inclusion Criteria** Women with diagnosis of anterior low lying placenta and placenta praevia who had a previous CS were included in the study **Exclusion Criteria** Pregnant women with posterior or fundal placenta were excluded **Demographics - Total** Total N = 215, Women with placenta praevia and prior CS n = 20 **Cases** Women with a history of previous caesarean section who had third trimester bleeding or who were scheduled for repeat CS (whose placenta was anterior, or praevia or low lying based on transvesical pelvic real time grey scale imaging) were included in the study. Using CFM, measurements of smallest myometrial thickness (SMT) were obtained. The presence of smallest myometrial thickness (SMT) <1 mm or placental sonolucency was predictive of all cases of invasion.	**Index Test** Real time grey scale imaging Colour flow mapping (CFM) **Reference Test** Pathology findings	Sensitivity (detection rate) Specificity Positive Predictive value (PPV) Negative predictive value (NPV) Positive Likelihood Ratio (+LR) Negative likelihood Ratio (-LR)	Pathologic and US (CFM) findings in women with prior CS and placenta praevia n=20 CFM diagnosis of placenta invasion (SMT < 1) True positive = n = 9* True negative = n = 8* False positive = n = 3* False negative = n = 0* Sensitivity (detection rate %) = 100 (95 % CI 100 to 100)* Specificity % = 72 (95 % CI 46 to 99)* +PPV % = 75* (95 % CI 50 to 99)* -NPV % = 100 (95 % CI 100 to 100)* +LR = 3.60 (95 % CI 1.39 to 9.26)* -LR = NC	**Funding** Not reported **Limitations** No explanation given about how women were identified and recruited for the study. Study period is unknown **Other information** Colour flow mapping (CMP) was performed using Acuson 12XP (Mountainview, CA) 3.5 or 5 MHz curved linear transducers.

	The CFM evaluations were not included in the ultrasound reports to the clinicians therefore the results were not used in the clinical management of the women. All women except one who were evaluated with CFM gave birth at the Parkland Memorial Heathand Hospital System. All women with placenta praevia had repeat CS.				

Bibliographic details	Number of Participant Participant Characteristics	Test characteristics	Outcome measures to be used	Results	Reviewer comment
Authors Masselli,G., Brunelli,R., Casciani,E., Polettini,E., Piccioni,M.G., Anceschi,M., Gualdi,G. **Year of publication** 2008 **Country of publication** Italy **Ref ID** 77785 **Sub-type** **Aim of study** To compare the value of pelvic ultrasound (US) with colour Doppler and MRI in: 1) the diagnosis of placental adhesive disorders (PADs) 2) the definition of the degree of placenta invasiveness 3) determining the topographic correlation between the diagnosis images and the surgical result	**Inclusion Criteria** Women with a high risk of abnormal placental implantation due to placenta praevia and at least one previous CS **Exclusion Criteria** Not reported **Demographics - Total** Total N = 50 **Cases** Cases = Women referred for detailed colour Doppler and MRI between March 2006 to June 2007 with a diagnosis of placenta praevia and at least one previous CS (n=56). Fifty (n = 50) women, who had all information regarding clinical and pathological diagnosis available, were included in the study All pelvic ultrasonography scans were performed by registered sonographers. Images were interpreted prospectively by two reviewers who were blinded to result of the US and pathological examination. Inter-observer agreement was assessed using K - statistics.	**Index Test** MRI Ultrasound (colour Doppler) **Reference Test** Pathological examinations	Sensitivity Specificity Positive Predictive value (PPV) Negative predictive value (NPV) Positive Likelihood Ratio (+LR) Negative likelihood Ratio (-LR)	Total n= 50 Normally attached placenta n = 38 Clinical and pathological confirmation of PAD n= 12 Identification of placenta accreta: Mean gestational age at the diagnosis =30 weeks (range of 20 - 37 weeks) MRI True positive = n = 12 True negative = n = 38 False positive = n = 0 False negative = n = 0 Sensitivity (detection rate) = 100% (n = 12/12, 95% CI 86 to 100) Specificity = 100% (n = 38/38, 95% CI 90 to 100) +PPV = 100% (n = 12/12, 95% CI 88 to 100)	**Funding** Not reported **Limitations** **Other information** All ultrasonography scans were performed using Siemens Sonoline Elegra (Siemens, Issaqua, Wash.) US equipment. MRI was performed on a Siemens Magneton Avanto 1.5 T scanner (Siemens Medical Solusion, Malvern, Pa) equipped with high performance gradients and phase array coils. Women were supine, with feet entering the magnet bore first to minimize feeling of claustrophobia

	A second interpretation was performed by the same reviewers, who reached a consensus in evaluation of invasion. The consensus evaluation (degree of placenta penetration and its specific topography) was compared to findings in the operating room according to clinical and anatomical criteria. <u>True positive and negative diagnosis:</u> Placenta was considered accreta if firmly attached to endometrium, increta when requiring surgical curettage to remove invasive tissue deeply implanted in the myometrium and percreta when extending through the myometrium and into the neighbouring organs. An uncomplicated placental removal without excessive bleeding after CS was defined as true negative. All true positive and negative diagnoses were confirmed by pathologic examination. The US Doppler and MRI			-NPV = 100% (n = 38/38, 95% CI 89 to 100) <u>US Doppler</u> True positive = n = 11 True negative = n = 38 False positive = n = 0 False negative = n = 1 Sensitivity (detection rate) = 91% (n = 11/12, 95% CI 68 to 94) Specificity = 100% (n = 38/38, 95% CI 85 to 100) +PPV = 100% (n = 11/11, 95% CI 87 to 100) -NPV = 97% (n = 38/39, 95% CI 75 to 100) <u>Evaluating the degree of invasion (placenta accreta, increta, percreta):</u> <u>Diagnosis of PAD (placental adhesive disorders) using US Doppler and MRI</u> <u>US Doppler</u> Negative n = 39	

	were performed in the same day for all women.			accreta n=8 increta n = 1 percreta n = 2 <u>MRI</u> Negative n = 38 accreta n=7 increta n = 2 percreta n = 3 <u>Surgery and pathology</u> Negative n = 38 accreta n= 7 increta n = 2 percreta n = 3 <u>Evaluating of topographic areas of placenta invasion (S1 is the uterine sector bordering the upper posterior bladder wall and S2 is the uterine sector adjacent to the lower posterior wall) using US Doppler and MRI:</u>	

				<u>US Doppler</u> S1 = 8 S2 = 4 <u>MRI</u> S1 = 5 S2 = 7 <u>Surgery and pathology</u> S1 = 5 S2 = 7	

Bibliographic details	Number of Participant Participant Characteristics	Test characteristics	Outcome measures to be used	Results	Reviewer comment
Authors Comstock,C.H., Love,J.J.,Jr., Bronsteen,R.A., Lee,W., Vettraino,I.M., Huang,R.R., Lorenz,R.P. **Year of publication** 2004 **Country of publication** USA **Ref ID** 106230 **Sub-type** Prospective cohort study **Aim of study** To determine whether ultrasonography can detect placenta accreta reliably in at-risk patients.	**Inclusion Criteria** All women with a previous caesarean delivery and an anterior placenta or placenta praevia. **Exclusion Criteria** Not reported **Demographics - Total** Total n = 2002 with prior CS, and with either placenta praevia or low anterior placenta. In n = 33/2002 cases ultrasound findings were suspicious for placenta accreta (noted on at least 1 scan) **Cases** All women with a previous CS who were seen for a fetal ultrasound examination between March 1990 and August 2002 were asked to participate in the study. Participating women were evaluated prospectively at each visit for sonographic signs of placenta accreta Diagnostic criteria that suggested placenta accreta, increta, or percreta included ≥ 1 of the following situations: interruption of the posterior bladder wall-uterine interface, absence of the	**Index Test** Transvaginal ultrasound, all examinations were recorded on videotape **Reference Test** Pathological findings in a hysterectomy specimen that demonstrated trophoblast directly in contact or invading myometrium		<u>Diagnostic accuracy of transvaginal ultrasound in diagnosis of placenta accreta at 15 to 20 weeks gestation</u> Ultrasound examinations performed between 15 and 20 weeks of gestation <u>Any criteria</u> Sensitivity = 86% (n = 12/14) Positive predictive value = 63% (12/19) <u>Diagnostic accuracy of transvaginal ultrasound in diagnosis of placenta accreta at 15 to 40 weeks gestation</u> Ultrasound examinations performed between 15 and 40 weeks of gestational age <u>Any criteria</u> Sensitivity = 100% PPV = 48% (15/31) <u>Sensitivity and positive</u>	**Funding** Not reported **Limitations** No information is provided for negative cases (true negative and false negative) therefore the diagnostic accuracy of ultrasound cannot be fully evaluated. **Other information** The equipments included scanners (Acuson 128 XP and Sequoia, Acuson Corporation, Mountainview, Calif), (Voluson 730 and 530D; General Electric Medical Systems, Milwaukee Wis), (Aloka 650; Corometrics Ultrasound Medica Systems, Wallingford, Conn), and (Phillips platinum; Phillips Medical Systems, Santa Ana, Calif)

	retroplacental clear zone, and placental lacunae. If the possibility of placenta accreta was raised in at least 1 scan, that case was labelled as positive even if on subsequent scans the suggestions were revoked. Study period: 12 years Transvaginal ultrasound examinations were performed for most women with placenta accreta in the first trimester. Scans were performed by registered sonographers under the direction of 6 obstetricians who were specialists in fetal imaging. Data were analysed in 5 weeks intervals starting at 15 weeks gestation.			predictive value of ultrasound diagnostic criteria for placenta accreta at 15 to 20 weeks gestation ≥ 2 Criteria Sensitivity = 57 % PPV = 89% Lacunae Sensitivity = 79% PPV = 89% Clear space (isolated) Sensitivity = 7% PPV = 14% Clear space (with other) Sensitivity = 50% PPV = 88% Bladder serosa wall Sensitivity = 21% PPV = 100% Sensitivity and positive predictive value of ultrasound diagnostic criteria for placenta accreta at 15 to 40	

				weeks gestation ≥ 2 Criteria Sensitivity = 80% PPV = *86% Lacunae Sensitivity = 93% PPV = 93% Clear space (isolated) Sensitivity = 7% PPV = 6% Clear space (with other) Sensitivity = 73% PPV = 85% Bladder serosa wall Sensitivity = 20% PPV = 75%	

Bibliographic details	Number of Participant Participant Characteristics	Test characteristics	Outcome measures to be used	Results	Reviewer comment
Authors Woodring,T.C., Klauser,C.K., Bofill,J.A., Martin,R.W., Morrison,J.C. **Year of publication** 2011 **Country of publication** USA **Ref ID** 109386 **Sub-type** Retrospective cohort study **Aim of study** To determine the accuracy of ultrasound and colour flow Doppler to diagnose placenta accreta	**Inclusion Criteria** Women with obsteric sonography or colour flow Doppler suspicious for placenta accreta or its variants were reviewed for a 64 month period. **Exclusion Criteria** Not reported **Demographics - Total** 12 cases with suspected placenta accreta **Cases** The ultrasound images of all women consistent with signs of placenta accreta (concomitant praevia, numerous vascular lacunae, absent lower uterine segment between bladder-placenta, turbulent or complicated blood flow at the uteroplacental interface) were reviewed for clinical characteristics. In addition, data regarding neonatal outcomes was collected. Over a 64 month period there were 15,420 birth and 26 were coded as ICD-9 (International Classification of Diseases) criteria. Of the 12 cases the mean maternal age was 27 ± 5.6	**Index Test** Sonography or colour flow Doppler **Reference Test** The gold standard for the diagnosis of placenta accreta was the clinical findings at the time of the surgery and the analysis of specimens submitted for pathological examination.		Over 64 months, 12 cases with suspected placenta accreta by ultrasound were studied. The median gestational age at first diagnosis was 25 weeks and 92% had a praevia, while all had at least one previous caesarean delivery. At surgery, 83% (10/12) had an adherent placenta requiring hysterectomy (eight accreta, one increta, and one percreta). There were two false positives (one complete praevia, one low-lying placenta with vasa praevia). n = 9/12 women (75%) required blood transfusions due to a mean hematocrit nadir of 22.7 ± 4.6% (range 18 - 32%). The mean number of packed red blood cell units transfused was 4.9 ± 4.7 units (range 2 - 17 units). <u>Neonatal outcomes:</u> Mean birthweight (g) = 2423 ± 482 Mean 5 min Apgar score = 8.7 ± 0.5	**Funding** **Limitations** Only ultrasounds coded with suspicion of placenta accreta were reviewed, hence no information is provided for negative cases (true negative and false negative). Therefore, diagnostic accuracy of ultrasounds cannot be fully evaluated. **Other information** The ultrasound and colour flow assessments were performed by one of the three Antenatal Diagnostic Unit physicians and neither the criteria nor the physicians changed over the study period.

	years (mean ± SD), mean gravidity was 4.4 ± 1.6, and mean parity was 2.8 ± 0.9. All 12 women had at least one CS. The mean gestational age at diagnosis of suspected placenta accreta was 25 weeks, with most being < 24 weeks. The mean gestational age at birth was 35.1 ± 2.2 weeks. n= 11/12 with antenatal suspician of placenta accreta also had a concomitant placenta praevia.			Mean cord pH = 7.25 ± 0.05 Need for hysterectomy: 10/12 (83%) <u>Sonographic/colour flow doppler findings n= 12</u> Placenta accreta: True positive = 10 False positive = 2 Positive Predictive Value = 83 % (95% CI 62% to 100%) <u>Placenta praevia :</u> The findings of concomitant praevia were predictive of an associated accreta in all cases (10/10) when accreta was found at surgery and confirmed pathologically. Likewise, there was replacement of lower uterine segment by complicated blood flow in all 10 cases where accreta was confirmed.	

Caesarean Section (update)

Does a diagnosis of morbidly adherent placenta using imaging techniques lead to improved outcomes in pregnant women with a previous caesarean section who are currently diagnosed with placenta praevia?

Bibliographic details	Participants	Tests	Methods	Outcomes and results	Comments
Full Citation Wong,H.S., Hutton,J., Zuccollo,J., Tait,J., Pringle,K.C., The maternal outcome in placenta accreta: The significance of antenatal diagnosis and non-separation of placenta at delivery, New Zealand Medical Journal, 121, 30-38, 2008 **Ref ID** 61152 **Country/ies where the study was carried out** New Zealand **Study type** Retrospective cohort study **Aim of the study** To examine the effects of an antenatal diagnosis and the subsequent non separation of the placenta during the third stage on maternal outcomes in confirmed cases of placenta accreta. **Study dates** 1st January 2000 to 31st December 2006 **Source of funding**	**Sample size** Total women identified as having confirmed placenta accreta in 7 year period n =16 (n= 15 had histological confirmation n=1 had clinical confirmation by laparotomy) **Characteristics** Total population n = 16 Women with antenatal diagnosis of placenta accreta n = 7 Women with no antenatal diagnosis of placenta accreta n= 9 12/16 had previous CS 11/16 had placenta praevia in their current pregnancy **Inclusion Criteria** **Exclusion Criteria**	NA	Women with a diagnosis of placenta accreta or postpartum haemorrhage or hysterectomy, were identified from a perinatal database at Wellington Hospital (New Zealand). Antenatal diagnosis of placenta accreta was made by ultrasound and/or magnetic resonance imaging (MRI). The postnatal diagnosis of placenta accreta in those women identified was checked against the histological findings by the Pathology Department.	Women with antenatal diagnosis n = 7 (n = 6 had elective CS and n = 1 had preterm emergency CS because of haemorrhage) Women with no antenatal diagnosis n = 9 Attempted placenta separation With antenatal diagnosis n= 2/7 No antenatal diagnosis n= 9/9 P = 0.005 Total blood loss (litres mean ± SD) With antenatal diagnosis = 1.4 ± 1.0 No antenatal diagnosis = 3.6 ± 1.3 P = 0.003	**Limitations** Small sample size **Other information**

Not reported	Women who delivered in the second and third trimester with a diagnosis of placenta accreta or postpartum haemorrhage or hysterectomy who gave birth at Wellington Hospital between 2000 and 2006. Not reported			<u>Number of units of blood transfused (mean ± SD)</u> With antenatal diagnosis = 2.3 ± 2.9 No antenatal diagnosis = 5.1 ± 2.9 P = 0.07 <u>Emergency hysterectomy</u> With antenatal diagnosis n = 1/7 No antenatal diagnosis n = 9/9 P = 0.001 <u>Bladder injury</u> With antenatal diagnosis n = 1/7 No antenatal diagnosis n = 1/9 P = 1.0 <u>ICU admission</u> With antenatal diagnosis n = 1/7 No antenatal diagnosis n =	

				1/9 P = 1.0 <u>Length of postnatal stay (days mean ± SD)</u> With antenatal diagnosis = 8.6 ± 4.9 No antenatal diagnosis = 9.9 ± 9.3 P = 0.92	

Bibliographic details	Participants	Tests	Methods	Outcomes and results	Comments
Full Citation Warshak,C.R., Ramos,G.A., Eskander,R., Benirschke,K., Saenz,C.C., Kelly,T.F., Moore,T.R., Resnik,R., Effect of predelivery diagnosis in 99 consecutive cases of placenta accreta, Obstetrics and Gynecology, 115, 65-69, 2010 **Ref ID** 77842 **Country/ies where the study was carried out** USA **Study type** Retrospective cohort study **Aim of the study** To compare outcomes in women with a pre-delivery diagnosis of placenta accreta with those in whom a pre-delivery diagnosis was not made **Study dates** January 1990 to April 2008 **Source of funding** Not reported	**Sample size** Group 1: women with diagnosis of placenta accreta before birth n = 62 Group 2: women without diagnosis of placenta accreta before birth n = 37 **Characteristics** Total population n = 99 No prior CS n = 15/99 (15%) ≥ 2 prior CS n = 52/99 (53%) <u>One prior CS</u> Pre delivery diagnosis n=19/62 (31%) No pre delivery diagnosis n= 12/37 (33%) p = 0.82 <u>Two prior CS</u> Pre delivery diagnosis n=21/62 (34%) No pre delivery diagnosis n= 7/37 (19%)	NA	Pre delivery diagnosis of placenta accreta was made following the identification of suspicious characteristics on ultrasonography in women with risks factors. If the ultrasound findings were considered definite, magnetic resonance imaging (MRI) was performed. Once the prenatal diagnosis of placenta accreta was made, all women were offered a planned caesarean hysterectomy without attempted removal of placenta. The CS was scheduled for 34- 35 weeks gestation, after a 48 hour course of betamethasone (to enhance fetal lung maturity). A multidisciplinary team was involved, consisting of perinatology, gynaecologic oncology, anaesthesiology, interventional radiology and neonatology.	<u>Maternal Outcomes</u> Pre delivery diagnosis n = 62 (n=22 required emergency intervention before the scheduled caesarean hysterectomy) No pre delivery diagnosis n = 37 <u>Estimated blood loss (ml ± SD)*</u> Pre delivery diagnosis = 2,344 ± 1.7* No pre delivery diagnosis = 2951 ± 1.8* p = 0.34 *1.7ml and 1.8 ml was reported in the paper, the technical team believe the correct figures are 1700 ml and 1800 ml. <u>Units of packed red blood cell (PRBCs ± SD)</u> Pre delivery diagnosis = 4.7 ± 2.2 No pre delivery diagnosis =	**Limitations** Information regarding blood loss was obtained from operating report Long study period (18 years) considering the advance of imaging techniques **Other information**

	p = 0.17 <u>Three or more prior CS</u> Pre delivery diagnosis n=19/62 (31%) No pre delivery diagnosis n= 6/37 (15%) p = 0.15 <u>Placenta praevia</u> Pre delivery diagnosis n= 52/62 (84%) No pre delivery diagnosis n= 19/37 (53%) p = 0.002 <u>Placenta percreta</u> Pre delivery diagnosis n= 32/62 (52%) No pre delivery diagnosis n= 2/37 (6%) p <0.001 No significant differences were observed between the two groups in age, mymectomy and number of previous caesarean sections. **Inclusion Criteria** **Exclusion Criteria**			6.9 ± 1.8 p = 0.02 <u>ICU admission n (%)</u> Pre delivery diagnosis n = 43/62 (72%) No pre delivery diagnosis n = 22/37 (65%) p = 0.49 <u>Length of hospital stays (days ± SD)</u> Pre delivery diagnosis = 7.4 ± 1.8 No pre delivery diagnosis = 5.5 ± 1.6 p = 0.01 <u>Surgical complication (bladder injury) n (%)</u> Pre delivery diagnosis n = 14/62 (23%) No pre delivery diagnosis n = 3/37 (9.8%) p = not reported * Log transferred data were transformed. Values shown are retransformed data ± SD.	

	All women with placenta accreta confirmed pathologically after having given birth at the University of California, San Diego Medical Centre. All cases were examined by a single pathologist. Cases of clinically suspected placenta accreta that were not subsequently confirmed with pathologic examination of the placenta and uterus.			<u>Neonatal outcomes:</u> <u>NICU admissions n (%)</u> Pre delivery diagnosis n = 50/62 (86%) No pre delivery diagnosis = 19/37 (60%) p = 0.005 <u>NICU length of stay (days)</u> Pre delivery diagnosis = 9.8 ± 2.5 No pre delivery diagnosis = 6.3 ± 3.5 p = 0.13	

Caesarean Section (update)

What is the effectiveness of planned caesarean section compared with planned vaginal birth at the decreasing the mother to child transmission of the virus in pregnant women with HIV, for both low and higher viral load?

Study details	Participants	Interventions	Outcomes	Results	Comments
Authors Islam,S., Oon,V., Thomas,P. **Year of publication** 2010 **Country** UK **Ref ID** 53216 **Design** Retrospective cohort study **Aim of study** To investigate the maternal outcome of planned vaginal birth as well as the rate of MTCT	**Inclusion Criteria** HIV infected women opting for planned vaginal birth. The offer of the option of vaginal birth was based upon viral load < 50 cells/ml around 36 weeks gestation **Exclusion Criteria** Not reported **Demographics - Total** <u>Population:</u> n=144 HIV infected women attending for antenatal care between June 2004 and June 2006	**Experimental** <u>Intervention</u> n= 23/144 selected to have elective vaginal birth and the rest n=121/144 opted for elective caesarean section. <u>Methods</u> The maternal viral load obtained closest to birth and up to 7 days postpartum was recorded. All babies had antiretroviral therapy and none were breast fed. Polymerase chain reaction (PCR) tests were done at 1 month and 3 month and an ELISA test was done at 18 months. <u>Mode of birth definition</u> Planned vaginal birth includes those started vaginally but	**Dichotomous** Mother to child transmission rate **Continuous**	Mother to child transmission rate <u>Elective vaginal birth (n=23)</u> 0/23 <u>Plasma viral load at birth (RNA/ copies /ml)</u> < 50 copies/ml=14/23 (61%) 50-999 copies/ml =7/23(31%) >1000 copies/ml= 2/23 (8%) <u>Antiretroviral therapy</u> HAART = 18/23 Dual therapy = 2/23 Mono therapy = 3/23 In 10 women retroviral	**Funding** Not reported **Limitations** Retrospective study Very small numbers (underpowered) Non-randomised mode of birth **Other information**

		finished as CS. <u>Data analysis:</u> Descriptive statistics <u>Other Details:</u> Data were collected from maternity and medical records. All women received retroviral therapy (mono therapy, dual therapy or HAART). **Comparator** Elective caesarean section		therapy was started at or before 28 weeks gestation and in 13 women after 28 weeks gestation. <u>Actual vaginal birth</u> 15/23 (65%) 8 women had caesarean section, mainly for fetal distress and failure to progress. 22/23 had spontaneous onset of labour and n=1 had induction of labour. n=21 delivered at term (>37 weeks), n= 2 delivered around 36 weeks. No results reported for women allocated to have elective CS. In 10 women retroviral therapy was started at or before 28 weeks gestation and in 13 women after 28 weeks gestation. <u>Actual vaginal birth</u>	

				15/23 (65%) 8 women had caesarean section, mainly for fetal distress and failure to progress. 22/23 had spontaneous onset of labour and n=1 had induction of labour. n=21 delivered at term (>37 weeks), n= 2 delivered around 36 weeks. No results reported for women allocated to have elective CS.	

Study details	Participants	Interventions	Outcomes	Results	Comments
Authors Townsend,C.L., Cortina-Borja,M., Peckham,C.S., de,Ruiter A., Lyall,H., Tookey,P.A. **Year of publication** 2008 **Country** UK **Ref ID** 53245 **Design** Retrospective cohort study **Aim of study** To explore the impact of different strategies to prevent mother-to-child transmission at a population level	**Inclusion Criteria** Singleton birth between 2000 and 2006, to women diagnosed with HIV infection before birth and reported to NSHPC (National Study of HIV in Pregnancy and Childhood) by June 2007. **Exclusion Criteria** Multiple birth **Demographics - Total** <u>Population:</u> Total n = 5930 <u>Study Dates:</u> 2000 to 2006 <u>Ethnic origin (n = 5875)</u> Black African n = 4630 (78.8%) White n = 775 (13.2%) Other n = 470 (8.0%) <u>Antiretroviral therapy (n = 5760)</u> None (declined, diagnosed late or delivered prematurely < 37 weeks) n= 186 (3.2%) Monotherapy n = 712 (12.4%)	**Experimental** <u>Investigation:</u> Factors associated with transmission were explored for singleton births between 2000 and 2006 <u>Comparisons:</u> Vaginal birth Elective CS Emergency CS Viral load Antenatal antiretroviral therapy (ART) - <u>Methods:</u> Paediatric and obstetric information on HIV-infected pregnant women in the UK and Ireland were collected through comprehensive, population-based surveillance (National Study of HIV in Pregnancy and Childhood;	**Dichotomous** Mother to child transmission rate (MTCT) **Continuous**	<u>MTCT rate for women on HAART (all viral loads)</u> - <u>Elective CS</u> 17/2286 (0.7%) <u>Planned vaginal birth</u> 4/559 (0.7%) AOR 1.24 (95% CI -0.34 to 4.52), p=0.746 (adjusted for sex and viral load) <u>Emergency CS</u> 15/877 (1.7%) (significantly higher compared to elective CS, p=0.027) <u>Unplanned vaginal birth</u> 4/122 (3.3%) (significantly higher compared to planned vaginal birth, p=0.019) - <u>MTCT rate for women on HAART with no detectable viral</u>	**Funding** NSHPC Funded by Health Protecting Agency **Limitations** Observational study Relatively small numbers (rare event) Incomplete paediatric follow-up data **Other information** Pregnancies in diagnosed HIV-infected women in the UK and Ireland are notified to the National Study of HIV in Pregnancy and Childhood. The infant's infection status is subsequently reported. British HIV Association (BHIVA) guideline at the time of the study advocated the zidovudine mono therapy and planned caesarean section as an alternative to HAART for women with CD4 cell counts and pre treatments viral load of less than 6000-10000 copies/ml.

	Dual therapy n = 136 (2.4%) HAART n = 4726 (82.1%) <u>Age at giving birth</u> Median 29.8 years, range (26.2 - 33.6 years) <u>Mode of birth n = 5901</u> Elective CS n = 3368 (57.7%) Emergency CS n = 1223 (20.7%) Vaginal birth total n = 1310 (22.2%) Planned vaginal birth n = 745 (12.6%) Unplanned vaginal birth n = 176 (3%) Unspecified n = 389 (6.6%) <u>Gestational age</u> n = 5760 At least 37 weeks n = 5029 (87.3%) 35-36 weeks n = 360 (6.2%) 32-34 weeks n = 218 (3.8%)	NSHPC). The surveillance scheme ran under the sponsorship of the Royal College of Obstetricians and Gynaecologists. “uninfected” if PCR test result was negative after one month and 3 months of age, or they had a negative HIV antibody test after 18 months of age. Infants were confirmed “infected” if two positive PCR tests were reported or they had a positive antibody test after 18 months of age. The antepartum maternal HIV plasma viral load closest to the birth and seven days postpartum were used. Viral load was classified as less than 50 (undetectable). For logistic regression analysis, viral load was $\log_{10}$ transformed. - <u>Mode of birth definition</u> Mode of birth was classified as an elective CS (performed		<u>load (<50 copies/ml)</u> - n=3/2117 (0.1%, 95% CI 0.0 to 0.4%) <u>Elective C/S</u> 2/1135 (0.2%) <u>Planned vaginal birth</u> 1/417 (0.2%). Two of the infants (one born vaginally) had positive PCR result within 72 hours of birth, suggesting possible in utero transmission. <u>MTCT rate for women on HAART with detectable viral load (≥50 and <1000 copies/ml)</u> - <u>Elective C/S</u> 4/417 (0.8%) <u>Planned vaginal birth</u> 2/81 (2.5%) p=0.215 Two of the infected infants,	

	Less than 32 weeks n = 153 (2.7%)	before rupture of membranes or onset of labour), emergency CS (performed after rupture of membranes or onset of labour, or for obstetric indication) and vaginal delivery (no definition provided). <u>Data Analysis</u> Categorical variables were compared using χ2 test or Fisher's exact tests, means using t-test and medians using Kruskal Wallis test. Logistic regression models were used to obtain odd ratios and 95% confidence interval. **Comparator**		both born by elective CS, had a positive PCR within 72 hours of birth (both born by elective CS). <u>MTCT (gestational age) (univariate analysis)</u> - <u>At least 37 weeks</u> 45/4383 (1%) • Crude OR 1.00 <u>35-36 weeks</u> 3/315 (1%) Crude OR 0.93 (95% CI 0.29 to 3.00) <u>32-34 weeks</u> 4/189 (2.1%) Crude OR 2.08 (95% CI 0.74 to 5.86) <u>Less than 32 weeks</u> 7/115 (6.1%) Crude OR 6.25 (95% CI 2.75 to 14.17)	

				MTCT (gestational age) (multivariate analysis, OR adjusted for viral load) - At least 37 weeks (n=4383) • Adjusted OR 1.00 35-36 weeks (n=306) Adjusted OR 0.49 (95% CI 0.11 to2.23), p=0.359 32-34 weeks (n=185) Adjusted OR 1.17 (95% CI 0.32 to 4.29), p=0.816 Less than 32 weeks (n=113) Adjusted OR 6.25 (95% CI 0.77 to 7.20), p=0134 In the multivariate analysis (n=4084) controlling for ART, mode of birth, gestational age and sex, each log10 increase in viral load was associated with a 2.4-fold increase in risk of transmission (AOR=2.41,	

				p<0.001). In this model, lack of ART (AOR=3.17, p=0.023) and vaginal birth (AOR=2.40, p=0.033) were strongly associated with transmission, but gestational age and sex were not. In the multivariable model (n=4892) vaginal birth was associated with a non-significant 1.8-fold increased risk of transmission compared with elective CS (AOR=1.82, p=0.076). After adjusting for ART, gestational age and sex, unplanned vaginal birth was strongly associated with transmission (AOR=4.16, 95% CI 1.66-10.41, p=0.002) when compared with elective caesarean section, but planned vaginal birth was not (AOR=1.56, 95% CI 0.65-3.72 , p=0.319) Incomplete data Infection status was not reported for n=779/5930 (13.01%) of infants, for various reasons	

				(paediatric notification not received or pending [82.4%], lost to follow up [11.4%], left UK/Ireland [3.5%] and death [2.7%]). No significant difference was observed between children with unreported infection status and those with known infection status, in terms of maternal HIV exposure, clinical status or mode of birth. More children with unreported infection status were born at less than 32 weeks (p<0.001) to women with a viral load of at least 1000 copies (p=0.061)	

Study details	Participants	Interventions	Outcomes	Results	Comments
Authors Warszawski,J., Tubiana,R., Le,Chenadec J., Blanche,S., Teglas,J.P., Dollfus,C., Faye,A., Burgard,M., Rouzioux,C., Mandelbrot,L., NRS French,Perinatal Cohort **Year of publication** 2008 **Country** France **Ref ID** 53250 **Design** Prospective cohort study **Aim of study** To identify factors associated with mother to child HIV- 1 transmission (MTCT) from women receiving antenatal antiretroviral therapy	**Inclusion Criteria** All HIV-1- infected women who delivered French Perinatal Cohort study sites (mainland France) between January 1997 and 31 December 2004. Women were included if they received at least one antenatal ART at any time during pregnancy, did not breastfeed and the child's infection status was documented. **Exclusion Criteria** Not reported **Demographics - Total** <u>Population:</u> The study population consisted of 5271 women from 77 sites, who received antiretroviral therapy during pregnancy, delivered from 1997 to 2004 and did not breastfeed. <u>Other Details:</u> Infants were confirmed "infected" if two separate positive PCR or HIV RNA or 9PBMC were reported or they had a positive antibody test after 18 months of age. Infants confirmed "uninfected" if	**Experimental** <u>Investigation:</u> MTCT of HIV: n=5540 women who received ART and did not breastfeed, 269 were excluded for various reasons (incomplete virological data, stillbirths, neonatal deaths), for 117 multiple pregnancies only the first born was included. Overall n=5271 mother-child pairs were enrolled in analysis. <u>Methods :</u> No specific HIV treatment and obstetric care were recommended for the women included in the cohort. The last combination of ART prescribed before birth and the level of plasma HIV1 RNA and CD4 cell count nearest to the time of birth and no more than 7 days after birth, was considered for analysis. **Comparator**	**Dichotomous** Mother to child transmission rate (MTCT) **Continuous**	<u>MTCT rate: univariate analysis of all births (term and preterm)</u> 67/5271 (1.3%) 95% CI 1.0 to 1.6 <u>MTCT rate HIV-1 RNA at birth in all births (term and preterm)</u> <u><400 copies/ml</u> 19/3256 (0.6) 95% CI 0.4 to 0.9 <u>400-999 copies/ml</u> 3/440 (0.7%) <u>1000-9999 copies/ml</u> 14/938 (1.5%) 95% CI 0.8 to 2.5 <u>≥10000 copies/ml</u> 30/440 (6.85%) 95% CI 4.6 to 9.6 p<0.001 <u>MTCT rate: mode of birth all</u>	**Funding** Supported by the French National Agency for AIDS Research (ANRS), Paris **Limitations** Observational study Relatively small numbers Management policy in place that could influence the results **Other information** Based on French national policy, HAART was recommended to pregnant women with viral load >10000 copies/ml in 2002, and to all pregnant women in 2004. Since 2002, elective CS was not recommended for those delivered under HAART with viral load below 400 copies/ ml. <u>Data analysis</u> First viral load and prematurity and their relation to transmission were studied independently of one another. The interaction between prematurity and viral load was investigated in stratified

	virology test result was negative on two separate samples (of which at least one taken after termination of neonatal prophylactic treatment) or if serological testing was negative after 18 months. The last combination of ART prescribed before birth was considered for analysis. It was categorised into one of three classes: Mono therapy (NRTI, almost exclusively zidovudine) Dual therapy (two NRTI, almost mostly zidovudine-lamivudine) HAART (three or more drugs of any class)			births (term and preterm) (univariate analysis) Elective CS n=23/2438 (0.9%) Emergency Caesarean Section: 18/1046 (1.7%) Vaginal birth 25/1758 (1.4%) p=0.13 MTCT rate: women received ART all births (term and preterm) HAART 30/2513 (1.2%) Dual-drug therapy 22/1745 (1.3%) Mono therapy 15/1003 (1.5%) p=0.77 (chi-squared)	analysis. The assessment made for all births, term births, term birth with viral load of < 400 copies/ml and the validity of linear assumption between transmission rate and duration of ART. A backward stepwise logistic regression was performed, with child's HIV status as dependent variable. Mode of birth definition - Mode of birth was classified as vaginal birth (no definition provided), elective CS (no definition provided) and emergency CS (caesarean performed after rupture of membranes or onset of labour).

				Viral load < 400 copies/ml (term births) HAART 9/1585 (0.6%) Dual-drug therapy 6/938 (0.6%) Mono therapy 2/328 (0.6%) p=0.94 (chi-squared) Viral load ≥10000 copies/ml (term births) HAART 13/155 (8.4%) Dual-drug therapy 6/105 (5.7%) Mono therapy 5/104 (4.8%) p=0.48 (chi-squared) No significant difference in transmission risk observed	

				according to the mode of birth among women who delivered with < 400 copies/ml (crude OR 0.83; 95% CI, 0.29-2.39; p=0.37) <u>MTCT rate gestational age all birth (term and preterm)</u> <u><33 weeks</u> 8/122 (6.6%; 95% CI 2.9-12.5) <u>33-36 weeks</u> 7/563 (1.2%; 95% CI 0.8-1.5) <u>≥37 weeks</u> 52/4583 (1.1%; 95% CI 0.5-2.5) p<0.001 (Fisher's Exact Test) No significant interaction between viral load and prematurity observed, however among severe premature birth MTCT rate passed from 1.7% below 400 copies /ml to more	

				than 11% for other categories with viral load over 400 copies/ml. <u>MTCT rate viral load < 50 copies/ml (term birth)</u> 5/1338 (0.4%, 95% CI 0.1-0.9) All five (5) infant's mothers started therapy late, between 32 and 33 weeks of pregnancy. <u>MTCT rate viral load < 400 copies/ml (term birth) n=2856</u> <u>Elective CS</u> 7/1296 (0.5%) <u>Emergency CS</u> 3/464 (0.7%) <u>Vaginal birth</u> 7/1083 (0.7%) p= 0.90 (chi-squared) Viral load ≥10000 copies/ml (term birth)	

				Elective CS 10/203 (4.9%) Emergency CS 8/86 (9.3%) Vaginal birth 5/72 (6.9%) p=0.37 (chi-squared) MTCT in women receiving antiretroviral therapy during pregnancy stepwise logistic regression analysis: (Child's HIV status as the dependent variable, independent variables included gestational age at birth, maternal viral load at birth, maternal CD4 cell count at birth, gender of neonate, mode of birth, ART) All births n=4713 (multivariate analysis) Elective CS	

				OR 0.49 (95% CI 0.26 to 0.89) <u>Emergency CS</u> OR 0.81 (95% CI 0.42 to1.56) <u>Vaginal birth</u> OR 1 p=0.059 <u>Maternal viral load at birth < 400 copies/ml n=2659</u> <u>Elective CS</u> OR 0.72 (95% CI 0.24 to 2.16) <u>Emergency Caesarean</u> OR 0.95 (95% CI 0.23 to 3.89) <u>Vaginal birth</u> OR 1 NS <u>Maternal viral load at</u>	

				birth ≥ 10000 copies/ml n=340 Elective CS Adjusted OR 1.46 (95% CI 0.37 to 5.80) Emergency CS Adjusted OR 2.59 (95% CI 0.65 to 10.32) Vaginal birth OR 1 The duration of ART was a risk factor that was significant in the initial and final models. The OR for each increment week was OR 0.94 (95% CI 0.90 to 0.99), p=0.031. The time at initiation of ART or duration of last ART was also correlated with transmission rate (p=0.011, p=0.013 respectively). Intrapartum therapy was associated with four fold lower MTCT (p.0.04 in case of viral load > 1000 copies/ml).	

Study details	Participants	Interventions	Outcomes	Results	Comments
Authors Boer,K., England,K., Godfried,M.H., Thorne,C. **Year of publication** 2010 **Country** Eight Western European countries (Italy, Spain, Belgium, Netherlands, UK, Germany, Denmark and Sweden) **Ref ID** 121777 **Design** Prospective cohort study **Aim of study** To examine temporal and geographical patterns of mode of birth in the Western European centres of European Collaborative study (ECS), to identify factors associated with likelihood of elective CS birth in the HAART era and to explore the association between mode of birth and mother to child transmission (MTCT).	**Inclusion Criteria** Pregnant HIV infected women enrolled into the study from January 1985 to May 2007. **Exclusion Criteria** Women with elective or emergency CS for maternal indication or premature rupture of membranes (PROM) **Demographics - Total** <u>Population:</u> Total n = 5238 mother-child pairs <u>Study Dates:</u> January 1985- May 2007	**Experimental** <u>Investigation:</u> Association of caesarean section with reduction in risk of MTCT - <u>Comparison:</u> Vaginal birth - <u>Method:</u> was collected at enrolment and during the pregnancy. Laboratory test were performed locally. Maternal CD4 cell count and HIV RNA levels obtained closest to birth were used in the analysis. Maternal HIV RNA measurements have been routinely collected since 1998. Children with a positive virological marker of infection and/or children aged >18 months with persistence of antibody were defined as	**Dichotomous** Mother to child transmission rate (MTCT) **Continuous**	<u>MTCT rate among all mother-child pairs (MCPs) with HAART and viral load < 50 copies/ml (n=559)</u> - <u>Elective CS</u> 1/238 (0.42%) p=0.48 Infected infant's mother had HAART treatment started 2 months prior to birth and infant was born at 37 weeks gestation <u>Vaginal birth and emergency CS</u> 1/321 (0.31%) Infected infant's mother had HAART treatment started before pregnancy and infant was born vaginally at < 34 weeks gestation. (Note: vaginal birth and emergency CS were combined for this finding; number of women who gave birth vaginally not reported)	**Funding** <u>Funding:</u> The ECS is co-ordination action of the European commission. CT is supported by Wellcome Trust Research Career Development Fellowship. - **Limitations** Observational study Low numbers Vaginal birth definition includes women who gave birth by CS having planned a vaginal birth and laboured , however these numbers are not reported **Other information** Guidelines in Western Europe generally advocate the application of HAART and in the case of measurable pre-labour HIV RNA (>50 copies/ml) an elective CS is generally recommended.

		infected. Child who had never been detected with HIV antibody, virus or antigen, were classified as uninfected. The child was recorded as provisionally uninfected if he/she had a negative polymerase chain reaction (PCR) test at > 12 weeks postnatally. In the analysis, provisionally uninfected children were regarded as uninfected. <u>Mode of birth definition</u> Elective caesarean section birth was classified in this study as a CS performed before commencement of contractions or rupture of membranes (included some CS undertaken for urgent medical reasons). Emergency CS birth was classified as a CS performed after commencement of contractions or rupture of membranes. Vaginal birth was defined as actual vaginal birth plus those births where labour started		<u>MTCT among all MCPs with viral load < 400 copies/ml (n=960) (HAART status not reported)</u> <u>Vaginal birth</u> 11/242 (4.6%) <u>Emergency CS</u> 2/147 (1.4%) <u>Elective CS</u> 4/571 (0.7%) Odds ratio (95% CI), p value <u>Vaginal birth</u> OR 1.00 <u>Emergency CS</u> OR 0.29 (0.06 to1.33), p=0.11 <u>Elective CS</u> OR 0.15 (0.05 to 0.47), p=0.001 - Adjusted odd ratio (95% CI), p	

		vaginally but baby was born by CS. <u>Data Analysis</u> Univariable comparisons were performed with the χ2 test. Logistic regression analysis was used to obtain adjusted and unadjusted odds ratios. <u>Other Details:</u> The European Collaborative Study is an ongoing prospective cohort study of HIV infected pregnant women and their infants. It was set up in 1985 and includes 29 centres in 10 European countries. **Comparator**		value (adjusting for antenatal HAART and prematurity) <u>Vaginal birth</u> Adjusted OR 1.00 - <u>Emergency CS</u> Adjusted OR 0.19 (0.03 to 1.02), p=0.05 <u>Elective CS</u> Adjusted OR 0.20 (0.05 to 0.65), p=0.008 - <u>MTCT rate among all MCPs with viral load < 400 copies/ml (n=960) with and without HAART (all modes of birth)</u> - <u>No antenatal HAART</u> 12/227 (5.3%) <u>With antenatal HAART</u> 5/733 (0.7%)	

				Odd ratio (95% CI), p value <u>No antenatal HAART</u> OR 1.00 <u>With antenatal HAART</u> OR 0.12(0.04 to 0.35), p < 0.001 - Adjusted odd ratio (95% CI), p value <u>No antenatal HAART</u> adjusted OR 1.00 <u>With antenatal HAART</u> adjusted OR 0.15 (0.05 to 0.45), p < 0.001 - <u>MTCT among all MCPs with viral load < 400 copies/ml (n=960) (all modes of birth)</u> - <u>Gestational age</u> <u>≥ 37 weeks</u>	

				9/730 (1.2%) <u>34-36 weeks</u> 4/179 (2.2%) <u><34 weeks</u> 5/51 (7.8%) Odd ratio (95% CI), p value <u>≥ 37 weeks</u> OR 1.00 <u>34-36 weeks</u> 1.83 (0.56 to 6.02), p=0.32 <u><34 weeks</u> 6.82 (2.03 to 23.0), p=0.002 Adjusted odd ratio (95% CI), p value <u>Term ≥ 37 weeks</u> Adjusted OR 1 <u>34-36 weeks</u>	

				2.21 (0.64 to 7.59), p=0.21 <u><34 weeks</u> 8.47 (1.99 to 36.1), p=0.004 <u>MTCT rate in a subgroup of women on HAART with viral load < 1000 copies/ml</u> - <u>Elective CS</u> 3/424 (0.7%) (95% CI 0.15 to 2.05) - <u>Not elective CS (women started labour and gave birth either vaginally or by CS)</u> 0/155 - <u>MTCT rate in women on HAART viral load ≥ 1000 copies/ml</u> - <u>Vaginal birth (including vaginal births converted</u>	

				to emergency CS) 2/310 (0.65%) Elective caesarean section 11/822 (1.3%) p=0.64 * Viral load measurement was available 30 MTCT rate in a subgroup of women on HAART with viral load < 1000 copies/ml - Elective CS 3/424 (0.7%) (95% CI 0.15 to 2.05) - Not elective CS (women started labour and gave birth either vaginally or by CS)	

				0/155 - <u>MTCT rate in women on HAART viral load ≥</u> 1000 copies/ml - <u>Vaginal birth (including vaginal births converted to emergency CS)</u> 2/310 (0.65%) <u>Elective caesarean section</u> 11/822 (1.3%) p=0.64 * Viral load measurement was available 30 days before birth or one day postpartum	

Caesarean Section (update)

What is the appropriate care pathway for women who request a primary caesarean section where there is no obstetric or medical indication?

Bibliographic details	Participant characteristics	Intervention characteristics	Methods	Outcomes and results	Reviewer comment
Authors Wiklund, I., Edman, G. & Andolf, E. Year of publication 2007 Country Sweden Ref ID 61132 Design Prospective cohort study Aim: To investigate first time mothers undergoing CS in the absence of medical indication. The outcomes recorded included their reason for the request, self-estimated health, expectations of birth and experience of delivery as well as duration of breastfeeding, re-establishment of sexual life and postnatal depression.	Inclusion Criteria Healthy women with their first full term pregnancy were included in the study during gestational weeks 37 – 39. Women were recruited from a hospital which serves a middle and high income area of Stockholm This is a report of N=357/545 women included in the entire study Case group N=91 Women planning and giving birth with elective CS Control Group N=266 Women planning a vaginal birth Exclusion Criteria Women with BMI > 30, psychiatric illness, complications during pregnancy	Data collection Cases and controls were given a baseline questionnaire (see baseline characteristics). 2 days after delivery, the women received a second questionnaire regarding delivery, trust in midwives / obstetricians, perceived pain and birth experience (VAS). 3 months after delivery, the women received a third questionnaire regarding breastfeeding, sexual life, family planning, birth experience, signs of depression (EPDS) Medical details were taken from patient notes.	Sample size calculation Not reported Recruitment Cases were identified from the hospital's theatre surgical schedule. 105 cases fulfilled inclusion criteria, and out of these, 91 cases (87%) consented to participate. 2 -3 controls per case were consecutively recruited from the same antenatal clinic. 29 (11%) women who planned a vaginal birth subsequently had an emergency CS and 36 (13%) had an instrumental delivery. Analysis An intention to treat analysis was performed. T-tests were performed for continuous data. Chi^2 tests were performed for nominal and categorical variables	Maternal outcomes <u>Maternal hospital stay (mean days)</u> Cases = 3.6 Controls = 2.8 p value = 0.001 <u>Confidence in obstetrician (at 2 days postpartum)</u> Cases = 64/70 (91%) Controls = 99/125 (79%) p value = 0.031 <u>Confidence in midwife (at 2 days postpartum)</u> Cases = 80/92 (87%) Controls = 213/242 (88%) p value = 0.068 <u>Birth experience (at 2 days postpartum)</u> (Mean Likert scale for "thinkable experience" where 1 = worst, 10 = best) Cases = 8.3 Controls = 6.7 p value = 0.001	Ethics Approval Research Ethics Committee of the Karolinska Institute Informed consent was obtained from all participants. Funding Support received from "County Council of Stockholm" and "BB Stockholm AB"

	Baseline Characteristics Cases vs. controls, p value Age (mean years) 33.0 vs. 30.4, 0.001 Native Swede 78% vs. 89%, 0.003 University education 68% vs. 71%, 0.097 Smoking 9% vs. 7%, 0.097 IVF 13% vs. 3.3%, 0.003 Planned pregnancy 79% vs. 90%, 0.012 Parenthood education 67% vs. 85%, 0.001 Perceived good health 85% vs. 98%, 0.001			<u>Birth experience (at 3 months postpartum)</u> (Mean Likert scale for "thinkable experience" where 1 = worst, 10 = best) Cases = 8.1 Controls = 6.6 p value = 0.002 <u>Uncomplicated breastfeeding (at 2 days postpartum)</u> Cases = 50/92 (54%) Controls = 162/237 (68%) p value = 0.052 <u>Breastfeeding (at 3 months postpartum)</u> Cases = 79% Controls = 248/266 (93%) p value = 0.001 <u>Coitus (at 3 months postpartum)</u> Cases = 57% Controls = 67% p value = 0.106 <u>Family planning (plans for a sibling at 3 months postpartum)</u> Cases = 52% Controls = 81% p value = 0.001 <u>Depression (Edinburgh Postnatal Depression Score</u>) In total, 243 women completed the questionnaire. 29/243 had scores lower that	

				the threshold (score of 12). No significant differences between the groups were found (p=0.877). Neonatal outcomes <u>NICU care</u> Cases = 5/99 (5%) Controls = 12/237 (5%) p value = 0.996	

Caesarean Section (update)

What is the appropriate decision to delivery interval for unplanned caesarean section?

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
Full citation Hillemanns,P., Hasbargen,U., Strauss,A., Schulze,A., Genzel-Boroviczeny,O., Hepp,H., Maternal and neonatal morbidity of emergency caesarean sections with a decision-to-delivery interval under 30 minutes: Evidence from 10 years, Archives of Gynecology and Obstetrics, 268, 136-141, 2003 **Ref ID** 57811 **Country/ies where the study was carried out** Germany **Study type** Retrospective cohort study **Aim of the study** To investigate the decision to delivery interval for emergency caesarean section and to compare the preoperative maternal and neonatal morbidity to that of intrapartum non-emergency caesarean section **Study dates** 1997 to 1998 **Source of funding** Not reported	**Sample size** Total n = 218 Cases n= 109 Control n = 109 Additional Control (Bavarian registry) n = 1,095,722 **Characteristics** No statistically significant differences were observed between the cases and control groups in maternal age, parity, gestational age, smoking during pregnancy and previous CS. The gravidity was higher in control than in cases (p ≤ .001) <u>Obstetric characteristic:</u> No statistically significant differences were observed between the case and control groups in preterm labour, PROM, preeclampsia, IUGR, twin gestation, gestational diabetes and fetal malformation. Oligo hydraminous were more common in cases (p ≤ .05) and gestational diabetes was more	Subjects eligible for the study were identified from the central delivery book between 1997 and 1998. All emergency caesarean sections were identified as cases. Controls were matched for gestational age from women who underwent intrapartum non emergency caesarean section due to failure to progress, preeclampsia, malpresentation and other reasons. A second control group of women who had delivered in the state of Bavaria during the study period was selected from the Bavarian perinatal registry. Data was collected by reviewing the labour, delivery and anaesthesia and neonatal records. Caesarean section was defined as an emergency if severe fetal distress or clinical maternal condition were presented and required immediate caesarean section in the delivery room, referred to as 'crash'	The study was conducted at the University Hospital Munich-Grosshadern (a level 3 hospital with total of 14,706 deliveries during the study interval)	<u>Maternal outcomes</u> <u>Change in haemoglobin (mean ± SD)</u> Emergency CS = 3.6 ± 1.8 Control group = 3.1 ± 1.6 p = 0.05 <u>Blood transfusion</u> Emergency CS n = 11/109 (10.1%) Control group n= 1/109 (0.9%) p ≤ 0.05 <u>Perioperative morbidity</u> Emergency CS n = 18/109 (16.5%) Control group n= 12/109 (11.0%) p = ns <u>Uterine / bladder laceration</u>	**Limitations** The control group consisted of women who underwent intrapartum non-emergency caesarean section due to failure to progress, preeclampsia, malpresentation and other reasons **Other information** The leading indications for emergency CS were: - Abnormal fetal heart (91%) - Prolapsed cord (21%) - Placental abruption (20%) - No reason could be identified from the records (26.6%) Failure to progress, malpresentation and amnionitis/chrionitis were the main indications for CS in the control group

	common in controls (p ≤ .05) **Inclusion criteria** Cases = All women with emergency caesarean sections Controls = Women who underwent intrapartum non emergency caesarean section due to failure to progress, preeclampsia, malpresentation and other reasons. **Exclusion criteria** Not reported	caesarean sections (cord prolapse, placenta abruption, severe bradycardia etc) If the decision for caesarean section was made during labour as a result of fetal distress, failing labour or maternal reasons it was classified as intrapartum non-emergent caesarean section. For the emergency caesarean sections, the decision to delivery time was defined as the time interval from the decision to perform caesarean section until delivery. All emergency CS were performed in delivery rooms		Emergency CS n = 7/109 (6.4%) Control group n= 8/109 (7.4%) p = ns <u>Postpartum haemorrhage</u> Emergency CS n = 2/109 (1.8%) Control group n= 1/109 (0.9%) p = ns <u>Postpartum morbidity</u> Emergency CS n = 17/109 (15.6%) Control group n= 16/109 (14.7%) p = ns <u>Intensive care unit</u> Emergency CS n = 11/109 (10.1%) Control group n= 5/109 (4.6%) p = ns <u>Standard ferbrile morbidity</u>	

				Emergency CS n = 8/109 (7.3%) Control group n= 6/109 (5.5%) p = ns <u>Endometritis</u> Emergency CS n = 3/109 (2.8%) Control group n= 2/109 (1.8%) p = ns <u>Wound infection</u> Emergency CS n = 1/109 (0.9%) Control group n= 5/109 (4.6%) p =ns <u>Urinary tract infection</u> Emergency CS n = 3/109 (2.8%) Control group n= 2/109 (1.8%) p =ns	

				Neonatal outcomes <u>Birth weight (mean ± SD)</u> Emergency CS = 2,292 ± 1,025 Control group = 2,328 ± 1,013 p = ns <u>Apgar score < 7 after 5 min</u> Emergency CS n = 21/124 (16.9%) Control group n = 9/124 (7.3%) p ≤ 0.05 <u>Apgar score at 1 min (mean ± SD)</u> Emergency CS = 5.7 ± 2.8 Control group = 7.1 ± 2.3 p ≤ 0.001 <u>Apgar score at</u> 5 min (mean ± SD) Emergency CS = 8.2 ± 1.9 Control group = 8.8 ± 1.6	

				p ≤ 0.01 <u>Apgar score at</u> 10 min (mean ± SD) Emergency CS = 8.8 ± 1.5 Control group = 9.3 ± 1.0 p ≤ 0.01 <u>Arterial cord pH (mean ± SD)</u> Emergency CS = 7.18 ± 0.15 Control group = 7.29 ± 0.07 p ≤ 0.001 <u>pH < 7.10</u> Emergency CS n = 34/124 (29.3%) Control group n = 2/124 (1.6%) p ≤ 0.001 <u>pH < 7.00</u> Emergency CS n = 10/124 (8.6%) Control group n = 0/124 (0%)	

				p ≤ 0.001 <u>Perinatal mortality</u> Emergency CS n = 7/124 (5.6%) Control group n = 3/124 (2.4%) Bavarian registry n = (0.6%) *p ≤ 0.05 *compared with Bavarian registry (n = 1,100,995) <u>NICU admission</u> Emergency CS n = 74/124 (59.7%) Control group n = 65/124 (52.4%) Bavarian registry n = (4.2%) *p ≤ 0.001 *compared with Bavarian registry (n = 1,100,995)	

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
Full citation Bloom,S.L., Leveno,K.J., Spong,C.Y., Gilbert,S., Hauth,J.C., Landon,M.B., Varner,M.W., Moawad,A.H., Caritis,S.N., Harper,M., Wapner,R.J., Sorokin,Y., Miodovnik,M., O'Sullivan,M.J., Sibai,B.M., Langer,O., Gabbe,S.G., National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network., Decision-to-incision times and maternal and infant outcomes, Obstetrics and Gynecology, 108, 6-11, 2006 **Ref ID** 59743 **Country/ies where the study was carried out** USA **Study type** Prospective cohort study **Aim of the study** To prospectively audit decision to incision intervals in a large cohort of women undergoing caesarean section for an emergency indication at the multiple hospitals throughout the United States, in order to measure maternal and infant outcomes potentially related to the caesarean section response time **Study dates**	**Sample size** n = 11,481 **Characteristics** <u>Maternal age (mean in years):</u> ≥ 30 minutes = 25 ± 6.7 (13-46) ≤ 31 minutes = 26.5 ± 6.7 (13-47) <u>Race</u> White: ≥ 30 minutes n= 558 (30.8%) ≤ 31 minutes n= 269 (27.1%) African: ≥ 30 minutes n= 788 (43.4%) ≤ 31 minutes n= 437 (44.0%) Hispanic: ≥ 30 minutes n= 372 (20.5%) ≤ 31 minutes n= 219 (22%) Asian: ≥ 30 minutes n= 29 (1.6%) ≤ 31 minutes n= 16 (1.6%) <u>Nulliparous</u>	The caesarean registry was a prospective observational study, conducted between 1999 and 2002 (at the network centre composed of 13 institutions and one coordinator centre). The study was designed to assess several specific contemporary issues related to caesarean delivery. During the study period (1999 - 2001) data was collected on all women undergoing a caesarean section at the participating centres. Data from 13 centres was transmitted weekly by telecommunications link to the data coordinating centre at the George Washington University Biostatistics Centre where they were edited for missing, out of range, and inconsistent values. The edited report was then transmitted to each centre for correction or clarification	Emergency procedures were defined as those performed for umbilical cord prolapse, placental abruption, placenta praevia with haemorrhage, non reassuring fetal heart rate pattern, or uterine rupture. Detailed information regarding medical and obstetrical history was extracted directly from maternal and infant charts by a specially trained and certified research nurse. The intervals between the point of decision to perform caesarean to the actual skin incision were calculated by a trained research nurses. The decision time was determined from either the physician's or nurse's progress notes and if notes were not available, the time the women was prepped was used as a substitute. The skin incision times were determined from intra operative records.	<u>Maternal complications associated with emergency caesarean section</u> <u>Postoperative endometritis</u> (fever with abnormal uterine tenderness in the absence of another source of infection) ≥ 30 minutes n= 212/1,814 (11.7) ≤ 31 minutes n= 129/994 (13.0) p = 0.32 <u>Wound complication</u> ≥ 30 minutes n= 23/1,814 (1.3) ≤ 31 minutes n= 9/994 (0.9) p = 0.39 <u>Cystotomy</u> ≥ 30 minutes n= 2/1,814 (0.1) ≤ 31 minutes n= 3/994 (0.3) p = 0.35 <u>Bowel laceration</u> ≥ 30 minutes n= 1/1,814 (0.1)	**Limitations** Indications for CS were very different in the two groups. 7% women in DDI < 30 minutes had cord prolapse compared with 0.2% in DDI > 30 group. **Other information** Emergency caesarean sections were defined to include those performed for umbilical cord prolapse, placental abruption, placenta praevia, haemorrhage, non reassuring fetal heart rate patterns, or uterine rupture There were no significant differences between the two groups (≥ 30) and (≤ 31 min) in maternal age, race, parity, education and proportion who received antenatal care <u>Indication for CS < 30 min n = 1814 :</u> Non reassuring FHR n = 1647 Cord prolapse n = 128 Placenta abruption n = 34 Placenta praevia n = 34 Uterine rupture n = 1 <u>Indication for CS < 30 min n</u>

1999 to 2001 **Source of funding** Supported by grants from the National Institute of Child Health and Human Development	≥ 30 minutes n= 1,115 (61.6%) ≤ 31 minutes n= 699 (70.5%) <u>Education (mean years of education)</u> ≥ 30 minutes = 11.7 ± 2.9 ≤ 31 minutes n= 12.2 ± 2.7 <u>Received antenatal care</u> ≥ 30 minutes n= 1,778 (98%) ≤ 31 minutes n= 968 (97.4%) **Inclusion criteria** Women who gave birth to a singleton infant weighting 2,500 g or more by primary caesarean, and women who were in active labour, defined as reaching a minimum of 4 cm cervical dilatation (to ensure that all women studied had their emergency event occur in a labour and delivery unit) **Exclusion criteria** Not reported			≤ 31 minutes n= 1/994 (0.1) p = 1.00 <u>Ureteral injury</u> ≥ 30 minutes n= 2/1,814 (0.1) ≤ 31 minutes n= 1/994 (0.1) p = 1.00 <u>Infant outcomes associated with emergency caesarean section</u> <u>Neonatal Death</u> <u>With no malformation</u> ≥ 30 minutes n= 7/1,814 (0.4) ≤ 31 minutes n= 1/994 (0.1) p = 0.27 <u>With malformation</u> ≥ 30 minutes n= 8/1,814 (0.4) ≤ 31 minutes n= 3/994 (0.3) p = 0.76 <u>Fetal death in labour</u> ≥ 30 minutes n= 3/1,814 (0.2)	<u>= 994 :</u> Non reassuring FHR n = 991 Cord prolapse n = 2 Placenta abruption n = 1 Placenta praevia n = 0 Uterine rupture n = 0

				≤ 31 minutes n= 0/994 (0) p = 0.31 <u>Hypoxic ischaemic encephalopathy</u> ≥ 30 minutes n= 12/1,814 (0.7) ≤ 31 minutes n= 5/994 (0.5) p = 0.61 <u>Umbilical cord pH < 7*</u> ≥ 30 minutes n= 52/1,814 (4.8) ≤ 31 minutes n= 9/994 (1.6) p = 0.001 * Umbilical artery pH was missing for 41% of the infants <u>Intubation in delivery room</u> ≥ 30 minutes n= 56/1,814 (3.1) ≤ 31 minutes n= 13/994 (1.3) p = 0.004 <u>CPR</u>	

				≥ 30 minutes n= 32/1,814 (1.8) ≤ 31 minutes n= 13/994 (1.2) p = 0.26 <u>5 minute Apgar score ≥ 3</u> ≥ 30 minutes n= 18/1,814 (1.0) ≤ 31 minutes n= 9/994 (0.9) p = 0.82	

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
Full citation Holcroft,C.J., Graham,E.M., ina-Mumuney,A., Rai,K.K., Henderson,J.L., Penning,D.H., Cord gas analysis, decision-to-delivery interval, and the 30-minute rule for emergency cesareans, Journal of Perinatology, 25, 229-235, 2005 **Ref ID** 60225 **Country/ies where the study was carried out** USA **Study type** Retrospective cohort study **Aim of the study** To examine the relationship between umbilical arterial gas analysis and decision to delivery interval for emergency caesareans performed for non reassuring fetal status to determine if this would validate the 30 minute rule **Study dates** September 2001 to January 2003 **Source of funding** Not reported	**Sample size** Total n =117 Emergent n = 34 Urgent n = 83 **Characteristics** Of the 145 women who underwent a caesarean section for non reassuring fetal status, 117 met the inclusion criteria. Of the 117 women, 34 were classified as emergent and 83 as urgent There were no statistically significant differences between the two groups (emergent and urgent) in gestational age, neonatal birth weight, spinal and epidural. Women in the emergent group had more general anaesthesia compared with women in the urgent group (p = 0.003). **Inclusion criteria** All caesarean sections performed for non reassuring fetal status during the study period. **Exclusion criteria** Non vertex presentation Chromosomal abnormalities Congenital malformations	All delivery records at a single tertiary hospital from 2001 to 2003 were reviewed. The electronic FHR tracing from the hour prior to birth was obtained for each of births, and reviewed by three board-eligible or board-certified maternal - fetal medicine specialists blinded to neonatal outcomes. The reviewers then graded each case as either emergent or urgent. An emergent CS was defined as one where the reviewer wished to deliver the infant as quickly as possible. An urgent delivery was defined as one where the reviewer was willing to wait up to 30 minutes. In the event of disagreement, the cases were classified in the group that two of the three reviewers favoured. The Kappa correlation for agreement for these reviewers in classifying the cases as emergent versus urgent was 0.35, which shows fair/moderate correlation.	An emergent CS was defined as one where the reviewer wished to deliver the infant as quickly as possible. An urgent delivery was defined as one where the reviewer was willing to wait up to 30 minutes. In the event of disagreement, the cases were classified in the group that two of the three reviewers favoured. The institution used a computerized FHR monitoring system integrated with a centralised clock. Once the physician made a decision to proceed with an emergency caesarean section, the women were taken off the monitor in the labour room and brought back to operating room. The decision time was designated as the time the women were taken off the monitor in the labour room. The time of incision and delivery were determined from the same centralised clock as used for EFM.	Women in emergent group had more general anaesthesia compared with women in urgent group (p = 0.003) <u>Decision to delivery interval (min)</u> Emergent = 23 ± 15.3 Urgent = 36.7 ± 14.9 p < 0.001 <u>Neonatal death</u> Emergent = n = 1/34 Urgent = n = 0/83 p = 0.64 <u>1 minute Apgar < 7</u> Emergent = n = 15/34 (44%) Urgent = n = 27/83 (33%) p = 0.24 <u>5 minute Apgar < 7</u> Emergent = n = 3/34 (9%) Urgent = n= 8/83 (33%) p = 1.0	**Limitations** The decision time was designated as the time the women were taken off the monitor in the labour room **Other information**

	Lack of an umbilical arterial gas Those who were not monitored for at least 1 hour prior to delivery			<u>Umbilical arterial pH</u> Emergent = 7.12 ± 0.16 Urgent = 7.22 ± 0.08 p < 0.001 <u>Umbilical arterial BE (mmol/l)</u> Emergent = -8.8 ± 4.3 Urgent = -3.9 ± 2.4 p < 0.001 <u>Cord pH ≤ 7.0</u> Emergent = n = 6/34 (17.7%) Urgent = n= 2/83 (2.4%) p = 0.007 <u>Cord BE < -12.0 (mmol/l)</u> Emergent = n = 8/34 (23.5%) Urgent = n= 1/83 (1.2%) p <0.001 <u>Intraventricular haemorrhage</u> Emergent = n = 2/34 (5.9%) Urgent = n= 5/83 (6.0%)	

				p = 1.0 <u>Linear regression of decision to delivery interval versus umbilical arterial pH and umbilical base excess</u> A statistically significant correlation was found between increasing decision to delivery interval and marginally improved umbilical arterial pH (r = 0.22, p = 0.02) and base excess (r = 0.33, p< 0.001) These correlations were not clinically significant in predicting when the fetus would develop metabolic acidosis severe enough to increase the risk of long term neurologic morbidity.	

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
Full citation Roy,K.K., Baruah,J., Kumar,S., Deorari,A.K., Sharma,J.B., Karmakar,D., Cesarean section for suspected fetal distress, continuous fetal heart monitoring and decision to delivery time, Indian Journal of Pediatrics, 75, 1249-1252, 2008 **Ref ID** 60814 **Country/ies where the study was carried out** India **Study type** Prospective observational study **Aim of the study** To evaluate whether a 30 minute decision to delivery interval for emergency caesarean section influences perinatal outcome **Study dates** March 2002 to March 2007 **Source of funding** Not reported	**Sample size** Total = 217 women **Characteristics** Not reported **Inclusion criteria** Gestational age ≥ 36 weeks, no fetal anomalies and non reassuring fetal heart rate pattern detected by CTG. **Exclusion criteria** Abnormal presentation Multiple pregnancy Severe intrauterine Growth Restriction (IUGR) Caesarean section for other primary indications	Data was collected from the women in one unit who underwent caesarean section for suspected fetal distress during labour. The DDI was the time between the decision to perform the caesarean and exact delivery time. The data obtained was analysed to correlate the non reassuring fetal heart and DDI with adverse neonatal outcome.	The cause of the fetal distress: n = 18 (8.2%) had thick meconium stained liquor n = 17 (7.8%) had two or more tight loops of cord around neck n = 11 (5.1%) women had retroplacental clot with blood stained liquor n = 171 (78.8%) had no detectable cause or effect of fetal distress	<u>Neonatal outcomes</u> <u>Fresh stillbirth (due to placental abruption)</u> D-D interval ≤ 30 min n = 1/121 D-D interval > 30 min n = nil/96 <u>Mean birth weight</u> D-D interval ≤ 30 min (n = 121) = 2850 ± 340 D-D interval > 30 min (n = 96) = 2760 ± 413 p = ns <u>Mean birth weight < 2500 g</u> D-D interval ≤ 30 min n = 16/121 (14.8%) D-D interval > 30 min n = 11/96 (11.4%) p = ns <u>Apgar score < 7 at 5 min</u> D-D interval ≤ 30 min n = 18/121 (14.8%) D-D interval > 30 min n = 15/96 (15.6%)	**Limitations** Emergency caesarean sections were not classified. No details about the characteristics of the women are reported. **Other information**

				p = ns <u>Umbilical cord pH < 7.10</u> D-D interval ≤ 30 min n = 8/121 (6.6%) D-D interval > 30 min n = 5/96 (5.2%) p = ns <u>Neonate requiring immediate ventilation</u> D-D interval ≤ 30 min n = 4/121 (3.3%) D-D interval > 30 min n = 96 (2.08%) p = ns <u>Admission to NICU</u> D-D interval ≤ 30 min n = 26/121 (21.4%) D-D interval > 30 min n = 7/96 (7.2%) p <0.05 <u>Indication for NICU admission</u> <u>Severe birth asphyxia (Apgar score <4 at 5 min)</u>	

				D-D interval ≤ 30 min n = 10/26 D-D interval > 30 min n = 3/7 <u>Moderate birth asphyxia (Apgar score <7 at 5 min)</u> D-D interval ≤ 30 min n = 8/26 D-D interval > 30 min n = 2/7 <u>TTN (transient tachpynea of newborn) for observation</u> D-D interval ≤ 30 min n = 8/26 D-D interval > 30 min n = 2/7	

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
Full citation Thomas,J., Paranjothy,S., James,D., National cross sectional survey to determine whether the decision to delivery interval is critical in emergency caesarean section, BMJ, 328, 665-, 2004 **Ref ID** 61005 **Country/ies where the study was carried out** UK **Study type** Retrospective observational study **Aim of the study** To examinethe association between decision to delivery interval and neonatal and maternal outcomes **Study dates** 1st May 2000 to 31st July 2000 **Source of funding** NICE (National Institute for Clinical Excellence)	**Sample size** Grade 1) Immediate threat to the life of the woman or fetus (n = 4622) Grade 2) Maternal or fetal compromise not immediately life threatening (n = 9122) Grade 3) No maternal or fetal compromise but early delivery needed (n = 347) Total n = 17,780: ≤ 15 min n = 1381 16 -30 min n = 2577 31 - 45 min n = 3589 46 - 60 min n = 3261 61 - 75 min n = 1865 > 75 min n = 3891 **Characteristics** Not reported **Inclusion criteria** Singletons delivered by emergency CS **Exclusion criteria** Multiple pregnancies	The data for the study was obtained from the national sentinel caesarean section audit. The audit was designed to accurately measure caesarean rates and to assess the quality of care given to women having caesarean section in England and Wales.	The decision to delivery interval is defined as the interval in minutes from the date and time of decision to carry out the caesarean section to the date and time of birth of baby Urgency of caesarean section: Grade 1) Immediate threat to the life of the woman or fetus Grade 2) Maternal or fetal compromise not immediately life threatening Grade 3) No maternal or fetal compromise but early delivery needed Grade 4) Delivery timed to suit the woman and staff	Association between decision to delivery interval and maternal and neonatal outcomes Maternal outcomes: <u>Maternal requirement for special care</u> ≤ 15 min n = 194 (14.1%) adjusted OR 1 16 - 30 min n = 301 (11.7%) adjusted OR 0.8 (95% CI 0.7 to 1.1) 31 - 45 min n = 361 (10.1%) adjusted OR 0.9 (95% CI 0.8 to 1.2) 46 - 60 min n = 277 (8.5%) adjusted OR 0.9 (95% CI 0.7 to 1.1) 61 - 75 min n = 197 (10.6%) adjusted OR 1.1 (95% CI 0.8 to 1.4) > 75 min n = 752 (19.4%) adjusted OR 1.5 (95% CI 1.2 to 1.8) Neonatal outcomes: <u>Stillbirth</u>	**Limitations** Regression analysis was not able to control bias. Other factors associated with adverse neonatal outcome, e.g. gestation and failed instrumental delivery, were not considered **Other information** Perceived urgency was classified as grade I for 26 % (n=4622), grade 2 for 51.3% (n = 9122), and grade 3 for 20.8% (n = 3689). The most common indications for emergency CS were presumed fetal compromise, intrauterine growth retardation or an abnormal cardiogram (35%), and failure to progress (32%). Presumed fetal compromise was the primary indication (66%) with more cases with grade I urgency.

				≤ 15 min n = 11 (0.8%) adjusted OR 1 16 -30 min n = 16 (0.6%) adjusted OR 0.8 (95% CI 0.3 to 1.7) 31 - 45 min n = 5 (0.1%) adjusted OR 0.4 (95% CI 0.1 to 1.3) 46 - 60 min n = 3 (0.1%) adjusted OR 0.5 (95% CI 0.1 to 1.9) 61 - 75 min n = 4 (0.2 %) adjusted OR 1.6 (95% CI 0.5 to 5.3) > 75 min n = 11 (0.3 %) adjusted OR (95% CI) <u>5 minute Apgar score < 7</u> ≤ 15 min n = 87 (6.5%) adjusted OR 1 16 -30 min n = 139 (5.5%) adjusted OR 0.9 (95% CI 0.6 to 1.2) 31 - 45 min n = 106 (3%) adjusted OR 1 (95% CI 0.7 to 1.4) 46 - 60 min n = 71 (2.2%) adjusted OR 1.1 (95% CI 0.8 to 0.4)	

				61 - 75 min n = 35 (1.9%) adjusted OR 1.1 (95% CI 0.7 to 1.7) > 75 min n = 116 (3.1%) adjusted OR 1.7 (95% CI 1.2 to 2.4) <u>5 minute Apgar score < 4</u> ≤ 15 min n = 32 (2.4%) adjusted OR 1 16 -30 min n = 44 (1.7%) adjusted OR 0.8 (95% CI 0.5 to 1.3) 31 - 45 min n = 25 (0.7%) adjusted OR (0.795% CI 0.4 to 1.3) 46 - 60 min n = 23 (0.7%) adjusted OR 1.3 (95% CI 0.7 to 2.3) 61 - 75 min n = 10 (0.5%) adjusted OR 1.0 (95% CI 0.4 to 2.3) > 75 min n = 31 (0.8%) adjusted OR 1.4 (95% CI 0.7 to 2.5) Grade of urgency <u>Maternal requirement for special care</u> Need early delivery	

				n = 233 (6.3%) adjusted OR 1.0 Urgent, not life threatening n = 1154 (12.7%) adjusted OR 1.6 (95% CI 1.3 to 1.9) Urgent, life threatening n = 857 (18.6%) adjusted OR 2.2 (95% CI 1.7 to 2.7) <u>Stillbirth</u> Need early delivery n = 3 (0.1%) adjusted OR 1 Urgent, not life threatening n = 6 (0.1%) adjusted OR 0.9 (95% CI 0.2 to 3.1) Urgent, life threatening n = 43 (0.9%) adjusted OR 8.3 (95% CI 1.5 to 44.7) <u>5 minute Apgar score < 4</u> Need early delivery n = 3 (0.1%) adjusted OR 1 Urgent, not life threatening	

				n = 46 (0.5%) adjusted OR 0.8 (95% CI 0.4 to 1.9) Urgent, life threatening n = 115 (2.6%) adjusted OR 1.6 (95% CI 0.6 to 4.0) <u>5 minute Apgar score < 7</u> Need early delivery n = 31 (0.9%) adjusted OR 1 Urgent, not life threatening n = 189 (2.6%) adjusted OR 1.7 (95% CI 1.1 to 2.6) Urgent, life threatening n = 352 (7.9%) adjusted OR 2.9 (95% CI 1.8 to 4.8) *Data was adjusted for the primary indication for CS, cardiotocography findings, grade of urgency, and type of anaesthesia	

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
Full citation Chauleur,C., Collet,F., Furtos,C., Nourrissat,A., Seffert,P., Chauvin,F., Identification of factors influencing the decision-to-delivery interval in emergency caesarean sections, Gynecologic and Obstetric Investigation, 68, 248-254, 2009 **Ref ID** 92326 **Country/ies where the study was carried out** France **Study type** Retrospective cohort study **Aim of the study** To investigate decision to delivery intervals with regard to the compliance with the recommended intervals and their influencing factors **Study dates** 1st September to 1st November 2007 **Source of funding** The study was supported by the University Hospital of Saint Etienne, Saint-Etienne (France)	**Sample size** Total n = 68 women with emergency caesarean section (EmCS) Class 1 (Extremely urgent CS) + Class 2 (Urgent CS) n = 34 Class 3 (Non urgent CS) n =34 Neonatal outcomes were reviewed for 71 babies (3 twins) **Characteristics** Univariate analysis of DDI of 68 CS: There were no statistically significant differences observed in decision to delivery interval (min) with regards to maternal gravidity (1 and >1), parity (1 and >1), gestational age at delivery (≤36 weeks and >36) and outside standard working hours (yes and no). Women who were hospitalised in the pathological pregnancy unit had longer DDI compared with women who were in the labour ward on the same hospital floor (p = 0.03) **Inclusion criteria** All emergency caesarean sections performed during the study period	Data for the study was collected from a clinical audit which was carried out in Saint-Etienne University Hospital. All emergency caesarean sections performed during the study period were included.	All files concerning an emergency CS performed during the study period were reviewed, and 68 women were identified for study inclusion. Class 1 and class 2 CS were combined in one group (n = 34) and the remaining 34 women were classified as class 3 CS.	<u>Apgar score total n =70</u> DDI > 30 min: <7 = n = 2 (0.04%) ≥7 = n = 43 (0.96%) DDI < 30 min: < = n = 0(0%) ≥7 = n = 25 (100%) p = 0.53 <u>Lactates n =54</u> DDI > 30 min: <6 = n = 31 (0.89%) ≥6 = n = 4 (0.11%) DDI < 30 min: <6 = n = 15 (0.79%) ≥6 = n = 4 (0.21%) p = 0.43 <u>pH</u> DDI > 30 min: ≤7.10 = n = 1 (0.03%)	**Limitations** No definition for DDI given Indication for CS not specified **Other information** The classification of the CS was retrospectively done by 3 obstetricians who were among the authors of this article. Three classes of CS were defined as: Extremely urgent = class 1 - imminent threat to life (extraction of infant within 15 min) Urgent = class 2 - short term threat to life (extraction of infant within 30 min) Non-urgent = class 3 - no threat to life (extraction of infant with >30 min)

	Exclusion criteria Not reported			>7.10 = n = 36 (0.97%) DDI < 30 min: ≤7.10 = n = 2 (0.11%) >7.10 = n = 17 (0.89%) p = 0.26 <u>Paediatric reanimation</u> DDI > 30 min: No = n = 27(0.59%) Yes = n = 19 (0.41%) DDI < 30 min: No = n = 17(0.68%) Yes = n = 8 (0.32%) p = 0.44 <u>Paediatric reanimation unit</u> DDI > 30 min: No = n = 35(0.76%) Yes = n = 11(0.24%) DDI < 30 min: No = n = 24 (0.96%)	
				Yes = n = 1 (0.04%) p = 0.46	

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
Full citation Hillemanns,P., Strauss,A., Hasbargen,U., Schulze,A., Genzel-Boroviczeny,O., Weninger,E., Hepp,H., Crash emergency cesarean section: decision-to-delivery interval under 30 min and its effect on Apgar and umbilical artery pH, Archives of Gynecology and Obstetrics, 273, 161-165, 2005 **Ref ID** 92387 **Country/ies where the study was carried out** Germany **Study type** Retrospective cohort study **Aim of the study** To examine the effect of decision to delivery interval of crash emergency caesarean section on Apgar and umbilical artery pH **Study dates** 1988 to 1997 **Source of funding** Not reported	**Sample size** All crash CS n =109 < 32 weeks gestation n = 33 ≥ 32 weeks gestation n = 49 **Characteristics** Not reported **Inclusion criteria** Women with crash emergency CS **Exclusion criteria** Not reported	One hundred and nine (n =109) crash emergency CS were performed during the 10 year study period in a level 3 hospital (17,706 delivery per year). The crash emergency operations were performed in the delivery rooms (all delivery rooms were fully equipped with the necessary anaesthetic equipment and emergency pack). All emergency CS were performed within the 30 minute interval. The median time was 10 minutes (mean ± SD = 11.4 ± 5.2).	The decision for emergency CS was usually made by a resident. The time point was documented by the midwife, marked on the electrocardiogram paper, and defined the beginning of decision to delivery time. The consultant had to confirm the indication and perform the emergency CS under general anaesthesia unless loco-regional anaesthesia was already in place. Surgery was conducted in sub-optimal sterile condition (no shaving, no scrubbing of obstetrician, quick disinfection of the abdomen, bladder drainage, and broad spectrum antibioprophylaxis).	<u>Relation between the umbilical cord arterial blood pH and decision to delivery time:</u> Correlation coefficient r = 0.36 p> 0.05 (ns) <u>Relation between the Apgar score and decision to delivery time :</u> Emergency caesarean sections performed within 19 min presented with lower Apgar values after 1, 5, and 10 min than those required 20 min or more (p = 0.003, 0.003 and 0.01, respectively)	**Limitations** n = 33 (30.3%) of the emergency CS had a gestational age < 32 weeks and n= 60 (55%) below 37 weeks. **Other information** The CS were classified as emergency if severe fetal distress or critical maternal condition were anticipated and required immediate delivery by operation in the delivery room, referred to "crash“ caesarean sections. The indication for all emergency CS n = 109: - Abnormal fetal heart n = 99 (20.28%) - Placenta abruption n = 22 (90.8%) - Cord prolapse n = 23 (21.1%) - Failure to progress n = 17 (90.8%) - Malpresentation n = 12 (11%) - Other (preeclampsia, placenta praevia, amnionitis, fetopelvic disproportion, epidural complication, failed operative vaginal delivery) n = 21 (19.2%) n= 33 (30.3%) of the emergency CS had a gestational age < 32 weeks and
					n= 60 (55%) below 37 weeks.

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
Full citation Kolas,T., Hofoss,D., Oian,P., Predictions for the decision-to-delivery interval for emergency cesarean sections in Norway, Acta Obstetricia et Gynecologica Scandinavica, 85, 561-566, 2006 **Ref ID** 92419 **Country/ies where the study was carried out** Norway **Study type** Prospective cohort study **Aim of the study** To identify factors that influence the decision to delivery intervals in emergency caesarean sections. **Study dates** 1st December 1998 to 1st July 1999 **Source of funding** Not reported	**Sample size** n = 1,511 emergency caesarean sections (n = 1,297 acute, n = 214 urgent) **Characteristics** Women in the two groups (acute and urgent) were comparable in age, BMI, parity and also in neonatal birth weight and gestational age. **Inclusion criteria** All women with emergency CS **Exclusion criteria** Not reported	Prospective registration of all emergency caesareans was provided by 24 maternity units (18 level 2 with 400 - 1500 delivery per year and 6 level 3 units with > 1500 delivery per year) during the study period. 1,767 emergency singleton caesarean section were registered. However, in 256 cases information about DDI was not provided; therefore n = 1,511 emergency caesarean section included. Data for the study was obtained from the Medical Birth Registry of Norway (MBRN) that routinely collects information about all deliveries.	A registration form was designed for the study. The form gave detailed information about medical and obstetric history, complications during the pregnancy, the operation, and perinatal events. The clinicians filled in the form for every emergency caesarean section done and the MBRN entered the information into the database. The clinician that reported the data was directly involved in the decision making process for the emergency operation. Women in the two groups (acute and urgent) were comparable in age, BMI, parity and also in neonatal birth weight and gestational age. For each caesarean section, the clinicians specified the indication by ticking a list of 31 pre-specified indications. Fetal distress, abruptio placentae and umbilical cord prolapse were statistically significantly higher than any other indication listed in the form.	<u>Decision to delivery intervals (DDI) related to NICU admission</u> Total number of cases n = 1,480 (Preterm n = 284 Term n = 1,200) <u>Transfers to NICU (preterm) :</u> ALL = 85.8 % DDI < 15 min (total cases n = 39/41) = 97.4 % DDI 16 - 30 min (total cases n = 38/54) = 84.3% DDI 31 - 60 min (total cases n = 70/86) = 82.9% DDI > 60 min (total cases n = 86/103) = 84.3% p = ns <u>Transfers to NICU (term ≥ 37 weeks) total n = 1200 :</u> ALL: 21.9 % DDI < 15 min (total cases n = 70/242) = 29.0 % DDI 16-30 min (total cases n = 87/382) = 23.4%	**Limitations** **Other information** All CS performed < 8 hours after the decision for operation were classified as emergency. Emergency sections were divided into acute (those that were performed as quickly as possible after decision was made), and urgent (the decision triggered a set of particularly speedy preparation procedures)

				DDI 31 - 60 min (total cases n = 75/394) = 19.3% DDI > 60 min (total cases n = 27/182) = 15.5% p < 0.01 <u>Apgar score at 5 min < 7 (preterm) n = 284</u> ALL = 11.2 % DDI < 15 min (total cases n = 10/41) = 25.6% DDI 16-30 min (total cases n = 7/54) = 13.0% DDI 31 - 60 min (total cases n = 7/86) = 8.4% DDI > 60 min (total cases n = 7/103) = 7.0% p < 0.01 <u>Apgar score at 5 min < 7 (term)</u> <u>ALL</u>: 5.8% DDI < 15 min (total cases n = 26/242) = 11.0 % DDI 16-30 min (total cases n = 22/382) = 5.9 % DDI 31 - 60 min (total cases n	

				= 39/394) = 1.0 % DDI > 60 min (total cases n = 4/182) = 2.2% p < 0.01 <u>Apgar score at 5 min < 4 (preterm)</u> ALL = 1.5 % DDI < 15 min (total cases n = 1/41) = 2.6 % DDI 16-30 min (total cases n = 54) = 0 DDI 31 - 60 min (total cases n = 86) = 0 DDI > 60 min (total cases n = 3/103) = 3.0% p = ns <u>Apgar score at 5 min < 4 (term)</u> ALL: 1.3% DDI < 15 min (total cases n = 6/242) = 2.5% DDI 16-30 min (total cases n = 5/382) = 1.3% DDI 31 - 60 min (total cases n = 2/394) = 0.5%	

				DDI > 60 min (total cases n = 2/182) = 1.1% p = ns	

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
Full citation Leung,T.Y., Chung,P.W., Rogers,M.S., Sahota,D.S., Lao,T.T., Hung Chung,T.K., Urgent cesarean delivery for fetal bradycardia, Obstetrics and Gynecology, 114, 1023-1028, 2009 **Ref ID** 92430 **Country/ies where the study was carried out** China **Study type** Retrospective cohort **Aim of the study** To estimate whether bradycardia to delivery interval was related to adverse perinatal outcome after extremely urgent caesarean section for different cause of fetal distress **Study dates** 2005 to 2008 **Source of funding** Not reported	**Sample size** Total n = 235 Irreversible n =39 Potentially reversible n = 22 Unknown n= 174 **Characteristics** There were no statistically significant differences between the three groups (irreversible, potentially reversible and unknown) in maternal age and neonatal birth weight. The median gestation at delivery and percentage of nulliparity in the irreversible group were less than in the potentially reversible and unknown groups (p<0.05). **Inclusion criteria** Pregnant women who underwent an extremely urgent CS. **Exclusion criteria** Multiple pregnancies Pregnancies with fetal abnormalities Acute maternal ketoacidosis	Women who gave birth during the study period by extremely urgent CS because of the fetal distress were identified from the hospital Obstetric Specialty Clinical Information System. The medical notes of the eligible cases were reviewed for the bradycardia to delivery interval, decision to delivery interval and umbilical cord arterial blood gas. The causes of the bradycardia were reviewed according to fetal distress and categorized into: 1) Irreversible 2) Potentially reversible 3) Unknown		Bradycardia to decision to delivery interval (BDI) [median (interquartile range)] Irreversible n= 39 11 min (9 -16) Potentially reversible n= 22 16.5 min (14 -18.3) Unknown n = 174 16 min (14 -19) p < 0.001 Decision to delivery interval (DDI) [median (interquartile range)] Irreversible n= 39 10 min (9 -12) Potentially reversible n= 22 11.5 min (10.8 -13.3) Unknown n = 174 11 min (10 -13) p = 0.001 Cord arterial pH [median	**Limitations** **Other information** The study unit had a standard intrapartum management protocol: 1) The routine use of the continuous cardiotocograph (CTG) monitoring 2) The interpretation of the CTG based on the RCOG and NICE Guideline 3) Extremely urgent caesarean section should be prepared for when there was persistent fetal bradycardia (> 110 bpm) for 3 minutes, and should be decided when it lasted for 5 minutes without sign of recovery or when the bradycardia is associated with irreversible conditions like placental abruption or cord prolapse. The definition of the extremely urgent caesarean section used in the study unit was equivalent to the grade 1 of the RCOG classification of urgency for emergency CS.

				(interquartile range)] Irreversible n= 39 7.094 (6.991 - 7.216) Potentially reversible n= 22 7.162 (7.064 - 7.251) Unknown n = 174 7.210 (7.161 - 7.255) p < 0.001 Cases with arterial pH < 7 [n (%)] Irreversible n= 39 10 (25.6) Potentially reversible n= 22 1 (4.5) Unknown n = 174 8 (4.6) Cord base excess [median (interquartile range)] Irreversible n= 39 -10.0 (-5.6 to -13.1) Potentially reversible n= 22	

				-9.5 (-5.3 to -11.9) Unknown n = 174 -6.3 (-4.5 to -8.3) Cases with cord base excess < 12 [n (%)] Irreversible n= 39 12 (30.8) Potentially reversible n= 22 5 (22.7) Unknown n = 174 12 (6.9) Correlation between pH and base excess with BDI and DDI using Spearman's P test (P = Correlation Coefficient) pH vs BDI Irreversible n= 39 -0.354 (0.027) Potentially reversible n= 22 -0.204 (0.364) Unknown n = 174	

				0.043 (0.572) <u>pH vs DDI</u> Irreversible n= 39 -0.069 (0.676) Potentially reversible n= 22 -0.255 (0.252) Unknown n = 174 0.019 (0.803) <u>BE (base excess) vs BDI</u> Irreversible n= 39 -0.406 (0.11) Potentially reversible n= 22 -0.323 (0.153) Unknown n = 174 -0.037 (0.631) <u>BE (base excess) vs DDI</u> Irreversible n= 39 -0.138 (0.410) Potentially reversible n= 22 -0.162 (0.483)	

				Unknown n = 174 -0.020 (0.801)	

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
Full citation Nasrallah,F.K., Harirah,H.M., Vadhera,R., Jain,V., Franklin,L.T., Hankins,G.D., The 30-minute decision-to-incision interval for emergency cesarean delivery: fact or fiction?, American Journal of Perinatology, 21, 63-68, 2004 **Ref ID** 92469 **Country/ies where the study was carried out** USA **Study type** Retrospective cohort study **Aim of the study** To identify whether a 30 minute interval has an impact on neonatal and maternal outcome in cases of emergent caesarean delivery (ECD) **Study dates** January 1999 to December 2001 **Source of funding**	**Sample size** Total: n = 111 Group I (had skin incision undertaken ≤ 30 minutes [median = 16 mins, range = 5 to 30 minutes]): n = 83 Group II (had skin incision undertaken > 30 minutes [median = 38 mins, range = 5 to 57 minutes]): n = 28 **Characteristics** There were no statistically significant differences between the two groups in maternal age, parity, weight or gestational age at delivery. **Inclusion criteria** All women with singleton gestations between 32 and 42 weeks who underwent emergency CS during the study period **Exclusion criteria** Not reported	The study was conducted at a tertiary hospital and data was retrospectively collected from women's medical notes. Subjects were identified and categorized into two groups: Group I = decision to incision (D-I) ≤ 30 min Group II = decision to incision (D-I) > 30 min No statistically significant differences were observed between the two groups in maternal age, parity, weight or gestational age at delivery. In group I there were 10 women with the history of a prior CS compared with 0 in group II. 108/111 were performed through transverse incisions of the lower uterine segment. General anaesthesia was performed more in group I (50/83 [60%]) than group II (2/28 [7%]), p < 0.001	The indication for ECD included: no reassuring fetal heart rate patterns, placental abruption, cord prolapse, bleeding placenta praevia, and suspected uterine rupture. The timing of the decision to perform caesarean section, presence of the patient in the operating room, skin incision and type of anaesthesia were obtained from the nursing and operating room records.	<u>Time intervals (min) between the two groups = median (range)</u> Group I = decision to incision (D-I) = 16 (5 - 30) Group II = decision to incision (D-I) = 38 (31 - 57) Group I = decision to operating room interval = 6 (2 - 22) Group II = decision to operating room interval = 16 (5 - 30) Group I = operating room to incision interval (D-I) = 8 (2 - 26) Group I = operating room to incision interval (D-I) = 16 (7 - 44) <u>Maternal outcomes</u> <u>Estimated blood loss (ml)</u> Group I (n = 83) = 1000 (500 - 3500) Group II (n = 28) = 950 (800 -1700) p = ns	**Limitations** n = 50/83 (60%) in group I had general anaesthesia compared to n = 2/28 (7%) in group II **Other information**

				Blood transfusion n (%) Group I (n = 83) = 6 (7%) Group II (n = 28) = 0 (0%) p = ns Surgical injuries n (%) Group I (n = 83) = 10 (12%) Group II (n = 28) = 1 (4%) p = ns Uterine rupture n (%) Group I (n = 83) = 5 (6%) Group II (n = 28) = 0 (0%) p = ns Caesarean hysterectomy n (%) Group I (n = 83) = 2 (2.5%) Group II (n = 28) = 0 (0%) p = ns Neonatal outcomes Apgar score at 1 min ≤ 3 n (%) Group I (n = 83) = 11 (13%)	

				Group II (n = 28) = 1 (3.6%) p = ns <u>Apgar score at 1 min 4-6 n (%)</u> Group I (n = 83)= 22 (27%) Group II (n = 28) = 2 (7%) p = ns <u>Apgar score at 1 min ≥ 7 n (%)</u> Group I (n = 83)= 50 (60%) Group II (n = 28) = 25 (89.4%) p = 0.009 <u>Apgar score at 5 min < 7 n (%)</u> Group I (n = 83) = 8 (9.5%) Group II (n = 28) = 1 (3.6%) p = ns <u>Apgar score at 5 min ≥ 7 n (%)</u> Group I (n = 83)= 75 (90.5%) Group II (n = 28) = 27	

				(96.4%) p = ns <u>Apgar score at 10 min < 7 n (%)</u> Group I (n = 83) n = 2 Group II (n = 28) n = not reported <u>Apgar score at 10 min ≥ 7 n (%)</u> Group I (n = 83) n = 3 Group II (n = 28) n = not reported <u>Umbilical cord venous pH ≥ 7.20 n (%)</u> Group I (n = 83) = 69 (83%) Group II (n = 28) = 25 (89%) p = ns <u>Umbilical cord venous pH 7.17 - 7.00 n (%)</u> Group I (n = 83)= 10 (12%) Group II (n = 28) = 3 (11%) p = ns <u>Umbilical cord venous pH <</u>	

				7.00 n (%) Group I (n = 83) = 4 (5%) Group II (n = 28) = 0 (0%) p = ns Umbilical cord arterial pH ≥ 7.20 n (%) Group I (n = 83) = 60 (72%) Group II (n = 28) = 20 (71%) p = ns Umbilical cord arterial pH 7.17 - 7.00 n (%) Group I (n = 83) = 18 (22%) Group II (n = 28) = 8 (29%) p = ns Umbilical cord arterial pH < 7.00 n (%) Group I (n = 83) = 5 (6%) Group II (n = 28) = 0 (0%) p = ns Seizures n (%)	

				Group I (n = 83) = 4 (5%) Group II (n = 28) = 0 (0%) p = ns <u>Encephalopathy n (%)</u> Group I (n = 83) = 5 (6%) Group II (n = 28) = 0 (0%) p = ns <u>Admission to NICU n (%)</u> Group I (n = 83) = 21 (25%) Group II (n = 28) = 6 (21%) p = ns <u>NICU stay [days median (range)]</u> Group I (n = 83) = 13 (1 - 40) Group II (n = 28) = 9 (3 - 35) p = ns	

Caesarean Section (update)

What is the effectiveness of antibiotics given prior to clamping of the cord compared to antibiotics given after clamping of the cord during a planned or emergency caesarean section?

Bibliographic details	Number of Participant Participant Characteristics	Intervention characteristics	Outcome measures	Quality Assessment	Reviewer comment
Authors Nokiani,F.A., Akbari,H., Rezaei,M. **Year of publication** 2009 **Study location** Iran **Ref ID** 57298 **Aim of study** To determine whether cefazolin administration prior to skin incision was superior to cefazolin administration at the time of cord clamping for prevention of post-caesarean maternal and neonatal infectious morbidity **Study type** Randomised controlled study	**Inclusion Criteria** Women with singleton pregnancies delivered by caesarean sections (CS) performed between 8am and 2pm each working day, between February 2007 and March 2008. Therefore, these were mostly elective CS, although some emergency cases were included. **Exclusion Criteria** Previous CS Confirmation of any systemic diseases such as diabetes mellitus, hypertension, immune compromised disease, coagulation disorders, heart or renal failure. Febrile state Greater than 18 hours duration since amniotic rupture of membranes	**Intervention** 2g IV cefazolin in 50ccl normal saline given at 30-60 minutes prior to skin incision and 2g cephazolin given 6 hours after operation. The intervention was performed by one of two investigators; the other investigator performed follow up of women and neonates. **Comparison** 2g IV cefazolin in 50ccl normal saline given at cord clamp and 2g cephazolin given 6 hours after operation. The intervention was performed by one of two investigators; the other investigator performed follow up of women and neonates.	**Maternal outcomes** Follow up of women and neonates was performed by one of two investigators; the other investigator performed the intervention. Outcomes were assessed by a single obstetrics and gynaecology resident following caesarean section. 1) Surgical site opening Definition: wound dehiscence before incision intervention group = 0/196 (0%) after clamping comparison group = 1/91 (1.1%) p value = not estimable 2)Total maternal fever before incision intervention group = 10/196 (5.1%) after clamping comparison group = 3/91 (3.3%) p value = 0.761 3) Maternal fever at day 2 before incision intervention group = 9/196 (4.6%) after clamping comparison group = 3/91 (3.3%) p value = 0.756 4) Maternal fever at day 40	Limitations Allocation concealment: Unclear Participants blinded to intervention: No Carers blinded to intervention: No Investigators blinded to intervention: Unclear, single assessor Number of participants not completing treatment: None Number of participants with no available outcome data: None Selective outcome reporting: No Any other limitations: All subjects received 2g cefazolin 6 hours postoperatively (tend to reduce effect size), significantly more women undergoing elective surgery in the "before incision" intervention group (179/196, 91.3%) compared to the "post clamping" comparison group (74/91, 81.3%) (p = 0.015) Indirectness Population: None Intervention: None	**Funding** Not reported **Other information** Informed consent given by women: Yes Sample size calculation: Not reported Ethics board permission: Medical Ethics Committee of Kermanshah University of Medical Sciences

	Baseline Characteristics At baseline, there were no significant differences between intervention and comparison groups for mean age, distribution by age group, mean parity, distribution of number of previous births, BMI (range 19-28kg/m^2) and fetal gestational age (at least 37 weeks). There were significantly more women undergoing elective surgery in the "before incision" intervention group (179/196) compared to the "post clamping" comparison group (74/91) (p = 0.015) During surgery, all women received general anaesthesia. **Intervention Group** N = 196 **Comparison Group** N = 91		before incision intervention group = 1/196 (0.5%) after clamping comparison group = 0/91 (0%) p value = 1.0 5) Endometritis Definition: fever, open cervix on vaginal examination and vaginal bleeding before incision intervention group = 0/196 (0%) after clamping comparison group = 0/91 (0%) **Neonatal outcomes** Follow up of women and neonates was performed by one of two investigators; the other investigator performed the intervention. Outcomes were assessed by a trained nurse on days 1, 3 and 7. Sepsis work up was performed by well-orientated paediatrician. 1) Total neonatal sepsis before incision intervention group = 4/196 (2.0%) after clamping comparison group = 1/91 (1.1%) p value = 1.0 (NCC calculated p = 0.67) 2) Total need for NICU before incision intervention group = 5/196 (2.6%) after clamping comparison group = 1/91 (1.1%) p value = 0.668 3) Newborn hospitalisation (days) before incision intervention group = 2.99± 0.07, n=196 after clamping comparison group = 2.99± 0.11, n=191 p value = 0.578	Comparison: None Outcomes assessed: None Imprecision No statistically significant differences between treatment and comparison groups for any maternal or neonatal outcome	

Bibliographic details	Number of Participant Participant Characteristics	Intervention characteristics	Outcome measures	Quality Assessment	Reviewer comment
Authors Sullivan,S.A., Smith,T., Chang,E., Hulsey,T., Vandorsten,J.P., Soper,D. **Year of publication** 2007 **Study location** USA **Ref ID** 57285 **Aim of study** To determine whether the administration of cefazolin prior to skin incision was superior to administration at the time of umbilical cord clamping for the prevention of post-caesarean infectious morbidity **Study type** Randomised controlled study	**Inclusion Criteria** Women were eligible for inclusion if the estimated fetal gestational age was > 24 weeks and caesarean delivery was required at the tertiary care center **Exclusion Criteria** Cephalosporin allergy Gestational age < 18 weeks Exposure to any antibiotic within 1 week of delivery Need for an emergent caesarean delivery **Baseline Characteristics** At baseline, there were no significant differences between the intervention and comparison groups for mean maternal age, mean maternal weight, parity, race, Medicaid cover, premature delivery (less than 37 weeks, 30/175 [17%] vs. 46/182 [25%]; p=0.08), mean fetal gestational age (37.5 ± 2.8 vs. 37 ± 3.1; p=0.11) and birthweight.	**Intervention** 1g IV cefazolin in 50cc normal saline given at least 15 minutes prior to skin incision and 50cc IV normal saline given at time of cord clamping Infusion bags including cefazolin or placebo were identical in appearance Surgery performed by resident physicians, giving a longer than average surgery time (infection risk factor) **Comparison** 50cc IV normal saline given at least 15 minutes prior to skin incision and 1g IV cefazolin in 50cc normal saline given at time of cord clamping Infusion bags including cefazolin or placebo were identical in appearance Surgery performed by resident physicians giving a	**Maternal outcomes** 1) Total infectious morbidity Includes endomyometritis, wound infection, haematoma/seroma, pyelonephritis and pneumonia (definitions given) before incision intervention group = 8/175 (4.5%) after clamping comparison group = 21/182 (11.5%) RR 0.4 (95% CI 0.18 to 0.87) (NCC calculated RR 0.39) Adjusted OR 0.35 (95% CI 0.14 to 0.82) OR adjustment made during logistic regression for 6 unspecified demographic and clinical variables associated with infectious risk. 2) Wound infection Definition: purulent discharge, erythema and induration of the incision site before incision intervention group = 5/175 (3%) after clamping comparison group = 10/182 (5%) RR 0.52 (95% CI 0.18 to 1.5) Adjusted OR 0.4 (95% CI 0.14 to 1.3) OR adjustment made during logistic regression for 6 unspecified demographic and clinical variables associated with infectious risk. 3) Endomyometritis Definition: maternal fever greater than 100.4° F on two separate occasions, along with fundal tenderness, tachycardia or leukocytosis	Limitations Allocation concealment: Yes, random number table used by pharmacy staff to generate sequence Participants blinded to intervention: Yes Carers blinded to intervention: Yes Investigators blinded to intervention: Yes Number of participants not completing treatment: 8 (3 from intervention group, 5 from comparison group) Number of participants with no available outcome data: None, data found for all treatment non-completers Selective outcome reporting: No Any other limitations: No Indirectness Population: Tertiary center for high risk group (see baseline characteristics) Intervention: None Comparison: None Outcomes assessed: None - definitions given for outcomes assessed and relevant Imprecision Statistically significant benefit of	**Funding** Department of Obstetrics and Gynaecology Research Foundation, Medical University of South Carolina **Other information** Informed consent given by women: Yes Sample size calculation: Power = 0.80, α = 0.05 requires 174 subjects in each arm to detect a 50% decrease in overall infectious morbidity for subjects given pre-operative antibiotic prophylaxis Ethics board permission: Institutional

	There were no significant differences between the intervention and comparison groups for the following obstetric variables : indications for caesarean section, diabetes, multiple gestation, pre-eclampsia, estimated blood loss, ROM time, internal monitors, subcutaneous drain insertion and operative time. The author notes that, compared to the general population, the study population (from a tertiary care centre) was at higher risk. Specifically, women were more obese, and more likely to have diabetes, pre-term delivery, multiple gestation and be of a minority ethnic group. Treatment effects might be diminished in a lower risk group. **Intervention Group** N = 175 mothers **Comparison Group** N = 182 mothers	longer than average surgery time (infection risk factor)	before incision intervention group = 2/175 (1%) after clamping comparison group = 10/182 (5%) RR 0.2 (95% CI 0.15 to 0.94) (NCC calculated RR 0.208) Adjusted OR 0.22 (95% CI 0.05 to 0.9) OR adjustment made during logistic regression for 6 unspecified demographic and clinical variables associated with infectious risk. **Neonatal outcomes** 1) Sepsis Definition: a positive blood culture before incision intervention group = 6/185 (3%) after clamping comparison group = 7/194 (3%) p value = 0.99 2) Number of NICU admissions Determined by staff neonatologists blinded to group assignment before incision intervention group = 25/185 (13.5%) after clamping comparison group = 33/194 (17%) p value = 0.40 3) Mean number of days in NICU Determined by staff neonatologists blinded to group assignment before incision intervention group = 14.2 ± 15.8, n = 185 after clamping comparison group = 19.7 ± 24.9, n = 194 p value = 0.01 4) Length of stay Unit of measurement unspecified, determined by staff neonatologists blinded to group assignment.	pre-clamp antibiotics for maternal outcomes Statistically significant benefit of pre-clamp antibiotics to reduce mean number of days in NICU No other statistically significant differences were found for other neonatal outcomes	Review Board at the Medical University of South Carolina and the research division of the Department of Obstetrics and Gynaecology (approval #11120 Jan 2003)

			before incision intervention group = 6.6 ± 9.9, n = 185 after clamping comparison group = 8.5 ± 15.8, n = 194 p value = 0.17 5) Intermediate admission No definition reported, determined by staff neonatologists blinded to group assignment. before incision intervention group = 35/185 (19%) after clamping comparison group = 32/194 (16.4%) p value = 0.65 6) Sepsis workup before incision intervention group = 35/185 (19%) after clamping comparison group = 36/194 (18.5%) p value = 0.96		

Bibliographic details	Number of Participant Participant Characteristics	Intervention characteristics	Outcome measures	Quality Assessment	Reviewer comment
Authors Thigpen,B.D., Hood,W.A., Chauhan,S., Bufkin,L., Bofill,J., Magann,E., Morrison,J.C. **Year of publication** 2005 **Study location** USA **Ref ID** 57297 **Aim of study** To determine whether the timing of prophylactic antibiotics at caesarean delivery influences maternal/neonatal infectious morbidity **Study type** Randomised controlled study	**Inclusion Criteria** Women in active labour who subsequently required a caesarean section Women with GBS were given aqueous penicillin 5 million units IV then 3 million units q 4 hours **Exclusion Criteria** Acute chorioamnionitis Allergy to penicillin or cephalosporins Caesarean section without labour Administration of antibiotics in the previous 2 week prenatal period Vaginal birth before caesarean section performed 44/346 women were excluded prior to randomisation **Baseline Characteristics** At baseline, there were no significant differences between the intervention and comparison groups in age, race, gestational age nulliparity, parity, cervical ripening, induction and cervical dilation. Perioperatively, there were	**Intervention** 2g IV cefazolin given before skin incision and IV placebo given just after cord clamping **Comparison** IV placebo given before skin incision and 2g IV cefazolin given just after cord clamping	**Maternal outcomes** 1) Wound infection Definition: tenderness with wound dehiscence, breakdown of surgical edges, and/or purulent drainage with or without an elevated maternal temperature before incision intervention group = 6/153 after clamping comparison group = 8/149 RR 0.84 (95% CI 0.45 to 1.55) (NCC calculated RR 0.73 [95% CI 0.25 to 2.05]) 2) Endometritis Definition: maternal temperature ≥ 100.4°F on 2 separate occasions 6 hours apart, exclusive of the first 12 hours following surgery accompanied by uterine tenderness and/or purulent or foul smelling lochia before incision intervention group = 12/153 after clamping comparison group = 22/149 RR 0.67 (95% CI 0.42 to 1.07) (NCC calculated RR 0.52 [95% CI 0.26 to 1.01]) **Neonatal outcomes** 1) Total infectious morbidity Includes suspected sepsis, sepsis, pneumonia, UTI, meningitis, and viral syndrome. Definitions given. before incision intervention group = 20/153 after clamping comparison group = 21/149 RR 0.96 (95% CI 0.68 to 1.34) 2) Sepsis	Limitations Allocation concealment: Yes, pharmacy controlled Participants blinded to intervention: Yes Carers blinded to intervention: Yes Investigators blinded to intervention: Yes Number of participants not completing treatment: 44 women excluded prior to randomisation Number of participants with no available outcome data: None Selective outcome reporting: No Any other limitations: Indirectness Population: Population at high risk of infection Intervention: None Comparison: None Outcomes assessed: None Imprecision There were no statistically significant differences between treatment and comparison groups for any maternal or neonatal outcome	**Funding** Not reported **Other information** Informed consent given by women: Yes Sample size calculation: Power = 0.08 to detect a 10% difference between the 2 groups with 300 women in total. This was attained due to endometritis and wound infection rates being 50% higher than expected Ethics board permission: Institutional Review Board for the University of Mississippi Medical Centre (IRB #2000-112, Nov 28 2000)

	no significant differences between the intervention and comparison groups for cervical dilation at CS, other antibiotic prophylaxis before CS, general anaesthesia, indications for CS, operative time, estimated blood loss, pre- and post-operative haematocrit. There was a significant difference between groups in the time since membranes had ruptured (7.2 hrs±5.8 " skin incision group" vs. 8.6hrs ±6.4 "post clamp" group; p=0.045). Additional IV fluids were given at the discretion of the attending anaesthetist, but no other antibiotics were given unless a postoperative infection was diagnosed. **Intervention Group** N = 153 **Comparison Group** N = 149		Determined by a positive blood culture. before incision intervention group = 7/153 after clamping comparison group = 7/149 RR 0.96 (95% CI 0.58 to 1.69) (NCC calculated RR 0.97 [95% CI 0.35 to 2.70]) 3) NICU admission before incision intervention group = 20/153 after clamping comparison group = 21/149 RR 1.28 (95% CI 0.91 to 1.79) (NCC calculated RR 0.92 [95% CI 0.52 to 1.63])		

Bibliographic details	Number of Participant Participant Characteristics	Intervention characteristics	Outcome measures	Quality Assessment	Reviewer comment
Authors Yildirim,G., Gungorduk,K., Guven,H.Z., Aslan,H., Celikkol,O., Sudolmus,S., Ceylan,Y. **Year of publication** 2009 **Study location** Turkey **Ref ID** 57299 **Aim of study** To determine whether the timing of antibiotic prophylaxis at caesarean delivery influences maternal and neonatal infectious morbidity **Study type** Randomised controlled study	**Inclusion Criteria** Women undergoing elective caesarean section during June 2007 and December 2007 in a tertiary care centre (without any exclusion criteria) **Exclusion Criteria** Use of antibiotics in the previous 24 hours Pathology needing treatment with antibiotics Pre-existing maternal disease such as diabetes, collagen vascular disease, or immune system problems Chorioamnionitis Fever on admission Need for transfusion before or during CS Preterm CS **Baseline Characteristics** At baseline, there were no significant differences between intervention and comparison groups in age, gravidity, parity, fetal gestational age, indications	**Intervention** 1g IV cefazolin in 50cc normal saline given 10 to 45 minutes prior to skin incision **Comparison** 1g IV cefazolin in 50cc normal saline post clamping	**Maternal outcomes** 1) Total infectious morbidity No definition given before incision intervention group = 17/194 (8.8%) after clamping comparison group = 23/195 (11.8%) p value = 0.32 RR 1.39 (95% CI 0.71 to 2.69) 2) Overall infectious morbidity Includes febrile morbidity, wound infection, endometritis, UTI, mastitis, septic pelvic thrombophlebitis, and RTI before incision intervention group = 23/194 (11.9%) after clamping comparison group = 27/195 (13.8%) p value = 0.65 RR 1.19 (95% CI 0.65 to 2.16) 3) Febrile morbidity Definition: persistent fever of greater than 38°C for at least 24 hours after surgery, not associated with lower abdominal or pelvic tenderness and with no signs of infection elsewhere. before incision intervention group = 9/194 (4.6%) after clamping comparison group = 7/195 (3.6%) p value = 0.60 RR 0.76 (95% CI 0.29 to 2.09) 4) Wound infection	Limitations Allocation concealment: Yes Participants blinded to intervention: No Carers blinded to intervention: Unclear Investigators blinded to intervention: Unclear Number of participants not completing treatment: 11 (6 in intervention group, 5 in comparison group) Number of participants with no available outcome data: 11 Selective outcome reporting: No Any other limitations: Indirectness Population: None Intervention: None Comparison: None Outcomes assessed: None Imprecision No statistically significant differences were found between the two treatment groups for any maternal or neonatal outcome	**Funding** Not reported **Other information** Informed consent given by women: Yes Sample size calculation: Power = 80%, α = 0.05, 197 women needed to detect a 50% difference in postoperative infections Ethics board permission: Not reported

	for CS or BMI. Perioperatively, there were no significant differences between intervention and comparison groups for pre- or post-operative haematocrit, pre- or post-operative haemoglobin, estimated blood loss, pre-operative temperature or operative time. **Intervention Group** N = 194 **Comparison Group** N = 195		Definition: erythema, swelling, discharge or tenderness before incision intervention group = 6/194 (3.1%) after clamping comparison group = 8/195 (4.1%) p value = 0.59 RR 1.34 (95% CI 0.45 to 3.93) 5) Endometritis Definition: body temperature of greater than 38.5°C with concomitant foul smelling discharge or abnormally tender uterus on bimanual examination before incision intervention group = 5/194 (2.6%) after clamping comparison group = 7/195 (3.6%) p value = 0.56 RR 1.40 (95% CI 0.43 to 4.51) 6) Septic pelvic thrombophlebitis No definition given before incision intervention group = 0/194 (0%) after clamping comparison group = 0/195 (0%) 7) UTI MSU culture before incision intervention group = 3/194 (1.5%) after clamping comparison group = 5/195 (2.6%) p value = 0.47 RR 1.67 (95% CI 0.39 to 7.11) 8) RTI No definition given before incision intervention group = 0/194 (0%)		

			after clamping comparison group = 0/195 (0%) **Neonatal outcomes** 1) Sepsis No definition given before incision intervention group = 9/201 (4.4%) after clamping comparison group = 13/198 (6.3%) p value = 0.38 RR 1.47 (95% CI 0.61 to 3.53) 2) Number of NICU admissions before incision intervention group =4/201 (2%) after clamping comparison group = 7/198 (3.4%) p value = 0.35 RR 1.77 (95% CI 0.51 to 6.16) 3) Mean number of days in NICU before incision intervention group = 8.25 ± 2.62, n=201 after clamping comparison group = 5.66 ± 2.58, n=198 p value = 0.16		

Bibliographic details	Number of Participant Participant Characteristics	Intervention characteristics	Outcome measures	Quality Assessment	Reviewer comment
Authors Wax,J.R., Hersey,K., Philput,C., Wright,M.S., Nichols,K.V., Eggleston,M.K., Smith,J.F. **Year of publication** 1997 **Study location** USA **Ref ID** 57294 **Aim of study** To test the hypothesis that a single 1g dose of cefazolin administered preoperatively is no more effective than one administered after cord clamping in preventing post caesarean infections **Study type** Randomised controlled study	**Inclusion Criteria** Women undergoing caesarean section if in labour with a single fetus of at least 37 weeks gestation, recruited over the course of 12 months. **Exclusion Criteria** Penicillin or cephalosporin allergy Antibiotic use within 2 weeks of delivery Temperature ≥37.8°C in labour Insulin dependent diabetes mellitus HIV infection Chronic glucocorticoid use Multiple gestation. **Baseline Characteristics** The women in the two groups were similar for maternal age, race and weight. The two groups were also similar for the following intrapartum and surgical	**Intervention** Pharmacy prepared 50ml intravenous infusion for each patient containing 1g of cefazolin in 0.9% saline identical in appearance **Comparison** Pharmacy prepared 50ml intravenous infusion for each patient containing 0.9% saline	**Maternal outcomes** 1) Total infectious morbidity Definition: wound infection, endometritis, intra-abdominal abcess formation, septic pelvic thrombophlebitis, pneumonia or UTI before incision intervention group = 2/49 after clamping comparison group = 3/41 2) Wound infection Definition: incisional erythema, tenderness, warmth, with or without purulent drainage before incision intervention group = 1/49 after clamping comparison group = 2/41 3) Endometritis Definition: fever reaching 100.4°F on two occasions at least 6 hours apart or a single fever ≥ 101°F outside the first 24 hours following delivery, associated with uterine or parametrial tenderness, malodorous or purulent lochia or leucocytosis. before incision intervention group = 1/49 after clamping comparison group = 1/41 4) Septic pelvic thrombophlebitis No definition given. before incision intervention group = 0/49	Limitations Allocation concealment: Yes, computer generated randomisation code used by pharmacy staff to generate sequence Participants blinded to intervention: Yes Carers blinded to intervention: Yes Investigators blinded to intervention: Yes Number of participants not completing treatment: None Number of participants with no available outcome data: None Selective outcome reporting: No Any other limitations: No Indirectness Population: Military hospital Intervention: None Comparison: None Outcomes assessed: None - definitions given for outcomes assessed and relevant Imprecision No statistically significant differences were found for maternal or neonatal outcomes	**Funding** Supported by the Bureau of Medicine and Surgery Clinical Investigation Program P93-00000-029 **Other information** Study size calculation: The study was powered for the primary outcome of endometritis. Given a 20% post-caesarean rate of endometritis, a sample size of 88 subjects would provide 80% power to detect a 25% difference in post-operative infections with $\alpha = 0.05$. Written and verbal consent given by

	characteristics: number of women with ruptured membranes, duration of rupture, number of women on whom internal monitors were used, number of vaginal examinations, pre-operative haematocrit, general anaesthetic, vertical uterine incision, manual placental delivery, duration of surgery, time from infusion to incision, and time from incision to second incision. The group receiving cefazolin preoperatively had a significantly longer mean duration of labour (13.0 ±7.2 hours, n = 49 vs. 9.9 ± 7.3 hours, n = 41; p = 0.03) and internal monitors were used for significantly longer (11.1 ± 4.2, n = 49 vs. 9.3 ± 4.7, n = 41; p = 0.04) when compared to the group receiving antibiotics after cord clamping. Their babies were similar for gestational age at delivery, birth weight, newborn 1 and 5 minutes Apgar scores < 7, umbilical arterial cord pH < 7.2 and intensive care admissions.		after clamping comparison group = 0/41 5) UTI No definition given. before incision intervention group = 0/49 after clamping comparison group = 0/41 **Neonatal outcomes** 1) Neonatal sepsis before incision intervention group = 0/49 after clamping comparison group = 0/41 2) Neonatal sepsis workup before incision intervention group = 6/49 after clamping comparison group = 2/41 p = 0.28 3) Neonatal pneumonia Definition: based on clinical and radiographic findings before incision intervention group = 2/49 after clamping comparison group = 0/41		participants Ethical approval given by hosting organisation

	Intervention Group n = 49 **Comparison Group** n = 41				

Bibliographic details	Number of Participant Participant Characteristics	Intervention characteristics	Outcome measures	Quality Assessment	Reviewer comment
Authors Gordon,H.R., Phelps,D., Blanchard,K. **Year of publication** 1979 **Study location** USA **Ref ID** 57293 **Aim of study** To resolve whether antibiotics can be started during surgery or immediately after cord clamping with the same decrease in maternal postoperative morbidity as when started pre-operatively, and whether the antibiotics have an effect on neonatal morbidity, including nursery stay **Study type** Some other intervention type	**Inclusion Criteria** Starting November 1976, all obstetric patients undergoing caesarean section at 2 Los Angeles medical centres were considered for inclusion. These were primarily indigent cases. **Exclusion Criteria** Exclusions were: penicillin allergy, temperature > 38°C prior to caesarean section, women already on prescribed antibiotics and those who declined to participate. The ethical board did not permit inclusion of emergency caesarean sections (due to anticipated difficulties with getting consent from women) and this resulted in sections for fetal distress and bleeding generally being excluded. For this review, a third treatment group who received no antibiotics is not reported. **Baseline Characteristics**	**Intervention** 1g of ampicillin given intravenously 15 - 30 minutes prior to anaesthetic induction and repeated 2 and 8 hours postoperatively for a total of 3 doses **Comparison** 1g ampicillin given intravenously immediately on clamping the umbilical cord and repeated 2 and 8 hours postoperatively for a total of 3 doses	**Maternal outcomes** 1) Total infectious morbidity Definition: includes endometritis, urinary tract infection and/or wound infection, with a positive culture. Inclusion of other infections not confirmed. before incision intervention group = 4/38 (10.6%) after clamping comparison group = 3/40 (7.3%) p = NS 2) Wound infection Definition: positive culture before incision intervention group = 0/38 after clamping comparison group = 1/40 p = NS 3) Endometritis Definition: positive culture before incision intervention group = 4/38 after clamping comparison group = 2/40 p = NS 4) Mean length of maternal hospital stay (days) before incision intervention group = 5.1, n = 38 after clamping comparison group = 4.7, n = 40 p = NS **Neonatal outcomes**	Limitations Allocation concealment: Unclear, randomisation performed, but method not stated Participants blinded to intervention: No Carers blinded to intervention: Yes Investigators blinded to intervention: Unclear, not stated Number of participants not completing treatment: None Number of participants with no available outcome data: None Selective outcome reporting: No Any other limitations: Only elective caesarean sections are included. Data not reported for neonatal outcomes because the number in each treatment group is not specified Indirectness Population: None Intervention: None Comparison: None Outcomes assessed: None - definitions given for outcomes assessed and relevant Imprecision No statistically significant differences were found for any maternal outcome	**Funding** Not stated **Other information** Ethical approval given by "The Human Subject Protection Committee" for inclusion of elective caesarean sections only No power calculation given

	64 women were cared for at the San Bernardino County Medical Centre and 50 were cared for at the University of California at Los Angeles Medical Centre. The author reports "acceptable randomisation" for baseline characteristics of indication for caesarean section (CPD, breech, repeat caesarean section, failed induction, bleeding, fetal distress), meconium, blood transfusion, duration of labour, duration of membranes rupture and duration of internal monitoring. No risk ratios or p values provided. **Intervention Group** N = 38 **Comparison Group** N = 40		None reportable, due to the numbers of participants in each group not being specified.		

Caesarean Section (update)

What are the risks and benefits of planned caesarean section compared with planned vaginal birth for both women and babies in women who have had a previous caesarean section?

Bibliographic details	Number of Participant Participant Characteristics	Intervention characteristics	Outcome measures to be used	Results	Reviewer comment
Authors Cahill,A.G., Tuuli,M., Odibo,A.O., Stamilio,D.M., Macones,G.A. **Year of publication** 2010 **Country of publication** USA **Ref ID** 65899 **Sub-type** Retrospective cohort study **Aim of study** To estimate the rate of success and risk of maternal morbidities in women with three or more caesareans who attempted vaginal birth after caesarean (VBAC)	**Inclusion Criteria** Women with at least one prior caesarean delivery **Exclusion Criteria** Women without a prior low transverse uterine incision **Demographics - Total** Total n = 25005 with a history of prior CS (860/25,005 had at least 3 CS) **Cases** n = 771/860 elected for a repeat CS **Controls** n = 89/860 had planned VBAC	**Experimental** Women who had ≥3 prior CS and elected for a repeat caesarean n=771 **Control** Women with attempted VBAC after ≥3 caesareans n = 89 Women attempted VBAC after one or two prior caesareans n =13,617 (2 prior CS = 1082, 1 prior CS = 12,535) **method** Between 1996 and 2000, the maternal risks associated with VBAC in women with at least one prior CS were studied in 17 centres in the north eastern USA. This study is a secondary analysis of women with the history of three or more caesareans who attempted VBAC. Women were identified for inclusion using	**Outcomes** Uterine rupture (defined a priori as full thickness disruption of the uterine scar, identified at laparoscopy) Bladder injury Surgical injury Transfusion (need for transfusion) Fever (determined by the caring physician, temperature of > 38.0°C) **Raw Data** **Summary Data**	**Results** Women with ≥3 prior CS n = 860/25,005 (n = 89 planned VBAC, n = 771 elected for repeat CS): n=748/860 (87%) had 3 prior CS n = 97/860 (11%) had 4 prior CS n = 13/860 (1.5%) had 5 prior CS n = 2/860 (0.2%) had 6 prior CS Successful VBAC attempt (%): Women with ≥3 prior CS = 79.8% Women with 2 prior CS = 74.6% Women with 1 prior CS = 75.5%	**Funding** Supported by a grant from NICHD **Quality Items** **Other information** There were no significant differences between the VBAC and elective repeat caesarean groups with respect to gravidity, diabetes, hypertension and twin gestation. Women in attempted VBAC group were significantly younger, delivered about one week earlier, were more likely to be of black race and were less likely to deliver at a university hospital. When compared with those who had one prior CS, women with ≥3 prior CS and attempted VBAC had a significantly higher rate of preterm birth (<34), had significantly higher rate of alcohol and tobacco use, were more likely to be of black race

		International Classification of Disease, Ninth Revision (ICD - 9) for 'previous caesarean delivery, delivered'. Charts were extracted by trained research nurses using close ended extraction tools.		Successful VBAC attempt ≥3 prior vs. 1 prior CS: Unadjusted RR 1.06 (95% CI 0.95 to 1.17) Adjusted OR* 1.40 (95% CI 0.81 to 2.41) p = 0.22 Successful VBAC attempt ≥3 prior vs. 2 prior CS: Unadjusted RR 1.07 (95% CI 0.96 to 1.19) Adjusted OR* 1.49 (95% CI 0.85 to 2.60) p = 0.16 <u>VBAC (≥3) vs. Repeat CS :</u> <u>Uterine rupture = n/total (%)</u> VBAC = 0/89 (0) Repeat CS = 0/771 (0) p = NC <u>Bladder injury = n/total (%)</u> VBAC = 0/89 (0) Repeat CS = 12/771 (1.6) p = 0.24 <u>Surgical injury= n/total (%)</u> VBAC = 0/89 (0)	and less likely to deliver at a university hospital. No significant difference was observed between the two groups with respect to maternal age, post term birth, diabetes, prior vaginal delivery, induction and oxytocin exposure.

				Repeat CS = 7/771 (0.9) p = 0.44 <u>Transfusion (need for transfusion) = n/total (%)</u> VBAC = 2/89 (2.2) Repeat CS = 17/771 (2.2) Unadjusted RR 1.02 (95% CI 0.24 to 4.34) p = 0.98 <u>Fever= n/total (%)</u> VBAC = 14/89 (15.7) Repeat CS = 121/771 (15.7) p = 0.99 Unadjusted RR 1.00 (95% CI 0.60 to 1.67) <u>VBAC ≥ 3 prior CS vs. VBAC 1 prior CS</u> <u>Transfusion ≥ 3 prior CS = 2.2%</u> <u>Transfusion 1 prior CS = 0.7%</u> Adjusted OR*: too few events to perform adjusted	

				analysis p = 0.10 <u>Fever ≥ 3 prior CS = 15.7%</u> <u>Fever 1 prior CS = 9.5%</u> Adjusted OR** 1.50 (95% CI 0.50 to 4.56) p = 0.47 <u>VBAC ≥ 3 prior CS vs. VBAC 2 prior CS</u> <u>Transfusion ≥ 3 prior CS = 2.2%</u> <u>Transfusion 2 prior CS = 0.9%</u> Adjusted OR: too few events to perform adjusted analysis p = 0.25 <u>Fever ≥ 3 prior CS = 15.7%</u> <u>Fever 2 prior CS = 8.9%</u> Adjusted RR** 1.80 (0.59 - 5.51) p = 0.30 *adjusted for prior vaginal delivery, induced labour,	

				oxytocin exposure, or diabetes (any type) ** adjusted for prior vaginal delivery or black vs. non black race **Results 2** **Results 3**	

Bibliographic details	Number of Participant Participant Characteristics	Intervention characteristics	Outcome measures to be used	Results	Reviewer comment
Authors Guise,J.M., Eden,K., Emeis,C., Jonas,D.E., Morgan,L.C., Reuland,D., Gilchrist,M., Finkelstein,J., Wiswanathan,M., Lohr,K.N., Lyda-McDonald,B. **Year of publication** 2010 **Country of publication** Developed countries **Ref ID** 66341 **Sub-type** **Aim of study** To examine the published literature on vaginal birth after caesarean (VBAC) and review the trends and incidence of VBAC, maternal benefits and harms, infants benefits and harms and relevant factors influencing each.	**Inclusion Criteria** Full text studies with data on women with a prior caesarean delivery eligible for a TOL (trial of labour) or ERCD (elective repeat caesarean delivery) and maternal and/or infant outcomes. Studies were included if: They had 10 or more participants, represented the target population, and reported data on benefits and harms to the mother or infant. Studies of women with prior caesarean delivery who delivered preterm and at term were included (for maternal outcomes). For neonatal outcomes, studies which reported outcomes for term babies (≥ 37 weeks) were included. **Exclusion Criteria** Studies of women without a prior caesarean delivery, nulliparous patients, breech delivery, exclusive focus on preterm delivery, low birth weight, studies of pregnancies including twins or abortions, studies begun or published	**Experimental** Elective Repeat Caesarean Delivery (ERCD) **Control** Trial of labour (TOL) No studies of health outcomes measured "intended" vaginal birth after caesarean (VBAC) therefore primary comparison groups are TOL and ERCD. **method**	**Outcomes** **Raw Data** Studies were included in the synthesis if they achieved a good or fair quality rating. Two reviewers independently rated the quality of the RCTs, cohorts, case control studies and case series studies using valid tools specific to different study designs. The strength of available evidence was assessed using the method described in the Methods Reference Guide for Effectiveness and Comparative Effectiveness Reviews (Similar to the GRADE system). Meta analysis was conducted for homogenous studies using MetaAnalyst (Beta 3.13) and STATA 10.1 (Stata Corp). A random effects model was used to combine the studies while incorporating variations among studies. Statistical heterogeneity assessed using the standard Q test and the chi square statistic. **Summary Data** Maternal outcomes:	**Results** Maternal outcomes: <u>Mortality rate</u> <u>Any gestational ages (GAs) n = 12 studies:</u> <u>Overall:</u> Total n = 24/402,883 <u>ERCD</u>: n = 19/229635 13.4 per 100,000 (95% CI 4.3 to 41.6 per 100,000) Heterogeneity p = 0.521 <u>TOL</u> n = 5/167,220 3.8 per 100,000 (95% CI 0.9 to 15.5 per 100,000) Heterogeneity Fisher exact test p = 0.443 RR 2.76 (95 % CI 1.07 to 714) Adjusted risk difference = 9	**Funding** Supported by the office of Medical Applications of Research (OMAR) at the National Institute of Health and the Agency for Healthcare Research and Quality (AHRQ) **Quality Items** **Other information** The range of ToL and VBAC rates were large (28 - 82% and 49 - 87% respectively). In 43 US based studies, 74% of women who had a ToL gave birth vaginally: <u>Overall studies:</u> n = 67 (14 prospective cohort studies + 53 retrospective cohort studies) <u>Vaginal birth after caesarean rates in US studies</u> <u>Any GAs n = 30 studies</u> 0.74 (95% CI 0.71 to 0.77) <u>Term n= 13 studies</u> 0.73 (95% CI 0.70 to 0.77) <u>Vaginal birth after caesarean</u>

	before the 1980 NIH Consensus Conference on VBAC, and studies focusing on patients with particular conditions such as gestational diabetes, HIV, preeclampsia, etc. Non-English language papers, editorials, letters, studies available exclusively in abstract form, and studies of animals or cadavers were also excluded. Studies conducted in undeveloped or developing countries were excluded. For the neonatal outcomes, any studies that did not exclude cases with congenital or fetal anomalies (before or after analysis) were excluded **Demographics - Total** Relevant studies were identified from multiple searches of MEDLINE; DARE; Cochrane data base (1966 to September 2009); and from recent systematic reviews, reference lists, reviews, editorials, websites and experts. Of the 3,134 citations reviewed, 2171 met the exclusion criteria at the abstract level, 936 full text papers were retrieved and reviewed for inclusion. A total		<u>Mortality</u> All GAs n = (12 good or fair quality studies observational studies) Term studies (n = 4 good or fair quality studies observational studies) Only one of the studies stratified maternal death rates by the institution size/number of births. <u>Uterine rupture</u> Defined as a complete uterine rupture (separation through the entire thickness of the wall including visceral serosa) or incomplete uterine rupture (separation that was not completely through the entire thickness of the wall including visceral serosa) All GAs (n = 4 good or fair quality observational studies) <u>Transfusion/PPH</u> Term studies (n = 4 good or fair quality observational studies) <u>Hysterectomy</u>	less death per 100,000 (95% CI 1.6 to 11.7) from ToL group when compared to the ERCD group. <u>Term studies n= 4 studies:</u> <u>Overall:</u> n = 20/381929 <u>ERCD:</u> n = 17/225239 9.6 per 100,000 (95% CI 2.1 to 43.2 per 100,000) Heterogeneity = Fisher's exact test p = 0.013 <u>TOL:</u> n = 3/156690 1.9 per 100,000 (95% CI 0.4 to 9.5 per 100,000) Heterogeneity Fisher's exact test p = 0.443 RR 3.94 (95% CI 1.2 to 12.5; p = 0.025) Adjusted risk difference = 7 less death per 100,000 (95% CI 1.4 to 8.7) from ToL group when compared to the ERCD group.	<u>rates in non-US studies</u> <u>Any GAs n = 19 studies</u> 0.73 (95% CI 0.70 to 0.77) <u>Term n = 5 studies</u> 0.73 (95% CI 0.71 to 0.74) Studies were stratified by the year of data collection, study design, country and gestational age. No factors except "study design" were found to result in statistically significant differences. The rate of VBAC for 14 prospective studies was 73% (95% CI 71% to 77%) compared with 77% (95% CI 75% to 79%) for the 53 retrospective studies.

	of 203 full text papers met inclusion after applying paper inclusion/exclusion criteria. **Cases** **Controls**		Term studies (n = 3 good or fair quality observational studies) <u>Infection</u> All GAs (n = 10 good or fair quality observational studies) The confidence in the magnitude and direction of the body of evidence is low due to inconsistencies in definition, indirect evidence, and high risk of bias. Five studies reported on endometritis and chorioamnionitis and five other studies reported on wound and other postpartum infections. <u>Surgical injury</u> All GAs (n = 7 observational studies, 4 from same cohort of patients that reported differently on surgical injury rates) Surgical injury was defined differently between studies. <u>Length of hospital stay</u> All GAs (n = 8 good or fair quality studies observational	<u>One Canadian study stratified maternal death rate by institution size:</u> Less than 500 deliveries per year: Odds ratio TOL compared with RCD = 2.68 (95% CI 0.16 to 45.5) Higher than 500 deliveries per year: Odds ratio TOL compared with RCD = 0.16 (95% CI 0.02 to 1.29) <u>Uterine rupture rate</u> <u>All GAs n = 4 studies:</u> <u>Overall:</u> n = 154/47,202 <u>ERCD:</u> n = 6/26535 Uterine rupture rate: 0.026% (95% CI 0.009 to 0.082)	

			studies) All studies were affiliated with teaching institutions. There was significant heterogeneity among studies I^2 = 98.2%, p < 0.001 Neonatal outcomes <u>Mortality</u> Perinatal mortality: Defined as death at less than 28 days age and fetal deaths of 20 weeks or more gestation Term studies (n = 5 good or fair quality observational studies), 3 conducted in tertiary or university settings, 2 studies used population databases. Neonatal mortality: Defined as death in the first 28 days of life Term studies (n = 6 good or fair quality observational studies), 2 studies representative of academic medical centres, 2 studies representative of population database and 2 studies representative of a diversity of hospital types)	Heterogeneity Fisher exact test p = 0.421 <u>TOL:</u> n = 148/20717 Uterine rupture rate: 0.47% (95% CI 0.28% to 0.77%) Heterogeneity Fisher exact test = I^2 = 77.6% p = 0.004 RR 0.031 (95% CI 0.014 to 0.070) Adjusted risk difference = 5.1 additional ruptures per 1000 women undergoing TOL (95% CI 2.3 to 11.2) The increased risk of uterine rupture among the TOL group is largely affected by one study that included women with incisional types other than low transfer caesarean section. However the authors concluded that the contribution of incisional types to the overall data set was small, thus leaving this finding largely unexplained. None of the four studies provided details on	

			TOL = Test for heterogeneity performed based on fisher exact test: p = 0.037 <u>NICU admission</u> All GAs (n = 8 good or fair quality observational studies), inconsistency and imprecise measures, no studies defined the criteria for NICU admission <u>Sepsis</u> All GAs (n = 3 good or fair quality observational studies) <u>Neonatal respiratory morbidity</u> Term studies (n = 6 fair quality observational studies) <u>Bag and mask ventilation</u> All GAs (n = 3 good or fair quality observational) <u>Rates of transient tachypnea (TTN)</u> Term studies (n = 3 good or fair quality observational studies)	the proportion of women who underwent induction of labour. <u>Term n = 2 studies:</u> <u>Overall:</u> n = 222/34445 <u>ERCD:</u> n = 4/18195 Uterine rupture rate = 0.02% (95% CI 0.003 to 0.189) <u>ToL:</u> n = 118/16250 Uterine rupture rate = 0.70% (95% CI 0.51 to 0.96) RR 0.03 (95% CI 0.011 to 0.082) Adjusted risk difference = 6 more rupture per 1000 from ToL group when compared to the ERCD group. <u>Transfusion rate</u> <u>All GAs n = 9 studies:</u>	

			Hypoxic-ischemic encephalopathy/asphyxia (HIE) Term studies (n = 3 good or fair quality observational studies) lack of consistency in measurement presented in studies	Overall: n = 1353/401307 ERCD: n = 712/233884 Heterogeneity I^2 = 98.9%, p<0.001 TOL: n = 641/167423 Heterogeneity I^2 = 98.6%, p<0.001 RR 0.795 (95% CI 0.714 to 0.884) limited to term studies: 4 studies ERCD: n = 607/227960 Transfusion rate = 0.5% (95% CI 0.2 to 1.3 per 100) Heterogeneity I^2 = 99.3%, p < 0.001 TOL: n = 547/156690	

				Transfusion rate = 0.7% (95% CI 0.2% to 2.2%) Heterogeneity I^2 = 99.4%, p < 0.001 RR 0.76 (95% CI 0.67 to 0.85) Adjusted risk difference = 0.14% (95% CI 0.07 to 0.22) <u>PPH (rate %)</u> <u>All GAs n = 6 studies:</u> Studies were inconsistent regarding the definition of haemorrhage and outcomes measured n = not reported <u>ERCD:</u> n = not rported PPH rate = 6.82% <u>TOL:</u> n = not reported PPH rate = 2.36% All studies found a trend toward increased	

				blood loss with ERCD. However none found a statistically significant difference in PPH rates between TOL and RECD. <u>Term studies n = 1 study:</u> Low risk women were separated from high risk women based on antenatal conditions. Women in low risk group with ToL had a lower rate of PPH compared with RECD (2.36% vs. 6.82% p = ns) <u>Multiple CS (RCD) n= 3</u> Definitions of hemorrhage varied among studies. In one study among women with a prior caesarean delivery, the percentage of women with blood transfusions increased with increasing number of prior caesarean deliveries from 1.8, 2.6, 4.3, 4.6, and 14.6 percent for women with one to five or more prior caesarean deliveries,	

				respectively. The odds ratio for women with five or more caesarean deliveries was 7.6 (95% CI: 4.0 to 14.3). One study compared outcomes for women at a single institution in Israel undergoing a second versus three or more caesarean deliveries. Women were identified who experienced "excessive blood loss" of greater than 1000 mL or were transfused two or more units. Among women having their second caesarean delivery, 3.3 % (16/491) met this definition compared with 7.9 % (22/277) of those with two or more prior caesarean delivery (odds ratio 2.3; 95 percent CI: 1.1 to 4.5). One study performed a secondary analysis of a multicentre, retrospective cohort study and examined incidence of blood transfusion. In women with two	

				prior caesarean deliveries who did not attempt a TOL, 1.18 percent of 2,888 women received a transfusion (odds ratio 0.54; 95 % CI: 0.23 to 1.27). Rates of haemorrhage/transfusion were < 5 %, the risk appears to increase with increasing numbers of CS. **Results 2** Hysterectomy Rates <u>All GAs n = 8 studies:</u> <u>Overall:</u> n= 477/402,059 <u>ERCD:</u> n = 280/234349 Rate of hysterectomy = 0.28% (95% CI 0.12% to 0.67%) Hetrogeneity = Fisher exact test p < 0.001 <u>TOL:</u> n = 197/167710 Rate of hysterectomy = 0.17%	

				(95% CI 0.13 to 0.38) Heterogeneity $I^{2 =}$ 75.4%; p <0.001 RR 1.01 (95% CI 0.84 to 1.22) <u>Term only n=3 studies:</u> Total n = 422/383242 <u>ERCD:</u> n = 248/227479 Hysterectomy rate = 0.16% (95% CI 0.07% to 0.36%) Heterogeneity I^2 = 97.3%, p =0.672 <u>TOL:</u> n = 174/155763 Hysterectomy rate = 0.14% (95% CI 0.08% to 0.22%) Heterogeneity I^2 = 85.2%, p = 0.001 RR 0.97 (95% CI 0.804 to 1.184) <u>Rate of hysterectomy in women with multiple CS (n = 7 studies)</u> One study reported women	

				with ≥1 prior caesarean were significantly more likely to require hysterectomy (odds ratio 7.9; 95 percent CI: 5.8 to 10.7). Similarly, another study noted an increased risk for hysterectomy with primary caesarean (odds ratio 7.13; 95 percent CI: 3.71 to 13.7). The risk of peripartum hysterectomy for women with ≥2 prior caesareans was significantly higher (odds ratio 18.6; 95 percent CI: 7.67 to 45.4) than for women with one prior caesarean delivery (odds ratio 2.14; 95 percent CI: 1.37 to 3.33). Hysterectomy rates in one study for women undergoing a primary caesarean were 0.062%, and increased with one prior caesarean delivery to 0.735%. Women with ≥1 prior caesarean had a hysterectomy rate of 1.08%, these rates were statistically significant. One study compared women undergoing a second caesarean versus women with two or more prior caesareans. The rate of hysterectomy increased from 0.2% (1/491) to 1.1% (3/277) in the multiple caesarean group, but the	

				result was not statistically significant. One study found a similar rate of hysterectomy in women with four or more prior caesareans of 1.1% (2/170). One study noted increasing incidence of hysterectomy with increasing number of caesareans from 0.65, 0.42, 0.90, 2.41, 3.49, and 8.99% with zero to five or more prior caesareans, respectively. Women with five or more prior caesareans were 15 times more likely to require hysterectomy (odds ratio 15.2; 95 percent CI: 6.9 to 33.5), these results were statistically significant. Repeat caesarean section (RCD): One previous CS = OR 0.7 to 2.14 One and more CS = OR 1.4 to 7.9 Two or more CS = OR 3.8 to 18.6 <u>Infection</u> <u>All GAs n = 10 studies:</u>	

				Studies reported endometritis or chorioamniotitis and wound infection <u>ERCD:</u> Infection rate = 32 per 1000 (95% CI 13 - 73) Heterogeneity I^2 = 99.4%, p < 0.001 <u>TOL:</u> Infection rate = 46 per 1000 (95% CI 15 - 135) Heterogeneity I^2 = 99.7%, p < 0.001 <u>Term studies = not reported</u> <u>Multiple CS (RCD)</u> All GAs n = 4 studies: There was no uniform definition of infection. One US study reported an incidence of "febrile morbidity" of 19.2% (163/847) for women undergoing RCD, but the authors did not define febrile morbidity. Similarly, another study noted 14.1% of women with three or more prior cesareans had postoperative infections (odds ratio 0.9; 95%	

				CI: 0.5 to 1.8), but the criteria for infection were not defined. Urinary tract infection (UTI) and upper respiratory tract infection (URI) were used by one study to describe postoperative infectious complications. One study defined postpartum endometritis clinically on the absence of findings consistent with an extrauterine source. There was a statistically significant increase in endometritis with multiple caesareans (p<0.001). Based on these studies the risk of postoperative infection with multiple CSs remains unclear. <u>Multiple CS (RCD)</u> <u>Wound infection</u> All GAs n = 4 studies: One study reviewed wound infection and wound dehiscence and found no statistically significant change with multiple caesareans (p=0.09 and 0.18, respectively). Similarly, another study found no correlation between number of caesareans and wound problems. <u>Surgical injury:</u>	

				<u>All GAs n = 7 studies:</u> Four studies (4) from same cohort of patients (reported differently on surgical injury rates). None found a significant difference between ERCD and TOL for the rate of surgical injury. <u>Multiple CS n= 2 studies</u> Both studies evaluated bladder injuries. One found 1.6% of women with two or more prior caesareans had a bladder injury (4/250). Another study noted less than 0.3% of women with less than three prior caesareans experienced a bladder injury compared with 4.5% of women with five or more prior caesareans. This trend was statistically significant at p<0.001. The risk of bowel and ureteral injury with increasing number of caesareans was also statistically significant, although overall incidence was less than 1.2%. <u>Mean length of hospital stay (days)</u> <u>All GAs n = 8 studies:</u>	

				ERCD: Mean = 3.92 days (95% CI 3.56 - 4.29 days) TOL: Mean = 2.55 days (95% CI 2.34 - 2.76 days) **Results 3** Neonatal outcomes Perinatal Mortality: Term n = 5 studies: Overall: n = 118/76899 ERCD: n = 46/35,686 Mortality rate = 0.05% (95% CI 0.007% - 0.38%) ToL: n = 72/41,213 Mortality rate = 0.13% (95% CI 0.06% - 0.3%) RR 0.73 (95% CI 0.51 to 1.06)	

				Adjusted risk difference : 0.41% (95% CI 0.012% to 0.08%) Intrapartum death rate: TOL = 0.1 to 0.4 per 1000 ERCD = 0 to 0.04 per 1000 <u>Neonatal Mortality</u> <u>Term n = 6 studies</u> <u>Overall:</u> n = 91/108328 <u>ERCD:</u> n = 40/63,843 Mortality rate = 0.5% (95% CI 0.02% to 0.15%) <u>TOL:</u> n = 51/44,485 Mortality rate = 0.11% (95% CI 0.06% to 0.2%) Heterogeneity based on Fisher's exact test: p = 0.0218 RR 0.546 (95% CI 0.362 to 0.824)	

				<u>NICU admission</u> n = 8 studies (pooled data not reported) 6 of the 8 studies found no significant differences in frequency of NICU admission between TOL and ERCD One study reported the greater risk of NICU admission in infants undergoing an ERCD without labour (OR = 2.93) when compared to a successful VBAC (OR = 1.0g) <u>Sepsis</u> (pooled data not reported) n = 3 studies measured sepsis; only one study defined and measured proven sepsis. In this study, there were no differences in proven sepsis in infants born born by TOL versus ERCD. <u>Neonatal respiratory morbidity</u> n = 6 fair quality observational studies (term)	

				Bag and mask ventilation Term n = 3 studies: Overall: n = 245/2110 ERCD: n = 62/976 Rates for infants needing bag = 2.5% (95% CI 1.6% to 3.6 %) TOL: n = 183 /1134 Rates for infants needing bag= 5.5% (95% CI 3.5% to 7.6 %) Between study heterogeneity I^2 = 42.9%, Q statistic = 3.5, p = 0.1736 RR 0.39 (95 % CI 0.30 to 0.52) Adjusted risk difference (TOL vs. ERCD): 2.5% (95% CI 0.72% to 5.0%) Rates of transient tachypnea (TTN) Term n= 3 studies:	

				<u>Overall:</u> n = 617/4927 <u>ERCD:</u> n = 190/1476 Rate Of TTN = 4.2% (95% CI 1.9% to 7.3%) <u>ToL:</u> n = 427/3451 Rate of TTN = 3.6% (95% CI 0.9% to 8.0%) Between study heterogeneity I^2 = 67%, Q statistic = 6.05, p = 0.0485 RR 1.04 (0.88 to 1.21) Adjusted risk difference (ToL vs. ERCD) = -0.83% (95% CI -3.35% to 1.7%) <u>Hypoxic-ischemic encephalopathy/asphyxia (HIE)</u> <u>Term n = 3 studies:</u> Lack of consistency in the measurements presented in studies	

				Studies reported higher risk of HIE for ToL compared with ERCD but the true relationship is not clear due to the low strength evidence. Pooled result not reported <u>Apgar score</u> n = 4 studies found no differences in apgar score of > 7 at 5 minutes in infants undergoing a TOL versus ERCD. n = 3 studies found no differences in apgar score of > 7 at 5 minutes in infants born by VBAC versus RCD after a TOL.	

Bibliographic details	Number of Participant Participant Characteristics	Intervention characteristics	Outcome measures to be used	Results	Reviewer comment
Authors Tahseen,S., Griffiths,M. **Year of publication** 2010 **Country of publication** UK **Ref ID** 76986 **Sub-type** Systematic review **Aim of study** To assess the success rate and associated major complications of trial of vaginal birth after two caesarean sections (VBAC-2) compared with VBAC -1 and repeat third caesarean section (RCD)	**Inclusion Criteria** Searches were performed on the following databases: Medline (from 1966), CINAHL (from 1982), the Cochrane library (2008, Issue 3), Current Controlled Trials, HIMC database, National research register, Research Findings Electronic Register (ReFER), SIGLE (from 1980) and Biomed Central **Exclusion Criteria** Individual reports, duplicated publications and comment papers were excluded. When the studies reported details of the same cohort, only the study with the most updated, complete and relevant data were used. **Demographics - Total** n = 20 studies were appraised for quality, n=3 excluded based on the poor quality, n = 17 studies included **Cases** Women with attempted VBAC after 2 prior CS **Controls** Women with attempted VBAC after 1 prior CS and repeat third CS	**Experimental** **Control** **method** Data was extracted independently by the two authors and discrepancies were resolved by discussion. Appraisal tools STROBE were used to assess methodological quality of evidence. Meta-analyses were performed with RevMan (Review Manager, The Cochrane Collaboration). Inter-study heterogenity was tested with chi square test for heterogenity at the significant level of p = 0.10 and a random effects model was generated whenever the I^2 was > 25% using Mantel-Haenszel analysis method.	**Outcomes** VBAC 2 versus VBAC 1 Success rates Uterine rupture rates Hysterectomy rates Blood transfusion VBAC 2 versus RCS Hysterectomy rates Blood transfusion Febrile morbidity Adverse neonatal outcomes Perinatal death Asphyxial injury NICU admission rate **Raw Data** **Summary Data**	**Results** VBAC 2 versus VBAC 1 Success rate of VBAC 2 versus VBAC 1 n = 6 studies, events/numbers (%) VBAC 2 = 3274/4565 (72%) VBAC 1 = 38814/50685 (76.5%) p < 0.0001 OR 1.48 (95 % CI = 1.23 to 1.78) Heterogeneity = I^2 = 83% Uterine rupture rates in VBAC 2 versus VBAC 1 n = 5 studies VBAC 2 = 69/4320 (1.5%) VBAC 1 = 327/45197 (0.7%) OR 0.42 (95 % CI = 0.29 to 0.60) Heterogeneity I^2 = 35 % Hysterectomy rates in VBAC 2 versus VBAC 1 n = 3 studies Total number VBAC 2 = 8/4565	**Funding** Not reported **Quality Items** **Other information**

				(0.1%) Total number VBAC 1 = 42/50686 (0.08%) OR 0.29 (95 % CI 0.13 to 0.61) Heterogeneity I^2 = 0% <u>Blood transfusion rates in VBAC 2 versus VBAC 1 n = 2 studies</u> Total number VBAC 2 = 41/2057 (1.9%) Total number VBAC 1 = 358/29450 (1.2%) OR 0.56 (95 % CI 0.40 to 0.77) Heterogeneity I^2 = 0% VBAC 2 versus RCS <u>Hysterectomy rates in VBAC 2 versus RCS n= 7 studies</u> Total number VBAC 2 = 9/1747 (0.5%) Total number RCS = 51/8009 (0.6%) OR 0.75 (95 % CI = 0.23 to 2.43)	

				Heterogeneity I^2 = 42% <u>Blood transfusion rates in VBAC 2 versus RCS n= 6 studies</u> VBAC 2 = 47/2292 (2%) RSC = 172/10277 (1.7%) OR 0.94 (95 % CI = 0.45 to 1.96) Heterogeneity I^2 = 64% <u>Febrile morbidity rates in VBAC 2 versus RCS n= 6 studies</u> VBAC 2 = 192/2678 (7%) RSC = 630/9858 (6%) OR 0.81 (95 % CI = 0.55 to 1.18) Heterogeneity I^2 = 65% **Results 2** <u>Adverse neonatal outcomes: all studies</u> <u>Perinatal death or asphyxial injury rates n= 6 studies</u> (Note: prelabour still births and deaths unrelated to the mode of delivery were not included) Rates = 0.09% (ranges	

				0-0.33%) <u>NICU admission rate n= 6 studies</u> Rates = 7.7% (ranges 0-0.34.9%) <u>Adverse neonatal outcomes: all studies VBAC 1 vs. VBAC 2</u> <u>Perinatal death or Asphyxial injury rates</u> VBAC 1 = 0.09% VBAC 2 = 0.05% p = 0.35 <u>Adverse neonatal outcomes: all studies VBAC 2 vs. RCS</u> VBAC 1 = 0.09% RCS = 0.01% p = 0.14 <u>NICU admission rate</u> VBAC 2 = 8.85% RCS = 8.49% **Results 3**	

Bibliographic details	Number of Participant Participant Characteristics	Intervention characteristics	Outcome measures to be used	Results	Reviewer comment
Authors Law,L.W., Pang,M.W., Chung,T.K., Lao,T.T., Lee,D.T., Leung,T.Y., Sahota,D.S., Lau,T.K. **Year of publication** 2010 **Country of publication** Hong Kong **Ref ID** 109248 **Sub-type** **Aim of study** To examine and compare the psychological status and morbidity during and after delivery among women with a previous caesarean section (CS) who were randomised to planned vaginal birth (VBAC) or planned CS	**Inclusion Criteria** Women with one previous lower segment CS and singleton pregnancy, eligible for VBAC **Exclusion Criteria** Women who had one or more previous vaginal deliveries or a contraindication for vaginal delivery **Demographics - Total** Total planned CS n = 146, planned VBAC = 145, refused randomisation n = 103 **Cases** Planned CS **Controls** Planned VBAC	**Experimental** Planned CS: Women in this group were scheduled to have an elective CS at 38 weeks of gestation **Control** Planned VBAC: Women in this group were allowed to go into spontanous labour. Regardless of the original randomaisation, CS was arranged in presence of medical indications. **method** Eligible women were invited to participate in the study at their first antenatal visit before 28 weeks gestation. Women who agreed to participate were randomised to either planned VBAC or planned CS by drawing sequentially numbered, opaque, sealed envelopes, each containing a computer generated allocation code. Women who declined randomisation were also asked to complete baseline psychometric scales for comparison with those who agreed to randomisation. Psychometric tests were performed at the time of recruitment, at 34 weeks	**Outcomes** The difference in the psychometric scores in women randomised to planned VBAC or planned CS. **Raw Data** **Summary Data**	**Results** <u>Comparison of psychometric scores of study women :</u> <u>S-AI median (IQR)</u> Baseline : Planned CS = 33 (25 - 43.3) Planned VBAC = 31 (24 - 40) p = 0.226 3rd trimester (34 weeks) : Planned CS = 35.5 (25.8 - 44) Planned VBAC = 33 (24.8 - 45) p = 0.423 Within subject changes (p) Planned CS = (0.078) Planned VBAC = (<0.001) <u>EPDS median (IQR)</u> Baseline	**Funding** Not reported **Quality Items** **Other information**

		gestation, 2-3 days after delivery, and at 3 months and 6 months after delivery. <u>Psychometric scales used:</u> State-Trait Anxiety Inventory: used to measure the present existing state and the enduring anxiety trait of an individual. The scale has a 40 item self report scale divided into two 20 item sections (S-AI [evaluates the anxiety state], T-AI [assesses the anxiety trait]) EPDS (Edinburgh Postnatal Scale): 10 item scale for identifying antenatal and postnatal depression BDI (Beck Depression Inventory): 21 item scale to measure the severity of depression GHQ-12: used to measure general psychological well-being and quality of life All four scales were validated in Hong Kong Chinese populations. The client's overall satisfaction with their childbirth experience was assessed using		Planned CS = 5.0 (1 - 10) Planned VBAC = 5 (1 - 9) p = 0.398 3rd trimester (34 weeks) Planned CS = 5 (0 - 9) Planned VBAC = 3.5 (0 - 9.3) p = 0.423 Post delivery Planned CS = 2 (0 - 7) Planned VBAC = 1 (0 - 7) p = 0.404 Postnatal 3 months Planned CS = 2 (0 - 7) Planned VBAC = 1 (0 - 6) p = 0.452 Postnatal 6 months Planned CS = 0 (0 - 4) Planned VBAC =0.5 (0 - 4) p = 0.766 Within subject changes (p)	

		a Chinese version of CSQ (Client Satisfaction Questionnaire) Sample size: The required sample size for detection of a standardised effect size (on psychological well being) of 0.4 at power of 90% and two tailed alpha of 0.05 was 131 in each arm. Therefore the study required 144 in each arm (total 288), assuming 10% drop out rate. <u>Statistical Analysis:</u> Performed with Statistical Package for Social Science version 16.0 (SPSS, IL). Univariate analysis was used to compare baseline characteristics, baseline psychometric scores and subgroup analyses. Fridman test or Wilcoxon signed ranks test and Mann-Whitney test were also used. The analysis was based on the intention to treat analysis. <u>Characteristics:</u> There were no statistically significant differences between the three groups		Planned CS = (p<0.001) Planned VBAC = (p<0.001) <u>BDI median (IQR)</u> Baseline Planned CS = 5 (3 - 9.3) Planned VBAC = 5 (2 - 9) p = 0.514 3rd trimester (34 weeks) : Planned CS = 4.5 (2 - 9) Planned VBAC = 4.5 (1 - 8) p = 0.314 Post delivery : Planned CS = 2 (0 - 6) Planned VBAC = 2 (0 - 6) p = 0.933 Postnatal 3 months Planned CS = 2 (0 - 5.3) Planned VBAC = 2 (0 - 6)	

		(planned CS, planned VBAC, refused randomisation) in maternal age, gestation at recruitment, marital status, educational level, residential status (Hong Kong citizen), background psychiatric disorders and future fertility wishes. Women who refused randomisation had higher family income (mean 3.37 thousand US $ [SD 2.54]) when compared with randomised CS (mean 2.76 thousand US $ [SD 2.09]) and planned VBAC group (mean 2.70 thousand US $ [SD 2.34]) p = 0.01)		p = 0.780 Postnatal 6 months Planned CS = 1.5 (0 - 4.8) Planned VBAC = 1 (0- 4.3) p = 0.929 Within subject changes (p) Planned CS = (p<0.001) Planned VBAC = (p<0.001) <u>GHQ-12 median (IQR)</u> Baseline Planned CS = 1 (0 - 3) Planned VBAC = 1 (0 -3) p = 0.514 3rd trimester (34 weeks) Planned CS = 1 (0 - 3) Planned VBAC = 1 (0 - 3) p = 0.783 Post delivery Planned CS = 0 (0 - 2)	

				Planned VBAC = 0 (0 - 3) p = 0.721 Postnatal 3 months Planned CS = 0 (0 - 2) Planned VBAC = 0 (0 - 2) p = 0.467 Postnatal 6 months Planned CS = 0 (0 - 1) Planned VBAC = 0 (0 - 2) p = 0.728 Within subject changes (p) Planned CS = (p<0.001) Planned VBAC = (p<0.001) <u>CSQ median (IQR)</u> Post delivery Planned CS = 24 (23 - 25) Planned VBAC = 24 (23 - 26)	

				p = 0.353 Postnatal 6 months Planned CS = 24 (22 - 25) Planned VBAC =23 (22 - 25) p = 0.433 Within subject changes (p) Planned CS = (0.186) Planned VBAC = (<0.001) IQR = inter-quartile range, S-AI = State Anxiety Inventory, EPDS = Edinburgh Postnatal Depression Scale, BDI = Beck Depression Inventory, GHQ-12 + General Health Questionnaire Significantly more women in planned VBAC (27/123) requested to change to elective CS, compared to those who were randomised to planned CS (15/135) and requested to change to planned VBAC (OR: 2.25; 95% CI: 1.13-4.47). Subgroup analyses	

				showed that women who changed from planned CS to VBAC had lower satisfaction at delivery [Client Satisfaction Score: 24.0 (23.0-24.3), 23.0 (22.0-24.0); p=0.009] compared to women who did not change their plan for elective CS. **Results 2** **Results 3**	