

Queensland Clinical Guidelines

Translating evidence into best clinical practice

Maternity and Neonatal **Clinical Guideline**

Induction of labour

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| Author: | Queensland Clinical Guidelines |
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| Endorsed by: | Queensland Clinical Guidelines Steering Committee Statewide Maternity and Neonatal Clinical Network (Queensland) |
| Contact: | Email: Guidelines@health.qld.gov.au URL: www.health.qld.gov.au/qcg |

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- Supporting consumer rights and informed decision making in partnership with healthcare practitioners, including the right to decline intervention or ongoing management
- Advising consumers of their choices in an environment that is culturally appropriate and which enables comfortable and confidential discussion. This includes the use of interpreter services where necessary
- Ensuring informed consent is obtained prior to delivering care
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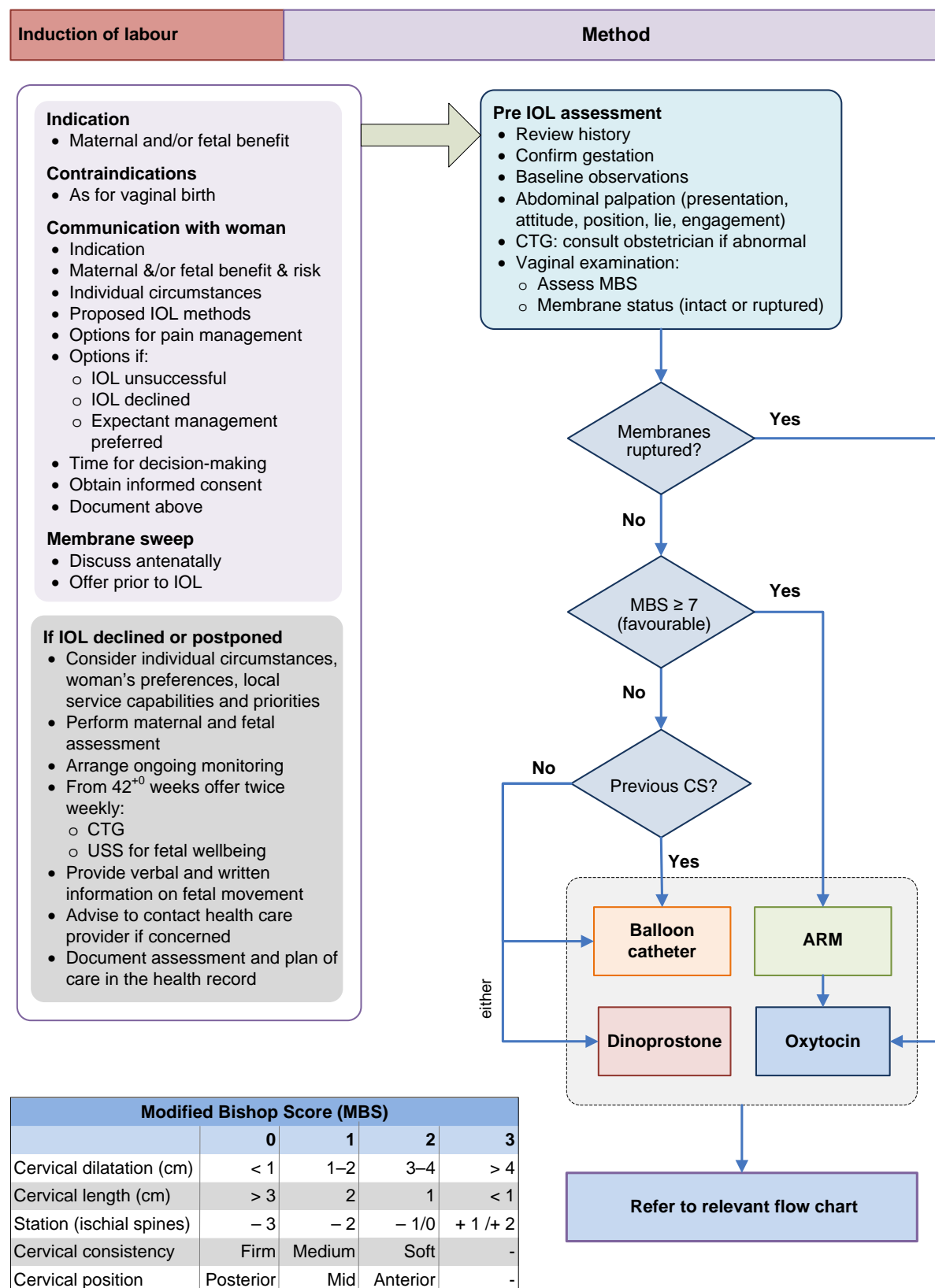
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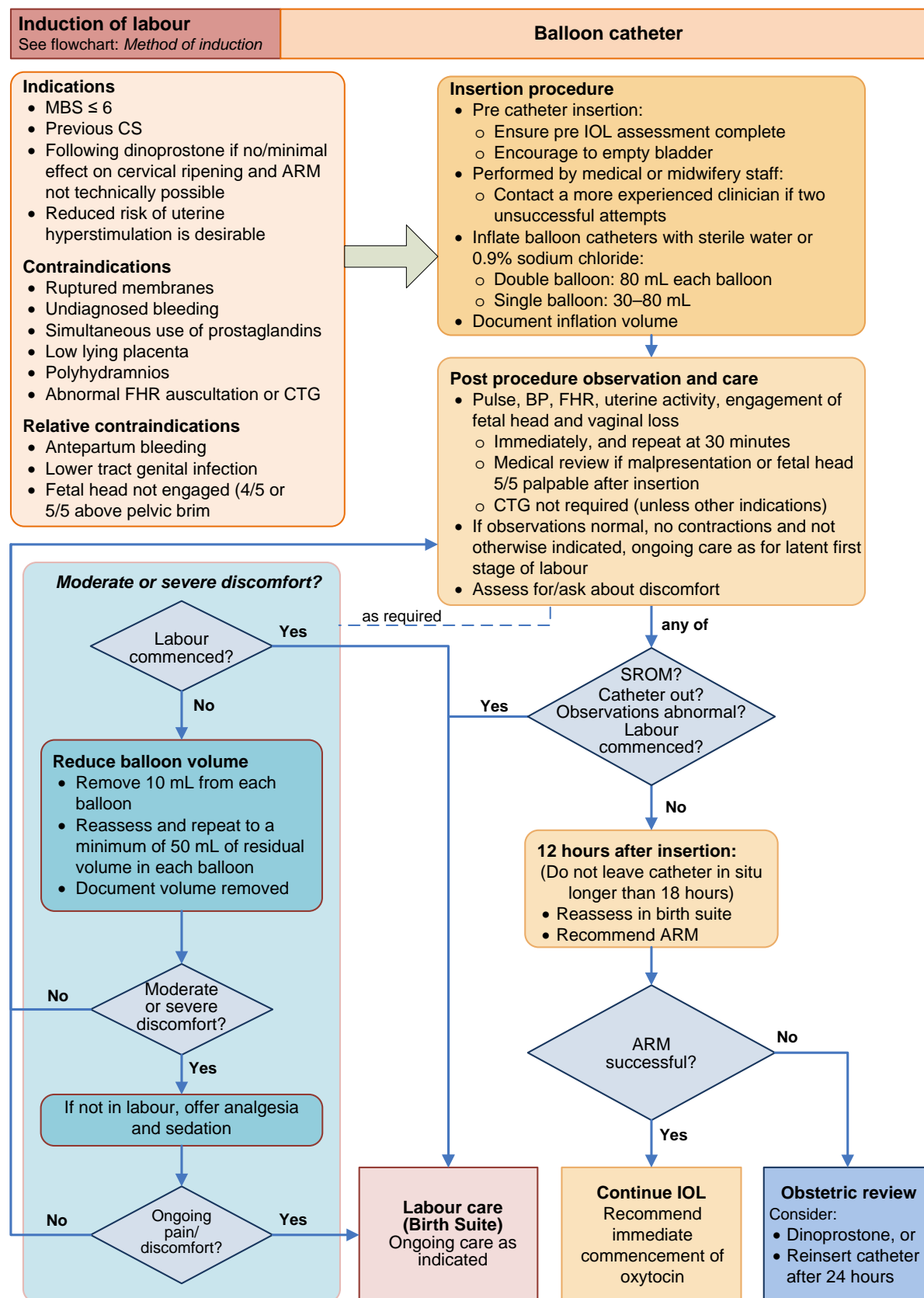
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Flow Chart: Method of induction of labour



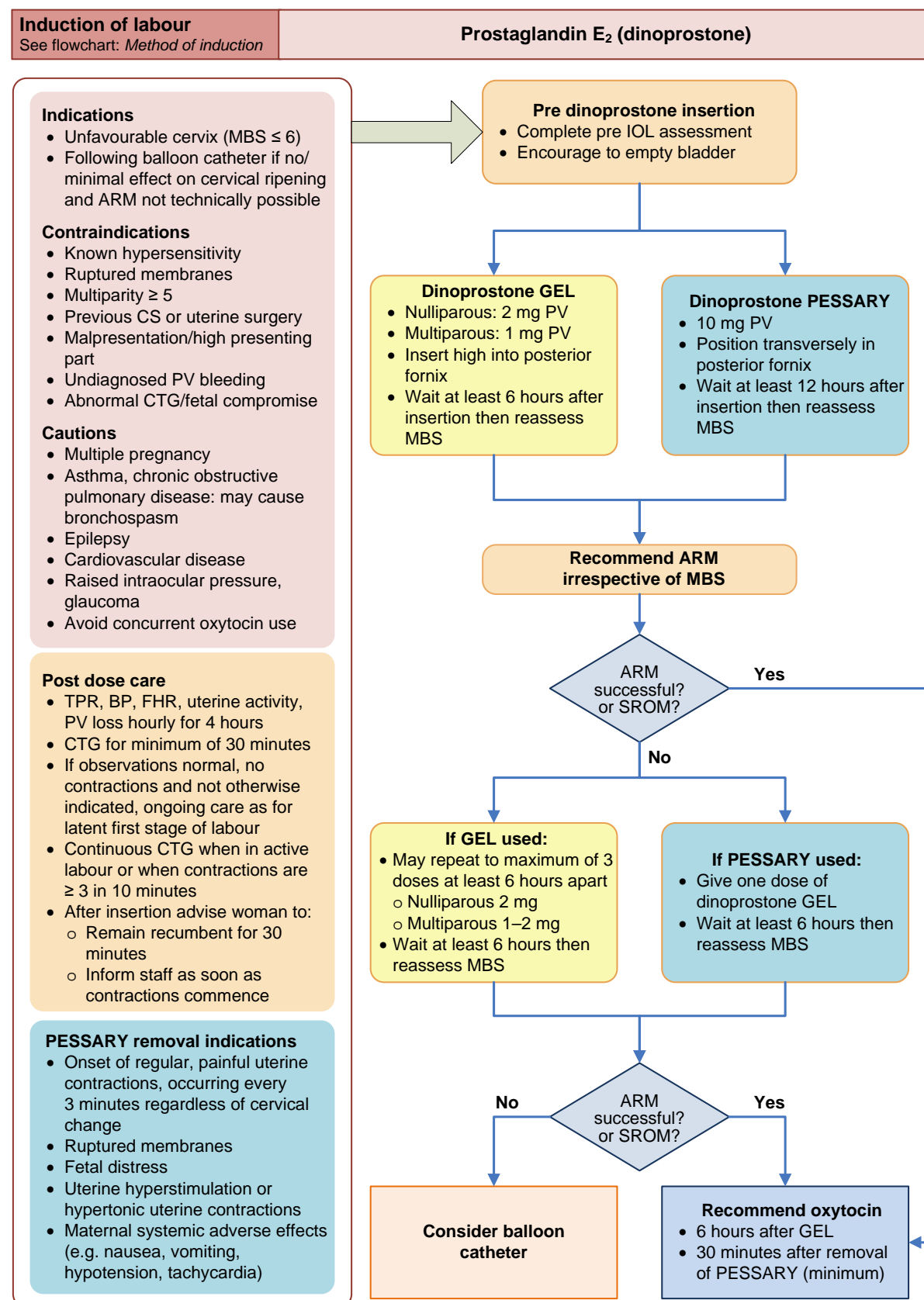
Queensland Clinical Guidelines: F17.22-1-V5-R22

ARM Artificial rupture of membranes; **cm** centimetres; **CS** Caesarean section; **CTG** Cardiotocography; **IOL** Induction of labour; **MBS** Modified Bishop Score; **USS** Ultrasound scan; **<** less than; **>** greater than; **≥** greater than or equal to

Flow Chart: Balloon catheter

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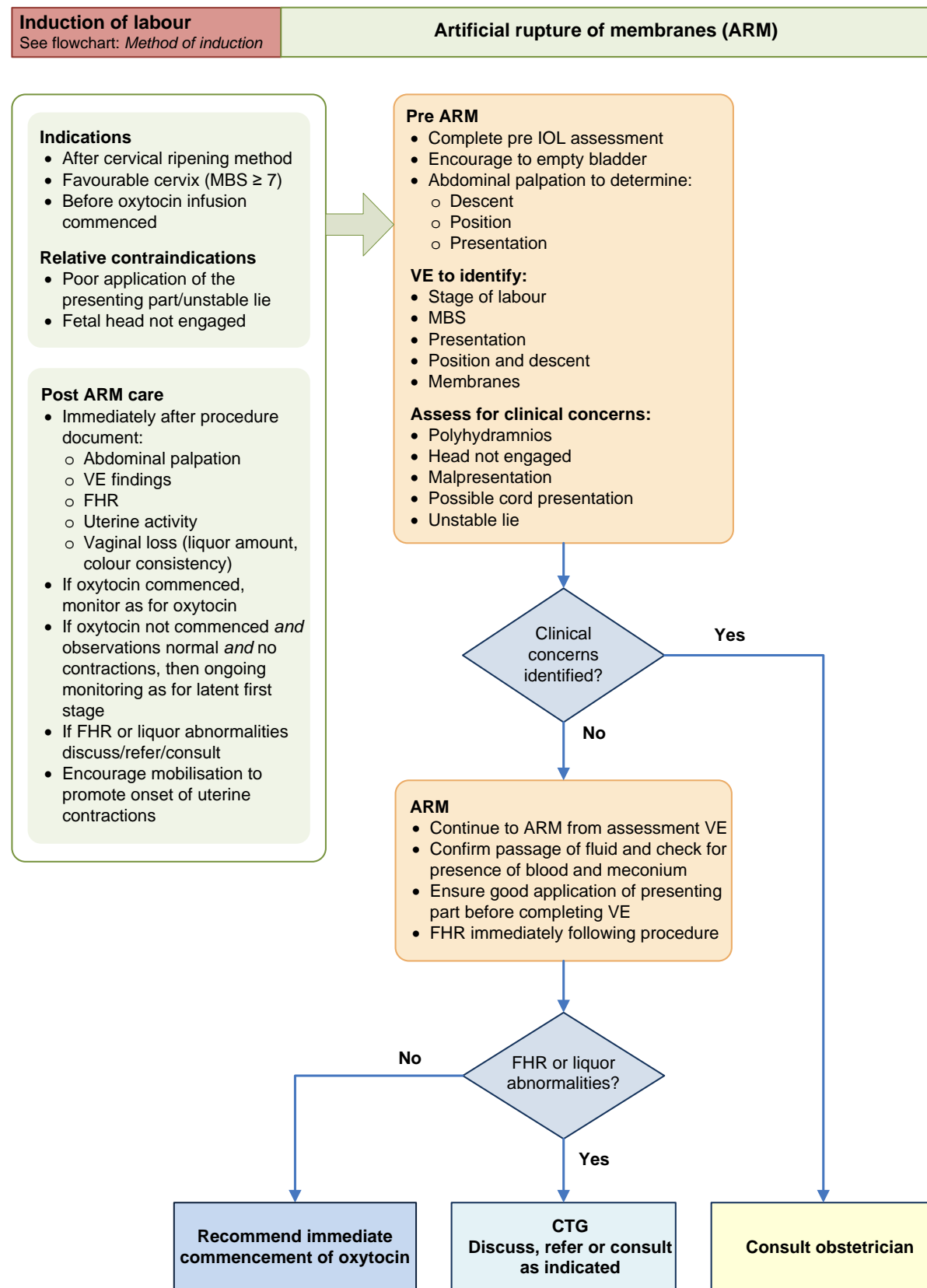
ARM Artificial rupture of membranes; **BP** Blood pressure; **CS** Caesarean section; **CTG** Cardiotocography; **FHR** Fetal heart rate; **IOL** Induction of labour; **MBS** Modified Bishop Score; **SROM** Spontaneous rupture of membranes; \leq less than or equal to,

Flow Chart: Prostaglandin E₂ (dinoprostone)

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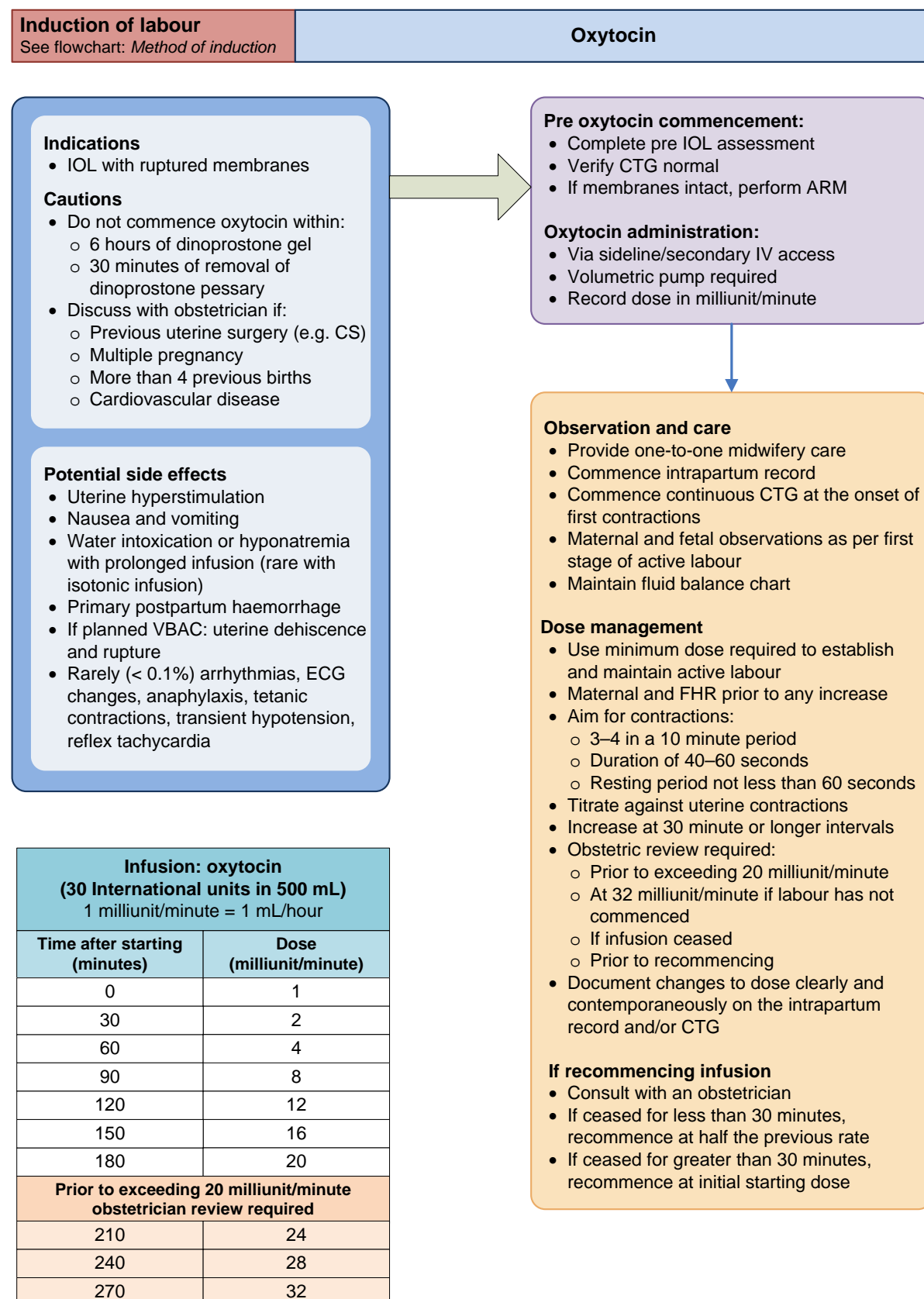
ARM Artificial rupture of membranes; **BP** Blood pressure; **CS** Caesarean section; **CTG** Cardiotocography; **FHR** Fetal heart rate; **IOL** Induction of labour; **MBS** Modified Bishop Score; **PV** Per vaginam; **SROM** spontaneous rupture of membranes; **TPR**: Temperature, pulse and respirations; ≥ greater than or equal to; ≤ less than or equal to

Flow Chart: Artificial rupture of membranes



Queensland Clinical Guidelines: F17.22-4-V5-R22

ARM Artificial rupture of membranes; **CTG**: Cardiotocograph, **FHR** Fetal heart rate; **IOL** Induction of labour; **MBS** Modified Bishop Score; **VE** Vaginal examination

Flow Chart: Oxytocin

Queensland Clinical Guidelines: F17.22-5-V5-R22

ARM Artificial rupture of membranes; **CS** Caesarean section; **CTG** Cardiotocography; **ECG** Electrocardiograph; **FHR** Fetal heart rate; **IOL** Induction of labour; **IV** Intravenous; **VBAC** Vaginal birth after caesarean section; **<** less than; **≥** greater than or equal to

Abbreviations

| | |
|------------------------|---|
| ARM | Artificial rupture of membranes |
| BP | Blood pressure |
| CI | Confidence interval |
| CS | Caesarean section |
| CTG | Cardiotocography |
| EFW | Estimated fetal weight |
| FGR | Fetal growth restriction |
| FHR | Fetal heart rate |
| IOL | Induction of labour |
| MBS | Modified Bishop Score |
| NICU | Neonatal intensive care unit |
| NNT | Number needed to treat |
| PGE₂ | Prostaglandin E2 |
| PPH | Primary postpartum haemorrhage |
| PV | Per vaginam |
| RCT | Randomised controlled trial |
| RR | Risk ratio |
| SROM | Spontaneous rupture of membranes |
| TPR | Temperature, pulse, respiration |
| USS | Ultrasound scan |
| VBAC | Vaginal birth after caesarean |
| VE | Vaginal examination |
| VTE | Venous thromboembolism |
| x^{+y} | x is number of completed weeks of pregnancy +y is the number of days past the number of completed weeks of pregnancy (e.g. 40 ⁺³ is 40 completed weeks of pregnancy plus 3 days) |

Definition of terms

| | |
|--------------------------|---|
| Amniotomy | Artificial rupture of membranes to initiate or speed up labour. ¹ |
| Balloon catheter | A flexible tube with an inflatable balloon at one end. This can be introduced through the cervix and the balloon inflated, holding the catheter in place. Also known as transcervical catheter |
| Cervical ripening | A prelude to the onset of labour whereby the cervix becomes soft and compliant. This allows its shape to change from being long and closed, to being thinned out (effaced) and starting to open (dilate). It either occurs naturally or as a result of physical or pharmacological interventions. ¹ |
| Expectant management | Allowing labour to develop and progress under supervision without intervention, unless clinically indicated. ¹ |
| Favourable cervix | The cervix is said to be favourable when its characteristics suggest there is a high chance of spontaneous onset of labour, or of responding to interventions made to induce labour. ¹ |
| Fetal growth restriction | Also known as intrauterine growth restriction (IUGR). Fetal growth restriction (FGR) indicates the presence of a pathophysiological process occurring in utero that inhibits fetal growth. ² |
| Grand multipara | A woman who has given birth to five or more babies. |
| Induction of labour | The process of artificially initiating labour. ¹ |
| Mechanical method | Non-pharmacological method of inducing labour. ¹ |
| Obstetrician | Local facilities may differentiate the roles and responsibilities assigned in this document to an "Obstetrician" according to their specific practitioner group requirements; for example to General Practitioner Obstetricians, Specialist Obstetricians, Consultants, Visiting Medical Officers, Senior Registrars, Obstetric Fellows or other members of the team as required. |
| Prolonged pregnancy | A pregnancy past 42 ⁺⁰ weeks gestation. ¹ |
| Transcervical catheter | Refer to the definition for balloon catheter. |
| Uterine hyperstimulation | Either uterine tachysystole or uterine hypertonus with FHR abnormalities. ³ |
| Uterine hypertonus | Contractions lasting more than two minutes in duration or contractions occurring within 60 seconds of each other, without fetal heart rate abnormalities. ³ |
| Uterine tachysystole | More than 5 contractions in 10 minutes without FHR abnormalities. ³ |

Table of Contents

| | | |
|-------|--|----|
| 1 | Introduction | 10 |
| 1.1 | Communication and information | 10 |
| 1.2 | IOL declined or postponed..... | 11 |
| 1.3 | Clinical standards | 11 |
| 2 | Specific indications and circumstances..... | 12 |
| 2.1 | Prolonged pregnancy prevention..... | 12 |
| 2.2 | Concern for fetal wellbeing | 12 |
| 2.3 | Twin pregnancy | 13 |
| 2.4 | Fetal macrosomia | 13 |
| 2.5 | Advanced maternal age..... | 13 |
| 2.6 | Obstetric cholestasis (intrahepatic cholestasis of pregnancy)..... | 14 |
| 2.7 | Maternal ethnicity..... | 14 |
| 2.8 | Maternal request..... | 14 |
| 3 | Pre IOL assessment..... | 15 |
| 3.1 | Cervical assessment..... | 15 |
| 3.2 | Membrane sweeping | 16 |
| 4 | Methods of IOL | 17 |
| 4.1 | Balloon (transcervical) catheter | 18 |
| 4.1.1 | Balloon (transcervical) catheter insertion | 19 |
| 4.1.2 | Balloon (transcervical) catheter post insertion care..... | 20 |
| 4.2 | Dinoprostone | 21 |
| 4.2.1 | Dinoprostone administration | 22 |
| 4.3 | Artificial rupture of membranes..... | 23 |
| 4.4 | Oxytocin | 24 |
| 4.4.1 | Oxytocin regimen administration | 25 |
| 5 | Risks and benefits associated with IOL | 26 |
| | References | 27 |
| | Acknowledgements..... | 30 |

List of Tables

| | |
|---|----|
| Table 1. Communication and information..... | 10 |
| Table 2. IOL declined or postponed | 11 |
| Table 3. Clinical standards | 11 |
| Table 4. Prolonged pregnancy | 12 |
| Table 5. Fetal growth restriction | 12 |
| Table 6. Twin pregnancy | 13 |
| Table 7. Suspected fetal macrosomia | 13 |
| Table 8. Advanced maternal age..... | 13 |
| Table 9. Obstetric cholestasis | 14 |
| Table 10. Maternal ethnicity | 14 |
| Table 11. Maternal request..... | 14 |
| Table 12. Modified Bishop score | 15 |
| Table 13. Membrane sweeping | 16 |
| Table 14. Methods of IOL | 17 |
| Table 15. Balloon catheter considerations | 18 |
| Table 16. Balloon catheter insertion procedure..... | 19 |
| Table 17. Post balloon catheter insertion | 20 |
| Table 18. Dinoprostone considerations and dose | 21 |
| Table 19. Dinoprostone administration..... | 22 |
| Table 20. Artificial rupture of membranes..... | 23 |
| Table 21. Oxytocin..... | 24 |
| Table 22. Oxytocin administration | 25 |
| Table 23. Oxytocin regimen..... | 25 |
| Table 24. Risks and benefits associated with IOL..... | 26 |

1 Introduction

Induction of labour (IOL) is the initiation of contractions in a pregnant woman who is not in labour. IOL is indicated when the maternal and/or fetal risks of ongoing pregnancy outweigh the risks of IOL and birth. Contraindications to IOL are consistent with those for vaginal birth. A woman's individual circumstances and preferences will influence the timing and method of IOL. In 2014 the IOL rate in Queensland was 24.9% of all births.⁴

The purpose of this guideline is to guide the IOL process in women at or near term. Refer to associated Queensland Clinical Guidelines for specific circumstances outside the scope of this guideline including:

- *Early pregnancy loss*⁵
- *Therapeutic termination of pregnancy*⁶
- *Perinatal care at the threshold of viability*⁷
- *Stillbirth care*⁸

1.1 Communication and information

Discuss the risks and benefits of IOL as they pertain to each individual woman. Take into account individual needs and preferences, to enable the woman to make an informed decision in consultation with her health care provider.⁹

Table 1. Communication and information-

| Aspect | Good practice points |
|-----------------------------------|--|
| Maternal experience | <ul style="list-style-type: none"> • Provide time for questions and decision making • In 2014–2015 in Queensland, for women who had an IOL: <ul style="list-style-type: none"> ◦ 27% reported having made an informed decision¹⁰ ◦ 91% felt the reasons for the IOL were explained in a way they could understand¹¹ ◦ 21% felt they had no choice about whether their labour would be induced¹¹ |
| IOL discussion points | <ul style="list-style-type: none"> • Indication for IOL • Method of IOL • Potential risks and benefits <ul style="list-style-type: none"> ◦ Refer to Section 5 Risks and benefits associated with IOL • Options for pain relief • Options if unsuccessful • Options if declined |
| Written/online information | <ul style="list-style-type: none"> • Consider the use of decision aids to assist the woman make informed choices¹² <ul style="list-style-type: none"> ◦ Refer to Queensland Clinical Guideline parent information: <i>Induction of labour</i>¹³ |
| Documentation | <ul style="list-style-type: none"> • Clear and contemporaneous documentation is required in the healthcare record including: <ul style="list-style-type: none"> ◦ The indication for IOL ◦ The content and outcome of discussions [refer to discussion points above] ◦ Informed consent/choice ◦ Care provided (e.g. Bishop score, observations) ◦ Clinician signature and designation |

1.2 IOL declined or postponed

Table 2. IOL declined or postponed

| Aspect | Good practice points |
|----------------------|---|
| Communication | <ul style="list-style-type: none"> • If IOL is declined, respect the woman's decision • Where pregnancy gestation was greater than 41 weeks gestation, women who¹⁴: <ul style="list-style-type: none"> ◦ Waited for labour to start—38% would choose to wait next time ◦ Were induced—73% would choose IOL next time • No form of increased antenatal monitoring has been shown to reduce perinatal mortality associated with prolonged pregnancy¹⁵ |
| Plan care | <ul style="list-style-type: none"> • If IOL is declined or postponed (e.g. due to resourcing issues or as a result of maternal request), take into account the: <ul style="list-style-type: none"> ◦ Individual clinical circumstances and preferences ◦ Indication for IOL ◦ Local service capabilities and priorities • Perform an assessment of maternal and fetal wellbeing • Develop a plan with the woman for continued care including: <ul style="list-style-type: none"> ◦ Arrangements for ongoing monitoring ◦ Return for IOL • From 42⁺⁰ weeks offer at least twice weekly assessment for fetal wellbeing^{9,16}, including¹: <ul style="list-style-type: none"> ◦ Cardiotocography (CTG) ◦ Ultrasound scan (USS) assessment of amniotic fluid volume using estimation of deepest vertical pocket ◦ Refer to Section 2.1 Prolonged pregnancy prevention • Advise the woman to contact her health care provider/facility if concerned about her wellbeing or that of her baby (including not to wait until the next day¹⁷) • Provide verbal and written information about fetal movements¹⁷ • Document the discussion, assessment and plan in the health record |

1.3 Clinical standards

Table 3. Clinical standards

| Aspect | Good practice points |
|-----------------------------|--|
| Service capabilities | <ul style="list-style-type: none"> • Provide care in the context of the Clinical Services Capability Framework¹⁸ • Ensure availability of health care professionals appropriate to the circumstances • Continuous electronic fetal heart monitoring and uterine contraction monitoring is required for IOL with oxytocin and prostaglandin³ • Establish quality and safety programs and tools to monitor care (e.g. IOL safety audits and reviews) • Provide care in accordance with the national consensus statement¹⁹ |
| Outpatient setting | <ul style="list-style-type: none"> • There is insufficient evidence to determine if IOL is effective and safe in outpatient settings²⁰ • If a facility provides outpatient IOL prior to the onset of established labour (e.g. for cervical ripening), develop local protocols to support: <ul style="list-style-type: none"> ◦ Appropriate clinical governance, clinical indications, inclusion/exclusion criteria, written information for women, observation/monitoring protocols and adequate follow-up and support for women ◦ In the outpatient setting, IOL with balloon catheters may be safer than IOL with prostaglandins as studies show less uterine hyperstimulation during the cervical ripening phase²¹ |

2 Specific indications and circumstances

Refer to associated Queensland Clinical Guidelines, which include IOL considerations for the specific maternal circumstances of:

- Hypertensive disorders of pregnancy²²
- Gestational diabetes mellitus²³
- Obesity in pregnancy²⁴
- Vaginal birth after caesarean (VBAC)²⁵
- Early onset Group B Streptococcal disease (EOGBSD)²⁶, includes information related to:
 - Prelabour rupture of membranes
 - Preterm prelabour rupture of membranes
- Stillbirth care⁸
- Venous thromboembolism (VTE) prophylaxis in pregnancy and the puerperium²⁷
- Perinatal substance use: maternal²⁸

Considerations for other IOL indications and circumstances are outlined in the following sections.

2.1 Prolonged pregnancy prevention

Table 4. Prolonged pregnancy

| Prevention of prolonged pregnancy | |
|-----------------------------------|---|
| Risk/Benefit | <ul style="list-style-type: none"> • No form of increased antenatal monitoring has been shown to reduce perinatal mortality associated with prolonged pregnancy¹⁵ • IOL from 41⁺⁰ weeks, compared with expectant management, is associated with¹⁵: <ul style="list-style-type: none"> ○ Fewer perinatal deaths [0.4 versus 3.2 per 1000 women] ○ Less meconium aspiration syndrome [40 versus 66 per 1000 newborns] ○ No difference in neonatal intensive care (NICU) admissions ○ Fewer caesarean sections (CS) [168 versus 225 per 1000 women] ○ Most women prefer IOL at 41 weeks over serial antenatal monitoring¹⁴ |
| Clinical practice point | <ul style="list-style-type: none"> • For uncomplicated pregnancies, recommend IOL after 41⁺⁰ weeks^{1,16,29} • Exact timing depends on the specific risk of stillbirth, individual preferences and local circumstances¹ • Waiting after 42⁺⁰ weeks is not recommended^{1,30} |

2.2 Concern for fetal wellbeing

Concern for fetal wellbeing may arise with FGR/small for gestational age [refer to Table 5], decreased fetal movements, oligohydramnios, non-reassuring fetal surveillance test, fetal abnormality, or isoimmunisation. The timing of birth may depend on gestational age, severity of concern and results of tests of fetal wellbeing. Increased fetal surveillance may be required with expectant management [refer to Section 1.2 IOL declined or postponed].

Table 5. Fetal growth restriction

| Fetal growth restriction | |
|--------------------------------|---|
| Risk/Benefit | <ul style="list-style-type: none"> • Although underpowered to show differences in late pregnancy loss, for term FGR, comparing IOL with expectant monitoring, studies show no significant difference in^{31,32} <ul style="list-style-type: none"> ○ Rate of obstetric interventions (e.g. CS) ○ Maternal or neonatal morbidity and mortality ○ Admission to a neonatal unit if birth occurred after 38 weeks gestation |
| Clinical practice point | <ul style="list-style-type: none"> • For babies with FGR, use of umbilical artery, middle cerebral and ductus venosus Doppler may assist in improving perinatal outcome through more appropriate timing of birth^{33,34} • Severity affects the decision concerning mode and timing of birth³⁵ • If recommending expectant management, increase fetal surveillance [refer to Section 1.2 IOL declined or postponed] • IOL at term to prevent stillbirth is appropriate |

2.3 Twin pregnancy

Table 6. Twin pregnancy

| Twin pregnancy | |
|--------------------------------|--|
| Risk/Benefit | <ul style="list-style-type: none"> Based on data from the United States, the fetal/infant mortality per additional week of expectant management at³⁶: <ul style="list-style-type: none"> 37 weeks is 4.39 per 1000 women 95% CI 4.07 to 4.70 38 weeks is 5.92 per 1000 women 95% CI 5.40 to 6.43 A Cochrane review of elective birth at 37 weeks compared to expectant management demonstrated³⁷: <ul style="list-style-type: none"> No statistically significant differences in CS, perinatal death or serious morbidity, maternal death or serious maternal morbidity Significant reduction in risk of babies being born with a birth weight less than the third percentile [one study; RR 0.30; 95% CI 0.13 to 0.68] Monochorionic twins are at increased risk of stillbirth in the third trimester compared to dichorionic twins³⁸ |
| Clinical practice point | <ul style="list-style-type: none"> In uncomplicated twin pregnancies (monochorionic^{39,40} or dichorionic), plan birth after 37⁺⁰ weeks^{36,37,41} |

2.4 Fetal macrosomia

Table 7. Suspected fetal macrosomia

| Fetal macrosomia | |
|--------------------------------|--|
| Consideration | <ul style="list-style-type: none"> In a Cochrane review, comparing IOL at 37–40 weeks to expectant management, there were⁴²: <ul style="list-style-type: none"> No significant differences in: <ul style="list-style-type: none"> CS rate or instrumental birth Measures of neonatal asphyxia Lower risks of shoulder dystocia, and (any) fracture (NNT=60) Lower birth weights [178.03 g, 95% CI 40.81 to 315.26] Higher incidences of third and fourth degree perineal tears (one study) |
| Clinical practice point | <ul style="list-style-type: none"> IOL on the basis of clinical suspicion of macrosomia alone is not recommended¹ USS for estimated fetal weight (EFW) is advised⁴³ With a suspected large for gestation age baby based on clinical assessment (e.g. symphysio-fundal height equals 3 cm more than expected from 36 weeks), offer an USS to measure EFW⁴³ Discuss IOL after 38⁺⁰ weeks if EFW greater than⁴³: <ul style="list-style-type: none"> 3500 g at approximately 36 weeks 3700 g at approximately 37 weeks 3900 g at approximately 38 weeks |

2.5 Advanced maternal age

Table 8. Advanced maternal age

| Advanced maternal age | |
|--------------------------------|--|
| Risk/Benefit | <ul style="list-style-type: none"> Advanced maternal age is an independent risk factor for stillbirth^{44,45,46} <ul style="list-style-type: none"> Nulliparous women may be at higher risk of stillbirth, but evidence is inconsistent^{45,47} IOL at 39 weeks for advanced maternal age, compared to expectant management, had no significant effect on the CS rate and no adverse short-term effects on maternal and neonatal outcomes⁴⁸ |
| Clinical practice point | <ul style="list-style-type: none"> For women aged 40 years or older, offer IOL at 39⁺⁰–40⁺⁰ weeks gestation^{45,49} |

2.6 Obstetric cholestasis (intrahepatic cholestasis of pregnancy)

Table 9. Obstetric cholestasis

| Obstetric cholestasis | |
|--------------------------------|--|
| Risk/Benefit | <ul style="list-style-type: none"> Associated with: <ul style="list-style-type: none"> Stillbirth^{50,51} <ul style="list-style-type: none"> Approximately 1.2% after 37 weeks gestation (although this may be consistent with population stillbirth rates⁵²) Increases with increasing gestational age and bile acid levels Meconium stained liquor^{50,51} Preterm birth^{50,51} No quality evidence exists to guide timing of birth^{50,53} although IOL is often recommended between 37 to 38 weeks⁵⁴ due to risk of stillbirth Identified as a medical indication for late preterm (34⁺⁰–36⁺⁶ weeks gestational age) or early term (37⁺⁰–38⁺⁶ weeks gestational age) birth by American College of Obstetricians and Gynaecologists⁵⁵ |
| Clinical practice point | <ul style="list-style-type: none"> Consider IOL between 37⁺⁰ and 37⁺⁶ weeks gestation as relevant to⁵³: <ul style="list-style-type: none"> Individual circumstances—case for intervention is stronger with more severe biochemical abnormalities Risk of stillbirth—cannot predict if pregnancy continues Higher risk of neonatal respiratory morbidity from early intervention Offer continuous fetal monitoring during labour Consider IOL around 36 weeks for severe cases with jaundice, progressive elevations in serum bile acids and liver enzymes, and suspected fetal compromise⁵⁶ |

2.7 Maternal ethnicity

Table 10. Maternal ethnicity

| Maternal ethnicity | |
|--------------------------------|--|
| Consideration | <ul style="list-style-type: none"> Differences in ethnicity have been reported in perinatal mortality data⁵⁷⁻⁶³ but whether this is entirely attributable to genetic factors is unclear In one retrospective study, South-Asian born women (country of birth India, Sri Lanka, Bangladesh, Pakistan) compared to Australian-born women: <ul style="list-style-type: none"> Had a higher antepartum stillbirth rate [2.4 times more likely, 95% CI 1.4 to 4.0] with risk increasing progressively with gestation Were twice as likely to have a low birthweight baby (less than 2500 g) |
| Clinical practice point | <ul style="list-style-type: none"> Insufficient evidence to recommend IOL based on maternal ethnicity alone Consider a woman's ethnicity in the context of other risk factors when determining timing of IOL |

2.8 Maternal request

Table 11. Maternal request

| Maternal request | |
|--------------------------------|---|
| Risk/Benefit | <ul style="list-style-type: none"> For low risk women elective IOL at term is not associated with an increased risk of CS⁶⁴ The long term population consequences of a significant proportion of low risk women receiving elective IOL are unknown IOL requires more intensive clinical resources than spontaneous onset of labour in low risk women Retrospective and population based studies suggest a possible association between birth prior to 39 weeks and developmental/early childhood health problems⁶⁵⁻⁶⁸ |
| Clinical practice point | <ul style="list-style-type: none"> Consider IOL at term based on exceptional circumstances of the woman and her family (i.e. not solely because of patient or health care provider preference⁹) |

3 Pre IOL assessment

Immediately prior to IOL:

- Review maternal history
- Confirm gestation
- Perform baseline maternal observations (e.g. temperature pulse, respiratory rate and blood pressure)
- Perform abdominal palpation to confirm presentation, attitude, lie, position, and engagement
- Assess membrane status (ruptured or intact)⁹
- Vaginal examination (VE) to assess the cervix [refer to Section 3.1 Cervical assessment]
- Assess fetal wellbeing:
 - FHR
 - Confirm CTG is normal¹
 - If CTG abnormal, escalate as per local protocols
 - Refer to Queensland Clinical Guideline: *Intrapartum fetal surveillance*⁶⁹
- Assess for contraindications to IOL
- Consider urgency for IOL

3.1 Cervical assessment

The Bishop score is commonly used to assess the cervix and to inform the choice of method of IOL. Each feature of the cervix is scored and then the scores are summed⁷⁰ [refer Table 12]. The state of the cervix is one of the important predictors of successful IOL.⁹ The cervix is unfavourable if the MBS is 6 or less.⁹

Table 12. Modified Bishop score

| Cervical feature | Score | | | |
|--------------------------------------|-----------|--------|----------|---------|
| | 0 | 1 | 2 | 3 |
| Dilation (cm) | < 1 | 1–2 | 3–4 | > 4 |
| Length of cervix (cm) | > 3 | 2 | 1 | < 1 |
| Station (relative to ischial spines) | – 3 | – 2 | – 1/0 | + 1/+ 2 |
| Consistency | Firm | Medium | Soft | – |
| Position | Posterior | Mid | Anterior | – |

3.2 Membrane sweeping

Membrane sweeping refers to the digital separation of the fetal membranes from the lower uterine segment during VE. This movement helps to separate the cervix from the membranes and stimulate the release of prostaglandins.

Table 13. Membrane sweeping

| Membrane sweeping | |
|--------------------------------|--|
| Indication | <ul style="list-style-type: none"> • Reduce the need for IOL by encouraging spontaneous labour |
| Contraindication | <ul style="list-style-type: none"> • Consistent with contraindications for vaginal birth⁷¹ • Preterm gestation |
| Risk/Benefit | <ul style="list-style-type: none"> • Reduced need for IOL, particularly in multiparous women⁷² • Optimal gestation at which to commence is controversial⁷¹ • Optimal frequency is unknown⁷¹ <ul style="list-style-type: none"> ◦ Serial membrane sweeping (every 2 days) reduced the number of pregnancies reaching 42 weeks [NNT=6⁷²] ◦ When performed at the onset of formal induction, membrane sweeping resulted in shorter induction to birth interval, shorter duration of oxytocin infusion and improved birth process satisfaction^{73,74} • No evidence of increased risk of maternal or neonatal infection^{71,75} <ul style="list-style-type: none"> ◦ Is as safe in Group B Streptococcus (GBS) positive women as for women whose GBS status is unknown or negative^{71,76} ◦ No data available on HIV or hepatitis C⁷¹ • Associated with discomfort^{72,75}, vaginal bleeding and irregular contractions⁷⁵ • Some studies have shown no difference in cervical length, time to onset of labour, or duration of the active phase of labour, where VBAC is planned^{71,77,78} |
| Clinical practice point | <ul style="list-style-type: none"> • Discuss the benefits of membrane sweeping in the antenatal period • Offer prior to formal IOL⁷¹ • If the cervix is closed and membrane sweeping is not possible, cervical massage in vaginal fornices may achieve similar effect¹ |

4 Methods of IOL

Table 14. Methods of IOL

| Aspect | Recommendation | | | | | | | | | |
|---|--|--------------------------------------|--------------------------|--------------------------|----------------------------------|----------|------------------|------------------------|----------|--------------------------------------|
| Cervical ripening for unfavourable cervix | <ul style="list-style-type: none">• Mechanical: balloon (transcervical) catheter (e.g. Foley, Cook cervical ripening balloon)• Pharmacological: dinoprostone preparations (prostaglandin E₂/prostin gel, cervidil) | | | | | | | | | |
| After cervical ripening/ cervix favourable | <ul style="list-style-type: none">• Artificial rupture of membranes (ARM)• Oxytocin | | | | | | | | | |
| If primary cervical ripening method is unsuccessful | <ul style="list-style-type: none">• If primary method was: | | | | | | | | | |
| | <table><tr><td>o Balloon catheter</td><td>consider</td><td>Dinoprostone gel/pessary</td></tr><tr><td>o Dinoprostone gel up to 3 doses</td><td>consider</td><td>Balloon catheter</td></tr><tr><td>o Dinoprostone pessary</td><td>consider</td><td>Dinoprostone gel or balloon catheter</td></tr></table> | o Balloon catheter | consider | Dinoprostone gel/pessary | o Dinoprostone gel up to 3 doses | consider | Balloon catheter | o Dinoprostone pessary | consider | Dinoprostone gel or balloon catheter |
| | o Balloon catheter | consider | Dinoprostone gel/pessary | | | | | | | |
| o Dinoprostone gel up to 3 doses | consider | Balloon catheter | | | | | | | | |
| o Dinoprostone pessary | consider | Dinoprostone gel or balloon catheter | | | | | | | | |
| Insufficient evidence | <ul style="list-style-type: none">• For IOL—there is insufficient evidence to support Laminaria tents, breast/nipple stimulation (particularly if high risk^{79,80}), acupuncture⁸¹, sexual intercourse^{82,83}, evening primrose oil, homeopathy¹, castor oil⁸⁴, nitric oxide donors⁸⁵, hyaluronidase¹, oestrogen¹, and corticosteroids¹ | | | | | | | | | |
| Misoprostol | <ul style="list-style-type: none">• Compared with placebo, misoprostol (sustained release vaginal pessary, vaginal tablet, buccal/sublingual and oral tablet) had higher odds of uterine hyperstimulation with FHR changes than 31 other active interventions (180 studies)⁸⁶• Not currently recommended for IOL where a live birth is expected<ul style="list-style-type: none">o Not included on the Queensland Health List of Approved Medicines (LAM) for IOL with a viable baby | | | | | | | | | |

4.1 Balloon (transcervical) catheter

Balloon catheters (e.g. Foley, Cooks) are used to ripen the cervix through applying pressure on the internal os of the cervix, thereby stretching the lower uterine segment and increasing local prostaglandin secretion.⁹

Table 15. Balloon catheter considerations

| Aspect | Clinical practice point |
|-----------------------------------|--|
| Indications | <ul style="list-style-type: none"> • Unfavourable cervix (MBS of 6 or less) • May be considered with previous CS • May be used following dinoprostone when there has been no/minimal effect on cervical ripening and ARM is not technically possible • May be preferred where a reduced risk of uterine hyperstimulation is desirable (e.g. SGA, grand multipara, scarred uterus²⁹) |
| Contraindication | <ul style="list-style-type: none"> • Any contraindication to vaginal birth (e.g. malpresentation, abnormal placentation, HIV, active genital herpes) • Any contraindications to IOL • Ruptured membranes • Undiagnosed bleeding • Simultaneous use of prostaglandins⁸⁷ and/or oxytocin • Low lying placenta^{9,87} • Polyhydramnios • Abnormal FHR auscultation or CTG |
| Relative contraindications | <ul style="list-style-type: none"> • Antepartum bleeding⁹ • Lower tract genital infection⁹ • Fetal head not engaged⁹ (4/5 or 5/5 above the pelvic brim) |
| Benefit⁸⁷ | <ul style="list-style-type: none"> • When compared to vaginal prostaglandins: <ul style="list-style-type: none"> ◦ Less uterine hyperstimulation and tachysystole²¹ ◦ No difference in CS rate ◦ No difference in overall number not achieving vaginal birth within 24 hours, although among multiparous women the risk of not birthing within 24 hours was higher • Low cost and no specific storage or temperature requirements • No evidence of an increased risk of infection although data is limited |
| Risk | <ul style="list-style-type: none"> • Placental abruption • Uterine rupture • Device entrapment • Maternal discomfort during and after insertion • Failed dilatation and inability to perform ARM • Cervical laceration or ischaemia (if prolonged use) • There is limited data comparing single to double balloon catheter^{87,88} |

4.1.1 Balloon (transcervical) catheter insertion

Table 16. Balloon catheter insertion procedure

| Aspect | Clinical practice point |
|-------------------------------------|--|
| Equipment | <ul style="list-style-type: none"> • Speculum • Balloon catheter, either <ul style="list-style-type: none"> ◦ 16/18 gauge catheter with double balloon (e.g. Cook cervical ripening balloon) ◦ 26 French gauge Foley catheter • Sponge forceps • Sterile water or 0.9% sodium chloride (200 mL) • Syringe (20 mL) • Sterile lubricating gel • Swabs • Tape • CTG monitor • Bed with stirrups • Chlorhexidine |
| Procedure | <ul style="list-style-type: none"> • Prior to commencement <ul style="list-style-type: none"> ◦ Ensure pre IOL assessment complete including baseline observations ◦ Encourage voiding • Performed by competent medical or midwifery staff • Contact a more experienced clinician if there are 2 unsuccessful attempts |
| Prepare the balloon catheter | <ul style="list-style-type: none"> • Stylet used with double balloon: <ul style="list-style-type: none"> ◦ Loosen the fitting on the proximal hub of the stylet so that the distal tip of the stylet is even with the distal tip of the balloon ◦ Tighten the fitting so that the wire does not move during manipulation ◦ Seat the adjustable handle firmly into the blue port labelled "S" |
| Insertion | <ul style="list-style-type: none"> • Digital placement of the catheter is less painful than using a speculum • Pass the balloon catheter through the internal os of the cervix using sponge forceps to assist • If insertion is technically difficult: <ul style="list-style-type: none"> ◦ Consider the lithotomy position ◦ Insert speculum and visualise the cervix ◦ Clean the cervix with chlorhexidine ◦ Pass the catheter through the cervix (using sponge forceps) until both balloons have entered the cervical canal |
| Double balloon inflation | <ul style="list-style-type: none"> • Once the catheter has traversed the cervix and the uterine balloon is above the internal os, remove the stylet (if used) before advancing the catheter further • Inflate the uterine balloon with 40 mL of sterile water or 0.9% sodium chloride • Gently pull the catheter back until the uterine balloon is against the internal cervical os • The vaginal balloon is now visible/palpable outside the external cervical os and is inflated with 20 mL of water or 0.9% sodium chloride • Once the balloons are situated on either side of the cervix, remove the speculum (if used) and add water or 0.9% sodium chloride up to a maximum of 80 mL per balloon • Document the inflation volume |
| Single balloon inflation | <ul style="list-style-type: none"> • Spigot the catheter • Inflate the balloon with 30–80 mL sterile water or 0.9% sodium chloride • Gently withdraw the catheter until the balloon rests against the internal os • Proximal end of the catheter may be taped to the thigh to provide constant, moderate tension of the balloon • Document the inflation volume |

4.1.2 Balloon (transcervical) catheter post insertion care

Table 17. Post balloon catheter insertion

| Aspect | Clinical practice point |
|--|---|
| Monitoring | <ul style="list-style-type: none"> Pulse, BP, FHR, uterine activity, engagement of the fetal head and vaginal loss: <ul style="list-style-type: none"> Immediately following balloon catheter insertion At 30 minutes post balloon catheter insertion Medical review required if malpresentation or fetal head 5/5 palpable after insertion CTG not required, unless other indications (e.g. uterine activity) Ongoing monitoring as for latent first stage of labour⁸⁹ while: <ul style="list-style-type: none"> Observations are normal No contractions Not otherwise indicated <ul style="list-style-type: none"> Refer to Queensland Clinical Guideline: <i>Normal Birth</i>⁸⁹ |
| 12 hour reassessment | <ul style="list-style-type: none"> Schedule assessment 12 hours after insertion with plan to ARM If the balloon catheter has not spontaneously fallen out and ARM is unsuccessful: <ul style="list-style-type: none"> Obstetric review is indicated Continuing IOL may involve dinoprostone or reinsertion of another balloon catheter after 24 hours If there is a delay in the scheduled 12 hour assessment, remove the balloon catheter no later than 18 hours after insertion |
| Indications for birth suite care | <ul style="list-style-type: none"> Observations abnormal Persistent pain and discomfort Spontaneous rupture of membranes Labour commences |
| Moderate or severe discomfort | <ul style="list-style-type: none"> Assess for labour Reduce balloon volume (discuss with experienced clinician as required): <ul style="list-style-type: none"> Foley catheter: remove maximum of 10 mL Double balloon catheter: remove 10 mL from each vaginal and uterine balloon (from green stopcock marked 'V' and from red stopcock marked 'U') Reassess and repeat ensuring a minimum of 50 mL of residual volume remains in each balloon Document the volume removed Offer analgesia and sedation if woman not in labour and continues to experience moderate to severe discomfort despite balloon deflation If persistent pain and discomfort following oral analgesia <ul style="list-style-type: none"> Review by an obstetrician, or Transfer to birth suite for further assessment |
| Indications for early removal of balloon catheter | <ul style="list-style-type: none"> Spontaneous rupture of membranes (SROM) Uterine hyperstimulation Maternal request |
| Difficulty passing urine | <ul style="list-style-type: none"> Offer appropriate analgesia and comfort aids If still unable to void, consider removing 10 mL of fluid from each of the uterine and vaginal balloons Note: Balloon may be in the vagina |
| If balloon catheter falls out | <ul style="list-style-type: none"> Transfer to birth suite Perform VE <ul style="list-style-type: none"> Plan ARM and oxytocin as soon as possible (due to the temporary dilatory effect of balloon catheters) |
| Removal of balloon catheter | <ul style="list-style-type: none"> After 12 hours remove the balloon catheter by completely deflating the balloon(s) using an appropriately sized syringe (do not leave balloon catheter insitu longer than 18 hours) Once the balloon catheter has been removed, perform an ARM and commence an oxytocin infusion |

4.2 Dinoprostone

Prostaglandins promote cervical ripening and stimulate uterine contractions.⁹⁰ Dinoprostone is the most commonly used prostaglandin agent in third trimester IOL.⁹⁰ Dinoprostone preparations include:

- Vaginal gel (prostaglandin E₂, (prostin) 1 mg and 2 mg
- Controlled release vaginal pessary (cervidil)
- Refer to Table 18 and Table 19

Table 18. Dinoprostone considerations and dose

| Aspect | Clinical practice point |
|-------------------------------------|---|
| Indication | <ul style="list-style-type: none"> • Unfavourable cervix⁹¹ • May be used following balloon catheter when there has been no/minimal effect on cervical ripening and artificial rupture of membranes (ARM) is not technically possible |
| Contraindication 91,92,93 | <ul style="list-style-type: none"> • Known hypersensitivity to dinoprostone • Ruptured membranes • Grand multiparity • Previous CS or any uterine surgery • Malpresentation/high presenting part • Unexplained PV bleeding during current pregnancy • Abnormal CTG/fetal compromise |
| Cautions ⁹¹ | <ul style="list-style-type: none"> • Multiple pregnancy • Asthma, chronic obstructive pulmonary disease—may cause bronchospasm • Epilepsy • Cardiovascular disease • Raised intraocular pressure, glaucoma • Avoid combining with oxytocin [refer to Section 4.4 Oxytocin] |
| Risk/benefit | <ul style="list-style-type: none"> • Nausea, vomiting and diarrhoea may occur soon after insertion⁹¹ • Vaginal PGE₂ compared to a placebo or expectant management⁹⁰: <ul style="list-style-type: none"> ○ Increased vaginal birth within 24 hours with repeated doses ○ Increased hyperstimulation with FHR changes (4.8% versus 1.0%, RR 3.16, 95%CI 1.67 to 5.98) ○ Did not appear to reduce CS rate, NICU admission, serious maternal/newborn morbidity/mortality |
| Before administration | <ul style="list-style-type: none"> • Ensure pre IOL assessment complete • Encourage to empty bladder |
| Dinoprostone gel dose | <p>Initial dose:</p> <ul style="list-style-type: none"> • Nulliparous: 2 mg PV • Multiparous: 1 mg PV <p>Repeat dose (if clinically indicated and only after 6 hours)</p> <ul style="list-style-type: none"> • Nulliparous: 2 mg • Multiparous: 1–2 mg <p>Do not give the repeat dose within 6 hours of the initial dose (i.e. so the maximum dose of 3 mg in a six hour period is not exceeded)</p> |
| Dinoprostone pessary dose | <ul style="list-style-type: none"> • 10 mg PV (released at a rate of approximately 4 mg in 12 hours)⁹³ • A second dose is not recommended |

4.2.1 Dinoprostone administration

Table 19. Dinoprostone administration

| Aspect | Dinoprostone administration |
|---|--|
| Administration | <ul style="list-style-type: none"> Maternal and fetal safety outcomes do not seem to differ whether prostaglandins are administered in the morning or evening, but women may prefer morning administration⁹⁴ Pessary use may avoid repeated application of the gel Gel may be more appropriate where cervix is favourable¹ |
| Dinoprostone gel⁹² | <ul style="list-style-type: none"> Use water soluble lubricants (not obstetric cream) Remove from refrigeration and stand at room temperature for at least 30 minutes prior to use Insert high into the posterior fornix of the vagina Not for intracervical administration Advise recumbent or left lateral position for 30 minutes after insertion |
| Dinoprostone pessary⁹³ | <ul style="list-style-type: none"> Remove from freezer or fridge immediately prior to use Can be stored in the refrigerator for up to one month (2–8 °C) after removal from the freezer Warming is not required Open only after decision has been made to use the pessary Use water soluble lubricant (not obstetric cream) Insert and position transversely in the posterior fornix of the vagina: <ul style="list-style-type: none"> To minimise potential for the pessary to fall out and subsequent insufficient dinoprostone exposure Ensure sufficient tape outside vagina to allow removal Woman to remain recumbent for 30 minutes Advise to report if pessary falls out |
| Monitoring post insertion | <ul style="list-style-type: none"> Temperature, pulse, respiratory rate, BP, FHR, uterine activity, and vaginal loss <ul style="list-style-type: none"> Immediately after insertion Hourly for 4 hours Perform CTG after insertion (minimum 30 minutes) Advise to inform staff as soon as contractions commence Ongoing monitoring as for latent first stage of labour while: <ul style="list-style-type: none"> Observations are normal No contractions Not otherwise indicated <ul style="list-style-type: none"> Refer to Queensland Clinical Guideline: <i>Normal birth</i>⁸⁹ When in active labour—continuous CTG⁶⁹ |
| Assessment of progress | <ul style="list-style-type: none"> Reassess the MBS: <ul style="list-style-type: none"> Gel—wait at least 6 hours after insertion⁹¹ Pessary—wait at least 12 hours after insertion⁹¹ Irrespective of MBS, recommend ARM if technically possible^{95,96} If ARM not possible, repeat gel dose may be required (following reassuring CTG) |
| Indications for removal: dinoprostone pessary⁹³ | <ul style="list-style-type: none"> Onset of regular, painful uterine contractions, occurring every 3 minutes irrespective of any cervical change Membranes rupture (spontaneous or ARM) Fetal distress Uterine hyperstimulation or hypertonic uterine contractions Maternal systemic adverse PGE₂ effects (e.g. nausea, vomiting, hypotension, tachycardia) If starting oxytocin infusion—remove at least 30 minutes prior to starting Insufficient cervical ripening after 12 hours |

4.3 Artificial rupture of membranes

Table 20. Artificial rupture of membranes

| Aspect | Clinical practice point |
|--|--|
| Indication | <ul style="list-style-type: none"> Favourable cervix (MBS of 7 or more)^{9,97} ARM alone is not recommended as time to onset of contractions is unpredictable⁹, particularly in nulliparous women [refer to Section 4.4 Oxytocin] To observe the colour and amount of liquor when clinically indicated |
| Relative contraindication | <ul style="list-style-type: none"> Poor application of the presenting part/unstable lie⁹ Fetal head not engaged⁹ (5/5 above the pelvic brim) |
| Risk/benefit | <ul style="list-style-type: none"> Risk of: cord prolapse⁹ or compression³⁶, rupture of vasa praevia⁹⁷, pain and discomfort⁹⁷ [refer to Section 5] ARM and immediate oxytocin compared to ARM and delayed oxytocin (commenced 4 hours post ARM) showed shorter ARM to birth interval in nulliparous^{98,99} and parous women¹⁰⁰ Compared to amniotomy alone, ARM and oxytocin resulted in fewer women not birthing vaginally at 24 hours⁹⁷ Following cervical priming, early ARM (performed regardless of MBS) has been associated with a decrease in IOL to birth interval and no difference in other outcomes^{96,98} |
| Before procedure | <ul style="list-style-type: none"> If no other IOL procedure before ARM, perform pre IOL assessment Encourage to empty bladder Abdominal palpation to determine descent¹⁰¹, position and presentation VE to determine stage of labour, MBS, presentation, position and descent, possible cord or malpresentation, identify membranes Consult obstetrician if the head is not engaged¹⁰¹, or cord presentation, malpresentation, unstable lie or polyhydramnios |
| Procedure (continuing on from assessment VE) | <ul style="list-style-type: none"> Maintain digital contact with presenting part Insert amnihook–amnicot, using examining finger as guard to hook Rupture forewaters—avoid ARM over fontanelle or face Remove amnihook–amnicot, guarding it against index finger Confirm passage of fluid and check for presence of blood or meconium Sweep membranes from presenting part Ensure good application of presenting part before completing VE Apply fetal scalp electrode, only if clinically indicated <ul style="list-style-type: none"> Refer to Queensland Clinical Guideline: <i>Intrapartum fetal surveillance</i>⁶⁹ Following ARM for IOL, recommend commencement of oxytocin immediately⁹ Document abdominal palpation and VE findings |
| Post ARM monitoring | <ul style="list-style-type: none"> FHR, uterine activity, and vaginal loss (liquor amount, colour and consistency) immediately after ARM If oxytocin commenced immediately after ARM, then monitor as for oxytocin [refer Section 4.4 Oxytocin] If oxytocin not commenced immediately after ARM (e.g. woman wishes to await onset of contractions), then ongoing monitoring as for latent first stage of labour while: <ul style="list-style-type: none"> Observations are normal No contractions Not otherwise indicated <ul style="list-style-type: none"> Refer to Queensland Clinical Guideline: <i>Normal birth</i>⁸⁹ If FHR or liquor abnormalities (e.g. meconium/blood stained or no liquor): <ul style="list-style-type: none"> Perform CTG Discuss/refer/consult as indicated Refer to Queensland Clinical Guideline: <i>Intrapartum fetal surveillance</i>⁶⁹ Encourage mobilisation to promote onset of uterine contractions |

4.4 Oxytocin

Oxytocin stimulates the smooth muscle of the uterus to produce rhythmic contractions.

Table 21. Oxytocin

| Aspect | Clinical practice point |
|------------------------------|--|
| Indication | <ul style="list-style-type: none"> IOL in the setting of ruptured membranes |
| Cautions | <ul style="list-style-type: none"> Due to the additive uterine effects, do not commence oxytocin within⁹¹: <ul style="list-style-type: none"> Six (6) hours of dinoprostone vaginal gel administration 30 minutes of removal of dinoprostone vaginal pessary Discuss with an obstetrician prior to commencement with: <ul style="list-style-type: none"> Previous uterine surgery (e.g. CS) [refer to Queensland Clinical Guideline: Vaginal birth after caesarean section²⁵] Multiple pregnancy Greater than four previous births Cardiovascular disease |
| Risk/benefit | <ul style="list-style-type: none"> Tachysystole or hypertonus with/without signs of FHR abnormalities <ul style="list-style-type: none"> Refer to Section 5 Risks and benefits associated with IOL Nausea and vomiting (0.1 to 1%)⁹¹ Rarely (less than 0.1%): arrhythmias, anaphylactoid reaction, severe (tetanic) uterine contraction leading to uterine rupture, flushing, electrocardiograph (ECG) changes (including prolonged QT interval), transient hypotension, reflex tachycardia (common with rapid IV injection)¹⁰² |
| Medication safety | <ul style="list-style-type: none"> The standard oxytocin preparation and administration regimen is recommended for all Queensland facilities as outlined in Section 4.4.1 Oxytocin regimen administration If required, the same infusion solution can be continued for PPH management and as PPH prophylaxis following CS |
| Before administration | <ul style="list-style-type: none"> Verify CTG normal If membranes are not ruptured, perform ARM prior to oxytocin infusion If SROM ensure forewaters are ruptured |
| Monitoring | <ul style="list-style-type: none"> Provide one-to-one midwifery care¹⁰³ Commence the intrapartum record when infusion is commenced Maternal and fetal observations as per first stage of active labour [refer to Queensland Clinical Guideline: <i>Normal birth</i>⁸⁹] Commence continuous CTG at the onset of first contractions <ul style="list-style-type: none"> Refer to Queensland Clinical Guideline: <i>Intrapartum fetal surveillance</i>⁶⁹ Maternal pulse and FHR prior to any increase in the infusion rate¹⁰² Monitor fluid balance as water intoxication/hyponatraemia may result from prolonged infusion¹⁰² (rare with the use of isotonic solutions¹⁰⁴) Planned VBAC—maintain vigilance for uterine dehiscence and rupture |

4.4.1 Oxytocin regimen administration

Table 22. Oxytocin administration

| Aspect | Clinical practice point |
|-------------------------------|--|
| Administration | <ul style="list-style-type: none"> Add oxytocin 30 International units to a 500 mL bag of either 0.9% sodium chloride or compound sodium lactate (Hartmann's solution) <ul style="list-style-type: none"> 1 milliunit/minute = 1 mL/hour Use a volumetric pump to ensure an accurate rate of infusion¹⁰³ <ul style="list-style-type: none"> Program delivery pumps for correct infusion concentrations Administer oxytocin by sideline/secondary IV access (as oxytocin infusion initiated at low volume) Record the dose in milliunit per minute⁹ Increase dose at 30 minute or longer intervals¹⁰² Aim for 3–4 contractions in a 10 minute period with duration of 40–60 seconds and resting period not less than 60 seconds Titrate dose against uterine contractions and FHR¹⁰² Use the minimum dose required to establish and maintain active labour Mark changes to dose clearly and contemporaneously on the intrapartum record and/or CTG |
| Discontinue/recommence | <ul style="list-style-type: none"> After labour is established (cervical dilation greater than or equal to 5 cm) oxytocin infusion <i>may be</i> electively discontinued <ul style="list-style-type: none"> Reduced incidence of FHR abnormalities and uterine hyperstimulation reported¹⁰⁵ Inconsistent evidence about effect on active phase duration (possibly increased)¹⁰⁵⁻¹⁰⁷ If recommencing infusion and no local protocol, use the following guide: <ul style="list-style-type: none"> If ceased for less than 30 minutes, recommence at half previous rate If ceased for longer than 30 minutes, recommence at initial starting dose (due to short half-life¹⁰³) |
| Obstetrician review | <ul style="list-style-type: none"> Prior to exceeding 20 milliunit/minute (manufacturer recommended maximum¹⁰³) At the maximum regimen dose of 32 milliunit/minute¹⁰² and labour not commenced If infusion ceased or recommenced |
| Variation to regimen | <ul style="list-style-type: none"> The ideal dosing regimen of oxytocin is unknown⁹ but there are well recognised complications <ul style="list-style-type: none"> Refer to Section 5 Risks and benefits associated with IOL Only vary the regimen (milliunit/minute, rate of increase and/or maximum dose) following an assessment by an obstetrician of the individual clinical circumstances and progress of labour <ul style="list-style-type: none"> Processes and systems that facilitate <i>routine</i> variation are not recommended |

Table 23. Oxytocin regimen

| Infusion: oxytocin (30 International units in 500 mL) 1 milliunit/minute is equal to 1 mL/hour | |
|---|-------------------------|
| Time after starting (minutes) | Dose (milliunit/minute) |
| 0 | 1 |
| 30 | 2 |
| 60 | 4 |
| 90 | 8 |
| 120 | 12 |
| 150 | 16 |
| 180 | 20 |
| Prior to exceeding 20 milliunit/minute: Obstetrician review required | |
| 210 | 24 |
| 240 | 28 |
| 270 | 32 |

5 Risks and benefits associated with IOL

Table 24. Risks and benefits associated with IOL

| Risk | Clinical practice point |
|--|--|
| Failed IOL¹ | <ul style="list-style-type: none"> The criteria for failed IOL are not generally agreed Review the individual clinical circumstances Assess fetal wellbeing using CTG Discuss options for care The likelihood of vaginal birth is significantly lower if not in active labour after 12 hours of oxytocin¹⁰⁸ If appropriate consider: <ul style="list-style-type: none"> An alternative IOL method, and/or Discharge home for 24 hours followed by second attempt at IOL Caesarean section |
| Tachysystole or hypertonus (without FHR abnormalities) OR Uterine hyperstimulation (with FHR abnormalities) | <ul style="list-style-type: none"> Escalate as required and according to local protocols Continuous CTG Attempt removal of any remaining dinoprostone gel Remove dinoprostone pessary if still in situ⁹¹ Cease/reduce rate of oxytocin infusion¹ while reassessing labour and fetal state Position left lateral Record maternal observations, including BP Commence intravenous (IV) fluids via new administration set VE to assess cervical dilation and exclude cord prolapse If persists, consider use of tocolytic¹: <ul style="list-style-type: none"> Terbutaline: 250 micrograms subcutaneously or Terbutaline: 250 micrograms in 5 mL IV over 5 minutes³ Salbutamol: 100 micrograms by slow IV injection³ *Sublingual Glyceryl Trinitrate (GTN) spray 400 micrograms³ Excessive uterine activity in the absence of evidence of fetal compromise is not in itself an indication for tocolysis³ If clinically indicated, prepare for instrumental birth or CS¹ (e.g. FHR does not return to normal) |
| Cord prolapse¹ | <ul style="list-style-type: none"> A potential risk at the time of membrane rupture especially when the membranes are ruptured artificially To reduce the likelihood of cord prolapse: <ul style="list-style-type: none"> Before ARM, assess engagement of the presenting part If the baby's head is high, avoid ARM Palpate for umbilical cord presentation during the VE Avoid dislodging the baby's head during the VE |
| Uterine rupture | <ul style="list-style-type: none"> An uncommon event with IOL¹ A life-threatening event for mother and baby If suspected, prepare for an emergency CS,¹ uterine repair or hysterectomy |
| PPH | <ul style="list-style-type: none"> IOL with oxytocin has been associated with an increased risk of PPH¹⁰⁹ Refer to Queensland Clinical Guideline: <i>Primary postpartum haemorrhage</i>¹⁰⁹ |
| Increased intervention | <ul style="list-style-type: none"> Compared with spontaneous labour, IOL may be associated with a higher incidence of additional interventions (e.g. electronic fetal monitoring, analgesia usage), although there is no increase in instrumental births¹¹⁰⁻¹¹² or CS¹¹³⁻¹¹⁶ in randomised controlled trials Compared with expectant management, no association found between IOL and increased rates of adverse perinatal outcomes of neonatal unit admission, maternal death, or meconium stained amniotic fluid⁸⁻¹⁰ |
| Benefits | <ul style="list-style-type: none"> When performed for a valid indication, IOL should result in a reduction in perinatal morbidity/mortality Limited evidence suggests women may prefer IOL to expectant management (serial antenatal monitoring) beyond 41 weeks¹⁴ |

*Not currently listed on the Queensland Health List of Approved Medications (LAM), not Therapeutics Good Administration (TGA) approved for this purpose

References

1. National Institute for Health and Clinical Excellence (NICE). Induction of labour. Clinical Guideline 70. [Internet]. 2008 [cited 2016 October 10]. Available from: www.nice.org.uk.
2. Queensland Clinical Guidelines. Term small for gestational age baby. Guideline No. MN16.16-V4-R21. [Internet]. Queensland Health. 2016. [cited 2016 November 29]. Available from: <http://www.health.qld.gov.au/qcg>
3. The Royal Australian and New Zealand College of Obstetricians and Gynaecologists. Intrapartum fetal surveillance clinical guideline-third edition. [Internet]. 2014 [cited 2016 August 15]. Available from: <http://www.ranzcog.edu.au/>.
4. Queensland Health, Statistical Services Branch. Perinatal statistics Queensland. 2015.
5. Queensland Clinical Guidelines. Early pregnancy loss. Guideline No. MN11.29-V3-R16. [Internet]. Queensland Health. 2011. [cited 2016 August 08]. Available from: <http://www.health.qld.gov.au/qcg>
6. Queensland Clinical Guidelines. Therapeutic termination of pregnancy. Guideline No. MN13.21-V1-R18. [Internet]. Queensland Health. 2013. [cited 2016 September 8]. Available from: <http://www.health.qld.gov.au/qcg>
7. Queensland Clinical Guidelines. Perinatal care at the threshold of viability. Guideline No. MN 14.32-V1-R19. [Internet]. Queensland Health. 2014. [cited Available from: <http://www.health.qld.gov.au/qcg>
8. Queensland Clinical Guidelines. Stillbirth care. Guideline No. MN11.24-V5-R17. [Internet]. Queensland Health. 2011. [cited 2016 August 15]. Available from: <http://www.health.qld.gov.au/qcg>
9. Leduc D, Biringier A, Lee L, Dy J. Induction of labour. Society of Obstetricians and Gynecologists Canada: Clinical Practice Guideline No.296. Journal of Obstetrics and Gynaecology Canada 2013;35(9):840-60.
10. Miller Y, Thompson R, Porter J, Prosser S. Findings from the having a baby in Queensland survey, 2010. Queensland Centre for Mothers and Babies, The University of Queensland 2011.
11. Queensland Government. Queensland Health maternity patient experience survey 2014–2015. 2015.
12. Queensland Health. Guide to informed decision-making in healthcare. 2nd ed. [Internet]. Queensland Government; 2017 [cited 2017 January 25]. Available from: <https://www.health.qld.gov.au>.
13. Queensland Clinical Guidelines. Parent information: Induction of labour. Guideline No. C-17.22-1-V2-R22. [Internet]. Queensland Health. 2017. [cited 2017, March 29]. Available from: <http://www.health.qld.gov.au/qcg>
14. Heimstad R, Romundstad P, Hyett J, Mattsson L, Salvendy K. Women's experiences and attitudes towards expectant management and induction of labor for post-term pregnancy. Acta Obstetrica et Gynecologica Scandinavica 2007;86(8):950-6.
15. Gülmezoglu A, Crowther C, Middleton P. Induction of labour for improving birth outcomes for women at or beyond term. Cochrane Database of Systematic Reviews. [Internet]. 2012 [cited 2016 October 16]; Issue 4. Art. No.: CD004945 DOI:10.1002/14651858.CD004945.pub2.
16. Vayssi re C, Haumonte J-B, Chantry A, Coatleven F, Debord MP, Gomez C, et al. Prolonged and post-term pregnancies: guidelines for clinical practice from the French College of Gynecologists and Obstetricians (CNGOF). European Journal of Obstetrics, Gynecology, and Reproductive Biology 2013;169(1):10-6.
17. The Australian and New Zealand Stillbirth Alliance (ANZSA). Clinical practice guideline for the management of women who report decreased fetal movements. Version 1.1. [Internet]. 2010 [cited 2016 August 16]. Available from: <http://www.stillbirthalliance.org.au>.
18. Department of Health. Maternity services: module overview. Clinical Services Capability Framework (CSCF) v3.2. [Internet]. 2014 [cited 2016 August 30]. Available from: <https://www.health.qld.gov.au>.
19. Australian Commission on Safety and Quality in Healthcare (ACSQHC). National consensus statement: essential elements for recognising and responding to clinical deterioration. Sydney: ACSQHC; 2010.
20. Kelly AJ, Alfirevic Z, Ghosh A. Outpatient versus inpatient induction of labour for improving birth outcomes. Cochrane Database of Systematic Reviews. [Internet]. 2013 [cited 2016 September 10]; Issue 11. Art. No.: CD007372 DOI:10.1002/14651858.CD007372.pub3.
21. Greenberg V, Khalifeh A. Intracervical Foley balloon catheter for cervical ripening and labor induction: a review. Seminars in Perinatology 2015;39(6):441-3.
22. Queensland Clinical Guidelines. Hypertensive disorders of pregnancy Guideline No. MN15.13-V7-R20. [Internet]. Queensland Health. 2015. [cited 2016 August 5]. Available from: <http://www.health.qld.gov.au/qcg>
23. Queensland Clinical Guidelines. Gestational diabetes mellitus. Guideline No. MN15.33-V1-R20. [Internet]. Queensland Health. 2015. [cited 2016, August 08]. Available from: <http://www.health.qld.gov.au/qcg>
24. Queensland Clinical Guidelines. Obesity in pregnancy. Guideline No. MN 15.14-V5-R20. [Internet]. Queensland Health. 2015. [cited 2016 August 08]. Available from: <http://www.health.qld.gov.au/qcg>
25. Queensland Clinical Guidelines. Vaginal birth after caesarean section (VBAC). Guideline No. MN15.12-V4-R19. [Internet]. Queensland Health. 2015. [cited 2016 August 15]. Available from: <http://www.health.qld.gov.au/qcg>
26. Queensland Clinical Guidelines. Early onset Group B Streptococcal disease. Guideline No. MN16.20-V3-R21. [Internet]. Queensland Health. 2016. [cited 2016 December 01]. Available from: <http://www.health.qld.gov.au/qcg>
27. Queensland Clinical Guidelines. Venous thromboembolism (VTE) prophylaxis in pregnancy and the puerperium. Guideline No. MN14.9-V5-R19. [Internet]. Queensland Health. 2014. [cited Available from: <http://www.health.qld.gov.au/qcg>
28. Queensland Clinical Guidelines. Perinatal substance use: maternal. Guideline No. MN16.37-V1-R21. [Internet]. Queensland Health. 2016. [cited 2016 August 08]. Available from: <http://www.health.qld.gov.au/qcg>
29. World Health Organization. WHO recommendations for induction of labour. [Internet]. 2011 [cited 2016 October 20]. Available from: <http://www.who.int>.
30. Mozurkewich E, Chilimigras J, Koepke E, Keeton K, King VJ. Indications for induction of labour: A best-evidence review. BJOG 2009;116:626-36.
31. Boers KE, van Wyk L, van der Post JA, Kwee A, van Pampus MG, Spaanderdam ME, et al. Neonatal morbidity after induction vs expectant monitoring in intrauterine growth restriction at term: a subanalysis of the DIGITAT RCT. Am J Obstet Gynecol 2012;206(4):344.e1-7.
32. Boers KE, Vijgen SM, Bijlenga D, van der Post JA, Bekedam DJ, Kwee A, et al. Induction versus expectant monitoring for intrauterine growth restriction at term: randomised equivalence trial (DIGITAT). BMJ 2010;341:c7087.
33. Royal College of Obstetricians and Gynaecologists. The investigation and management of the small-for-gestational-age fetus. Green-top Guideline No. 31 (2nd edition). [Internet]. 2013 (minor revisions 2014) [cited 2016 October 10]. Available from: <http://www.rcog.org.uk>.
34. Alfirevic Z, Stampalija T, Gyte GM. Fetal and umbilical Doppler ultrasound in high-risk pregnancies. Cochrane Database of Systematic Reviews. [Internet]. 2013 [cited 2016 September 10]; Issue 11. Art. No.: CD007529 DOI:10.1002/14651858.CD007529.pub3.
35. GRIT Study Group. A randomised trial of timed delivery for the compromised preterm fetus: short term outcomes and Bayesian interpretation. British Journal of Obstetrics and Gynaecology 2003;110(1):27-32.
36. Page JM, Pilliod RA, Snowden JM, Caughey AB. The risk of stillbirth and infant death by each additional week of expectant management in twin pregnancies. Am J Obstet Gynecol 2015;212(5):630.e1-7.
37. Dodd J, Deussen A, Grivell R, Crowther C. Elective birth at 37 weeks' gestation for women with an uncomplicated twin pregnancy. Cochrane Database of Systematic Reviews. [Internet]. 2014 [cited 2016 September 10]; Issue 2. Art. No.: CD003582. DOI:10.1002/14651858.CD003582.pub2.
38. Danon D, Sekar R, Hack KE, Fisk NM. Increased stillbirth in uncomplicated monochorionic twin pregnancies: a systematic review and meta-analysis. Obstet Gynecol 2013;121(6):1318-26.
39. Robinson BK, Miller RS, D'Alton ME, Grobman WA. Effectiveness of timing strategies for delivery of monochorionic diamniotic twins. Am J Obstet Gynecol 2012;207(1):53 e1-7.
40. Sullivan AE, Hopkins PN, Weng HY, Henry E, Lo JO, Varner MW, et al. Delivery of monochorionic twins in the absence of complications: analysis of neonatal outcomes and costs. Am J Obstet Gynecol 2012;206(3):257 e1-7.
41. Smith NA, Wilkins-Haug L, Santolaya-Forgas J, Acker D, Economy KE, Benson CB, et al. Contemporary management of monochorionic diamniotic twins: outcomes and delivery recommendations revisited. Am J Obstet Gynecol 2010;203(2):133 e1-6.
42. Boulvain M, Irion O, Dowswell T, Thornton J. Induction of labour at or near term for suspected fetal macrosomia. Cochrane Database of Systematic Reviews. [Internet]. 2016 [cited 2016 September 10]; Issue 5. Art. No.: CD000938 DOI:10.1002/14651858.CD000938.pub2.
43. Boulvain M, Senat M-V, Perrotin F, Winer N, Beucher G, Subtil D, et al. Induction of labour versus expectant management for large-for-date fetuses: a randomised controlled trial. Lancet 2015;385(9987):2600-5.
44. Reddy UM, Ko CW, Willinger M. Maternal age and the risk of stillbirth throughout pregnancy in the United States. Am J Obstet Gynecol 2006;195(3):764-70.
45. Gordon A, Raynes-Greenow C, McGeechan K, Morris J, Jeffery H. Risk factors for antepartum stillbirth and the influence of maternal age in New South Wales Australia: a population based study. BMC Pregnancy Childbirth 2013;13:12.

46. Arnold A, Beckmann M, Flenady V, Gibbons K. Term stillbirth in older women. *Aust N Z J Obstet Gynaecol* 2012;52(3):286-9.
47. Lisonkova S, Janssen PA, Sheps SB, Lee SK, Dahlgren L. The effect of maternal age on adverse birth outcomes: does parity matter? *J Obstet Gynaecol Can* 2010;32(6):541-8.
48. Walker KF, Bugg GJ, Macpherson M, McCormick C, Grace N, Wildsmith C, et al. Randomized trial of labor induction in women 35 years of age or older. *N Engl J Med* 2016;374(9):813-22.
49. Royal College of Obstetricians and Gynaecologists. Induction of labour at term in older mothers. Scientific impact paper no. 34 2013.
50. Bacak SJ, Olson-Chen C, Pressman E. Timing of induction of labor. *Semin Perinatol* 2015;39(6):450-8.
51. Brouwers L, Koster MP, Page-Christiaens GC, Kemperman H, Boon J, Evers IM, et al. Intrahepatic cholestasis of pregnancy: maternal and fetal outcomes associated with elevated bile acid levels. *Am J Obstet Gynecol* 2015;212(1):100 e1-7.
52. Henderson CE, Shah RR, Gottmukkala S, Ferreira KK, Hamaoui A, Mercado R. Primum non nocere: how active management became modus operandi for intrahepatic cholestasis of pregnancy. *Am J Obstet Gynecol* 2014;211(3):189-96.
53. Royal College of Obstetricians and Gynaecologists. Obstetric cholestasis. Guideline No. 43. [Internet]. 2011 [cited 2016 August 16]. Available from: <http://www.rcog.org.uk/>.
54. Arthur C, Mahomed K. Intrahepatic cholestasis of pregnancy: diagnosis and management; a survey of Royal Australian and New Zealand College of Obstetrics and Gynaecology fellows. *Aust N Z J Obstet Gynaecol* 2014;54(3):263-7.
55. The American College of Obstetricians and Gynecologists, The Society of Maternal Fetal Medicine. Nonmedically indicated early-term deliveries: Committee Opinion Number 561. [Internet]. 2013 (reaffirmed 2015) [cited 2016 December 05]. Available from: <https://www.acog.org/>.
56. Saleh M, Abdo K. Intrahepatic cholestasis of pregnancy: review of the literature and evaluation of current evidence. *J Women's Health* 2007 Jul-Aug;16(6):833-41.
57. Willinger M, Ko CW, Reddy UM. Racial disparities in stillbirth risk across gestation in the United States. *Am J Obstet Gynecol* 2009;201(5):469 e1-8.
58. Rosenstein MG, Snowden JM, Cheng YW, Caughey AB. The mortality risk of expectant management compared with delivery stratified by gestational age and race and ethnicity. *Am J Obstet Gynecol* 2014;211(6):660 e1-8.
59. Penn N, Oteng-Ntim E, Oakley LL, Doyle P. Ethnic variation in stillbirth risk and the role of maternal obesity: analysis of routine data from a London maternity unit. *BMC Pregnancy Childbirth* 2014;14:404.
60. Drysdale H, Ranasinha S, Kendall A, Knight M, Wallace EM. Ethnicity and the risk of late-pregnancy stillbirth. *Med J Aust* 2012;197(5):278-81.
61. Clarke M, Clayton DG, Mason ES, MacVicar J. Asian mothers' risk factors for perinatal death--the same or different? A 10 year review of Leicestershire perinatal deaths. *BMJ* 1988;297(6645):384-7.
62. Balchin I, Whittaker JC, Patel RR, Lamont RF, Steer PJ. Racial variation in the association between gestational age and perinatal mortality: prospective study. *BMJ* 2007;334(7598):833.
63. Ravelli AC, Schaaf JM, Eskes M, Abu-Hanna A, de Miranda E, Mol BW. Ethnic disparities in perinatal mortality at 40 and 41 weeks of gestation. *J Perinat Med* 2013;41(4):381-8.
64. Gibson KS, Waters TP, Bailit JL. Maternal and neonatal outcomes in electively induced low-risk term pregnancies. *Am J Obstet Gynecol* 2014;211(3):249 e1- e16.
65. Bentley JP, Roberts CL, Bowen JR, Martin AJ, Morris JM, Nassar N. Planned birth before 39 Weeks and child development: A population-based study. *Pediatrics* 2016;138(6).
66. Bentley JP, Simpson JM, Bowen JR, Morris JM, Roberts CL, Nassar N. Gestational age, mode of birth and breastmilk feeding all influence acute early childhood gastroenteritis: a record-linkage cohort study. *BMC Pediatr* 2016;16:55.
67. Smithers LG, Searle AK, Chittleborough CR, Scheil W, Brinkman SA, Lynch JW. A whole-of-population study of term and post-term gestational age at birth and children's development. *BJOG* 2015;122(10):1303-11.
68. Robinson M, Whitehouse AJ, Zubrick SR, Pennell CE, Jacoby P, McLean NJ, et al. Delivery at 37 weeks' gestation is associated with a higher risk for child behavioural problems. *Aust N Z J Obstet Gynaecol* 2013;53(2):143-51.
69. Queensland Clinical Guidelines. Intrapartum fetal surveillance Guideline No. MN15.15-V4-R20. [Internet]. Queensland Health. 2015. [cited 2016 August 15]. Available from: <http://www.health.qld.gov.au/qcgl>.
70. Lange A, Secher N, Westergaard J, Skovgård I. Prelabor evaluation of inducibility. *Obstetrics and Gynecology* 1982;60(2):137-47.
71. Heilmann E, Sushereba E. Amniotic membrane sweeping. *Seminars In Perinatology* 2015;39(6):466-70.
72. de Miranda E, van der Bam J, Bonsel G, Bleker O, Rosendaal F. Membrane sweeping and prevention of post-term pregnancy in low risk pregnancies: a randomised controlled trial. *BJOG* 2006;113(4):402-8.
73. Foong LC, Vanaja K, Tan G, Chua S. Membrane sweeping in conjunction with labor induction. *Obstet Gynecol* 2000;96(4):539-42.
74. Tan PC, Jacob R, Omar SZ. Membrane sweeping at initiation of formal labor induction: a randomized controlled trial. *Obstet Gynecol* 2006;107(3):569-77.
75. Boulvain M, Stan C, Irion O. Membrane sweeping for induction of labour Cochrane Database of Systematic Reviews. [Internet]. 2005 (updated 2009) [cited 2016 September 10]; Issue 1. Art. No.: CD000451 DOI: 10.1002/14651858.CD000451.pub2.
76. Kabiri D, Hants Y, Yarkoni TR, Shaulof E, Friedman SE, Paltiel O, et al. Antepartum membrane stripping in GBS carriers, Is it safe? (The STRIP-G Study). *Plos One* 2015;10(12):e0145905-e.
77. Ramya V, Ghose S, Pallavee P. Membrane sweeping for vaginal birth after caesarean section and its outcome -a comparative study. *Journal of Clinical and Diagnostic Research* 2015;9(8):QC01-QC3.
78. Hamdan M, Sidhu K, Sabir N, Omar SZ, Tan PC. Serial membrane sweeping at term in planned vaginal birth after cesarean: a randomized controlled trial. *Obstetrics And Gynecology* 2009;114(4):745-51.
79. Singh N, Tripathi R, Mala YM, Yedla N. Breast stimulation in low-risk primigravidas at term: does it aid in spontaneous onset of labour and vaginal delivery? A pilot study. *Biomed Res Int* 2014;2014:695037.
80. Kavanagh J, Kelly AJ, Thomas J. Breast stimulation for cervical ripening and induction of labour. Cochrane Database of Systematic Reviews. [Internet]. 2005 [cited 2016 September 10]; Issue 3. Art. No.: CD003392 DOI:10.1002/14651858.CD003392.pub2.
81. Smith CA, Crowther CA, Grant SJ. Acupuncture for induction of labour. Cochrane Database of Systematic Reviews. [Internet]. 2013 [cited 2016 September 10]; Issue 8. Art. No.: CD002962 DOI:10.1002/14651858.CD002962.pub3.
82. Omar NS, Tan PC, Sabir N, Yusop ES, Omar SZ. Coitus to expedite the onset of labour: a randomised trial. *BJOG* 2013;120(3):338-45.
83. Tan PC, Yow CM, Omar SZ. Effect of coital activity on onset of labor in women scheduled for labor induction: a randomized controlled trial. *Obstet Gynecol* 2007;110(4):820-6.
84. Kelly AJ, Kavanagh J, Thomas J. Castor oil, bath and/or enema for cervical priming and induction of labour. Cochrane Database of Systematic Reviews. [Internet]. 2013 [cited 2016 September 10]; Issue 7. Art. No.: CD003099 DOI:10.1002/14651858.CD003099.pub2.
85. National Institute for Health and Care Excellence (NICE). Induction of labour: evidence update July 2013. A summary of selected new evidence relevant to NICE clinical guideline 70 'Induction of labour' (2008). Evidence Update 44. [Internet]. 2013 [cited 2016 August 16]. Available from: www.nice.org.uk.
86. Alfirevic Z, Keeney E, Dowswell T, Welton NJ, Medley N, Dias S, et al. Methods to induce labour: a systematic review, network meta-analysis and cost-effectiveness analysis. *BJOG* 2016;123(9):1462-70.
87. Jozwiak M, Bloemenkamp KW, Kelly AJ, Mol BW, Irion O, Boulvain M. Mechanical methods for induction of labour. Cochrane Database of Systematic Reviews. [Internet]. 2012 [cited 2016 September 10]; Issue 3. Art. No.: CD001233 DOI:10.1002/14651858.CD001233.pub2.
88. Salim R, Zafran N, Nachum Z, Garmi G, Kraiem N, Shalev E. Single-balloon compared with double-balloon catheters for induction of labor: a randomized controlled trial. *Obstet Gynecol* 2011;118(1):79-86.
89. Queensland Clinical Guidelines. Normal birth. Guideline No. MN12.25-V1-R17. [Internet]. Queensland Health. 2012. [cited 2016 November 8]. Available from: <http://www.health.qld.gov.au/qcgl>.
90. Thomas J, Fairclough A, Kavanagh J, Kelly AJ. Vaginal prostaglandin (PGE2 and PGF2a) for induction of labour at term. Cochrane Database of Systematic Reviews. [Internet]. 2014 [cited 2016 September 10]; Issue 6. Art. No.: CD003101 DOI:10.1002/14651858.CD003101.pub3.
91. Australian Medicines Handbook. Dinoprostone. [Internet]: Australian Medicines Handbook Pty Ltd; July 2016 [cited July 2016]. Available from: <https://amhonline.amh.net.au>.
92. MIMS Online. Prostin E2 Vaginal Gel (Pfizer) full product informaton. [Internet]: MIMS Australia; Novmeber 2016 [cited 2016 November 25]. Available from: <https://www.mimsonline.com.au>.
93. MIMS Online. Cervidil Pessary (Ferring) full product information. [Internet]: MIMS Australia; November 2016 [cited 2016 November 25]. Available from: <https://www.mimsonline.com.au>.

94. Bakker J, van der Goes B, Pel M, Mol B, van der Post J. Morning versus evening induction of labour for improving outcomes. [Internet]. 2013 [cited 2016 November 14]; Issue 2. Art. No.: CD007707. Available from: www.cochranelibrary.com DOI:10.1002/14651858.CD007707.pub2.
95. Beckmann M, Kumar S, Flenady V, Harker E. Prostaglandin vaginal gel induction of labor comparing amniotomy with repeat prostaglandin gel. *Am J Obstet Gynecol* 2015;213(6):859.e1-9.
96. Beckmann M, Merollini K, Kumar S, Flenady V. Induction of labor using prostaglandin vaginal gel: cost analysis comparing early amniotomy with repeat prostaglandin gel. *Eur J Obstet Gynecol Reprod Biol* 2016;199:96-101.
97. Howarth GR, Botha DJ. Amniotomy plus intravenous oxytocin for induction of labour. *Cochrane Database of Systematic Reviews*. [Internet]. 2001 [cited 2016 September 10]; Issue 3. Art. No.: CD003250 DOI:10.1002/14651858.CD003250.
98. Macones GA, Cahill A, Stamilio DM, Odibo AO. The efficacy of early amniotomy in nulliparous labor induction: a randomized controlled trial. *Am J Obstet Gynecol* 2012;207(5):403.e1-5.
99. Selo-Ojeme D, Pisal P, Lawal O, Rogers C, Shah A, Sinha S. A randomised controlled trial of amniotomy and immediate oxytocin infusion versus amniotomy and delayed oxytocin infusion for induction of labour at term. *Archives of Gynecology and Obstetrics* 2009;279(6):813-20.
100. Tan PC, Soe MZ, Sulaiman S, Omar SZ. Immediate compared with delayed oxytocin after amniotomy labor induction in parous women: a randomized controlled trial. *Obstet Gynecol* 2013;121(2 Pt 1):253-9.
101. The Royal Australian and New Zealand College of Obstetricians and Gynaecologists. Routine intrapartum care in the absence of pregnancy complications. College statement:C-Obs 31. [Internet]. 2010 (assessed as current 2014) [cited 2016 October 10]. Available from: <http://www.ranzcog.edu.au>.
102. Australian Medicines Handbook. Oxytocin. [Internet]. Adelaide: Australian Medicines Handbook Pty Ltd; July 2016 [cited 2016 October 21]. Available from: <http://amhonline.amh.net.au/>
103. MIMS Online. Syntocinon Solution for injection [Novartis] full product information. [Internet]: MIMS Australia; November 2016 [cited 2016 November 25]. Available from: <https://www.mimsonline.com.au>.
104. Smith JG, Merrill DC. Oxytocin for induction of labor. *Clin Obstet Gynecol* 2006;49(3):594-608.
105. Bor P, Ledertoug S, Boie S, Knoblauch N, Stornes I. Continuation versus discontinuation of oxytocin infusion during the active phase of labour: a randomised controlled trial. *BJOG* 2016;123(1):129-35.
106. Chopra S, SenGupta SK, Jain V, Kumar P. Stopping oxytocin in active labor rather than continuing it until delivery: a viable option for the induction of labor. *Oman Med J* 2015;30(5):320-5.
107. Vlachos DE, Pergialiotis V, Papantoniou N, Trompoukis S, Vlachos GD. Oxytocin discontinuation after the active phase of labor is established. *J Matern Fetal Neonatal Med* 2015;28(12):1421-7.
108. Beckmann M. Predicting a failed induction. *The Australian & New Zealand Journal Of Obstetrics & Gynaecology* 2007;47(5):394-8.
109. Queensland Clinical Guidelines. Primary postpartum haemorrhage. Guideline No. MN12.1-V4-R17. [Internet]. Queensland Health. 2012. [cited 2016 October 21]. Available from: <http://www.health.qld.gov.au/qcgl>
110. Hannah ME, Ohlsson A, Farine D, Hewson SA, Hodnett ED, Myhr TL, et al. Induction of labor compared with expectant management for prelabor rupture of the membranes at term. *TERMPROM Study Group. N Engl J Med* 1996;334(16):1005-10.
111. Heimstad R, Skogvoll E, Mattsson LA, Johansen OJ, Eik-Nes SH, Salvesen KA. Induction of labor or serial antenatal fetal monitoring in postterm pregnancy: a randomized controlled trial. *Obstet Gynecol* 2007;109(3):609-17.
112. Nielsen PE, Howard BC, Hill CC, Larson PL, Holland RH, Smith PN. Comparison of elective induction of labor with favorable Bishop scores versus expectant management: a randomized clinical trial. *J Matern Fetal Neonatal Med* 2005;18(1):59-64.
113. Mishanina E, Rogozinska E, Thatthi T, Uddin-Khan R, Khan KS, Meads C. Use of labour induction and risk of cesarean delivery: a systematic review and meta-analysis. *CMAJ* 2014;186(9):665-73.
114. Sanchez-Ramos L, Olivier F, Delke I, Kaunitz AM. Labor induction versus expectant management for postterm pregnancies: a systematic review with meta-analysis. *Obstet Gynecol* 2003;101(6):1312-8.
115. Wennerholm UB, Hagberg H, Brorsson B, Bergh C. Induction of labor versus expectant management for post-date pregnancy: is there sufficient evidence for a change in clinical practice? *Acta Obstet Gynecol Scand* 2009;88(1):6-17.
116. Wood S, Cooper S, Ross S. Does induction of labour increase the risk of caesarean section? A systematic review and meta-analysis of trials in women with intact membranes. *BJOG* 2014;121(6):674-85; discussion 85.

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Working Party Clinical Lead

Dr Michael Beckmann, Director Mothers Babies and Women's Health Services, Mater Health, Brisbane

Queensland Clinical Guidelines Program Officers

Ms Lyndel Gray, Clinical Nurse Consultant

Ms Jacinta Lee, Program Manager

Working Party Members

Mrs Emma Archer, Clinical Midwife, Group Practice, Beaudesert Hospital
Ms Rukhsana Aziz, Clinical Midwifery Consultant, Maternity, Ipswich Hospital
Ms Rita Ball, Midwifery Educator, Cairns Hospital
Mrs Stephanie Bethel, Caseload Midwife, Mareeba Hospital
Dr Elize Bolton, Clinical Director, Obstetrics and Gynaecology, Bundaberg Hospital
Miss Samantha Borchers, Registered Midwife, Maternity/Birth Suite, Gold Coast University Hospital
Mrs Anne Bousfield, Clinical Midwifery Consultant, Maternity, Roma Hospital
Dr Huba Brezovsky, Consultant Obstetrician and Gynaecologist, Mackay Base Hospital
Ms Georgina Caldwell, Registered Midwife, Amity Midwifery Group Practice, Redcliffe
Ms Jackie Chaplin, Nurse Educator Midwifery and Neonatal, West Moreton Hospital and Health Services
Dr Lindsay Cochrane, Staff Specialist, Obstetrics and Gynaecology, Caboolture Hospital
Mrs Kelly Cooper, Registered Midwife, Maternity, Caboolture Hospital
Mrs Catherine Cooper, Practice Development Midwife, Mater Health, Brisbane
Mrs Allison Davis, Midwife, Birth Centre, Mackay Base Hospital
Dr Wendy Dutton, Director of Obstetrics and Gynaecology, Redland Hospital
Miss Samantha Feltis, Midwife, Maternity, Mount Isa Hospital
Ms Judy Foote, Midwife, RN, Child Birth Educator/Child and Family Health Nurse, The Townsville Hospital
Dr David Freidin, Intra-Partum Clinical Lead, Royal Women's and Brisbane Hospital
Dr Nelson Gonzalez, Obstetrician and Gynaecologist, Gold Coast University Hospital
Mrs Marceline Green, Consumer Representative, Maternity Consumer Network, Toowoomba
Ms Marnie Griffiths, Midwifery Lecturer, Bachelor of Midwifery, Griffith University, Brisbane
Mrs Pam Harsant, Nurse Unit Manager, Maternity, Hervey Bay Hospital
Ms Jacinta Hay, Midwife, Birth Suite, Logan Hospital
Ms Louise Homan, Nurse Unit Manager, Birth Suite, Cairns Hospital
Ms Debbie Humbley, A/Midwifery Unit Manager, Maternity Unit, Caboolture Hospital
Mrs Fiona, Kajewski, Clinical Midwife Consultant, Maternity Services, Toowoomba Hospital
Dr Christopher, King, Director of Obstetrics and Gynaecology, Mount Isa Hospital
Mrs Sarah Kirby, Midwifery Unit Manager, Birth Suite, Royal Brisbane and Women's Hospital
Ms Janelle Laws, Nurse Educator, Royal Brisbane and Women's Hospital
Mrs Gemma Macmillan, Clinical Midwife/Project Officer, The Townsville Hospital
Dr Brian McCully, Director of Obstetrics and Gynaecology, Ipswich Hospital
Mrs Michelle McElroy, Midwifery Educator, Maternity/Education, Mount Isa Hospital
Miss Tina Meynell, Midwife, Birth Suite, Caboolture Hospital
Ms Lyndall Mollart, Clinical Midwifery Consultant, Maternity Services, Rockhampton Hospital
Mrs Marcia Morris, Midwifery Educator, Royal Brisbane and Women's Hospital
Ms Lillian Newman, Clinical Midwife, Women and Birthing, Redland Hospital
Ms Jacqueline O'Neill, Midwife, Women's and Children's Service, Toowoomba Hospital
Dr Gino, Pecoraro, Obstetrician and Gynaecologist, Mater Health Services, Brisbane
Ms Jenny Ramsay, Consumer Representative, Friends of the Birth Centre, Brisbane
Miss Georgia Roehrig, Student Midwife, Maternity, Redland Hospital
Ms, Pamela, Sepulveda, Clinical Midwifery Consultant, Birthing Suites, Logan Hospital
Ms Alecia Staines, Consumer Representative, Maternity Consumer Network, Toowoomba
Mrs Angela Swift, Clinical Midwife Consultant, Mossman MPHS
Mrs Bethan Townsend, Clinical Facilitator, Education Department, Gold Coast University Hospital
Ms Nicole Utley, Midwife, Birth Centre, Royal Brisbane and Women's Hospital
Dr Karen Whitfield, Senior Pharmacist, Royal Brisbane and Women's Hospital

Queensland Clinical Guidelines Team

Associate Professor Rebecca Kimble, Director
Ms Jacinta Lee, Manager
Ms Cara Cox, Clinical Nurse Consultant
Ms Lyndel Gray, Clinical Nurse Consultant
Ms Stephanie Sutherns, Clinical Nurse Consultant
Dr Brent Knack, Program Officer
Steering Committee

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