National Collaborating Centre for
Women's and Children's Health

Induction of labour

Clinical Guideline

July 2008

Funded to produce guidelines for the NHS by NICE

Induction of labour

National Collaborating Centre for Women's and Children's Health

Commissioned by the National Institute for Health and Clinical Excellence

Evidence tables

July 2008

Update information: some sections have been removed as they have been replaced by the October 2021 update. These are marked accordingly.

This updates and replaces the 2001 guideline.

RCOG Press

Evidence tables should be read in conjunction with the main guideline.

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Contents

Abbreviations

41^{+3} weeks	41 completed weeks plus 3 days of gestation, etc.
ARM	artificial rupture of the membranes
BNF	British National Formulary
CI	confidence interval
CS	caesarean section
EFM	electronic fetal monitoring
EL	evidence level (level of evidence)
FHR	fetal heart rate
GA	gestational age
GDG	Guideline Development Group
ICER	incremental cost-effectiveness ratio
IMN	isosorbide mononitrate
IUFD	intrauterine fetal death
IV	intravenous
LSCS	lower segment caesarean section
MAD	minimum analgesic dose
NCC-WCH	National Collaborating Centre for Women's and Children's Health
NHS	National Health Service
NICE	National Institute for Health and Clinical Excellence
NICU	neonatal intensive care unit
NNT	number needed to treat
NS	not significant
OR	odds ratio
PCT	primary care trust
PG	prostaglandin
PGE_2	prostaglandin E_2
$PGF_{2\alpha}$	prostaglandin F_2 alpha
PPIP	Patient and Public Involvement Programme
QALY	quality-adjusted life year
RCOG	Royal College of Obstetricians and Gynecologists
RCT	randomised controlled trial
RR	relative risk
SD	standard deviation
SIGN	Scottish Intercollegiate Guidelines Network
SPC	summary of product characteristics
VE	vaginal examination
WHO	World Health Organization
WMD	weighted mean difference

3 Information and decision making

Bibliographic details	Study type and evidence level	Aim of study	Number of patients and patient characteristics	Population characteristics	Outcome measures	Reviewer comments
Shetty (2005)[16] Country: UK	Study Type: Cohort Evidence Level: 2+	To assess women's actual experience of the process of induced labour and their satisfaction with labour.	Total number of patients = 699 Women who laboured spontaneously *n* = 385 Women undergoing induction of labour at term (with vaginal PGE_2) *n* = 31	Women undergoing induction of labour at term and those labouring spontaneously.	Satisfaction with labour: 70% versus 80%, RR 0.89 (95% CI 0.8 to 0.96) Perception of pain of labour: more painful 50% versus 56% (NS) Complications with labour: more expected 37% versus 37% (NS) Perception of length of labour: longer 33% versus 29% (NS) Satisfaction with information received about induction prior to induction: NA Aspects women liked to see changed if women were to have another induction All women: 65% Liked to change speed of induction: 40% Fewer vaginal exam: 7% fewer complications: 9%	Funding: Not stated Questionnaire survey, likelihood of bias
Jacoby (1987)[15] Country: UK	Study Type: Other Evidence Level: 3	To assess women's preferences for and satisfaction with procedures in childbirth.	Total number of women = 1920	Women who had recently given birth.	Women's preferences over obstetric procedures (preferred not to/hoped it would not be necessary Induction by drug: 83% Membranes ruptured: 72% Epidural: 72% Women achieving their wishes (those who had wanted it) Induction by drug: 59% Membranes ruptured: 78% Epidural: 66% Women achieving their wishes (those who had not wanted it) Induction by drug: 23% Membranes ruptured: 59% Epidural: 11% Women's preferences over the social aspects (wanted the following)	Source of Funding: MRC Response rate 75% Retrospective: likelihood of bias in recall subjective data non-comparative result may not be generalisable

Bibliographic details	Study type and evidence level	Aim of study	Number of patients and patient characteristics	Population characteristics	Outcome measures	Reviewer comments
					Move freely in first stage of labour: 73% Father present all/some of labour: 90% Father present at delivery: 88% Hold baby as soon as born: 93% Labour/delivery managed as liked Able to move freely: 69% (yes); 45% (no) Baby's father present: 65% (all labour), 49% (part), 51% (not at all) Baby's father present : 64% (at birth), 47% (not at birth) Able to hold baby: 65% (yes), 35% (no) Procedures managed as liked (those who wanted the procedure) Induction by drugs: 59% had it, 62% didn't have it Epidural: 54% had it, 59% didn't have it Overall: 18% women whose labours were managed as they liked reported feeling depressed postnatally, 25% of those whose labours were managed as they liked in some ways but not in others, and 30% of those whose labours were not managed as they liked, did so.	
Cartwright (1977)[14] Country: UK	Study Type: Other Evidence Level: 3	To assess women's' experiences of pregnancy, labour and birth.	Total number of patients = 524	Women who had undergone induction of labour and had a live birth.	No clear association between induction and the mother's age and parity Despite being given more pain relief, those induced reported similar intensities of pain during the 1st and 2nd stages of labour to those whose labour started spontaneously. The period they had contractions was shorter for the induced than for those starting spontaneously, and the intensity of pain at delivery was rated somewhat less by those who were induced. Two-fifth of mothers who were induced would have liked more information about induction Two-fifth of mothers said they had not discussed induction with a doctor, midwife or nurse during pregnancy 17% of mothers who had induction said they would prefer to be induced again, 63% of those who had epidural would opt for the same procedures next time	Source of Funding: DHSS Retrospective: recall bias non-comparative, non-interventional, subjective data may not be generalisable, study published in 1977.

Bibliographic details	Study type and evidence level	Aim of study	Number of patients and patient characteristics	Population characteristics	Outcome measures	Reviewer comments
Stewart (1977)[13] Country: UK	Study Type: Other Evidence Level: 3	To assess women's' attitudes towards planned induction of labour (amniotomy with oxytocin or oxytocin with delayed amniotomy).	Total number of patients = 137	Women due for induction of labour (24 hours before and 12 hours after delivery).	Source of information on induction before this pregnancy Relatives and friends: 37% Newspaper/TV: 14% Hospital: 5% Cannot remember: 1% Never heard of induction: 22% From previous induction: 25% Opinions on induction before this pregnancy: Would prefer natural labour: 19% Adverse opinions: 1.5% In favour of induction: 2% Accept induction for sake of baby: 13% Thought induction was carried out for the convenience of the hospital: 0.7% Frightened: 0.7% Non-committal: 14% Never heard of induction: 22% Women's attitude towards own induction Glad: 66% Accept for baby's sake: 6% Relieved to know outcome: 0.7% Indifferent: 16% Reluctant:11% Women's description of methods of induction Painful: amniotomy (15%), IV infusion (10%) Uncomfortable: amniotomy (53%), IV infusion (54%) Frightening: amniotomy (5%), IV infusion (2%) Indifferent: amniotomy (28%), IV infusion (35%)	Source of Funding: Not stated Comments: non comparative subjective data likelihood of bias may not be generalisable study published 1977

4 Induction of labour in specific circumstances

4.1 Prolonged pregnancy

This section was updated and replaced in 2021. Please see the NICE website for the updated guideline.

4.2 Preterm prelabour rupture of membranes

Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
Naef (1998)[44] Country: US	Study Type: Randomised Controlled Trial Evidence level: 1++	Total number of patients = 120 Induction with IV oxytocin *n* = 57 conservative management by observation *n* = 63	Women with preterm prelabour rupture of membranes between 34 and 37 weeks of gestation (mixed parity).	Induction with IV oxytocin versus conservative management by observation	Admission-to-delivery interval (hours): 9.8 (7.8) versus 119 (223) (*P* = 0.001) Chorioamanionitis: 2% versus 16% (*P* = 0.007) Hospital stay (days): 2.6 (1.6) versus 5.2 (6.8) (*P* = 0.006) CS: 7% versus 5% (NS) Apgar score at 5 minutes: 9.1 (0.9) versus 9.1 (0.7) (NS) NICU admission: 19% versus 24% (NS) Sepsis: 0% versus 5% (NS) Total hospital stay (days): 4.5 (4.9) versus 4.8 (5.1) (NS)	Source of Funding: not stated computer-generated randomisation, allocation in sealed opaque envelopes Power calculation All women received antibiotic prophylaxis No tocolytics or corticosteroids given
Haghighi (2006)[46] Country: Iran	Study Type: Randomised controlled trial Evidence level: 1+	Total number of patients = 108 Vaginal misoprostol 25 mg *n* = 54 IV oxytocin *n* = 54	Women with preterm prelabour rupture of membranes and unfavourable cervix at 29 to 36 weeks of gestation.	Vaginal misoprostol 25 mg versus IV oxytocin.	Admission to delivery interval (minutes, mean): 507.68 (248.0) versus 596.66 (246.38) (*P* < 0.005) CS due to failed induction: 9% versus 19% (*P* < 0.004) Vaginal birth: 83% versus 76% (NS) Apgar score < 7 at 5 minutes (no) : 1 versus 1 (NS)	Source of Funding: not stated Sequential sealed envelopes numbered by means of random number tables No power calculation All women received antibiotics and dexamethasone if gestation < 34 weeks
Cox (1995)[43] Country: US	Study Type: Randomised controlled trial Evidence Level: 1+	Total number of patients = 129 Intentional delivery (oxytocin or caesarean birth) *n* = 61 Expectant management *n* = 68	Women with preterm prelabour rupture of membranes at 30 to 34 weeks of gestation.	Intentional delivery (oxytocin or caesarean birth) versus expectant management	Admission to delivery intervals < 24 hours: 97% versus 25% (*P* < 0.001) CS: 23% versus 12% (NS) Chorioamnionitis: 2% versus 15% (*P* = 0.009) Stillbirth: 0% versus 1.4% (NS) (1 death from E coli sepsis) Neonatal death: 5% (3 deaths: 1 from group B streptococcal sepsis, I from staphylococcus aureus and 1 from pulmonary hypoplasia) versus 0 (NS) Special care nursery stay: 19.9 days versus 19.3 days (NS)	Source of Funding: not stated Randomisation using random number tables allocation predetermined and placed in consecutively numbered sealed envelopes. No power calculation. No tocolytics, corticosteroids or prophylactic antibiotics were used during the trial.
	Study Type: Randomised controlled trial	Total number of patients = 109	Women with preterm prelabour rupture of membranes =	Vaginal misoprostol 50 µg versus	Insertion to delivery (hr, mean): 16.4 ± 10.2 versus 22.0 +/- 12.9 (*P* = 0.01)	Source of Funding: not stated

Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
	Evidence level: 1+	Vaginal misoprostol 50 µg *n* = 54 vag PGE_2 2.5 mg *n* = 55	34 weeks of gestation (median 36 weeks).	vaginal PGE_2 2.5 mg.	Delivery within 12 hours: 41% versus 16% (*P* = 0.005) Tachysystole: 20% versus 6% (*P* = 0.02) Uterine hyperstimulation: 9% versus 0% (*P* = 0.02) CS: 19% versus 26% (NS)	Computer-generated randomisation, allocations placed in consecutively numbered sealed opaque envelopes, power calculation.
Mercer (1993)[42] Country: US	Study Type: Randomised controlled trial Evidence level: 1+	Total number of patients = 93 Induction of labour *n* = 46 Expectant management (Expectant management included hospitalisation, assessment of fetal heart rate, chorioamnionitis and labour. Digital cervical examinations were prohibited until progress labour occurred) *n* = 47	Women with preterm prelabour rupture of membranes at 32 to 36 weeks of gestation.	Induction of labour versus expectant management.	Latency from randomisation to delivery (hr, median): 14 versus 36 (*P* < 0.001) Maternal hospitalisation (days, median): 2.3 versus 3.5 (*P* < 0.001) Overall chorioamnionitis: 11% versus 28% (*P* = 0.06) CS: 9% versus 6% (NS) Apgar score < 7 at 5 minutes: 0% versus 0% (NS) Neonatal hospital stay (days, median): 6.2 versus 7.3 (*P* = 0.09) Suspected neonatal sepsis: 28% versus 60% (*P* = 0.003) Antimicrobial therapy (neonates): 35% versus 79% (*P* = 0.001)	Source of Funding: not stated Computer-generated randomisation Methods of allocation concealment not reported No power calculation

4.4 Previous caesarean birth

Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
Vause (1999)[68] Country: UK, US, Sweden, Israel	Study Type: Systematic review/ meta-analysis Evidence level: 1+	1 RCT (42 women) 6 Observational studies (724 women)	Women with a caesarean birth scar undergoing induction of labour.	Vaginal PGE_2 2.5 mg followed by amniotomy versus amniotomy + IV oxytocin (1 RCT) 6 observational studies (Blanco 1992, Goldberger 1989, Mackenzie 1988, Norman 1992, Stone 1994, Williams 1995)	1 RCT (see review of individual RCT) 6 observational studies (PGE_2 versus comparison group) No of vaginal births Blanco 1992: 17 (81%, 95% CI 58% to 94%) versus 15 (71%, 95% CI 48% to 89%) Goldberger 1989: 18 (74%, 95% CI 51% to 87%) versus 46 (82%, 95% CI 72% to 92%) Mackenzie 1988: 329 (75%, 95% CI 71% to 79%) (no comparison group) Norman 1992: 22 (73%, 95% CI 54% to 88%) (no comparison group) Stone 1994: 60 (64%, 95% CI 54% to 74%) versus 598 (69%, 95% CI 66% to 72%) Williams 1995: 59 (50%, 95% CI 41% to 59%) versus 241 (68%, 95% CI 63% to 73%) Uterine rupture or dehiscence Blanco 1992: 0 versus 0 Goldberger 1989: 0 versus 0 Mackenzie 1988: 1 rupture, 4 dehiscence (no comparison group) Norman 1992: 0 (no comparison group) Stone 1994: 0 rupture and 2 dehiscence versus 0 Williams 1995: 0 versus 0	Source of Funding: none
McDonagh (2005)[67]	Study Type: Systematic review/ meta-analysis	2 RCTs (326 women)		Oral mifepristone 200 mg versus placebo (1 RCT)	Observational studies: compared with spontaneous labour, induction was more likely to result in	

Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
	Evidence level: 3	12 Observational studies (39170 women)		Weekly vaginal PGE_2 versus expectant management (1 RCT, 12 observational studies)	caesarean delivery (20% [range 11–35%] versus 32% [range 18–44%]) Caesarean occurred in 24% (range 18–51%) of spontaneous labour compared with 48% (range 28–51%) of PGE_2 induction There was a non-significant increase in uterine ruptures among those induced compared with spontaneous labour. There were no maternal deaths. Other maternal complications were infrequently and inadequately reported.	
Dodd (2004)[66] Country: US, UK, France	Study Type: Systematic review/ meta-analysis Evidence level: 1++	3 RCTs (112 women)	Women with a previous caesarean birth, undergoing induction of labour.	Vaginal PGE_2 2.5 mg followed by amniotomy versus amniotomy + IV oxytocin (1 RCT) Vaginal misoprostol 25 µg 6-hourly versus IV oxytocin (1 RCT) Oral mifepristone 200 mg versus placebo (1 RCT)	Insufficient evidence (refer to review of individual RCT)	Source of Funding: not stated
Dodd (2006)[65]	Study Type: Systematic review/meta-analysis Evidence level: 1++	No RCT was identified.	Women with previous caesarean birth.	No RCTs was identified		Source of Funding: University of Adelaide, Australia
Rayburn (1999)[72] Country: US	Study Type: Randomised controlled trial Evidence level: 1+	Total number of patients = 294 Weekly PGE_2 gel 0.5 mg, repeated at weekly office visits for up to three dose *n* = 143 Expectant management *n* = 151	Women at term who had one previous caesarean birth and unfavourable cervix (Bishop score < 6).	Weekly PGE_2 gel 0.5 mg, repeated at weekly office visits for up to three dose versus expectant management.	Undelivered at 40 weeks: 34% versus 44% (NS) Undelivered at 41 weeks: 28% versus 24% (NS) Spontaneous vaginal birth: 49% versus 49% (NS) instrumental vaginal birth: 8% versus 6% (NS) CS: 43% versus 45% (NS) Uterine hyperstimulation: 0.7% versus versus 0% (NS) Uterine rupture: 0% versus 0% (NS) Mternal nausea and vomiting: 1.4% versus 1.3% (NS)	Source of Funding: Pharmacia & Upjohn Co, Kalamazoo, MI, US Computer-generated randomisation Blind to investigators Power calculation
Wing (1998)[71] Country: US	Study Type: Randomised Controlled Trial	Total number of patients = 38 vaginal misoprostol	women with a prior CS requiring induction of labour	vaginal misoprostol 25 µg 6-hourly (maximum 4 doses) vs	Uterine rupture : 12% vs 0% (RR 6.11, 95% CI 0.31 to 119.33) Apgar score < 7 at 5 minutes: 6% versus 0% (NS) Neonatal intensive care admission: 35% vs 19% (NS)	Source of Funding: not reported

Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
	Evidence Level: 1-	25 µg at 6hourly interval (maximum 4 doses) *n* = 17 IV oxytocin *n* = 21		IV oxytocin		Method of randomisation and power calculation not reported The trial was stopped because of safety concerns
Taylor (1993)[70] Country: UK	Study Type: Randomised controlled trial Evidence level: 1+	Total number of patients = 42 Vaginal PGE_2 2.5 mg followed by amniotomy *n* = 21 Amniotomy + IV oxytocin *n* = 21	Women with a previous caesarean birth, undergoing induction of labour because of prolonged pregnancy or pre-eclampsia (Bishop score < 9).	Vaginal PGE_2 2.5 mg followed by amniotomy vs amniotomy + IV oxytocin.	Induction to delivery interval (hr): 10.8 (4.2) versus 8.9 (2.4) (NS) Spontaneous vaginal birth: 57% versus 52% (NS) Operative vaginal birth: 24% versus 19%, 1.33 (95% CI 0.30 to 5.84) CS: 19% versus 29%, OR 0.59 (95% CI 0.14 to 2.49) Epidural usage: 81% versus 57%, OR 3.19 (95% CI 0.79 to 12.80) Apgar score < 7 at 5 minutes: 0 versus 0 (NS) Uterine rupture: 1/21 versus 0/21 (NS) Repeat CS: 0/4 versus 5/6 (*P* < 0.05)	Source of Funding: Not reported Randomisation using a predetermined code contained in sealed envelopes. No power calculation.
Chilaka (2004)[60]	Study Type: Non comparative case series Evidence level: 3	To determine the risk of uterine rupture.	Total number of women = 130	Women with a previous caesarean section undergoing induction of labour with PGE_2.	Spontaneous vaginal delivery: 65/130 (50%) Instrumental vaginal delivery: 14/130 (11%) CS: 51/130 (39%) Admission to NICU: 6/130 Neonatal death: 0 Suspected uterine rupture: 2 cases, not confirmed	
Kayani (2005)[61]	Study Type: case series review of hospital delivery records Evidence level: 3	To estimate the risk of uterine rupture or dehiscence.	Total number of women = 205	Women with one previous caesarean section undergoing induction of labour (vaginal PGE_2 *n* = 97; PGE_2 + oxytocin *n* = 52; ARM *n* = 11; ARM + oxytocin *n* = 45	Spontaneous vaginal delivery: PGE_2: 47% PGE_2 + oxytocin: 38.5% ARM only: 73% ARM + oxytocin: 62% Instrumental vaginal delivery: PGE_2: 10% PGE_2 + oxytocin: 15.5% ARM only: 0 ARM + oxytocin: 13.5% CS: PGE_2: 43% PGE_2 + oxytocin: 46%	

Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
					ARM only: 27% ARM + oxytocin: 24.5% Uterine dehiscence: PGE_2: 0 PGE_2 + oxytocin: 0 ARM only: 0 ARM + oxytocin: 2% Uterine rupture: PGE_2: 1% PGE_2 + oxytocin: 4% ARM only: 0 ARM + oxytocin: 2% Adverse neonatal outcomes (seizures, death, admission to NICU, Apgar score < 7 at 5 minutes) PGE_2: 0 PGE_2 + oxytocin: 1 ARM only: 2 ARM + oxytocin: 1	
Grobman (2007)[64] Country: US	Study Type: Cohort Evidence level: 2+	To compare pregnancy outcomes after induction with pregnancy outcomes after spontaneous labour.	Total number of women = 11 778 With with no prior vaginal delivery (*n* = 6132) With with prior vaginal delivery (*n* = 5646)	Women with one previous caesarean birth undergoing induction of labour.	In women with no prior vaginal delivery Vaginal birth: induced vs apontaneous labour 51% versus 64.7% (OR 0.57, 95% CI 0.51 to 0.63) Uterine rupture: induced vs apontaneous labour 1.5% vs 0.8% (OR 1.84, 95% CI 1.11 to 3.05) Uterine rupture: induced with PGE_2:0% Uterine rupture: induced with oxy: 1.8% Uterine rupture: induced with oxy + PGE_2: 1.2% prior vaginal delivery Vaginal birth: induced vs apontaneous labour 83.3% versus 88.3% (OR 0.66, 95% CI 0.56 to 0.78) Uterine rupture: induced vs apontaneous labour 0.6% vs 0.4% (OR 1.39, 95% 0.62 to 3.13) Uterine rupture: induced with PGE_2:0% Uterine rupture: induced with oxy: 0.6% Uterine rupture: induced with oxy + PGE_2: 0.5%	Funding: National Institute of Child Health , US

4.5 Maternal request for induction of labour

Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
Cole (1975)[80] Country: UK	Study Type: Randomised controlled trial Evidence level: 1+	Total number of women = 228 Elective induction of labour (forewater amniotomy followed by IV oxytocin) *n* = 111 Expectant management *n* = 117	pregnant women at 39–40 weeks of gestation (mixed parity)	elective induction of labour (forewater amniotomy followed by IV oxytocin) vs expectant management	Spontaneous birth: 65% versus 70% (NS) Forceps births: 31% versus 22% (NS) CS: 5% versus 8% (NS) Mean length of labour (hrs): 6.4 (3.1) versus 7.0 (3.4) (NS) Mean dose of pethidine (mg): 157 versus 155 (NS) Number of epidurals: 22 versus 14 (NS) Mean blood loss after vaginal birth (ml): 185 (139) versus 233 (150) (*P* = 0.05)	Source of Funding: not stated Methods of randomisation and power calculation not reported.
Breart (1982)[79] Country: France	Study Type: Randomised controlled trial Evidence Level: 1+	Total number of women = 716 Elective induction of labour (oxytocin and AROM) *n* = 481 expectant management (fetal heart rate checking and amnioscopy every 2–3 days) *n* = 235	Women with low risk pregnancy at 37–39 weeks of gestation (no indication or contraindication for induction of labour).	Elective induction of labour (oxytocin and AROM) vs expectant management (fetal heart rate checking and amnioscopy every 2–3 days)	CS: 4% versus 7% (NS) Assisted vaginal births: 26% versus 15%, RR 1.74 (95% CI 1.24 to 2.45)	Source of Funding: not reported Randomised, allocation using envelopes (2:1 allocation) Power calculation not clear 36% of the intervention group and 86% of the control group followed the trial protocol.

4.6 Breech presentation

Bibliographic Information	Study type and evidence level	Aim of study	Number of patients and patient characteristics	Population characteristics	Outcome measures	Reviewer comments
Rojansky (2001)[86] Country: Israel	Study Type: Case–control Study Evidence level: 2-	To assess effects of breech induction.	Total number of women = 175	Women with breech presentation.	Vaginal birth: 66% versus 68% versus 0% (NS) CS: 34% versus 32% versus 100% (NS) Apgar score < 7: 0% versus < 1% versus 0% (NS)	Funding: not stated
Fait (1998)[85]	Study Type: retrospective matched-paired study Evidence level: 2-	Assess the effects of breech induction.	Total number of women = 69 Breech induction (extra-amniotic saline and concomitant oxytocin) *n* = 23 Vertex induction *n* = 46	Women with breech presentation.	Vaginal birth: 52% verus 83%, OR 0.23 (95% CI 0.07 to 0.8) Caesarean birth rate: 48% versus 17%, OR 4.3 (95% CI 1.3 to 15.6) Rates of Apgar score, birth trauma and maternal morbidity were similar in the groups.	

4.7 Fetal growth restriction

Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
Van den Hove (2006)[59] Country: The Netherlands	Study Type: Randomised controlled trial Evidence level: 1+	Total number of patients = 33 induction of labour *n* = 16 Expectant management *n* = 17	Women with fetal growth restriction at term.	Induction of labour (PGE_2 gel for cervical priming and amniotomy and IV oxytocin) versus expectant management.	Obstetric interventions (spontaneous birth, forceps, vacuum, CS): 25% versus 24% (NS) Neonatal morbidity: 50% versus 35% (NS)	Source of Funding: not reported Allocation by statistician at random and put in consecutively numbered envelopes. No power calculation.

4.9 Intrauterine fetal death

This section was partially updated and replaced in 2021 (intrauterine fetal death after previous caesarean birth). Please see the NICE website for the updated guideline.

Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
Irion (1998)[107] Country: Israel, US	Study Type: Systematic review/meta-analysis Evidence level: 1++	2 RCTs (313 women)	Non-diabetic women with suspected fetal macrosomia,for induction of labour.	Induction of labour (with prostaglandins and IV oxytocin) versus expectant management.	Induction of labour versus expectant management (2 RCTs) Caesarean birth: 22/153 versus 38/160, RR 0.88 (95% CI 0.59 to 1.34) Instrumental birth: 17/153 versus 18/160, RR 0.98 (95% CI 0.53 to 1.82) Spontaneous birth: 104/153 versus 104/160, RR 1.05 (95% CI 0.89 to 1.22) Third and fourth degree perineal tear: 0 Mean birthweight: WMD -61.44 (95% CI -132.00 to 11.12) Low Apgar score (5 minutes): 0 Shoulder dystocia: 9/153 versus 9/160, RR 1.06 (95% CI 0.44 to 2.56) Brachial plexus injury: 0/153 versus 2/160, RR 0.21 (95% CI 0.01 to 4.28) Fracture (any): 0/153 versus 4/160, RR 0.12 (95% CI 0.01 to 2.12) Admission to neonatal intensive care unit: 0 Intracranial haemorrhage: 3/63 versus 2/52, RR 1.06 (95% CI 0.19 to 5.96) Convulsions: 0 Perinatal mortality: 0	Source of Funding: University of Geneva
Cabrol (1990)[90] Country: France and South Africa	Study Type: Randomised controlled trial Evidence level: 1+	Mifepristone 600 mg (200 mg three times a day) for 2 days *n* = 48 Placebo for 2 days *n* = 46	Women (mean age between 27.8–28.9 years) with a gestational age> 16 weeks (mean 197–199 days of amenorrhea) and absence of signs of inminent labor based in obstetric and gynecology departments.	Mifepristone 600 mg (200 mg three times a day) for 2 days versus placebo.	Labour within 72 hours: 63% versus 17.4% ($P < 0.001$) Uterine bleeding: 3/46 vs 0 Nausea and vomiting: 2/46 vs 0	Source of Funding: One author associated with Roussel Uclaf Sample size calculation attempted, reported double-blind but not clear who was blind. Randomisation obtained by the method of random permutations. Allocation concealment unclear Two women from the Mifepristone group were excluded after randomisation.
Sanchez-Ramos (2002)[108]	Study Type: Systematic review/meta-analysis	2 RCTs, 9 observational studies.	Women with suspected fetal macrosomia.	Expectant management versus induction of labour.	2 RCTs CS: OR 1.17 (95% CI 0.69 to 2.01)	Source of Funding: Not stated.

	Spontaneous vaginal birth: OR 0.90 (95% CI 0.54 to 1.48)
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Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
Country: US, Europe	Evidence level: 2+				Operative vaginal birth: OR 1.02 (95% CI 0.50 to 2.08) Rate of shoulder dystocia: OR 0.93 (95% CI 0.35 to 2.46) <u>9 Observational studies</u> CS: OR 0.39 (95% CI 0.30 to 0.50) Spontaneous vaginal birth: OR 2.07 (95% CI 1.34 to 3.19) Operative vaginal birth: OR 0.89 (95% CI 0.68 to 1.17) Rate of shoulder dystocia: OR 0.81 (95% CI 0.50 to 1.31)	

5 Methods of induction of labour

5.1 Pharmacological-based methods

This section was updated and replaced in 2021. Please see the NICE website for the updated guideline.

5.2 Non-pharmacological methods

This section was partially updated (non-pharmacological methods, except membrane-sweeping) and replaced in 2021. Please see the NICE website for the updated guideline.

Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
Boulvain (2005)[146] Country: US, UK, Belgium, Canada, India, Thailand, China	Study Type: Systematic review/ meta-analysis Evidence level: 1++	27 097 women (22 RCTs)	Women from 37- = 40 weeks GA Bishop score (from closed cervix to >/=6) Mixed parity Mixed case load	<u>Membrane sweeping versus no treatment (19 RCTs)</u> Women at 37–40 weeks GA (13 RCTs) =40 weeks GA (6 RCTs) <u>Membrane sweeping versus prostaglandins (3 RCTs)</u> =40 weeks GA <u>Membrane sweeping versus oxytocin (1 RCT)</u> Sweeping frequency Weekly sweeping (7 RCTs) Sweeping every 3 days (1 RCT) Daily sweeping (2 RCTs) Sweeping frequency not reported (12 RCTs)	<u>Membrane sweeping versus no treatment (for all women)</u> Formal induction of labour: (12 RCTs): RR 0.60 (95% CI 0.51 to 0.71) CS (18 RCTs): RR 0.90 (95% CI 0.70 to 1.15) Reduced frequency of pregnancy beyond 41 weeks (6 RCTs): RR 0.59 (95% CI 0.46 to 0.74) Reduced frequency of pregnancy beyond 42 weeks (6 RCTs): RR 0.28 (95% CI 0.15 to 0.50) NNT to avoid on formal induction of labour: 8 Perinatal death: *2/401 versus **2/399 RR 1.0 (95% CI 0.20 to 4.88) * congenital heart defect, stillbirth: meconium-stained liquor ** congenital heart defect, double nuchal cord Serious maternal death (6 RCTs): 0 Oxytocin augmentation (3RCTs): RR 0.96 (95% CI 0.80 to 1.14) Epidural usage (6 RCTs): RR 1.08 (95% CI 0.94 to 1.23) Instrumental delivery (14 RCTs): RR 1.15 95% (CI 0.94 to 1.42) PPH(3 RCTs): RR 0.31 (95% CI 0.11 to 0.89) Prelabour rupture of membranes (10 RCTs): RR 1.14 (95% CI 0.89 to 1.45) Maternal infection/fever (11 RCTs): RR 1.05 (95% CI 0.68 to 1.65) Neonatal infection (6 RCTs): RR 0.92 (95% CI 0.0 to 2.82) Meconium-stained liquor (2 RCTs) : RR 0.67 (95% CI 0.33 to 1.35) Apgar score < 7 at 5 minutes (8 RCTs): RR 1.13 (95% CI 0.53 to 2.43) Admission to NICU (7 RCTs): RR 0.92 (95% CI 0.52 to 1.63) Pain and discomfort reported (2RCTs): RR 2.83 (95% CI 2.03 to 3.96) Sig higher median score (pain index and visual analogue scale) 70% reported that membrane sweeping associated with sig discomfort and pain Vaginal bleeding (3 RCTs): RR 1.75, (95% CI 1.08 to 2.83) <u>Membrane sweeping versus prostaglandins</u>	Source of Funding: University of Geneva

							CS 3 RCTs): RR 0.70 (95% CI 0.44 to 1.10) Oxytocin augmentation (1 RCT): RR 0.83 (95% CI 0.50 to 1.36) Instrumental vaginal birth (3 RCTs): RR 1.67 (95% CI 0.81 to 3.46)

Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
					Meconium-stained liquor (1 RCT): RR 1.37 (95% CI 0.61 to 3.10) Apgar score < 7 at 5 minutes (3 RCTs): RR 0.83 (95% CI 0.14 to 4.92) NICU admission (3 RCTs): RR 0.37 (95% CI 0.12 to 1.17) PPH (1 RCT): 0 Not delivered before 42 weeks (2 RCTs): RR 0.50 (95% CI 0.25 to 1.02) Membrane sweeping versus oxytocin CS (1 RCT): RR 0.69 (95% CI 0.12 to 3.85) Formal induction of labour (1 RCT): RR 0.51 (95% CI 0.05 to 5.42) In women with an unfavourable cervix Sweeping versus no treatment Requiring formal induction of labour (3 RCTs): RR 0.51 (95% CI 0.37 to 0.71) Caesarean births (3 RCTs): RR 0.98 (95% CI 0.49 to 1.95) Instrumental vaginal delivery (2 RCTs): RR 0.87 (95% CI 0.33 to 2.24) 5 minute Apgar score < 7 (1 RCT): RR 0.97 (95% CI 0.06 to 4.85) Neonatal intensive care unit admission (1 RCT): RR 0.97 (95% CI 0.15 to 6.47) Serious maternal or neonatal morbidity/perinatal death (1 RCT): 0 Maternal infection (1 RCT): RR 0.11 (95% CI 0.01 to 1.93) Prelabour rupture of membranes: (1 RCT): RR 2.00 (95% CI 0.39 to 10.22) Epidural analgesia (1 RCT): RR 0.70 (95% CI 0.42 to 1.18) Membrane sweeping versus vaginal prostaglandins Not delivered before 42 weeks (2 RCTs): RR 0.50 (95% CI 0.25 to 1.02) Caesarean births (2 RCTs): RR 0.67 (95% CI 0.41 to 1.08) Instrumental vaginal delivery (2 RCTs): RR 1.10 (95% CI 0.48 to 2.50) 5 minute Apgar score < 7 (1 RCT): RR 0.33 (95% CI 0.01 to 7.91) Neonatal intensive care unit admission (2 RCTs): RR 0.38 (95% CI 0.10 to 1.38) Requiring 'formal' induction of labour (1 RCT): RR 0.85 (95% CI 0.44 to 1.62) Prelabour rupture of membranes (1 RCT): RR 0.57 (95% CI 0.18 to 1.78)	

Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
					Membrane sweeping versus oxytocin Requiring 'formal' induction of labour (1 RCT): RR 0.51 (95% CI 0.05 to 5.42) Caesarean birth (1 RCT): RR 0.69 (95% CI 0.12 to 3.85)	
Allot (1993)[156] Country: UK Study included in SR [146]	Study Type: Randomised controlled trial Evidence Level: 1+	195 women	Low-risk pregnancy beyond 40 weeks (confirmed by US) Primigravida Membrane sweeping: 43% VE: 46% Bishop's score (BS) ≤ 6 Membrane sweeping: 44% VE: 44% ≥ 7 Membrane sweeping: 56% VE: 56% Exclusion: closed cervix	Membrane sweeping (*n* = 99) versus vaginal exam (VE) (*n* = 96) Frequency of sweeping: not reported	Not delivered within 48 hours: 47% versus 76%, RR 0.62 (95% CI 0.49 to 0.79) Formal induction of labour required: 8% versus 19% (*P* = 0.035) Caesarean section: 5.3% versus 4%, RR 0.78 (95% CI 0.21 to 2.80) Instrumental vaginal delivery: 11% versus 12%, RR 0.89 (95% CI 0.41 to 1.92) Epidural in labour: 19% versus 21%, RR 0.92 (95% CI 0.53 to 1.62) Maternal pyrexia: 1% versus 1%, RR 0.97 (95% CI 0.06 to 15.28) Apgar score < 7 at 5 minutes: 0% versus 0% Serious neonatal infection: 0% versus 1% Cumulative proportions of spontaneous labour within 3 days: All women: 65% versus 31% (*P* = 0.0001) Primig: 61% versus 31% (*P* = 0.0021) Multip: 68% versus 31% (*P* = 0.0003) Low BS: 71% versus 21% (*P* = 0.0001) High BS: 60% versus 39% (*P* = 0.04) Primig + low BS: 69% versus 13% (*P* = 0.0002) Primig + high BS: 56% versus 41% (*P* = 0.42) Multip + low BS: 73% versus 26% (*P* = 0.0023) Multip + high BS: 63% versus 36% (*P* = 0.03)	Computer randomisation: assignment in sealed envelopes, power calculation Bishop's score ≤ 6: low Bishop's score: ≥ 7: high Women's views on sweeping: Not reported Funding: not stated
El-Torkey (1992)[157] Country: UK Study included in SR [146]	Study Type: Randomised controlled trial Evidence Level: 1+	65 women	Women with pregnancy between 41–42 weeks GA Primigravida Membrane sweeping: 51% Control: 44% Cervix > 4 cm at first exam: Sweeping 49% No sweping 16% (*P* = 0.005)	Membrane sweeping (*n* = 33) versus no sweeping (*n* = 32) 6 women in sweeping group required cervical massage due to unfavourable cervix. Frequency of sweeping not reported.	Spontaneous labour (self-admission to hospital with regular contractions occurring ≥ twice in 10 minutes): 76% versus 37%, OR 4.65 (95% CI 1.85 to 12.31) In sweeping group: 89% had spontaneous labour (44% within 24 hours, 72% within 48 hours and 84% within 72 hours) versus 17% of women with unfavourable cervix had spontaneous labour Cervical dilation ≥ 4 cm at first exam: 48% versus 16%, OR 4.39 (95% CI 1.56 to 12.32) Pyrexia in labour/puerperium, requiring antibiotics: 0% versus 12%, OR 0.12 (95% CI 0.02 to 0.88)	Randomisation by random permuted blocks, codes placed in opaque sealed envelopes, power calculation Funding: not stated Trial stopped early because of high % of women achieving spontaneous labour.

Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
					Analgesia use/Modes of delivery/Neonatal outcomes: Similar in the two groups Serous infection: None Perinatal death: None Women's views on sweeping: Not reported	
Boulvain (1998)[154] Country: Canada Study included in SR [146]	Study Type: Randomised controlled trial Evidence Level: 1+	200 women	Women with non-urgent medical indications for induction of labour (85% post-term: ≥ 287 days GA; 3.5% hypertension, 2.5% diabetes, 1.5% fetal growth restriction, 6.5% others: ≥ 266 days GA) GA confirmed by last menstrual period and US Nulliparous: Membrane sweeping: 58% Control: 50% Bishop's score: < 6: Membrane sweeping: 46% Control: 51%	Membrane sweeping (*n* = 99) versus vaginal exam (VE) (*n* = 99) Frequency of sweeping not reported.	Duration of labour (hour): 8.7 versus 8.8 (NS) Formal induction of labour required: 49% versus 59%, RR 0.83 (95% CI 0.64 to 1.07) Epidural use: 75 versus 69 (NS) Caesarean section: 12 versus 12 (NS) Forceps/vacuum: 36 versus 27 (NS) Maternal pyrexia: 8 versus 8 (NS) Apgar score < 7 at 5 minutes: 3 versus 0 (NS) Neonatal infection: 1 versus 1 (NS) Admission to NICU: 6 versus 6 (NS) Pain (VAS) during VE: 2.4 versus 1.5 (*P* = 0.001) Bleeding before onset of labour: 45% versus 26% (*P* = 0.02) Recommended sweeping to friends: 87% Advantages more superior to disadvantages: 77% Sweeping as useless: 9% Unpleasant: 31% Painful: 22%	Computer randomisation, in blocks of six and eight, stratified by hospital Assignment in opaque sealed envelopes Power calculation Included pregnancies with medical complications Funding: Health Canada, Astra Pharma, MRC
Magann (1998)[153] Country: US	Study Type: Randomised controlled trial Evidence level: 1+	Total number of women = 105 Daily membrane sweeping *n* = 35 Daily PGE_2 gel *n* = 35 Daily cervical examination *n* = 35	Women at 41 weeks of gestation, mean Bishop score < 3.	Daily membrane sweeping versus daily PGE_2 gel versus daily cervical examination.	Sweeping vs PGE_2 vs control Induction at 42 weeks: 17% versus 20% versus 63% (*P* < 0.0001) Duration of labour: 10.1 (6.1) hr versus14.2 (6.0) hr versus 20 (7.0) hr(*P* < 0.05) Bishop score on admission to labour ward: versus control (*P* < 0.001) (no data) spontaneous vaginal birth: 26 versus 24 versus 25 (NS) instrumental birth: 4 versus 3 versus 5 (NS) CS: 5 versus 8 versus 5 (NS) 5 minute Apgar score at < 7:0 versus 1 versus 1 (NS) Admission to well-baby nursery: 33 versus 32 versus 35 (NS)	Source of Funding: Vicksburg Hospital Medical Foundation Randomisation using random number table, allocation in a series of sealed opaque envelopes, power calculation.
Magann (1999)[152]	Study Type:	Total number of	Women of mixed parity at	Daily membrane sweeping	Bishop score on admission to labour ward: 8.56 (2.50) versus 6.63	Source of Funding: Vicksburg

Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
Country: US	Randomised controlled trial Evidence level: 1+	women = 182 Daily membrane sweeping *n* = 91 Daily placement of a dinoprostol vaginal suppository *n* = 91	41 weeks of gestation, mean Bishop score < 3.	versus daily placement of a dinoprostol vaginal suppository.	(2.55) (*P* < 0.001) Mean admission to delivery interval (hr) : 10.8 (6.9) versus 13.1 (6.7) (*P* = 0.01) Spontaneous vaginal birth: 74% versus 65% (NS) Instrumental birth: 8% versus 8% (NS) CS: 19% versus 27% (NS) 5 minute Apgar score < 7: 0 versus 0 NICU admission: 1 versus 5 (NS) Induction at 42 weeks: 9% versus 14% (*P* = 0.041)	Hospital Medical Foundation Randomisation using table of random numbers allocation in sealed opaque envelopes, power calculation.
Wiriyasirivaj (1996)[149] Country: Thailand	Study Type: Randomised controlled trial Evidence level: 1+	Total number of women = 120 Weekly membrane sweeping *n* = 61 Weekly gentle pelvic examination *n* = 59	Women at 38 weeks of gestation mean Bishop score < 3	Weekly membrane sweeping versus weekly gentle pelvic examination.	Delivery within 7 days of first pelvic exam: 41% versus 20% (*P* = 0.014) Oxytocin use: 44% versus 44% (NS) Spontaneous vaginal birth: 74% versus 76% (NS) Instrumental vaginal birth: 16% versus 19% (NS) CS: 10% versus 5% (NS) 5 minute Apgar < 7: 9.9 (0.2) versus 9.9 (0.1) (NS) Pastpartum fever: 2% versus 0% (NS) Postpartum haem: 3% versus 3% (NS)	Source of Funding: Not stated Randomisation using table of random numbers, allocation kept in sealed black opaque envelope, no pwer calculation.
Magann (1998)[150] Country: US	Study Type: Randomised controlled trial Evidence level: 1+	Total number of women = 65 Membrane sweeping every 3 days *n* = 33 Gentle vaginal examination every 3 days *n* = 32	Women of mixed parity at 39 weeks of gestation, median Bishop score < 3.	Membrane sweeping every 3 days versus gentle vaginal examination every 3 days.	Bishop score at delivery ≥ 8: 19 versus 6 (*P* = 0.0002) Induction at 42 weeks: 0 versus 18 (*P* < 0.0001) Vaginal birth: 29 versus 27 (NS) CS: 4 versus versus 5 (NS) NICU: 2 versus 2 (NS)	Source of Funding: Not stated Randomisation using random number table, allocation in consecutive series of sealed apaque envelopes, power calculation.
Berghella (1996)[148] Country: US	Study Type: Randomised controlled trial Evidence level: 1+	Total number of women = 142 Weekly membrane sweeping *n* = 73	Women = 38 weeks of gestation, mean Bishop score < 4.	Weekly membrane sweeping versus weekly gentle cervical examination.	Days to delivery: 8.2 (6.3) versus 12.1(7.1) (*P* < 0.002) Spontaneous vaginal birth: 90% versus 86% (NS) Instrumental birth: 10% versus 10% (NS) CS: 0% versus 4% (NS) Days to delivery in women with Bishop score ≤ 3: 8.6 (6.4) (*n* = 39) versus 12.5 (6.8) (*P* < 0.02) (*n* = 44) Days to delivery in women with Bishop score > 3: 6.5 (5.4) (*n* = 34)	Source of Funding: not stated Computer-generated randomisation Allocation in sealed opaque envelops Power calculation

Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
		Weekly gentle cervical examination *n* = 69			versus 11.5 (8.2) (NS) (*n* = 25) Days to delivery in nulliparous women: 7.8 (6.0) (*n* = 35) versus 12.9 (6.6) (*P* < 0.009) (*n* = 43) Days to delivery in multiparous women: 7.2 (5.9) (*n* = 38) versus 11.0 (7.9) (NS) (26)	
Cammu (1998)[147] Country: Belgium	Study Type: Randomised controlled trial Evidence level: 1+	Total number of women = 278 Weekly membrane sweeping *n* = 140 Normal digital examination *n* = 139	Nulliparous women with uncomplicated pregnancies, 39 completed weeks of gestation, mean Bishop score < 4.	Weekly membrane sweeping versus normal digital examination.	Randomisation to delivery interval: 9.4 days versus 10.6 days (NS) Spontaneous labour: 51% versus 42% (NS) Induced labour: 11% versus 26%, OR 0.34 (95% CI 0.18 to 0.66) Epidural: 38% versus 38% (NS) Instrumental birth: 16% versus 13% (NS) CS: 4% versus 6% (NS) 5 minute Apgar score: 3 versus 7 (NS)	Source of Funding: Not stated Computer-generaterd randomisation, allocation in sealed numbered envelopes, opened after entry to trial, power calculation.
Dare (2002)[155] Country: Nigeria	Study Type: Randomised controlled trial Evidence level: 1+	Total number of women = 137 Membrane sweeping *n* = 69 Control (gentle cervical examination) *n* = 68	Women at 38 weeks of gestation, mean Bishop score > 4.	Membrane sweeping versus gentle cervical examination.	Mean time to delivery (days): 4.8 (0.9) versus 12.1 (1.4) (*P* < 0.001) Spontaneous vaginal birth: 68% versus 65% (NS) Instrumental vagial birth: 23% versus 16% (NS) CS: 9% versus 19% (*P* = 0.09) CS due to acute fetal distress: 2 versus 8 (*P* = 0.055) CS due to non-progress of labour: 4 versus 5 (NS) Maternal discomfort during vaginal exam: 66% versus 21% (*P* < 0.001) Prelabour rupture of membranes: 11% versus 9% (NS) Intrapartum chorioamnionitis: 2 versus 1 (NS) 5 minute Apgar < 7: 2 versus 1 (NS) NICU admission: 13% versus 16% (NS) Vaginal bleeding: 3% reported in sweeping group	Source of Funding: Not stated Computer-generated randomisation, allocation in numbered opaque sealed envelope drawn in consecutive order, power calculation.
de ME (2006)[151] Country: The Netherlands	Study Type: Randomised Controlled Trial Evidence Level: 1+	Total number of patients = 742 Sweeping *n* = 375 Control *n* = 367	Low-risk pregnant women at 41 weeks GA Nulliparity: 53% Bishop scores: < 6: 38% ≥ 6: 11%	Membrane sweeping every 48 hours versus routine monitoring	<u>Outcomes at 5 Days</u>: Post term pregnancy in nulliparous and multiparous women: 23% versus 41% (RR 0.57, 95% CI 0.46 to 0.71) Spontaneous onset of labour >42 weeks: 9% versus 14% (RR 0.59, 95% CI 0.39 to 0.89) Induction of labour in parous women: 15% versus 27% (RR 0.57, 95% CI 0.37 to 0.86) Induction of labour in nulliparous women: 29% versus 31% (RR 0.92, 95% CI 0.68 to 1.25) Mode of delivery: spontaneous: 76% versus 76% (NS) Mode of delivery: instrumental: 15% versus 14% (NS)	Source of Funding: ZONMw Block randomisation, allocation within consecutively numbered opaque sealed envelopes Power calculation

Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
					Mode of delivery: CS: 10% versus 10% (NS) Fever during labour: = 38° C: 7/375 versus 3/367 Analgesia use: epidural: 5% versus 4% (NS) Analgesia: Pethidine: 13% versus 12% (NS)	
Smith (2004)[159]	Study Type: Systematic review/meta-analysis Evidence level: 1++	Total number of women = 56	1 RCT, 56 women with uncomplicated singleton pregnancies, Bishop score < 5, mixed parity.	Acupuncture every two days versus no acupuncture.	No outcomes provided on these women.	Source of Funding: University of Adelaide, Australia 20% drop out rate, imbalance in post randomisation exclusions (5 in acupuncture group, 8 in control group). Overall, no meaningful outcomes for interpretation
Harper (2006)[160]	Study Type: Randomised controlled trial Evidence level: 1+	Total number of women = 56	Nulliparous women >/=39 weeks GA with singleton pregnancy, median Bishop score 4.	Outpatient acupuncture treatment + usual medical care versus usual medical care (not specified).	Time to delivery (hours) from enrolment:: 124 (SD 86.7) versus 145 (SD 82.7) (NS) Spontaneous labour:70% versus 50%, OR 2.33 (95% CI 0.78 to 6.98) Caesarean births: 17% versus 39%. OR 3.13 (95% CI 0.99 to 10.8) 5 minuteute Apgar score: NS Admission to NICU: NS	Source of Funding: Bowes Cefalo Young Researcher Award Computer generated randomisation in equal blocks of two and four. Group assignment in numbered sealed envelopes opened by principle investigator, care providers and patients not blind.
Smith (2003)[162]	Study Type: Systematic review/meta-analysis Evidence level: 1++	Total number of women = 133	133 women with GA 36–42 weeks (2 RCTs) 40 women with cervical score ≤ 4 cm and prelabour rupture of membranes (1 RCT) (in German) No information from the other RCT (in French)	Homeopathy (herb Caulophyllum) versus placebo.	Vaginal delivery within 24 hours: 1 versus 0, RR 5.0, (95% CI 0.26 to 98.00) Caesarean births: 2 versus 0, RR 5.0 (95% CI 0.26 to 98.00) Uterine hyperstimulation: No data Serous maternal morbidity (postpartum haem, admission to intensive care, septicaemia): No data Serious neonatal morbidity (Apgar score, NICU admission): No data Oxytocin augmentation: 9 versus 9, RR 1.0 (95% CI 0.50 to 1.98) Instrumental delivery: RR 1.0 (95% CI 0.54 to 1.86 Vaginal delivery within 24 hours: RR 0.33 (95% CI 0.01 to 7.72) Report of difficult labour (1 RCT): 6 versus 16, RR 0.28, (95% CI 0.12 to 0.66) Caesarean births: 2 versus 0, RR 5.0, (95% CI 0.26 to 98.00)	Source of Funding: University of Adelaide, Australia

Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
					Uterine hyperstimulation: No data Serious maternal morbidity (postpartum haem, admission to intensive care, septicaemia): No data Serious neonatal morbidity (Apgar score, NICU admission): No data Oxytocin augmentation: 9 versus 9, RR 1.0 (95% CI 0.50 to 1.98) Instrumental delivery: RR 1.0 (95% CI 0.54 to 1.86) Mean length of labour (1RCT): 5.1 hours versus 8.48 hours ($P < 0.001$) Report of difficult labour (1RCT): 11.3% versus 40%, RR 0.28 (95% CI 0.12 to 0.66)	
Kelly (2001)[163]	Study Type: Systematic review/meta-analysis Evidence level: 1++	Total number of women = 103	1 quasi-RCT, 103 women with singleton pregnancy requiring induction of labour, intact membranes, Bishop score < 4. Parity unknown	Castor oil (60 ml) diluted in orange juice versus no treatment.	All women: Caesarean birth: 19% versus 8.3%, RR 2.31 (95% CI 0.77 to 6.87) Meconium-stained liquor: 9.6% versus 12.5% , RR 0.77, (95% CI 0.25 to 2.36) 5 minute Apgar score < 7: no data Nausea with ingestion of castor oil: RR 97.08 (95% CI 6.16 to 1530.41)	Source of Funding: no funding
Kavanagh (2001)[165]	Study Type: Systematic review/meta-analysis Evidence Level: 1++	Total number of women = 28	1 RCT, 56 women with > 39 weeks of gestation Bishop score and parity unknown (paper in Dutch).	Sexual intercourse for 3 consecutive nights with vaginal sperm deposit versus no sexual intercourse.	5 minute Apgar score < 7: 0% versus 0% Mean change in Bishop score: 1.0 versus versus 0.5 (p,0.05) Women delivered within 3 days of intervention: 46% versus 47%, RR 0.99 (95% CI 0.45 to 2.20)	Source of Funding: CESU, RCOG, London UK EPPI-Centre, IOE, London UK
Kavanagh (2005)[169]	Study Type: Systematic review/meta-analysis Evidence level: 1++	Total number of women = 719	6 RCTs, 719 pregnant women (low and high risk), due for 3rd trimester induction of labour carrying a viable fetus, Bishop score 5–7, mixed parity.	Breast stimulation versus no breast stimulation or oxytocin infusion.	In all women: Caesarean births (1 RCT): 9% versus 10%, RR 0.90 (95% CI 0.38 to 2.12) Achieving labour within 72 hours (4 RCTs): 63% vs 94% (RR 5.79, 95% CI 3.41 to 9.81) Perinatal death (1 RCT):1.8% versus 0%, RR 8.17 (95% CI 0.45 to 147.76) Meconium staining (2 RCTs): 25.6% versus 30%, RR 0.85 (95% CI 0.56 to 1.28) Post-partum haemorrhage (2 RCTs): 0.7% versus 6%, RR 0.16 (95% CI 0.03 to 0.87) Women's satisfaction: NS	Source of Funding: CESU, RCOG, London UK; EPPI-Centre, IOE, London.

5.3 Surgical methods

This section was updated and replaced in 2021. Please see the NICE website for the updated guideline.

6 Setting and timing for induction of labour

Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
Oei (2000)[178] Country: The Netherlands	Study Type: Randomised controlled trial Evidence Level: 1+	Total women = 126 Endocervical PGE_2 gel 0.5 mg in morning between 0.800 – 0900 hours *n* = 58 Endocervical PGE_2 gel 0.5 mg in evening between 22.00 – 23.00 hours *n* = 68	Women at term (Bishop score < 6) scheduled for induction of labour.	Endocervical PGE_2 gel 0.5 mg in morning between 0.800 – 0900 vs endocervical PGE_2 gel 0.5 mg in evening between 22.00 –23.00 hours.	Delivery between 18.00 and 08.00 hours: 9 versus 9 (NS) Vacuum/forceps delivery in nulliparous women: 3 versus 19 (RR 4.2, 95% CI 1.4 to 13) CS: 7 versus 5 (NS) Maternal satisfaction: 77% versus 62% Report of bad sleep: 34% versus 73%, RR 1.7 (95% CI 1.1 to 2.5) Would choose the same time of induction in next pregnancy: 8% versus 23%, RR 2.4 (95% CI 0.86 to 6.6)	Source of Funding: not reported Randomisation using random number table, concealment by means of sequentially numbered sealed envelopes, power calculation.
Dodd (2006)[177] Country: Australia	Study Type: Randomised controlled trial Evidence level: 1+	Total number of women = 620 Morning admission (0800 hours) for induction of labour *n* = 280 Evening admission (2000 hours) for induction of labour *n* = 340	Women at = 36 +6 weeks of gestation	Morning admission (0800 hours) for induction versus evening admission (2000 hours) for induction.	Achieving vaginal birth within 24 hours: 43% versus 44% (NS) Incidence of uterine hyperstimulation with FHR changes: 2% versus 0% (NS) Caesarean birth: 22% versus 26% (NS) Women's satisfaction: disliked lack of sleep: 0.4% vs 4.4% (RR 0.08, 95% CI 0.01 to 0.61) Maternal complications: NS Fetal complications: NS	Source of Funding: Royal Australian and NZ College Obs & Gynae Computer generated randomisation, not blinded, power calculation.
Biem (2003)[174] Country: Canada	Study Type: Randomised controlled trial Evidence level: 1+	Total number of women = 300 Out patient induction of labour with controlled-release	Women at term (~ 80% postdates) with a Bishop score of = 6.	Out patient induction of labour with controlled-release PGE_2 versus inpatient induction of labour with controlled-release PGE_2.	Delivery by 24 hours:77% versus 71% (NS) Median time to delivery (hrs):21.4 versus 20.7 (NS) CS: 23% versus 25% (NS) Apgar score at 5 minutes (median): 8.81 versus 8.71 (NS)	Source of Funding: Not reported Computer generated randomisation, no power calculation.

Bibliographic details	Study type and evidence level	Number of patients	Patient characteristics	Intervention and comparison	Follow-up and outcome measures effect size	Reviewer comments
		PGE_2 *n* = 150 Inpatient abour induction with controlled-release PGE_2 *n* = 150				
Somerset (1995)[179] Country: UK	Study Type: Cohort Evidence level: 2+	Total number of women = 80 Induction of labour with vaginal PGE_2 gel 2 mg inserted at 1400 hours *n* = 40 Induction of labour with vaginal PGE_2 gel 2 mg inserted at 2200 hours *n* = 40	Women at 37–42 weeks of gestation scheduled for induction of labour	Induction of labour with vaginal PGE_2 gel 2 mg inserted at 1400 hours versus induction of labour with vaginal PGE_2 gel 2 mg inserted at 2200 hours	Forceps birth: 27% versus 33% (NS) CS: 10% versus 25% (NS) Days in hospital: 4.4 versus 5.3 (*P* < 0.01) Total costs of admission (£): 1461 versus1811 (*P* = 0.01)	Source of Funding: not reported
Sciscione (2001)[175] Country: US	Study Type: Randomised controlled trial Evidence level: 1+	Total number of women = 111 Outpatient cervical priming with transcervical Foley catheter *n* = 61 Inpatient cervical priming with transcervical Foley catheter *n* = 50	Women at term and a Bishop score < 5.	Outpatient cervical priming with transcervical Foley catheter vs inpatient cervical priming with transcervical Foley catheter.	Change in Bishop score: 3.0 versus 3.0 (NS) CS: 29% versus 43% (NS) Apgar score at 5 minutes: 0 versus 8.0 (NS) Maternal discomfort (1–10 visual analogue scale, 1 being no discomfort and 10 worst pain): 4.8 (2.4) versus 3.9 (2.3) (NS)	Source of Funding: not reported Computer generated randomisation, no power calculation.

7 Monitoring and pain relief for induction of labour

7.2 Pain relief during induction of labour

Bibliographic Information	Study type and evidence level	Aim of study	Number of patients and patient characteristics	Population characteristics	Outcome measures	Reviewer comments
Chen (2000)[182] Country: Taiwan	Study Type: Randomised controlled trial Evidence level: 1+		Total number of women = 120 Epidural (fentanyl)anto relieve early first stage of labour pain during the early period of the first stage of induced labour (IV oxytocin) *n* = 60 (Group A) No epidural (fentanyl)to relieve early first stage of labour pain during the early period of the first stage of induced labour (IV oxytocin) *n* = 60 (Group B) Convenience control sample (no analgesia during entire labour course) *n* = 198 (Group C)	Women undergoing induction of labour.	CS: Groups A, B and C: 17% versus 15% versus 29% Group A vs B [NS]; Group A vs C, *P* = 0.09; Group B vs C, *P* = 0.05 Pain scores (VAS visual analogue scale): Lower in group A than in group B and C (*P* < 0.001) Duration of labour: early first stage: Groups A vs B vs C (NS) Apgar score at 5 minutes: Groups A vs B vs C (NS) Quality of analgesia rated as 'excellent': Group A 80% vs Group B 0% (*P* < 0.001)	Funding: National Science Council, Republic of China Methods of randomisation not reported, no power calculation.
Balladur (1989)[183] Country: France	Study Type: Randomised controlled trial Evidence level: 1+		Total number of women = 88 Epidural (fentanyl) started at beginning of induction *n* = 41 Epidural (fentanyl) once labour became 'active'	Women at term (37 - 42 weeks of gestation) undergoing induction (oxytocin).	Duration of labour (mins): Primiparous: 445 Multiparous: 213 Primiparous: 360 (*P* < 0.05) Multiparous: 282 (*P* < 0.05) Forceps birth: 6 versus 9 CS: 2 versus 4	Funding: not stated Methods of randomisation not reported No power calculation

Bibliographic Information	Study type and evidence level	Aim of study	Number of patients and patient characteristics	Population characteristics	Outcome measures	Reviewer comments
			n = 47		Assisted births: 0 versus 4	
Capogna (2001)[181]	Study Type: Cohort	To compare analgesia requirement of women	Total number of women = 61	Women (= 37 weeks of gestation with cervical	Minimum analgesic dose of sufentanil: 22.2 µg (95% CI 19.6 to 22.8)	Funding: not stated
Country: Italy	Evidence level: 2+	in spontaneous labour and in induced labour	Spontaneous labour *n* = 30	dilation 2–4 cm) requesting epidural pain relief in labour.	27.3 µg (95% CI 23.8 to 30.9) (*P* = 0.0014) by a factor of 1.3 (95% CI 1.1 to 1.5)	Prospsective, double-blind study, sequential allocation: to reduce bias from confounders.
			Induction of labour (with PGE_2) *n* = 31		Duration of analgesia: 88 minutes versus 95 minutes (NS) Sedation (measured by VAS): 55 (34–70) versus 70 (50–80) (*P* = 0.024) Nausea (measured by VAS): 0 versus 1 (NS) Maternal hypotension(< 90 mmHg): 0 versus 3 (NS)	

8 Complications of induction of labour

8.1 Uterine hyperstimulation

Bibliographic details	Study type and evidence level	Aim of study	Number of patients and patient characteristics	Population characteristics	Outcome measures	Reviewer comments
Egarter (1990)[185]	Study Type: Other Evidence level: 3	To review the frequency of uterine hyperstimulation associated with PGE_2 use and describe the therapeutic effects of B2-adrenergic tocolytic therapy.	Total number of women = 3099	Maternity cases requiring low dose PGE_2 (vaginal tablet, gel and intracervical gel) therapy for induction of labour.	Uterine hyperstimulation in 181 cases (5.8%) 31.5% had FHR abnormalities Administration of tocolytic treatment with B-adrenergic drugs (hexoprenaline at 0.3 µg/minute or a single dose of terbutaline 250 µg intravenously or subcutaneously): Uterine contractions normalised and reversing any FHR abnormality in 178 cases (98.3%) Caesarean : 3 postpartum complications: 0	Source of Funding: not reported Uterine hyperstimulation defined as contraction frequency was more than 5 in 10 minutes or if contractions exceeded 2 minutes in duration. Non-comparative study: likelihood of confounders.

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