Queensland Clinical Guidelines

Translating evidence into best clinical practice

Maternity and Neonatal **Clinical Guideline**

Induction of labour

Queensland Government

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Acknowledgement

The Department of Health respectfully acknowledges the Traditional Owners and Cultural Custodians of the lands, waters and seas across Queensland. We pay our respects to Elders past and present, while recognising the role of current and future leaders in shaping a better health system.

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- Supporting consumer rights and informed decision making, 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
- Meeting all legislative requirements and professional standards
- Applying standard precautions, and additional precautions as necessary, when delivering care
- Documenting all care in accordance with mandatory and local requirements

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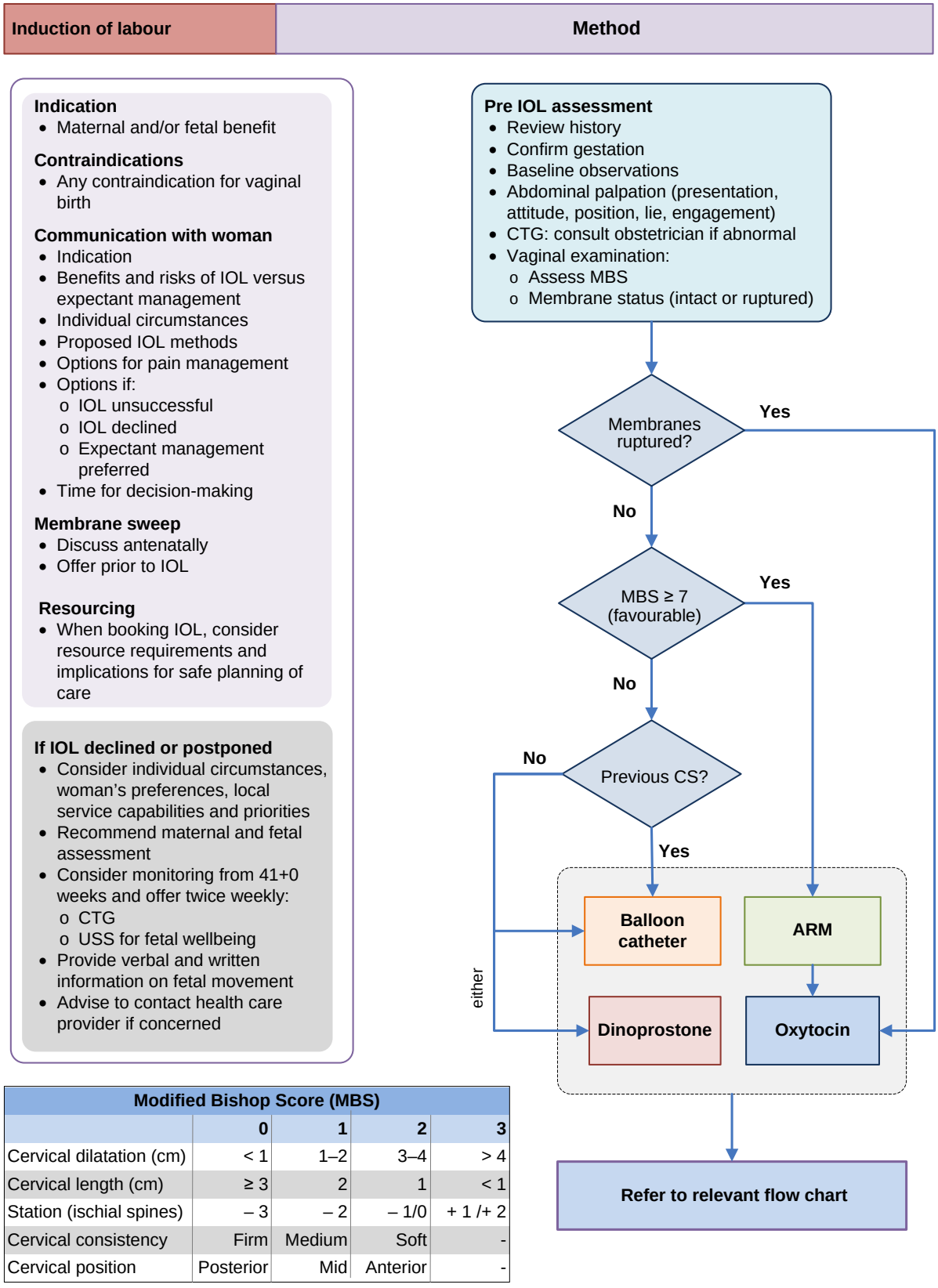
Flowchart: Methods of induction of labour

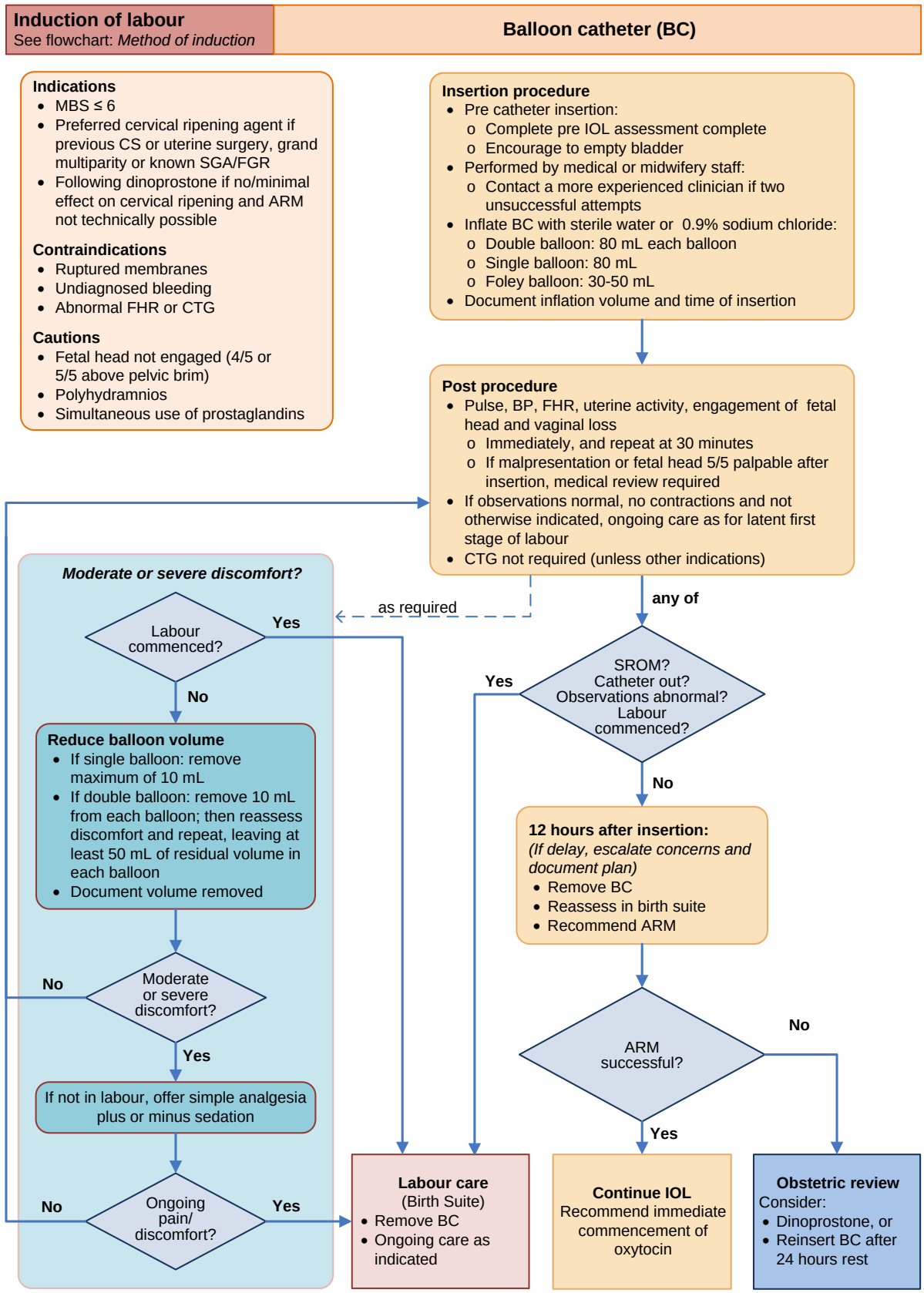


Modified Bishop Score (MBS)				
	0	1	2	3
Cervical dilatation (cm)	< 1	1–2	3–4	> 4
Cervical length (cm)	≥ 3	2	1	< 1
Station (ischial spines)	– 3	– 2	– 1/0	+ 1 /+ 2
Cervical consistency	Firm	Medium	Soft	-
Cervical position	Posterior	Mid	Anterior	-

ARM: artificial rupture of membranes; **cm:** centimetres; **CS:** caesarean section; **CTG:** cardiotocograph; **IOL:** induction of labour; **MBS:** modified Bishop score; **USS:** ultrasound scan; **<:** less than; **>:** greater than; **≥:** greater than or equal to

Flowchart: F22.22-1-V6-R27

Flowchart: Balloon catheter



ARM: artificial rupture of membranes; **BP:** blood pressure; **BC**: balloon catheter; **CS:** caesarean section; **CTG:** cardiotocograph; **FHR:** fetal heart rate; **IOL**: induction of labour; **MBS:** modified Bishop score; **SROM:** spontaneous rupture of membranes; **≤:** less than or equal to

Flowchart: F22.22-2-V8-R27

Flowchart: Prostaglandin E2 (dinoprostone)

Induction of labour
See flowchart: *Method of induction*

Prostaglandin E_2 (dinoprostone)

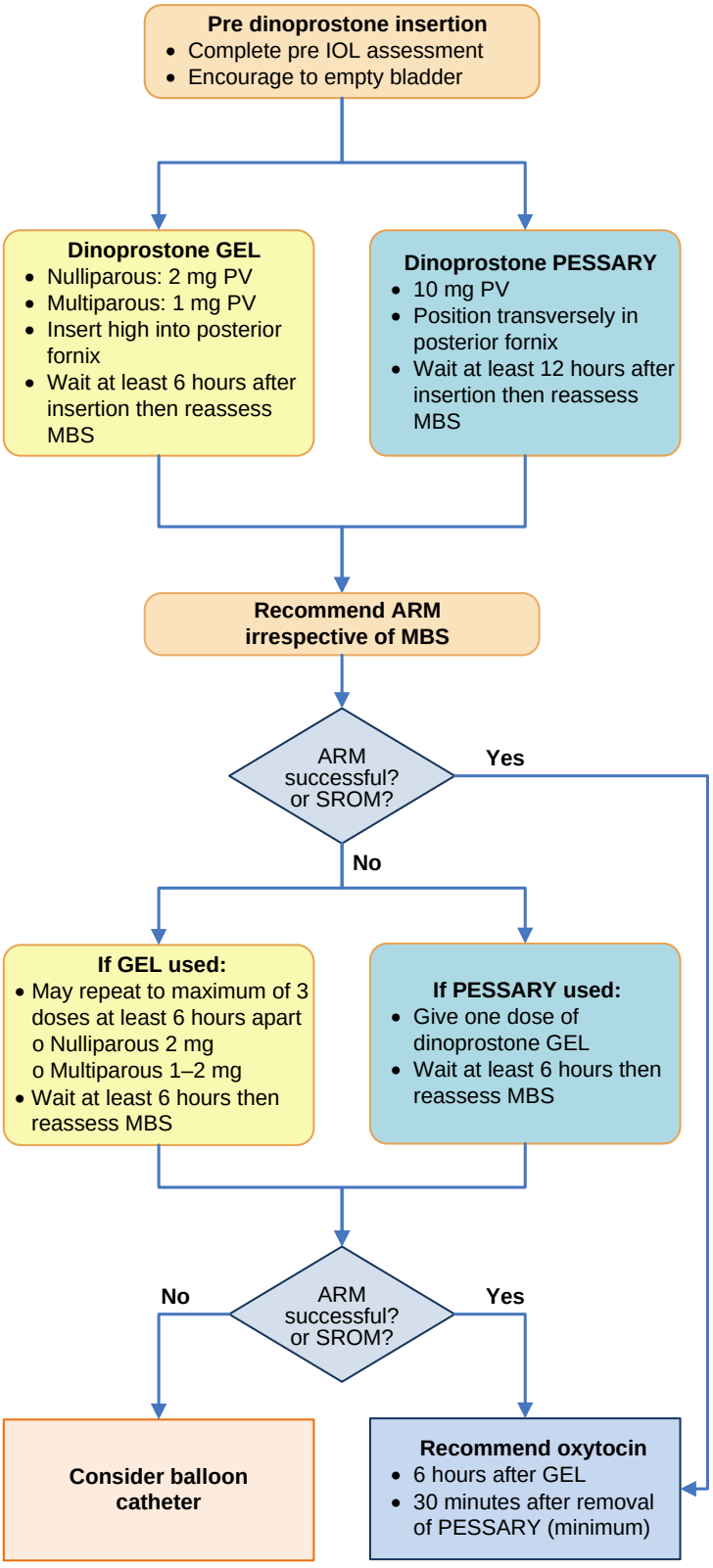
Indications
- Unfavourable cervix (MBS ≤ 6)
- Following balloon catheter if no/ minimal effect on cervical ripening and ARM not technically possible

Contraindications
- Known hypersensitivity
- Previous CS or uterine surgery
- Undiagnosed PV bleeding
- Abnormal FHR or CTG

Cautions
- Multiple pregnancy
- Multiparity ≥ 5
- Ruptured membranes
- High presenting part
- Asthma or COPD
- Epilepsy
- Cardiovascular disease
- Raised intraocular pressure, glaucoma
- Polyhydramnios
- Known SGA/FGR

Post dose care
- TPR, BP, FHR, uterine activity, PV loss hourly for 4 hours unless asleep
- CTG for minimum of 30 minutes
- If observations normal, no contractions and not otherwise indicated, ongoing care as for latent first stage of labour
- Continuous CTG when in active labour or when contractions are ≥ 3 in 10 minutes
- After insertion advise woman to:
  - Remain recumbent for 30 minutes
  - Inform staff as soon as contractions commence

PESSARY removal indications
- Onset of regular, painful uterine contractions
- Ruptured membranes
- Fetal distress
- Uterine hyperstimulation or hypertonic uterine contractions
- Maternal systemic adverse effects (e.g. nausea, vomiting, hypotension, tachycardia)
- 24 hours following insertion



ARM: artificial rupture of membranes; **BP:** blood pressure; **CS:** caesarean section; **CTG:** cardiotocograph; **FHR:** fetal heart rate; **IOL:** induction of labour; **MBS:** modified Bishop score; **PV:** per vaginal; **SROM:** spontaneous rupture of membranes; **TPR:** temperature, pulse and respirations; **≥** greater than or equal to; **≤** less than or equal to

Flowchart: F22.22-3-V7-R27

Flowchart: Artificial rupture of membranes (ARM)

Induction of labour
See flowchart: *Method of induction*

Artificial rupture of membranes (ARM)

Indications
- Favourable cervix (MBS ≥ 7)
- After cervical ripening method
- Before oxytocin infusion commenced
- To observe colour and amount of liquor when clinically indicated
- Less favourable cervix (MBS of 6 or less) and there is clinical reason to avoid cervical ripening

Contraindications
- Vasa praevia
- Cord presentation

Cautions
- Poor application of the presenting part/unstable lie
- Fetal head not engaged

Post ARM care
- If oxytocin commenced, monitor as for oxytocin
- If oxytocin not commenced *and* observations normal *and* no contractions, then ongoing monitoring as for latent first stage
- If FHR or liquor abnormalities discuss/refer/consult
- May mobilise if desired

Pre ARM
- Complete pre IOL assessment
- Encourage to empty bladder

VE to identify:
- Stage of labour
- MBS
- Presentation
- Position and descent
- Membranes

Assess for clinical concerns:
- Polyhydramnios
- Head not engaged
- Malpresentation
- Cord presentation or vasa praevia
- Unstable lie

Clinical concerns identified?

Yes

No

ARM
- Continue to ARM from assessment VE
- Confirm passage of fluid and check for presence of blood and meconium
- Ensure good application of presenting part before completing ARM
- FHR immediately following procedure

FHR or liquor abnormalities?

No

Yes

Recommend immediate commencement of oxytocin and CTG

CTG
Discuss, refer or consult as indicated

Consult obstetrician

ARM: artificial rupture of membranes; **CTG:** cardiotocograph**, FHR:** fetal heart rate; **IOL:** induction of labour; **MBS:** modified Bishop score; **VE:** vaginal examination

Flowchart: F22.22-4-V6-R27

Flowchart: Oxytocin

Induction of labour
See flowchart: *Method of induction*

Oxytocin

Indications
- IOL with ruptured membranes

Contraindications
- Do not commence oxytocin within:
  - 6 hours of dinoprostone gel
  - 30 minutes of removal of dinoprostone pessary

Cautions
- Discuss with obstetrician if:
  - Previous uterine surgery (e.g. CS, myomectomy)
  - Multiple pregnancy
  - More than 4 previous births
  - Cardiovascular disease

Pre oxytocin commencement:
- Complete pre IOL assessment
- If membranes intact, perform ARM

Oxytocin administration:
- Via sideline/secondary IV access
- Volumetric pump required
- Record dose in milliunit/minute

Infusion: oxytocin
(30 International units in 500 mL)
1 milliunit/minute = 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

**Exercise caution in women with previous uterine surgery and consider a maximum dose of 20 milliunit/min*

Observation and care
- Provide one-to-one midwifery care
- Commence intrapartum record
- Continuous CTG
- Maternal and fetal observations as per first stage of active labour
- Maintain fluid balance chart

Dose management
- Use minimum dose required to establish and maintain active labour
- Maternal and CTG review prior to any increase
- Aim for contractions:
  - 3–4 in a 10 minute period
  - Duration of 40–60 seconds
  - Resting period not less than 60 seconds
- Titrate against uterine contractions
- Increase at 30 minute or longer intervals
- Obstetric review required:
  - Prior to exceeding 20 milliunit/minute
  - At 32 milliunit/minute if labour has not commenced
  - If infusion ceased
  - Prior to recommencing

If recommencing infusion
- Consult with an obstetrician
- If ceased for less than 30 minutes, recommence at half the previous rate
- If ceased for greater than 30 minutes, consider recommencing at less than half the previous rate

ARM: artificial rupture of membranes; **CS:** caesarean section; **CTG:** cardiotocograph; **FHR:** fetal heart rate; **IOL:** induction of labour; **IV:** intravenous; **VBAC:** vaginal birth after caesarean section; **<:** less than

Flowchart: F22.22-5-V7-R27

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Abbreviations

ARM	Artificial rupture of membranes
BP	Blood pressure
CI	Confidence interval
CS	Caesarean section
CTG	Cardiotocograph
EFW	Estimated fetal weight
EDD	Estimated due date
EM	Expectant management
FGR	Fetal growth restriction
FHR	Fetal heart rate
IOL	Induction of labour
MBS	Modified Bishop Score
NNT	Number needed to treat
PGE_2	Prostaglandin E2
PV	Per vaginal
RR	Risk ratio
SGA	Small for gestational age
TPR	Temperature, pulse, respiration
USS	Ultrasound scan
VBAC	Vaginal birth after caesarean
VE	Vaginal examination
VTE	Venous thromboembolism

Definitions

Amniotomy	Artificial rupture of membranes.
Balloon catheter	A flexible tube with a single or double 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 changes from being long, firm and closed, to being thinned out (effaced), soft and starting to open (dilate). It either occurs naturally or as a result of physical or pharmacological interventions.[1]
Expectant management	A management approach, also called 'watch and wait', where no medical or surgical treatment is given. The aim is to allow labour to begin naturally.[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 fetal heart rate (FHR) abnormalities.[3]
Uterine hypertonus	A contraction lasting at least two minutes[4]
Uterine tachysystole	More than five contractions per 10 minutes for at least 20 minutes[4]
Woman/women	QCG recognise that individuals have diverse gender identities. In QCG documents, although the terms *woman* and *women* are used, these guidelines are inclusive of people who are pregnant or give birth and who do not identify as female.[5]

1 Introduction

Induction of labour (IOL) is the process of artificially stimulating the uterus to begin labour.[6] Cervical ripening (the process of softening, effacing and dilating the cervix) is often required prior to IOL. IOL is recommended when the maternal and/or fetal risks of ongoing pregnancy outweigh the risks of IOL and birth.

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

- Early pregnancy loss[7]
- Termination of pregnancy[8]
- Perinatal care of the extremely preterm baby[9]
- Preterm prelabour rupture of membranes[10]
- Term prelabour rupture of membranes[11]
- Stillbirth care[12]
- Vaginal birth after caesarean[13]

1.1 Clinical standards

Table 1. Clinical standards

Aspect	Consideration
Incidence	• The incidence of IOL is rising worldwide across developed countries[6] • In 2019, around 1 in 3 (35%) of women birthing in Australia had an IOL[14] • In 2020, the overall IOL rate in Queensland was 33.4% of all births[15] • For *selected nulliparous women across Australia, IOL has increased steadily from 31.0% in 2004 to 46.8% in 2019[16] o Queensland rates have increased from 20.1% in 2004 to 40.7% in 2019[16]
Standard care	• Refer to Queensland Clinical Guideline *Standard care*[17] for care considered 'usual' or 'standard' o Includes for example: privacy, consent, decision making, sensitive communication, medication administration, staff education and support, culturally appropriate care
General principles	• Establish an accurate estimated due date (EDD) early in pregnancy to inform IOL management at term o Routine antenatal ultrasound for confirmation of EDD reduces IOL rates for prolonged pregnancy (41+0 weeks or more) by correcting or confirming dates[18] • Intrapartum continuous electronic cardiotocography is recommended for IOL with oxytocin and/or prostaglandin[3]

**Selected women include those aged between 20 and 34 years, whose baby's gestational age at birth was between 37 and 41 completed weeks, with a singleton baby in the vertex presentation*

1.2 Timing of birth

Table 2. Timing of birth

Aspect	Consideration
Impacts of early term birth	• Birth at 37+0–38+6 weeks birth is associated with an increase in neonatal morbidity compared to birth at or beyond 39 weeks[19] o Higher incidence of short term risks such as respiratory problems, and the need for admission to neonatal unit[20] o Some evidence of longer term risks including attention deficit hyperactivity disorder and cognitive deficits[20] o Increased risk of poor child development at school age[21] • Fetal brain development accelerates in the later stages of pregnancy, making it vulnerable to disruption from shortened gestation[21,22]
Impacts of late term birth	• There is an increase in the risk of stillbirth with advancing gestation[23] o Stillbirth rate by gestational age ▪ 37 weeks: 2.1 per 10,000 ongoing pregnancies ▪ 38 weeks: 2.7 per 10,000 ongoing pregnancies ▪ 39 weeks: 3.5 per 10,000 ongoing pregnancies ▪ 40 weeks: 4.2 per 10,000 ongoing pregnancies ▪ 41 weeks: 6.1 per 10,000 ongoing pregnancies ▪ 42 weeks: 10.8 per 10,000 ongoing pregnancies • The risk of neonatal death remains constant for births between 38 and 41 weeks, but increases beyond 41 weeks[23] • Perinatal risks increase beyond 41+0 weeks[24] o Refer to Table 5. Fetal outcomes for IOL versus expectant management at term
Recommendation	• Individualise timing of birth according to individual clinical circumstances • Avoid IOL prior to 39+0 weeks gestation unless maternal and/or fetal risks of ongoing pregnancy outweigh the risks of IOL and birth[25] • Communicate the benefits of waiting until at least 39+0 weeks to clinicians, women and families[21] • If spontaneous labour has not occurred by 41+0 weeks, recommend IOL o Refer to Section 4.1 Prolonged pregnancy

1.3 Setting for cervical ripening

Table 3. Setting for cervical ripening

Aspect	Consideration
Context	• The setting for IOL can have a significant impact on women's experience, safety and the associated healthcare costs[4,26] • Women have unique views on what constitutes a safe and comfortable environment[26]
Advantages and disadvantages	• Inpatient setting o The hospital environment provides access to continuous maternal and/or fetal monitoring, and immediate operative birth if required[27] o Women often report finding the hospital environment noisy and busy with a lack of privacy and imposed rules[4,26] • Outpatient setting o Women may feel anxious in outpatient and home setting because of the uncertainties of IOL and practicalities of getting back to hospital[26] o Being in a familiar environment has been shown to increase women's comfort, ability to relax, rest and sleep[27,28] o Social supports and autonomy may be more easily facilitated in the home environment[27]
Women's experience	• Overall, evidence suggests that women[26]: o Give higher satisfaction ratings to outpatient compared to inpatient IOL o Would choose outpatient IOL again o Had more sleep than inpatients • Comparison of women's experience of dinoprostone as an inpatient versus a balloon catheter as an outpatient, demonstrated similar experiences in both arms of the trial[27,29]
Recommendation	• There is limited high quality evidence to determine if cervical ripening is effective and safe in outpatient settings[4] • Going home following the insertion of a balloon catheter for cervical ripening is feasible, with a low likelihood of adverse outcomes[29] • In the outpatient setting, balloon catheters may be safer than prostaglandins as studies show less uterine hyperstimulation during the cervical ripening phase[30] • If a facility provides outpatient cervical ripening: o Explore the woman's preferences, and offer choices about their preferred setting wherever possible[27] o Develop local protocols to support appropriate clinical governance, clinical indications, inclusion/exclusion criteria, written information for women, observation/monitoring protocols and adequate follow-up and support for women

2 Risks and benefits of IOL

Table 4. Risks and benefits of IOL

Aspect	Consideration
Context	• There are risks and benefits for both expectant management (EM) and IOL • Risks of IOL are dependent on the indication for IOL, method of induction and clinical circumstances o Refer to Section 4 Indications for IOL and Section 6 Methods of IOL • Women weigh potential risks and benefits uniquely, according to their risk profile, unique perspective, values and preferences[31,32] • Information received has significant impact on women's choice and decision making about IOL[32]
Benefits	• If performed for an established indication, reduction in perinatal and/or maternal morbidity and mortality • Women may prefer IOL to EM (serial antenatal monitoring) beyond 41+0 weeks[33]
Clinical risks	• Tachysystole, hypertonus and uterine hyperstimulation • Cord prolapse • Uterine rupture • Refer to Section 7 Management of clinical risks and complications • Unsuccessful IOL o Refer to Section 8 Unsuccessful IOL
Birth considerations	• Women's experiences of IOL are unique and varied[26] • Social support from health care providers has strong impact on women's experience of IOL[26] • Potential implications for birth include: o Increased pain[1,32] o Increased number of vaginal examinations[1] o Higher incidence of additional interventions (e.g. electronic fetal monitoring, analgesia usage) o Limitations on access to water immersion or water birth (dependent on local unit policy and available equipment)[1] o Limitations on choice of place of birth o Lack of control or feeling unprepared[26,34] o Possibility of delays to starting and/or progressing with IOL[35]
Clinical outcomes	• Comparing IOL with spontaneous labour does not provide insight into clinical management, as spontaneous labour is not a certain alternative to IOL o In clinical circumstances where IOL is being recommended, the alternative option is EM • Maternal and fetal clinical outcomes of IOL compared with EM are outlined in detail in the following section: o Refer to 2.1 Expectant management versus IOL at term[31]

2.1 Expectant management versus IOL at term

A systematic review of 34 randomised controlled trials comparing a policy of inducing labour (usually after 41 completed weeks gestation) with EM, examined various maternal and neonatal outcomes. The results are summarised in Table 5.

Table 5. Fetal outcomes for IOL versus expectant management at term

Outcome[31]		No. of studies	No. of events	No. of participants	Pooled effect	95% CI	Interpretation	Absolute risk reduction	NNT
Fetal	Perinatal death	22	29	18,795	RR 0.31	0.15 to 0.64	↓ risk with IOL	22.5 fewer per 10,000 births	445
	Stillbirth	22	18	18,795	RR 0.30	0.12 to 0.75	↓ risk with IOL	14.9 fewer per 10,000 births	670
	Neonatal death	21	11	18,611	RR 0.39	0.13 to 1.14	*No statistically significant difference*		
	Birth asphyxia	4	14	1,456	RR 1.66	0.16 to 4.55	*No statistically significant difference*		
	Admission to neonatal unit	17	1585	17,826	RR 0.88	0.80 to 0.96	↓ risk with IOL	118.3 fewer per 10,000 births	85
	Neonatal convulsions	5	24	13,216	RR 1.01	0.15 to 6.67	*No statistically significant difference*		
	Neonatal encephalopathy (HIE)	2	39	8,851	RR 0.69	0.37 to 1.31	*No statistically significant difference*		
	Meconium aspiration syndrome	13	354	16,622	RR 0.75	0.62 to 0.92	↓ risk with IOL	59.9 fewer per 10,000 births	167
	Pneumonia	2	37	8,851	RR 0.54	0.27 to 1.06	*No statistically significant difference*		
	*Apgar score less than 7 at 5 minutes	20	207	18,345	RR 0.73	0.56 to 0.96	↓ risk with IOL	35.8 fewer per 10,000 births	280
	Birthweight (grams)	18		8,817	MD -59.38	-77.03 to -41.72	↓ with IOL		
	*Birthweight >4000 g	8	663	5,593	RR 0.72	0.54 to 0.96	↓ risk with IOL	475.3 fewer per 10,000 births	27
	Neonatal birth trauma	5	81	13,106	RR 0.97	0.63 to 1.49	*No statistically significant difference*		

RR: risk ratio; **MD:** mean difference; **CI:** confidence interval; ↓: reduced; **NNT**: number needed to treat
NB: Term defined as at or beyond 37 weeks for this systematic review

NB: Estimates were calculated using Mantel-Haenszel method for meta-analysis
*Random effects were used when high heterogeneity was observed

Table 6. Maternal outcomes for IOL versus expectant management at term

Outcome[31]		No. of studies	No. of events	No. of participants	Pooled effect	95% CI	Interpretation	Actual risk difference IOL	NNT
Maternal	Caesarean section	31	3686	21,030	RR 0.90	0.85 to 0.95	↓ risk with IOL	190.3 fewer per 10,000 births	53
	Instrumental birth	22	2575	18,584	RR 1.03	0.96 to 1.10	*No statistically significant difference*		
	Use of epidural	8	2219	4,579	RR 1.09	0.99 to 1.20	*No statistically significant difference*		
	*Use of other analgesia	4	1119	2,352	RR 1.11	1.05 to 1.18	↑ risk with IOL	566.6 more per 10,000 births	-25
	Perineal trauma								
	Severe perineal trauma	5	371	11,589	RR 1.04	0.85 to 1.26	*No statistically significant difference*		
	Episiotomy	2	539	1,747	RR 0.96	0.84 to 1.11	*No statistically significant difference*		
	Obstetrical anal sphincter injuries	2	66	1,698	RR 0.81	0.51 to 1.31	*No statistically significant difference*		
	Prolonged labour								
	First stage	2	60	648	RR 0.76	0.49 to 1.20	*No statistically significant difference*		
	Second stage	1	40	508	RR 0.67	0.49 to 1.22	*No statistically significant difference*		
	Third stage	1	1	249	RR 3.02	0.12 to 73.52	*No statistically significant difference*		
	No definition	1	1	112	RR 0.35	0.01 to 8.30	*No statistically significant difference*		
	Postpartum haemorrhage	9	1000	12,609	RR 1.02	0.91 to 1.15	*No statistically significant difference*		
	Breastfeeding	2	3769	7,487	RR 1.00	0.96 to 1.04	*No statistically significant difference*		
	Length of maternal hospital stay (days)	7		4,120	MD -0.19	-0.56 to 0.18	*No statistically significant difference*		
	Length of labour (hours)	14		4,025	MD -1.08	-1.67 to -0.50	Shorter with IOL		

RR: risk ratio; **MD:** mean difference; **CI:** confidence interval; ↓: reduced; ↑: increased; **NNT**: number needed to treat
NB: Term defined as at or beyond 37 weeks for this systematic review

NB: Estimates were calculated using Mantel-Haenszel method for meta-analysis
*Random effects were used when high heterogeneity was observed

3 Communication and decision making

Table 7. Communication and decision making

Aspect	Consideration
Women's experience of decision making	• Some women report wanting more information to actively participate in decision making about IOL[26] whereas others prefer to defer the decision to their health care professional[34] • In 2018–2019 in Queensland, for women who had an IOL: o 87 % felt the reasons for the IOL were explained in a way they could understand[36] o 60 % felt they had a choice about whether their labour would be induced[36] • Qualitative studies have identified factors that positively influence women's experience of IOL decision-making: o Having trust in healthcare providers[34,35] o Having sufficient and consistent information about risks, benefits and alternatives[34,35] o Being provided choice around IOL rather than being informed of needing an IOL[26,34,35,37] o Not feeling rushed in the decision making process, with time to discuss personal preferences'[26]
Antenatal communication	• Discuss preferences for mode of birth early in pregnancy[1] o Options for birth include[1] ▪ EM ▪ IOL ▪ Planned caesarean birth • Discuss the potential for IOL with a post term pregnancy to o Provide opportunity for questions o Aid understanding of risks, benefits and implications for birth options[1,6] • Confirm preferences for birth towards end of pregnancy[1] o Preferences may have changed since earlier discussions
IOL discussion points[1]	• Indication for IOL • When, where and how IOL may be performed • Time frames for commencement of labour[38] • Success rates of different protocols[38] • Potential impacts, risks and benefits of IOL according to unique situation and proposed induction method • Options for support and pain relief • Alternative options if IOL declined • Possibility of an unsuccessful induction and options if this occurs
Recommendation	• Facilitate informed decision making • Provide clear, balanced, unbiased, in depth, and individualised information about IOL and other choices[32] • Gain an understanding from women about their preferences and preferred level of involvement with decision making regarding IOL • Access available decision aids or tools[32,34,35,39] o Refer to Queensland Clinical Guideline parent information: *Induction of labour*

3.1 IOL declined or postponed

Table 8. IOL declined or postponed

Aspect	Consideration
Communication	• Discuss options with woman including EM or caesarean birth • Where pregnancy was greater than 41+0 weeks gestation, women who[33]: o Waited for labour to start—38 % would choose to wait next time o Were induced—74 % would choose IOL next time • Develop a plan with the woman for continued care including: o Arrangements for ongoing monitoring o Return for IOL • If IOL is declined, respect the woman's decision o Refer to *Partnering with the woman who declines recommended maternity care* guideline and associated resources[40]
Monitoring	• Adverse effects on the baby (including stillbirth) cannot be prevented or reliably predicted with monitoring in prolonged pregnancy • No form of increased antenatal monitoring has been shown to reduce perinatal mortality associated with prolonged pregnancy[41] • Monitoring only provides a snapshot of the current situation and cannot prevent or reliably predict changes after monitoring ends[1] • Fetal monitoring may consist of twice weekly CTG and ultrasound estimation of maximum amniotic pool depth[18,1,42] • Definitive recommendations for monitoring are hampered by the absence of randomised controlled trials demonstrating reduced perinatal mortality and morbidity where monitoring instituted between 41 and 42 weeks gestation • Gestation for commencement of monitoring depends on clinical circumstances and the woman's individual risk of stillbirth o Consider from 41 weeks
Recommendation	• If IOL is declined or postponed, consider the: o Individual clinical circumstances, risk of stillbirth and preferences o Indication for IOL o Gestation for recommended commencement of monitoring • Perform an assessment of maternal and fetal wellbeing • Provide verbal and written information about fetal movements[43] and increased risk of stillbirth with advancing gestation o Refer to Section 1.2 Timing of birth o Refer to Queensland Clinical Guideline: *Fetal movements*[44] • Advise to contact health care provider/facility immediately if concerns about self or baby (e.g. reduced or altered fetal movements)[1]

4 Indications for IOL

IOL is recommended when the risk of continuing the pregnancy (for the woman or fetus) outweighs the risk associated with induction and birth.[18] 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.

Induction of labour considerations for the indications and clinical situations addressed within other Queensland Clinical Guidelines and are not repeated here. Refer to Table 9. Indications covered in other Queensland Clinical Guidelines. Considerations for other IOL indications and circumstances are outlined in subsequent sections.

Table 9. Indications covered in other Queensland Clinical Guidelines

Indication or situation	QCG guideline
PROM and PPROM	• Refer to: o Queensland Clinical Guideline: *Term prelabour rupture of membranes (PROM)*[11] o Queensland Clinical Guideline: *Preterm prelabour rupture of membranes (PPROM)*[10] o Queensland Clinical Guideline: *Early onset Group B Streptococcal disease*[45]
Intrauterine fetal death	• Refer to: o Queensland Clinical Guideline: *Stillbirth care*[12]
Previous caesarean birth	• Refer to: o Queensland Clinical Guideline: *Vaginal birth after caesarean (VBAC)*[13]
Gestational diabetes mellitus	• Refer to: o Queensland Clinical Guideline: *Gestational diabetes mellitus (GDM)*[46]
Hypertension and/or pre-eclampsia	• Refer to: o Queensland Clinical Guideline: *Hypertension and pregnancy*[47]
Obesity and pregnancy	• Refer to: o Queensland Clinical Guideline: *Obesity and pregnancy (including post bariatric surgery)*[48]
Termination of pregnancy	• Refer to: o Queensland Clinical Guideline: *Termination of pregnancy*[8]

4.1 Prolonged pregnancy

Table 10. Prolonged pregnancy

Aspect	Consideration
Risk/benefit	• Risks associated with a pregnancy continuing beyond 41+0 weeks increase over time including[1,31]: o Increased likelihood of caesarean birth o Increased likelihood of admission to a neonatal unit o Increased likelihood of stillbirth and neonatal death ▪ Refer to Section 1.2 Timing of birth • A randomised controlled trial comparing IOL at 41 weeks with EM was stopped early due to a significantly higher rate of perinatal mortality in the EM group[49] o Six perinatal deaths (five stillbirths and one neonatal death) occurred in the EM group versus no deaths in IOL group • Most women prefer IOL at 41 weeks over serial antenatal monitoring[33] • The likelihood of spontaneous labour increases with gestational age[1]
Recommendation	• Recommend IOL for women who have reached 41+0 weeks gestation[6,1,42] • Exact timing depends on the specific risk of stillbirth, individual preferences and local circumstances[18]

4.2 Intrahepatic cholestasis of pregnancy (obstetric cholestasis)

Table 11. Obstetric cholestasis

Aspect	Consideration
Risk/benefit	• Diagnosis considered if: o Itching in skin of normal appearance o Raised peak random total bile acid concentration of 19 micromol/L or more • Associated with increased risk of: o Stillbirth[25,50-53] o Meconium stained liquor[50-53] o Preterm birth[50,51,53] • Risk of stillbirth: o Increases with increasing gestational age[54] o Associated with serum total bile acids (TBA) levels[55,56] ▪ TBA of 100 micromol/L or more associated with 3.44% stillbirth rate after 24 weeks compared with general population stillbirth rate of 0.3% to 0.4%[53] ▪ TBA of less than 100 micromol/L have similar risk of stillbirth to that of general pregnant population, providing repeat bile acid testing is done until birth[53] ▪ TBA levels more predictive of stillbirth than aspartate transaminase, alanine aminotransferase and bilirubin levels[53,55]
Recommendation	• Recommended timing of IOL is informed by risk of stillbirth as guided by TBA levels • If TBA 19–39 micromol/L and no other risk factors for stillbirth[57] o Risk of stillbirth similar to background risk o Consider IOL by 40 weeks • If TBA 40–99 micromol/L and no other risk factors for stillbirth[57] o Risk of stillbirth similar to background risk until 38–39 weeks o Consider IOL at 38–39 weeks • If TBA 100 micromol/L or more[56,57] o Risk of stillbirth is higher than background risk and increases from 35–36 weeks gestation o Consider IOL at 35–36 weeks • Multiple pregnancy, and/or the presence of additional risk factors or comorbidities may increase risk of stillbirth and influence decision making for recommended timing of birth[57]

4.3 Twin pregnancy

Table 12. Twin pregnancy

Aspect	Consideration
Risk/benefit	• Based on data from the United States, the fetal/infant mortality per additional week of EM at[58]: o 37 weeks is 4.39 per 1000 women (95% CI 4.07 to 4.70) o 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 EM demonstrated[59]: o No significant differences in caesarean section (CS), perinatal death or serious morbidity, maternal death or serious maternal morbidity o 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 twins[60]
Recommendation	• Consider all clinical circumstances and consult with expert practitioner regarding mode and timing of birth, and indications for IOL • In uncomplicated twin pregnancy (monochororioic[61,62] or dichorionic), plan birth after 37+0 weeks[58,59,63]

4.4 Suspected fetal macrosomia

Table 13. Suspected fetal macrosomia

Aspect	Consideration
Context	• Variably defined as birthweight greater than 4000–4500 g at 40 weeks gestation, or above the 90th centile for estimated fetal weight (EFW) according to gestation[64] • The estimation of fetal weight using clinical examination is imprecise • Accuracy of ultrasonography for estimating fetal weight is dependent on factors such as the skill and experience of operator and the quality of ultrasound equipment[65] o Accuracy of ultrasound calculation of EFW has improved over time o Recent studies consistently produce random errors of less than 10%
Risk/benefit	• In a systematic review comparing IOL for suspected fetal macrosomia at 37–40 weeks to EM, there were[66]: o No significant differences in: ▪ CS rate or instrumental birth ▪ Measures of neonatal asphyxia o Decreased risk of shoulder dystocia with IOL ▪ RR 0.60, 95% CI 0.37 to 0.98 o Decreased risk of (any) fracture with IOL ▪ RR 0.20, 95% CI 0.05 to 0.79 o Lower birth weights with IOL [Mean difference 178.03 g, 95% CI 40.81 to 315.26] o Increased risk of third and fourth degree perineal tears with IOL ▪ RR 3.70 (95% CI 1.04 to 13.17)
Recommendation	• IOL for suspected macrosomia based on clinical examination alone is not recommended[1] • If clinical suspicion of macrosomia (e.g. symphysial fundal height equals 3 cm more than expected from 36 weeks), recommend ultrasound scan (USS) for EFW[67] o Universal USS is not recommended for EFW[64] • Discuss IOL from 38+0 weeks if USS EFW at 36 weeks or more is greater than 97th centile or[67]: o 3500 g at approximately 36 weeks o 3700 g at approximately 37 weeks o 3900 g at approximately 38 weeks • Clinical judgement is required when making recommendation about exact timing of IOL • Consider elective CS if EFW is[64]: o Greater than 4500 g in women with diabetes o Greater than 5000 g in women without diabetes

4.5 Advanced maternal age

Table 14. Advanced maternal age

Aspect	Consideration
Risk/benefit	• Advanced maternal age is an independent risk factor for stillbirth, maternal mortality and morbidity, obesity, multiple pregnancy, use of assisted reproductive technology, fetal growth restriction and placental dysfunction[68,69,70-72] • IOL at 39 weeks for advanced maternal age, compared to EM[73,74]: o No significant effect on the CS rate o No adverse short-term effects on maternal and neonatal outcomes o Lower risk of perinatal death[75]
Parity	• Risk of stillbirth increases with age for both nulliparous and multiparous women[68] • While risk of stillbirth increases with maternal age for multiparous women, the risk of stillbirth is higher for nulliparous women across all maternal age groups compared to multiparous women[68] • Stillbirth risk for at 37 weeks gestation or more[68]: o Nulliparous women: ▪ Younger than 35 years: 3.72 stillbirths per 1000 ongoing pregnancies ▪ 35–39 years: 6.41 stillbirths per 1000 ongoing pregnancies ▪ 40 years or more: 8.65 stillbirths per 1000 ongoing pregnancies o Multiparous women: ▪ Younger than 35 years: 1.29 stillbirths per 1000 ongoing pregnancies ▪ 35–39 years: 1.99 stillbirths per 1000 ongoing pregnancies ▪ 40 years or more: 3.29 stillbirths per 1000 ongoing pregnancies
Recommendation	• Inform women about the increasing risk of stillbirth with increasing maternal age • For women aged 40 years or older, offer IOL at 39+0–40+0 weeks gestation[69,71,76] o Consider potential cumulative risk factors when discussing the option of IOL with older women

4.6 Maternal ethnicity

Table 15. Maternal ethnicity

Aspect	Consideration
Context	• Differences in ethnicity have been reported in perinatal mortality data[77-82] 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: o Had a higher antepartum stillbirth rate [2.4 times more likely, 95% CI 1.4 to 4.0] with risk increasing progressively with gestation o Were twice as likely to have a low birthweight baby (less than 2500 g)
Recommendation	• 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

4.7 Other fetal concerns

Table 16. Other fetal concerns

Aspect	Consideration
Potential fetal concerns	• Concern for fetal wellbeing may arise with: o Fetal grown restriction (FGR)/small for gestational age (SGA) o Decreased fetal movements [refer to Queensland Clinical Guideline: *Fetal movements*[44]] o Oligohydramnios o Non-reassuring fetal surveillance test o Fetal abnormality o Isoimmunisation o Pre-existing Type 1 or Type 2 diabetes • The timing of birth may depend on gestational age, severity of concern and results of tests of fetal wellbeing.
Recommendation	• Optimal timing of birth depends on gestational age, severity of concern, a woman's individualised risk of stillbirth, and results of tests of fetal wellbeing[83] • Use of measures such as umbilical artery, middle cerebral and ductus venosus Doppler may assist in improving perinatal outcome through more appropriate timing of birth[84,85] • Consult with expert practitioners and multidisciplinary team as required

4.8 Maternal request

Table 17. Maternal request

Aspect	Consideration
Context	• IOL requires more intensive clinical resources than spontaneous onset of labour in low risk women • The long term population consequences of a significant proportion of low risk women receiving IOL without a medical or obstetric indication are unknown
Recommendation	• If IOL is requested without a medical or obstetric indication: o Escalate to senior clinician o Discuss membrane sweeping (refer to Section 5.2 Membrane sweeping) o Discuss risks, benefits and available options ▪ Refer to Section 2 Risks and benefits of IOL o Consider available resources at local facility o Consider IOL request from 39+0 weeks • IOL is not recommended prior to 39+0 weeks without a medical or obstetric indication[20]

5 Pre IOL assessment

5.1 Cervical assessment

The Modified Bishop score (MBS) 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 summed.[86] The state of the cervix is an important predictor of successful IOL.[18] Cervical ripening is recommended if the MBS is 6 or less.[18]

Table 18. 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	–

5.2 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 19. Membrane sweeping

Aspect	Consideration
Indication	• Reduce the need for IOL by encouraging spontaneous labour
Contraindication	• Consistent with contraindications for vaginal birth[87] • Preterm gestation
Risk/Benefit	• Effective for promoting spontaneous labour and reducing the need for IOL[88,89], particularly in multiparous women[90] • Optimal gestation at which to commence is controversial[87,89] • Optimal frequency is unknown[87,89] o Both single and multiple membrane sweeping are effective in promoting spontaneous labour[88] o Serial membrane sweeping (every 2 days) reduced the number of pregnancies reaching 42 weeks [NNT=6[90]] o 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[91,92] • No evidence of increased maternal or fetal morbidity[88] • No evidence of increased risk of maternal or neonatal infection[87,88] o Is as safe in Group B Streptococcus (GBS) positive women as for women whose GBS status is unknown or negative[87,93] o No data available on human immunodeficiency virus or hepatitis C[87] • Associated with discomfort[90], vaginal bleeding and irregular contractions[1] • 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[87,94,95]
Recommendation	• Discuss the benefits of membrane sweeping in the antenatal period • Offer membrane sweeping o From 39+0 weeks[1] o Prior to formal IOL[87] • If spontaneous labour does not occur after the first sweep, additional membrane sweeps may be offered [1] • If the cervix is closed and membrane sweeping is not possible, cervical massage in vaginal fornices may achieve a similar effect[1]

5.3 Day of IOL assessment

Table 20. Day of IOL assessment

Aspect	Consideration
Purpose	• To confirm suitability for IOL • Assess maternal and fetal wellbeing • Establish baseline maternal and fetal observations
Pre IOL assessment	Prior to IOL process: • Review maternal history • Confirm gestation • Perform baseline maternal observations (e.g. temperature, pulse, respiratory rate and blood pressure (BP)) • Perform abdominal palpation to confirm presentation, attitude, lie, position, and engagement • Assess membrane status (ruptured or intact)[18] • Vaginal examination (VE) to assess the cervix [refer to Section 5.1 Cervical assessment] • Assess fetal wellbeing: o Fetal heart rate (FHR) and cardiotocograph (CTG) • Confirm CTG is normal[1] o If CTG abnormal, escalate as per local protocols o Refer to Queensland Clinical Guideline: *Intrapartum fetal surveillance*[96] • Assess for contraindications to IOL • Consider urgency for IOL

6 Methods of IOL

Table 21. Methods of IOL

Aspect	Consideration
Cervical ripening for unfavourable cervix	• Mechanical: balloon (transcervical) catheter (e.g. Foley, Cook cervical ripening balloon) • Pharmacological: dinoprostone (prostaglandin E_2) products: o Vaginal gel (Prostin E_2®: 1 mg in 2.5 mL, and 2 mg in 2.5 mL) o Vaginal slow release pessary (Cervidil® 10 mg)
After cervical ripening/ cervix favourable	• Artificial rupture of membranes (ARM) • Oxytocin
If primary cervical ripening method is unsuccessful	• If primary method was: 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	• For IOL: insufficient evidence to support Laminaria tents, breast/nipple stimulation (particularly if high risk[97,98]), acupuncture/acupressure[99], sexual intercourse[100,101], evening primrose oil, homeopathy[1], castor oil, nitric oxide donors, hyaluronidase[1], oestrogen[1], and corticosteriods[1]
Misoprostol	• 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)[102] • Not currently recommended for IOL where a live birth is expected • Not included on the Queensland Health List of Approved Medicines (LAM) for IOL with a viable baby[103] • Misoprostol use for IOL is an off label indication in Australia[104]
Contraindications for IOL	• Any contraindication to vaginal birth (e.g. malpresentation, abnormal placentation, HIV, active genital herpes)

6.1 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.[18]

Table 22. Balloon catheter considerations

Aspect	Consideration
Indications	• Unfavourable cervix (MBS of 6 or less) • Preferred cervical ripening agent if: o Previous CS or uterine surgery[1] o Grand multiparity o Known SGA or FGR • May be used following dinoprostone when there has been no/minimal effect on cervical ripening and ARM is not technically possible
Contraindication	• Ruptured membranes • Undiagnosed bleeding • Abnormal FHR auscultation or CTG
Cautions	• Fetal head not engaged[18] (4/5 or 5/5 above the pelvic brim) • Polyhydramnios • Simultaneous use of prostaglandins
Benefit[105]	• When compared to vaginal dinoprostone (prostaglandin E2): o Overall more favourable safety profile ▪ Less uterine hyperstimulation[30] ▪ Reduced risk of serious neonatal morbidity or perinatal death o No difference in CS or instrumental vaginal birth rate • Lends itself to outpatient setting if desired/available • Low cost and no specific storage or temperature requirements • No evidence of an increased risk of infection
Risk	• Placental abruption • Uterine rupture • Device entrapment • Maternal discomfort during and after insertion • Increased risk of oxytocin augmentation compared to vaginal dinoprostone[105] • Failed dilatation and inability to perform ARM • Cervical laceration or ischaemia (if prolonged use) • There is limited data comparing single to double balloon catheter[105,106] o Available evidence does not suggest major differences in rates of success, CS, uterine hyperstimulation, or serious maternal or neonatal outcomes[105]

6.2 Dinoprostone

Table 23. Dinoprostone

Aspect	Consideration
Context and definition	• Dinoprostone is the international non-proprietary name for prostaglandin E2, also referred to as PGE2[1] • Prostaglandins promote cervical ripening and stimulate uterine contractions via their actions on smooth muscle[107,108] • Most commonly used prostaglandin agent in third trimester IOL[107] • Preparations include[108]: o Vaginal gel (1 mg and 2 mg) o Vaginal slow-release pessary (Cervidil® 10 mg) • Refer to Appendix B: Dinoprostone administration for dosage and administration recommendations
Indications	• Unfavourable cervix[108] • May be used following balloon catheter when there has been no/minimal effect on cervical ripening and ARM is not technically possible
Contraindications [108,109,110]	• Known hypersensitivity to dinoprostone • Previous CS or uterine surgery • Abnormal CTG/fetal compromise • Undiagnosed per vaginal (PV) bleeding
Cautions[108]	• Multiple pregnancy • Grand multiparity (5 or more previous births) • Ruptured membranes • High presenting part • Asthma, chronic obstructive pulmonary disease—may cause bronchospasm • Epilepsy • Cardiovascular disease • Raised intraocular pressure, glaucoma • Polyhydramnios • Known SGA or FGR
Risk/benefit	• Associated with vaginal pain[38] • Vaginal PGE_2 compared to a placebo or EM[107]: o Increased vaginal birth within 24 hours o Increased hyperstimulation (RR 3.16, 95% CI 1.67 to 5.98) o Did not appear to reduce neonatal unit admission, serious maternal/newborn morbidity/mortality
Repeat dinoprostone versus ARM	• Following initial dose of dinoprostone, recommend ARM once technically possible[111] • Compared with repeat dinoprostone gel, ARM as soon as technically possible is associated with[111]: o Shorter time from IOL to birth o Greater proportion of women having birthed by 24 hours o No difference in mode of birth • Women being induced with PGE2 vaginal gel prefer ARM as soon as technically possible rather than repeat doses of PGE2 to make cervix more favourable[38] o Women report being more satisfied with: ▪ Length of labour ▪ How long it takes labour to start ▪ Overall birth experience

6.3 Artificial rupture of membranes

Table 24. Artificial rupture of membranes

Aspect	Consideration
Indications	• Favourable cervix (MBS of 7 or more)[18,112] • Following initial dose of dinoprostone or removal of balloon catheter, if technically possible[111] • Before commencement of oxytocin infusion • To observe the colour and amount of liquor when clinically indicated • Less favourable cervix (MBS of 6 or less) and there is clinical reason to avoid cervical ripening
Contraindications	• Vasa previa • Cord presentation
Cautions	• Poor application of the presenting part/unstable lie[18] • Fetal head not engaged[18] (5/5 above the pelvic brim)
Risk/benefit	• Risk of: cord prolapse[18] or compression[58], rupture of vasa praevia[112], pain and discomfort[112] • ARM and immediate oxytocin compared to ARM and delayed oxytocin (commenced 4 hours post ARM) showed shorter ARM to birth interval in nulliparous[113,114] and parous women[115] • Compared to ARM alone, ARM and oxytocin in combination resulted in fewer women not birthing vaginally at 24 hours[112] • Following cervical priming, early ARM (performed regardless of MBS) associated with a decrease in IOL to birth interval and no difference in other outcomes[116,113]

6.4 Oxytocin

Table 25. Oxytocin

Aspect	Consideration
Indications	• IOL in the setting of ruptured membranes
Contraindications	• Due to additive uterine effects, do not commence oxytocin within[108]: o Six (6) hours of dinoprostone vaginal gel administration[109] o 30 minutes of removal of dinoprostone vaginal pessary[110]
Cautions	• Discuss with an obstetrician prior to commencement if: o Previous uterine surgery (e.g. CS, myomectomy) [refer to Queensland Clinical Guideline: Vaginal birth after caesarean section[13]] o Multiple pregnancy o Greater than four previous births o Cardiovascular disease
Risk/benefit	• Tachysystole, hypertonus and hyperstimulation o Refer to Section 7 Management of clinical risks and complications • Nausea and vomiting (0.1 to 1%)[117]
Medication safety	• The standard oxytocin regimen recommended for all Queensland facilities is outlined in Appendix D: Oxytocin regimen administration • If required, the same infusion solution can be continued for postpartum haemorrhage management or prophylaxis with appropriate rate change
Before administration	• Verify CTG normal • If membranes are not ruptured, perform ARM • If spontaneous rupture of membranes, ensure forewaters are ruptured
Monitoring	• Provide one-to-one midwifery care[118] • Commence the intrapartum record when infusion is commenced • Maternal and fetal observations as per first stage of active labour o Refer to Queensland Clinical Guideline: *Normal birth*[119] • Commence continuous CTG at the onset of oxytocin infusion o Refer to Queensland Clinical Guideline: *Intrapartum fetal surveillance*[96] • Maternal pulse and CTG review to any increase in the infusion rate[117] • Monitor fluid balance as water intoxication/hyponatraemia may result from prolonged infusion[117] (rare with the use of isotonic solutions[120]) • If planned VBAC—maintain vigilance for uterine dehiscence and rupture

7 Management of clinical risks and complications

Table 26. Management of clinical risks

Clinical risk	Management
Tachysystole or hypertonus OR Uterine hyperstimulation	• Escalate as required and according to local protocols • Continuous CTG • If dinoprostone gel in situ, attempt removal of any remaining gel according to local policy and procedure when possible[1] • If dinoprostone pessary in situ, remove • If oxytocin infusion running, cease or reduce rate[1] 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 tocolytic[1]: o Terbutaline: 250 micrograms subcutaneously or o *Sublingual Glyceryl Trinitrate (GTN) spray 400 micrograms[3] o Excessive uterine activity in the absence of evidence of fetal compromise is not in itself an indication for tocolysis[3] • If clinically indicated, prepare for instrumental birth or caesarean section (CS) (e.g. FHR does not return to normal)
Cord prolapse	• An emergency event o Call for emergency assistance and escalate according to local protocols o Indication for emergency CS o Management is aimed at relieving pressure of fetus on cord through positioning of woman and digital pressure to the presenting part • A potential risk at the time of membrane rupture especially with ARM • To reduce the likelihood of cord prolapse: o Before ARM, assess engagement of the presenting part o If the baby's head is high, avoid ARM o Palpate for umbilical cord presentation during the VE o Avoid dislodging the baby's head during the VE
Uterine rupture	• A rare, life-threatening event for woman and baby • If suspected, prepare for an emergency CS, uterine repair or hysterectomy

8 Unsuccessful IOL

Table 27. Unsuccessful IOL

Aspect	Consideration
Context	• Criteria for unsuccessful IOL are not generally agreed[121-124] • Time required to ripen the cervix can be prolonged, especially when the starting MBS is low o The goal is to prepare the cervix so ARM is possible. • Unsuccessful IOL variably defined as: o Labour not starting after one cycle of treatment[1] o Inability to perform ARM despite maximal cervical ripening o Cervical dilation of less than 4 cm after 12–18 hours of oxytocin[121,123]
Recommendation	• Review the individual clinical circumstances[1] • Assess fetal wellbeing using CTG[1] • After rupture of membranes and if not in active labour after 12 hours of oxytocin, the likelihood of vaginal birth is significantly lower [121] • Discuss options for care including[1]: o Further attempts to ripen the cervix with an alternative method o A rest period followed by re-assessment of the woman followed by second attempt at IOL if appropriate o Continuing oxytocin infusion longer than 12 hours o Caesarean birth

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Appendix A: Balloon (transcervical) catheter insertion

Aspect	Clinical practice point

Equipment	• Balloon catheter, either
	  o 16/18 gauge catheter with double balloon (e.g. Cook cervical ripening balloon)
	  o Foley catheter with balloon capacity of at least 30 mL
	• Sterile water or 0.9% sodium chloride (200 mL)
	• Syringe (20 mL)
	• Sterile gloves
	• Sterile lubricating gel
	• Swabs
	• Tape
	• CTG monitor
	• Bed with stirrups
	• Chlorhexidine
	• Speculum and sponge forceps (if required)

Procedure	• Prior to commencement
	  o Ensure pre IOL assessment complete including baseline observations
	  o Encourage voiding
	• Performed by competent medical or midwifery staff
	• Contact a more experienced clinician if there are 2 unsuccessful attempts

Insertion	• Digital placement of the catheter is generally less painful than using a speculum
	• Use stylet as per manufacturer's recommendations
	• Pass the balloon catheter through the internal os of the cervix
	• If insertion is technically difficult:
	  o Consider the lithotomy position
	  o Consider use of sponge forceps
	  o Insert speculum and visualise the cervix
	  o Pass the catheter through the cervix (using sponge forceps) until both balloons have entered the cervical canal
	• Document the procedure, time of insertion, inflation volume and any difficulties

Double balloon inflation	• 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
Single balloon inflation	• Spigot the catheter • Inflate the balloon with sterile water or 0.9 % sodium chloride o 80 mL for single cervical ripening balloon or 30–50 mL for Foley catheter • 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 light tension of the balloon

Balloon (transcervical) catheter post insertion

Aspect	Consideration
Monitoring	• TPR, BP, FHR, uterine activity, engagement of the fetal head and vaginal loss immediately following insertion and 30 minutes post insertion o 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 labour while: o Observations are normal o No contractions o Not otherwise indicated • Refer to Queensland Clinical Guideline: *Normal Birth*
Reassessment	• Schedule assessment 12 hours after insertion with plan to ARM • There is no evidence to support a balloon remaining in situ for a longer than 12 hours o If delay in reassessment, escalate concerns and document plan o Ensure removal of balloon is accompanied by review and plan to ARM • If the balloon catheter has not spontaneously fallen out and ARM is unsuccessful: o Obstetric review is indicated o Continuing IOL may involve dinoprostone or reinsertion of another balloon catheter after 24 hours • If balloon falls out spontaneously, timely review and continuation of IOL is required
Indications for birth suite care	• Observations abnormal • Persistent pain and discomfort despite comfort measures, simple analgesia and/or reduction of balloon size • Spontaneous rupture of membranes • Labour commences
Moderate or severe discomfort	• Assess for labour • Reduce balloon volume (discuss with experienced clinician as required): o Single balloon or Foley catheter: remove maximum of 10 mL o Double balloon catheter: remove 10 mL from each vaginal and uterine balloon ▪ Reassess and repeat ensuring a minimum of 50 mL of residual volume remains in each balloon o Document the volume removed • If not in labour and moderate to severe discomfort continues despite balloon deflation, offer simple analgesia and sedation • If persistent pain and discomfort following oral analgesia o Review by an obstetrician, or o Transfer to birth suite for further assessment
Indications for early removal of balloon catheter	• Spontaneous rupture of membranes • Uterine hyperstimulation • Maternal request
Difficulty passing urine	• 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	• Transfer to birth suite for further assessment • If at home, return to hospital • Perform VE • Plan ARM and oxytocin as soon as possible (due to the temporary dilatory effect of balloon catheters)
Removal of balloon catheter	• After 12 hours, remove the balloon catheter by completely deflating the balloon(s) using an appropriately sized syringe (do not leave balloon catheter in situ longer than 18 hours) • Once the balloon catheter has been removed, perform ARM and commence oxytocin infusion o If ARM not possible, consider another method of IOL

Appendix B: Dinoprostone administration

Aspect	Clinical practice point
Administration	• Maternal and fetal safety outcomes do not seem to differ whether administered in the morning or evening, but women may prefer morning administration[1] • Pessary use may avoid repeated application of the gel • Gel may be more appropriate where cervix is favourable[2]
Dinoprostone gel[3]	• Products: Prostin E_2 Vaginal Gel® o 1 mg in 2.5 mL gel o 2 mg in 2.5 mL gel • 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
Dose	• **Initial dose** o Nulliparous: 2 mg PV o Multiparous: 1 mg PV • **Repeat dose** (if ARM is not clinically possible, and only after 6 hours) o Nulliparous: 2 mg o Multiparous: 1–2 mg • Do not give the repeat dose within 6 hours of the initial dose, to ensure the maximum dose of 3 mg in a six hour period is not exceeded • Maximum 3 doses per therapeutic course
Dinoprostone vaginal pessary[4]	• Product: Cervidil® 10 mg vaginal controlled-release pessary • Remove from freezer or fridge immediately prior to use. Warming not required • Can be stored in the refrigerator for up to one month (2–8 ˚C) after removal from the freezer. • 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: o To minimise potential for the pessary to fall out and subsequent insufficient dinoprostone exposure • Ensure sufficient tape outside vagina to allow removal • Advise to remain recumbent for 30 minutes • Advise to report if pessary falls out
Dinoprostone pessary dose	• 10 mg PV (released at a rate of approximately 4 mg in 12 hours)[4] • May be inserted for up to 24 hours, a second dose is not recommended
Monitoring post insertion	• TPR, BP, FHR, uterine activity, and vaginal loss o Immediately after insertion o Hourly for 4 hours, unless woman asleep • CTG after insertion (minimum 30 minutes) • Advise to inform staff if contractions commence o Ongoing monitoring as for latent first stage of labour while observations are normal, no contractions and not otherwise indicated • When in active labour—continuous CTG[5]
Assessment of progress	• Reassess for ARM and calculate MBS: o Gel–wait at least 6 hours after insertion[6] o Pessary–wait at least 12 hours after insertion[6] • Irrespective of MBS, recommend ARM if technically possible[7,8] • If ARM not possible, may require repeat gel dose (following normal CTG)
Indications for removal: dinoprostone pessary[4]	• Onset of regular, painful uterine contractions • Rupture of membranes (spontaneous or ARM) • Fetal distress • Uterine hyperstimulation or hypertonic uterine contractions • Maternal systemic adverse PGE_2 effects (e.g. vomiting, hypotension) • If starting oxytocin infusion—remove at least 30 minutes prior to starting • Insufficient cervical ripening after 24 hours

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Appendix C: Artificial rupture of membranes procedure

Aspect	Consideration
Before procedure	• If no other IOL procedure before ARM, perform pre IOL assessment • Encourage to empty bladder • Abdominal palpation to determine descent, position and presentation • VE to determine stage of labour, MBS, presentation, position and descent, possible cord or malpresentation, identify membranes • Consult obstetrician if: o Head is not engaged o Cord presentation o Malpresentation o Unstable lie o Polyhydramnios o Vessels felt within membranes
Procedure (continuing on from assessment VE)	• 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 o Refer to Queensland Clinical Guideline: *Intrapartum fetal surveillance*[1] • Following ARM for IOL, recommend commencement of oxytocin • When comparing commencement of oxytocin immediately versus 2 hours following ARM, a 2 hour delay was associated with[2]: o Less likely to receive oxytocin o More likely to receive antibiotics o More likely to require a CS o Parous women and those with a favourable cervix at time of amniotomy were more likely to avoid oxytocin • Document abdominal palpation, VE findings, FHR, liquor amount, colour and consistency
Post ARM monitoring	• 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 • 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: o Observations are normal o No contractions o Not otherwise indicated ▪ Refer to Queensland Clinical Guideline: *Normal birth* • If FHR or liquor abnormalities (e.g. meconium/blood stained or no liquor): o Perform CTG o Discuss/refer/consult as indicated o Refer to Queensland Clinical Guideline: *Intrapartum fetal surveillance* • Woman may mobilise if desired

1. Queensland Clinical Guidelines. Intrapartum fetal surveillance. Guideline No. MN19.5-V7-R24. [Internet]. Queensland Health. 2019. [cited 2022 Nov 28]. Available from: https://www.health.qld.gov.au/qcg.
2. Thiele CE, Beckmann M. Induction of labour involving an amniotomy: Waiting compared to immediate oxytocin. Australian and New Zealand Journal of Obstetrics and Gynaecology. [Internet]. 2022 [cited 2022 Nov 28]:1-5. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35670072 DOI:10.1111/ajo.13544.

Appendix D: Oxytocin regimen administration

Aspect	Clinical practice point
Administration	• Add oxytocin 30 international units to a 500 mL bag of either 0.9% sodium chloride or compound sodium lactate (Hartmann's solution) o 1 milliunit/minute = 1 mL/hour • Use a volumetric pump to ensure an accurate rate of infusion o Program delivery pumps for correct infusion concentrations o Administer oxytocin by sideline/secondary IV access (as oxytocin infusion initiated at low volume) • Commence IV infusion at 1 milliunit/minute (see regimen table below) • Record the dose in milliunit per minute • Increase dose at 30 minute or longer intervals[1] • 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 FHR[1] • 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	• After labour is established (cervical dilation greater than or equal to 5 cm) oxytocin infusion *may be* electively discontinued o Reduced incidence of FHR abnormalities and uterine hyperstimulation reported[2] o Inconsistent evidence about effect on active phase duration (possibly increased)[2,3,4] • If recommencing infusion and no local protocol, use the following guide: o If ceased for less than 30 minutes, recommence at half previous rate o If ceased for longer than 30 minutes, consider recommencing at less than half the previous rate (due to short half-life[5])
Obstetrician review	• Prior to exceeding 20 milliunit/minute (manufacturer recommended maximum[5]) • At the maximum regimen dose of 32 milliunit/minute[1] and labour not commenced • If infusion ceased or recommenced
Variation to regimen	• The ideal dosing regimen of oxytocin is unknown[6] but there are well recognised complications o Refer to Section 2 Risks and benefits of 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 o Processes and systems that facilitate *routine* variation are not recommended

1. Australian Medicines Handbook. Oxytocin. [Internet]. Adelaide: Australian Medicines Handbook Pty Ltd; July 2022 [cited 2022 Nov 28]. Available from: http://amhonline.amh.net.au/ **2.** 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 **3.** 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 **4.** 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. **5.** MIMS Online. Oxytocin APX solution for injection [Apotex] full product information. [Internet]: MIMS Australia; February 2021 [cited 2022 Nov 28]. Available from: https://www.mimsonline.com.au. **6.** Leduc D, Biringer 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. **7.** Cahill AG, Stamilio DM, Odibo AO, Peipert JF, Stevens EJ, Macones GA. Does a maximum dose of oxytocin affect risk for uterine rupture in candidates for vaginal birth after cesarean delivery? Am J Obstet Gynecol 2007;197(5):495 e1-5. 8. Cahill AG, Waterman BM, Stamilio DM, Odibo AO, Allsworth JE, Evanoff B, et al. Higher maximum doses of oxytocin are associated with an unacceptably high risk for uterine rupture in patients attempting vaginal birth after cesarean delivery. Am J Obstet Gynecol 2008;199(1):32 e1-5.

Oxytocin regimen

**Exercise caution in women with previous uterine surgery and consider a maximum dose of 20 milliunit/min[7,8]*

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

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