Auckland Consensus Guideline on Induction of Labour

Guideline Development Group

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Introduction

This guideline has been developed by medical and midwifery representatives from the three District Health Boards (DHBs) in the City of Auckland: Auckland, Counties Manukau, and Waitemata. The guideline development group created a secure internet-based folder and met regularly over six months. The group selected and rated the evidence, including local expert advice, national guidelines, Cochrane meta-analyses, randomized trials with induction as the intervention, and significant observational studies. The group then formulated a draft guideline. The process was not funded, and none of the members of the group has any conflicts of interest.

Using an online anonymous survey, feedback was sought from stakeholders internally within the three DHBs, including hospital-employed midwives and obstetricians, consumer representatives, and medical officers training in obstetrics, and externally, including Lead Maternity Carers (self-employed midwives, private obstetricians and general practitioners), and the New Zealand College of Midwives. Feedback was taken into account, and the group then formulated the final recommendations.

The aim was to bring together the best quality and most recent research evidence for each possible clinical indication for induction of labour (IOL) and produce a consensus best practice guideline. Each DHB could then publish local guidelines linking to this consensus document, and develop its own implementation strategy taking into account local circumstances around maternal characteristics and hospital resources. Clinical practice could be monitored and audited in future as recommended by NICE.[1] Local guidelines would be reviewed and updated according to local DHB policy.

Purpose

The purpose of this document is to provide guidance on the indications and timing for IOL, to guide clinicians to offer IOL when appropriate (i.e. where evidence shows that benefit to mother and/or baby outweighs the risk), and to avoid IOL when not appropriate. IOL is defined as the artificial initiation of labour.[1] The alternative is expectant management of the pregnancy where spontaneous labour is awaited. The outcome for the woman is achieving a vaginal birth within 24 hours.

This document will also provide guidance on the safety and effectiveness of some common methods of IOL, and on the safety of outpatient IOL. Hopefully with its implementation, such a guideline will lessen variation in clinical practice between and within hospitals, improve patient safety and satisfaction, and increase the proportion of clinically appropriate inductions.

The target population is pregnant women who develop a maternal, fetal or obstetrical risk or complication where expedited delivery would be considered. The population includes women planning their birth in the City of Auckland. Women need to be informed of the risks of induction of labour, outlined elsewhere.[1] Augmentation of labour is not covered in this document.

Where research findings are clear, this document provides a concise summary of the findings and recommendations, linked to the quality of evidence. In some situations, the recommendation does not necessarily follow the evidence. In situations where research findings are inconclusive, this document gives expert opinion and/or leaves it up to individualised decision-making.

The list of indications reviewed are not comprehensive, rather an overview of the more common reasons for induction. There may be other situations where IOL is appropriate based on the individual clinical situation.

This guideline is meant to be used in conjunction with local DHB guidelines.

Rationale

Overall IOL rates have steadily increased over the last two decades. For example, of all women who gave birth at Auckland DHB in 2012, 33% of women had their labour induced, whereas the rate of IOL was stable at 26-27% from 1997 to 2005.[2] The most common indications were: pre-labour rupture of membranes at term, post-term, suspected small for gestational age fetus, and diabetes in pregnancy.

Rate of IOL is one of the ten clinical maternity indicators identified by the New Zealand Ministry of Health, as part of its national quality and safety programme for maternity services.[3] In 2011, in women expected to have an uncomplicated pregnancy and low intervention rates (defined as nulliparous, age 20-34 years, 37+0 – 41+6 weeks' gestation, cephalic-presenting singleton baby, and no obstetric complications), the induction rate was 4.3%. This rate has been stable over the three years the indicators have been published. The rate of IOL in this group of women with an uncomplicated pregnancy was lower at Counties Manukau DHB (2.7%) compared to Auckland DHB (4.2%) and Waitemata DHB (4.7%).

List of possible indications for induction of labour

1. Post-term
2. Pre-labour rupture of membranes (PROM) ≥ 37 weeks
3. Advanced maternal age
4. Obesity in pregnancy
5. Gestational diabetes (GDM)
6. Hypertension in pregnancy
7. Suspected small for gestational age(SGA)/fetal growth restriction (FGR) ≥ 34 weeks
8. Suspected macrosomia
9. Multiple pregnancy
10. Pregnancy following artificial reproductive techniques (ART)
11. Antepartum haemorrhage (APH) of unknown origin
12. Previous stillbirth
13. Cholestasis of pregnancy

Levels of evidence for intervention studies[1]

Level 1: Meta-analyses, systematic reviews of randomized controlled trials (RCTs), or RCTs with a low risk of bias

Level 2: Systematic reviews of case–control or cohort studies, or well conducted case–control or cohort studies with a low risk of confounding, bias or chance and a moderate probability that the relationship is causal

Level 3: Non-analytic studies (for example, case reports, case series)

Level 4: Expert opinion, formal consensus

Membrane sweeping to reduce the risk of post-term induction of labour

Membrane sweeping performed at ≥ 38 weeks reduces the duration of pregnancy.[4] Eight women would need to have membrane sweeping in order to prevent one formal post-term IOL. Thus, all women should be offered the option of membrane sweeping from 38 weeks.

Table 1: Recommendations for possible indications and timing of induction of labour (IOL)

Post-term	**Evidence level**
Post-term pregnancy is defined as pregnancy that has progressed beyond 42 weeks.[1] Women in the studies included in the Cochrane review that underwent planned IOL at 41 or more weeks vs. expectant management (wait for spontaneous labour) had significantly fewer perinatal deaths (RR 0.3). In addition, women in the planned induction group were significantly less likely to have a caesarean (RR 0.82).[5] A systematic review of nine RCTs comparing expectant management with planned IOL had similar findings.[6] Factors associated with successful labour induction included: increased parity, more favourable Bishop score, and decreased gestational age. Women should be offered the option of IOL to reduce the risks associated with post-term pregnancy.	Level 1
IOL should be arranged around 41+5, but this can be individualised where resources allow. There is no high quality evidence to support fetal monitoring prior to 42+0;[1] however in all RCTs cited in the Cochrane review the women randomized to expectant management had some form of fetal monitoring. Women could be offered fetal assessment at 41+0 (e.g. ultrasound scan, cardiotocography) and if there are any concerns about fetal well-being, then IOL should be offered. For women who choose to wait for spontaneous labour, consider additional fetal monitoring if clinically indicated (for example, additional antenatal risk factors, or from 42+0).	Level 4
Pre-labour rupture of membranes (PROM) ≥ 37 weeks	**Evidence level**
Women in the studies included in the Cochrane review that underwent planned early birth (usually IOL with oxytocin or prostaglandins) for PROM at ≥ 37 weeks vs. expectant management (wait for spontaneous labour) were significantly less likely to develop infection (chorioamnionitis in labour (RR 0.7) or postnatal endometritis (RR 0.3)) and were not more likely to have a caesarean. Their babies were less likely to be admitted to the neonatal unit (RR 0.7), and there was a trend to less neonatal infection requiring intravenous antibiotics.[7] Women who have diagnosed PROM at term should be offered the option of IOL or expectant management, unless they do not meet criteria for expectant management as per local DHB guidelines.	Level 1
Advanced maternal age	**Evidence level**
Advanced maternal age is an independent risk factor for perinatal mortality, however, there are no studies assessing early IOL to reduce the risk. A systematic review of eight cross sectional population-based studies in USA, Canada and	Level 4

Australia found that advanced maternal age (≥ 35 years) was an independent risk factor for perinatal death, and the risk was considerably higher in women ≥ 40 years.[8] A 2012 retrospective cohort study in Australia of women with singleton pregnancy who gave birth at ≥ 37 weeks showed a rate of stillbirth < 35 years of 1/1000, for 35-39 years rate of 0.8/1000, and for 40 years and older a rate of 2.4/1000. After adjusting for smoking and small for gestational age fetus, risk of stillbirth for women ≥ 40 years was 2.4 times higher than women < 40 years. Modelling based on UK data from 2010 suggests that a policy of routine IOL at 40 weeks in women ≥ 40 years would require an extra 679 women to be induced to prevent one stillbirth.[9] Women ≥ 40 years may be offered induction of labour at 40 weeks.	
There has been a trend in Auckland toward early IOL for women ≥ 35 years, thus this may be a change in practice for some clinicians. In women between 35 and 39, consider fetal assessment from 40 weeks (ultrasound scan, CTG); if there are any concerns about fetal well-being, then IOL should be offered. In the absence of other obstetric or medical indications, age (35-39 years) alone is not an indication for IOL.	Level 4
Obesity in pregnancy	**Evidence level**
Women with booking body mass index (BMI) ≥ 35 have an increased risk of antenatal complications such as preeclampsia, gestational diabetes, and small for gestational age fetus, and of complications during labour and birth (emergency caesarean, shoulder dystocia and post-partum haemorrhage).[10] In addition, a population-based cohort study in the United States found a significant increase in risk of stillbirth with increasing BMI, and with increasing gestational age.[11] After adjusting for confounders, risk of stillbirth for women with BMI ≥ 40 years was 2.5 times higher than women with normal BMI. However, no evidence was found about the effectiveness of early IOL to reduce these risks. In the absence of other obstetric or medical indications, obesity alone is not an indication for IOL. Ongoing risk assessment and fetal surveillance through pregnancy, in consultation with an obstetrician, is important.	Level 4
Gestational Diabetes	**Evidence level**
No evidence was found about the effectiveness of early IOL to reduce risks associated with gestational diabetes, with the exception of macrosomia.[12] Women with GDM, a normally grown fetus, and good glucose control throughout pregnancy (≥ 90% of blood glucose readings within treatment targets) should not be routinely offered IOL before 40 weeks. The decision about IOL needs to be individualized in women with poor glucose control, a large or small baby, or co-morbidities (such as preeclampsia, BMI ≥ 40, age ≥ 40), in consultation with an obstetrician.	Level 4

Hypertension in pregnancy	**Evidence level**
In the HYPITAT trial, women with hypertension with or without proteinuria who underwent IOL at 37 weeks vs. expectant management were significantly less likely to develop adverse maternal outcomes (eclampsia, HELLP, pulmonary oedema, venous thromboembolism, abruption, severe preeclampsia, post-partum haemorrhage > 1000mL) (31% vs. 44%, p<0.01).[13] In the 2014 ISSHP statement, preeclampsia is defined as hypertension (≥ 140 mmHg systolic or ≥ 90 mmHg diastolic) developing > 20 weeks with one of the following new onset conditions: (1) proteinuria (PCR > 30 mg/mmol, > 300 mg/day, or 2+ on dipstick); (2) other maternal organ dysfunction; (3) fetal growth restriction.[14] Women with preeclampsia should be offered IOL at 37 weeks to improve maternal outcomes. The decision about IOL in women with gestational hypertension and no evidence of preeclampsia needs to be individualized based on clinical considerations, in consultation with an obstetrician.	Level 1
Suspected SGA/FGR	**Evidence level**
Suspected small for gestational age (SGA) is defined as a fetus with a customized estimated fetal weight (EFW) < 10% for gestation. Fetal growth restriction (FGR) is defined as a fetus that has failed to reach its growth potential; it has considerable overlap with SGA but is more difficult to define. SGA babies have increased rates of perinatal morbidity and mortality. Improved antenatal detection, careful management and timely delivery may be associated with reduced morbidity and mortality in SGA pregnancies.[15] However, early induction has not been shown to improve neonatal outcomes. Secondary analysis of the DIGITAT RCT (2012) using the Morbidity Assessment Index for Newborns as the outcome found that neonatal admissions to NICU were lower after 38 weeks compared with 36 or 37 weeks' gestation.[16] In settings where middle cerebral and uterine Doppler studies are not available, women with suspected SGA/FGR should be offered IOL at 38 weeks. In settings where detailed Doppler studies are available, the decision about IOL needs to be individualized based on these results along with the severity of suspected growth restriction, in consultation with an obstetrician. Women with small babies with normal middle cerebral and uterine Dopplers may be at lower risk of adverse outcome and may be managed expectantly.	Level 4

Suspected macrosomia	**Evidence level**
Suspected macrosomia is defined as estimated fetal weight > 4000g or customized EFW > 90%. There is consistent evidence that increasing birth weight heightens the risk of shoulder dystocia and brachial plexus injury. However, the Cochrane review of three small trials in non-diabetic women with suspected macrosomic fetus at term (> 4000g or EFW > 97%), assessing a policy of early IOL vs. expectant management concluded that rate of neonatal trauma outcomes was not different between the groups.[17] These conclusions should be interpreted with caution as the outcomes were rare and the trials had limited power. In the absence of other obstetric or medical indications, macrosomia alone is not an indication for IOL.	Level 1
Multiple pregnancy	**Evidence level**
The Twins Timing of Birth RCT showed that for women with an uncomplicated twin pregnancy, elective birth at 37 weeks was associated with a significant reduction in risk of serious adverse outcome for the infant (4.7% vs. 12.2%, RR 0.39, p<0.01), primarily SGA.[18] Thus, women with uncomplicated dichorionic/diamniotic twin pregnancy should be offered IOL at 37-38 weeks in order to reduce the risk of adverse outcome in the infants.	Level 1
Pregnancy following ART	**Evidence level**
Women with singleton pregnancies who conceive after IVF/ICSI have a significantly higher risk of perinatal mortality (relative risk 1.9) and other obstetric and perinatal complications compared to women who conceive spontaneously.[19] However, no evidence was found about the effectiveness of early IOL to reduce this risk. In the absence of other obstetric or medical indications, conceiving after in vitro fertilization alone is not an indication for IOL. Ongoing risk assessment and fetal surveillance through pregnancy, in consultation with an obstetrician, is important.	Level 4
Antepartum haemorrhage (APH) of unknown origin	**Evidence level**
APH of unknown origin refers to women with vaginal bleeding after 20 weeks without maternal or fetal compromise and without evidence of abruption or placenta praevia. In nulliparous women who have APH of unknown origin, there is no increased risk of perinatal mortality, after adjusting for preterm birth.[20 21] The decision about IOL needs to be individualized based on clinical considerations, in consultation with an obstetrician.	Level 4

Previous Stillbirth	
Large population based studies have shown an increased risk of recurrent stillbirth in a subsequent pregnancy.[22] [23] These studies do not identify gestation at first or subsequent stillbirth and therefore cannot help with decision making around induction for a previous stillbirth. The decision about IOL needs to be individualized based on clinical considerations (such as risk factors for recurrence and other antenatal risk factors) and maternal anxiety, in consultation with an obstetrician.	Level 4
Obstetric Cholestasis	**Evidence level**
It has long been thought that women with cholestasis in pregnancy have higher rates of perinatal mortality. However, analysis of observational studies between 2001 and 2011 suggests that the perinatal mortality rate in pregnancies complicated by cholestasis is 5.7/1000,[24] which is similar to the perinatal mortality rate in the general population in NZ (6.7/1000 babies born, UK definition).[25] In pregnancies complicated by cholestasis, there does not appear to be an association with oligohydramnios or SGA/FGR, thus fetal monitoring has not been shown to be helpful. The decision about IOL needs to be individualized based on clinical considerations (such as symptoms, gestational age at diagnosis, and biochemical abnormalities), in consultation with an obstetrician.	Level 4

Table 2 Recommendations for methods of induction of labour

Balloon vs. prostaglandin method	**Evidence level**
A 2010 meta-analysis of 27 studies comparing outcomes after IOL with a Foley balloon catheter and locally applied prostaglandins E showed a significant reduction in the complication of uterine hyperstimulation and no difference in caesarean. Hyperstimulation was defined as six uterine contractions per 10 minute period combined with fetal heart rate abnormalities. For secondary outcomes, there was no difference in time from start of IOL to birth, however there was an increased use of oxytocin during labour (RR=1.4, p<0.01).[26] A 2011 meta-analysis of three newer studies also showed a significant reduction in uterine hyperstimulation and post-partum haemorrhage, no difference in caesarean, and a trend toward fewer babies with umbilical cord pH < 7.10. In the PROBAAT study specifically, no difference was found in the rate of caesarean which was the primary outcome. For secondary outcomes, women randomized to Foley induction had a longer median time from start of IOL to birth compared to women with prostaglandins (29 vs. 18 hours, p<0.01), and were more likely to have oxytocin augmentation (86% vs. 59%, p<0.01).[27] Compared with high-dose vaginal PGE_2 gel (3.5-10 mg), uterine hyperstimulation with fetal heart rate changes was significantly less likely to occur with the use of low-dose PGE_2 (1-2.5 mg).[1] The overall goal is to optimize effectiveness and safety. In light of practical considerations and local resources, it is reasonable to offer either induction method. It also depends on the clinical situation, where the risk of uterine hyperstimulation could have greater implications, e.g. suspected SGA, oligohydramnios, previous caesarean.	Level 1

Table 3: Recommendations for setting of induction of labour

Outpatient vs. inpatient setting	**Evidence level**
The four RCTs on outpatient induction are too small to be conclusive as to its safety and effectiveness.[28] Outpatient induction can be considered in low risk women (such as women with uncomplicated pregnancy and normal estimated fetal weight and liquor) as per local DHB guidelines and policies. It is imperative that safety measures and support are in place. Women should be encouraged to communicate with the hospital midwives if they have any questions or concerns, and be given written instructions to return to hospital if they have contractions or rupture of membranes, or at a pre-specified time for reassessment. It would seem safer to have women at home with balloon inductions rather than prostaglandins, given that studies show almost no uterine hyperstimulation during the cervical ripening phase of IOL with balloon.	Level 1

Primary outcomes for baseline and future audit[1]

- Vaginal birth achieved in 24 hours
- Uterine hyperstimulation with fetal heart rate changes
- Perinatal mortality or serious neonatal morbidity
- Maternal mortality or serious maternal morbidity
- Variation in gestational age range for post-term IOL
- Proportion of IOLs that are clinically appropriate in indication and timing

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