CLINICAL PRACTICE GUIDELINE

FOR THE CARE OF WOMEN WITH DECREASED FETAL MOVEMENTS WITH A SINGLETON PREGNANCY FROM 28 WEEKS' GESTATION

Version: 2.4 March 2023

ENDORSING ORGANISATIONS

Accepted clinical resource

Produced by:

This is the fourth version of the clinical guideline produced by a multidisciplinary working group led by the Centre of Research Excellence in Stillbirth, Mater Research Institute, The University of Queensland, Brisbane, Australia in partnership with the Perinatal Society of Australia and New Zealand (PSANZ). The initial version released in July 2010 was supported by the Mater Foundation, Brisbane.

Suggested citation:

Perinatal Society of Australia and New Zealand and Centre of Research Excellence Stillbirth. *Clinical practice guideline for the care of women with decreased fetal movements with a singleton pregnancy from 28 weeks' gestation*. Centre of Research Excellence in Stillbirth. Brisbane, Australia, September 2022.

Acknowledgments:

We wish to acknowledge all working group members and research support staff for their contribution to the current and previous versions of this guideline (see Appendix E).

Disclaimer:

The main objective of this guideline is to provide advice to maternity care providers on the care of women who present with concerns of decreased fetal movements (DFM) at 28 weeks gestation or more, with a singleton pregnancy, and to enhance consistency in information and care provided to women with DFM. This guideline has been developed to help reduce the risk of adverse pregnancy outcomes, including perinatal death or disability and maternal anxiety.

This guideline is not intended to be prescriptive. It is designed to provide the best available information, enabling integration of the best evidence, clinicians' judgement and individual choice in arriving at decisions about care. Clinical practice guidelines are considered as generally- recommended practice. Due to the lack of high-quality evidence, recommendations in this guideline are consensus-based, following consideration of the available evidence.

Terminology

The Stillbirth CRE recognise that individuals have diverse gender identities. In this guideline, we use the term 'woman' or mother' throughout. When we use these words, it is not meant to exclude those who are pregnant or breastfeeding and do not identify as women. Healthcare professionals should provide respectful care to all people and use the pronouns that individuals themselves prefer.

E-learning program

As part of the Australian Safer Baby Bundle initiative, an online education program has been developed to support clinicians in the provision of best practice care in stillbirth prevention. The Safer Baby Bundle eLearning module provides clinicians with evidence-based information on five elements of care, including decreased fetal movements. To access this program, visit https://learn.stillbirthcre.org.au/ or contact the Centre of Research Excellence in Stillbirth.

Update history:

The first version of the Guideline was developed and disseminated in July 2010, subsequently updated in August 2017 and again September 2019. In this update we incorporate the results of recent trials including the United Kingdom based Awareness of Fetal movements and Care Package to Reduce Fetal Mortality (AFFIRM) trial and the Australasian My Baby's Movements (MBM) trial. The management algorithm has been modified to include more specific advice around ultrasound investigations for DFM and education for pregnant women about normal fetal movements.

Further review and information:

This guideline will remain current until the next review on or before October 2025. Requests for further information, comments or suggestions are encouraged and can be forwarded to:

Centre of Research Excellence in Stillbirth
Mater Research Institute – The University of Queensland Level 3, Aubigny Place
South Brisbane, QLD 4101 Australia Phone +61 7 3163 1592
Email: stillbirthcre@mater.uq.edu.au

CONTENTS

1. Glossary of terms

TERM	DEFINITION
Acidaemia	Increased acidity of the blood caused by an increased concentration of hydrogen ions and measured by pH.
Amniotic fluid	The fluid that surrounds the fetus within the amniotic sac.
Antenatal	The period of the pregnancy prior to the onset of labour.
Antepartum	Before the onset of labour.
Apgar score	A system to assess the status of the baby after birth. The Apgar score is recorded at 1 minute and 5 minutes after birth and is based on the following five variables: heart rate, respiratory effort, muscle tone, reflex irritability and colour, with a maximum score of 10.
Body mass index (BMI)	A person's weight in kilograms divided by the square of height in meters.
Cardiotocography (CTG)	The electronic monitoring of the fetal heart rate (cardio) and of uterine contractions (toco). The fetal heart rate is recorded by means of either an external ultrasonic abdominal transducer or a fetal scalp electrode. Uterine contractions are recorded by means of an abdominal pressure transducer. The recordings are graphically represented over time.
Congenital anomaly	Structural or functional anomalies (e.g. metabolic disorders) that occur during intrauterine life and can be identified prenatally, at birth or later in life.[1]
Customised birthweight	Using a weight reference for the baby that is individualised (customised), and not based on population averages. Factors shown to be predictive of birthweight are maternal height and weight, ethnicity, fetal gender and gestational age. The customised birthweight standard is an adjusted standard for each individual baby.
Doppler ultrasound	A diagnostic tool that uses high frequency ultrasound to detect the presence or absence of blood flow and to measure blood flow velocity.
Fetal death	See “Stillbirth”
Fetal growth restriction (FGR)	Also known as ‘intrauterine growth restriction’ (IUGR). This term is often used interchangeably with the term ‘small for gestational age’ (SGA). However, SGA is defined as a baby with an antenatal ultrasound biometry assessment less than the 10th percentile for gestational age, while FGR refers to babies who have not reached their growth potential during pregnancy (which can be assessed by serial ultrasound scans). FGR babies are frequently *but not always* SGA.

[1] World Health Organization, 2022. Congenital anomalies. World Health Organization, accessed 24 July 2022 (https://www.who.int/topics/congenital_anomalies/en/)

TERM	DEFINITION
Fetal to maternal haemorrhage (FMH)	The passage of blood across the placental interface from the fetus to mother. FMH may be diagnosed using flow cytometry or the Kleihauer Betke test which detects fetal haemoglobin within red blood cells separately to the maternal adult haemoglobin. FMH may be acute or chronic and is usually asymptomatic. Although the volume of significant FMH is not defined and is gestational age dependent, it is associated with fetal mortality and morbidity.
Fetal movements	Any movements made by the fetus either perceived by the mother or detected on ultrasound or CTG at any gestation.
Decreased fetal movements (DFM)	Maternal perception of decrease in strength and/or frequency of her baby's movements in utero after 23 weeks' gestation.
Flow cytometry	A test used to detect FMH by differentiating fetal and maternal blood cells.
Gestation	The time from conception to birth. The duration of gestation is measured from the first day of the last normal menstrual period.
Maternity care provider	A midwife, GP, obstetrician, or other health professional providing maternity care.
Human placental lactogen (hPL)	hPL is a hormone produced by the placenta that modifies the metabolic state of the mother during pregnancy to facilitate the energy supply of the fetus.
Hypertension (Maternal)	Systolic BP $\geq$ 140 mm Hg and/or diastolic BP $\geq$ 90 mmHg (K5) Confirmed by repeated readings over several hours
Hypoglycaemia (Neonatal)	Low level of blood glucose (<2.6 mmol/L).[2]
Kick-chart	A method of counting fetal movements and recording them within a defined time frame.
Live birth	The complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which after such separation breathes or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord or definite movement of the voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached. The definition of a live birth is independent of gestational age.
Neonatal	Pertaining to the newborn period, which is the first 28 days after birth.
Neonatal mortality rate (NMR)	The number of neonatal deaths (those occurring within the first 28 days following birth) per 1000 births.
Oligohydramnios	Reduced amniotic fluid volume
Planned early birth	Induction of labour or elective caesarean section prior to spontaneous onset of labour.

[2] Queensland Clinical Guidelines, 2013. Newborn hypoglycaemia (MN13.8-V5-R18). Statewide Maternity and Neonatal Clinical Network (Queensland).

TERM	DEFINITION
Perinatal mortality rate (PMR)	The number of stillbirths and neonatal deaths per 1000 births.
Preterm birth	The birth of a baby at less than 37 weeks gestational age.

Randomised controlled trial	A comparative study in which participants are randomly allocated to intervention and control groups and are followed up to examine differences in outcomes between the two groups.
Recurrent presentation of DFM	Where a woman presents with or reports DFM more than once in the same pregnancy.
Shared decision making	Shared decision making is a joint process in which a healthcare professional works together with a person to reach a decision about care based both on evidence and on the person's individual preferences, beliefs and values. In shared decision-making health professionals seek to ensure the person understands the risks, benefits and possible consequences of different options through discussion and information sharing.
Small for gestational age (SGA)	A fetus or baby with an estimated birthweight or actual birthweight less than the 10th percentile for gestational age, according to National birthweight percentiles.
Singleton	A pregnancy involving a single fetus.
Stillbirth (Fetal Death)	In Australia and New Zealand stillbirth is defined as death prior to the complete expulsion or extraction from its mother of a product of conception of 20 or more completed weeks of gestation; or if the gestational age is not known, a birthweight of 400g or more. The death is indicated by the fact that after such separation, the fetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles. Internationally, stillbirth is defined by the World Health Organization (WHO) as fetal death of a baby born at 28 weeks gestation or more and/or weighing 1,000gms or more.
Stillbirth rate	The number of stillbirths per 1000 births.

2. Purpose of this guideline

There are over 2 million stillbirths occurring annually in late gestation worldwide[1] with little or no attention given to this public health problem, a strong call to action was made in the Lancet's Stillbirth series' of 2011 and 2016 [2-4]. Stillbirths are often preceded by maternal perception of decreased fetal movement (DFM) [5-7]. DFM is also strongly linked to adverse perinatal outcomes such as neurodevelopmental disability, infection, feto-maternal haemorrhage (FMH), emergency birth, and small for gestational age (SGA)[8-10]. DFM is also associated with placental dysfunction, fetal growth restriction (FGR), and/or stillbirth [11,12]. This guideline has been developed to promote consistency in clinical practice and information provided to women regarding decreased fetal movements (DFM) and clinical assessment and management of DFM presentations.

2.1 Aims and objectives

The aim of this guideline is to improve the quality of care for women who perceive DFM at or after 28 weeks' gestation, and has been developed with the following objectives:

- Provide an evidence-based approach to the management of women with DFM;
- Improve consistency in the management of women with DFM;
- Assist maternity care providers to counsel women with DFM;
- Reduce maternal concern about fetal activity and self-monitoring;
- Aid in the identification of women with higher-risk pregnancy; and
- Improve outcomes for women and their babies.

The management of women with specific pregnancy conditions identified during the course of care, in accordance with this guideline (e.g. fetal growth restriction, hypertension, diabetes), is beyond the scope of this guideline, as is the management of DFM in multiple pregnancy or before 28 weeks' gestation.

2.2 Target audience

This guideline is written for health care professionals providing antenatal care in Australia and New Zealand and encourages them to provide consistent, best-practice management for women with singleton pregnancies who report or who are concerned about DFM from 28 weeks' or more gestation. Pregnant women and their partners may also find this guideline helpful. The guideline forms part of the Safer Baby Bundle developed by the NHMRC Stillbirth Centre of Research Excellence to reduce stillbirths in Australia. An information brochure has also been prepared in multiple languages to inform and assist women and their maternity care providers to facilitate shared management decisions. This brochure is based on the key recommendations set out in this guideline. More information is available at www.stillbirthcre.org.au.

2.3 Methods

The original version of this guideline followed the existing National Health and Medical Research Council (NHMRC) development of clinical practice guidelines at that time[13,14]. In this update we have incorporated findings from recent trials of promoting awareness of fetal movements. Please refer to Appendix A for methods employed for version 1 of this guideline, Appendix B for an overview of the literature review, and Appendix C for grading of recommendations.

3. Summary of clinical practice recommendations and care pathway

3.1 Recommendations for information-provision and advice about fetal movement monitoring

RECOMMENDATIONS	REFERENCES	RECOMMENDATION GRADE*
RECOMMENDATION 1		
A. All pregnant women should be routinely provided with verbal and written information about fetal movement, including what is considered normal fetal movement, and what to do if fetal movements stop or decrease.	**15-17**	B
B. Information provided to pregnant women about normal fetal movement should include the following:		
• Perception of fetal movement is a sign of wellbeing.	**18,19**	B
• Women can expect to perceive the first fetal movements at around 20 weeks' of pregnancy and regular daily fetal movement from around 28 weeks.	20-23	A
• Normal patterns of fetal movement involve periods of both activity and rest, with activity levels normally higher in the afternoon and evening.	23,24	B
• Near term the fetus has longer rest periods but still moves every day right up to and including during labour.	21	B
• The perception of increasing strength of movement as baby grows, is reassuring.	16,21	B
C. From 28 weeks' gestation clinicians should advise women to contact their care provider if there is a decrease in strength or frequency of fetal movements or if the movements stop.		
RECOMMENDATION 2		
A. All women who report a concern about fetal movements to their healthcare provider should be invited to the health service for assessment without delay.	9,15,22	B
B. Assessment for DFM should not be deferred to the following day, or the next appointment.	16	B
C. Presentation should not be delayed through efforts to stimulate the baby with food or drink.	25,26	B
D. Maternal concern about DFM should not be attributed to anterior placenta or maternal body size.	27,28	√
RECOMMENDATION 3		
A. Pregnant women may choose to observe fetal movements daily from 28 weeks gestation, with or without counting movements. Either the woman may choose a time of day when baby is normally active and spend 15 minutes laying on her side and observing fetal movement strength, frequency (without counting) and character. Or the woman may choose to count fetal movements each evening while laying on her side and noting the time taken to count 10 movements. For most this will take around 20 minutes If 10 movements are not counted in 2 hours, she should contact the care provider.	15,16,20,22,29,30	B
B. Subjective maternal concern about DFM overrides any definition of DFM based on numbers of fetal movements	15,28,31	√

3.2 Recommendations for the investigation of decreased fetal movements

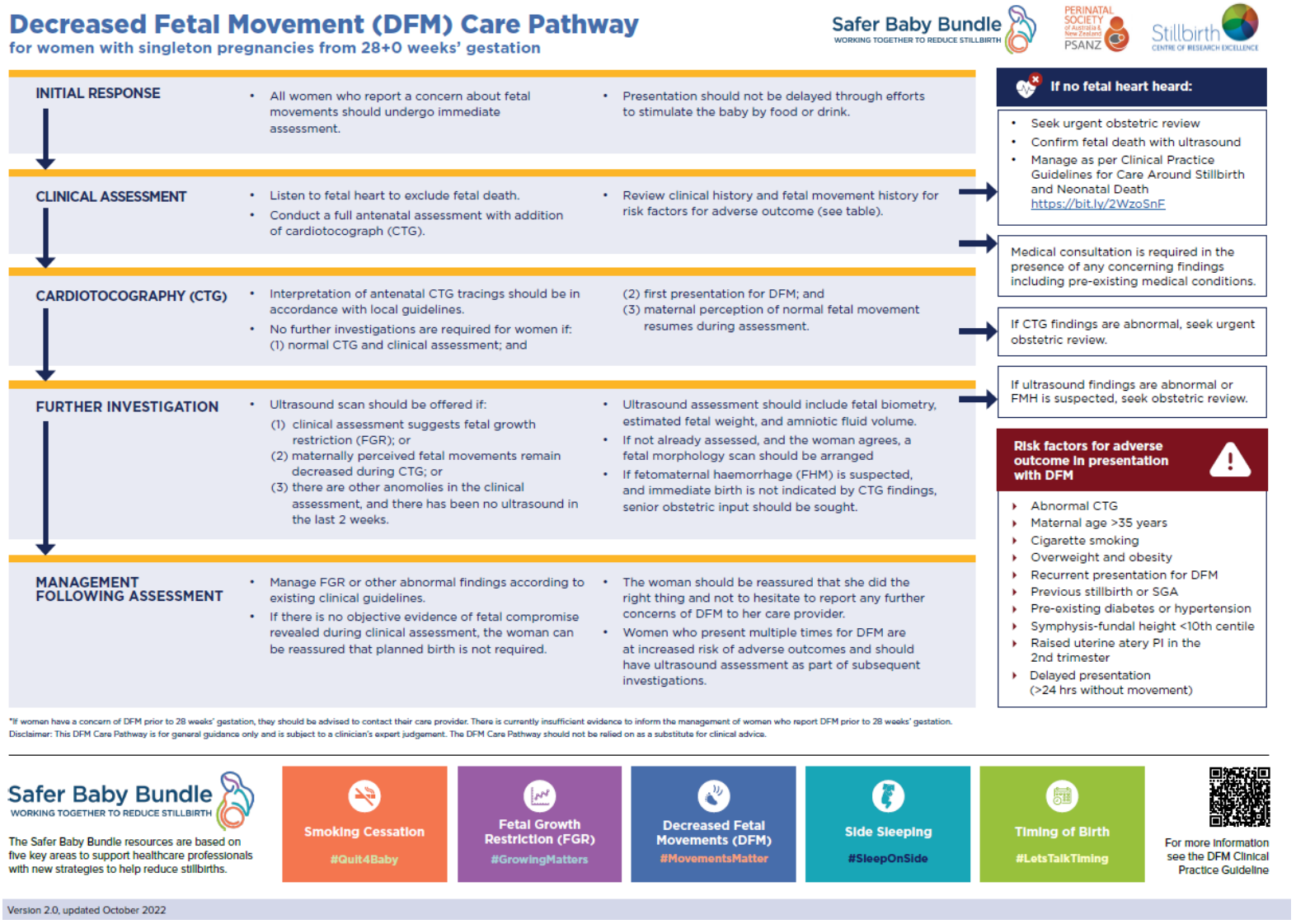
RECOMMENDATIONS	REFERENCES	RECOMMENDATION GRADE*
RECOMMENDATION 4		
A. Women reporting DFM should be asked about their history of fetal movements including when fetal movements were last felt, previous presentations for DFM, any changes in strength or frequency, and whether the fetus was active last evening.	17,21,32	B
B. When a woman reports DFM, a full antenatal examination should be undertaken to assess for clinical signs of fetal growth restriction, fetomaternal haemorrhage and coexisting conditions such as hypertension and diabetes.	10,33-35	B
C. Medical consultation is needed in the presence of any concerning findings.		√
RECOMMENDATION 5		
A. Listening to the fetal heart rate by handheld Doppler, or electronic fetal heart rate monitoring (EFM) via cardiotocography (CTG), should be performed to exclude fetal death.	7,36,37	A
B. In women 28 weeks or more, CTG should be performed to exclude acute fetal compromise and an urgent medical review should be undertaken where findings are abnormal.	33,36	B
C. If the CTG and clinical assessment are normal, and during the CTG maternal perception of fetal movement resumes, no further investigations are required.	38,39	C
RECOMMENDATION 6		
A. Ultrasound scan should be included in the assessment of DFM if 1) SGA or FGR are suspected, OR 2) the woman continues to perceive absent or decreased fetal movements during the clinical encounter, OR 3) other clinical concerns such as abnormal CTG are present.	15,39,40	B
B. The ultrasound scan should include fetal biometry, estimated fetal weight (if no growth scan has been performed in the last two weeks) and amniotic fluid volume assessment		
C. If SGA/FGR is present, umbilical artery Doppler SD or PI should be assessed.	16,40-42	B
D. If not already undertaken, and the woman agrees, a morphology scan should be arranged.		
E. The timeframe to perform the ultrasound scan will depend on clinical urgency.	43,44	A
F. Where ultrasound findings are abnormal, discuss with a senior obstetrician.		√
		√
RECOMMENDATION 7		
A. Fetomaternal haemorrhage (FMH) is a rare cause of DFM that is usually indicated by an abnormal CTG. If massive FMH is suspected based on clinical assessment a senior obstetrician should be consulted.	10,45,46	B
B. If FMH is suspected, and immediate delivery is not indicated by CTG findings, senior obstetric input should be sought. Ultrasound assessment of Middle Cerebral Artery peak systolic velocity Doppler and Kleihauer-Betke test should be considered.	46,47	C

3.3 Recommendations for management of women following presentation for DFM

RECOMMENDATIONS	REFERENCES	RECOMMENDATION GRADE*
RECOMMENDATION 8		
A. If no objective evidence of fetal compromise is revealed during the clinical examination for DFM the woman can be reassured that planned birth is not required.	15,48	A
B. Women who report DFM should be reassured that they have done the right thing in presenting for assessment and that they are not a 'nuisance' or 'burden' to their care providers, even when no abnormal findings are found.	49-52	B
RECOMMENDATION 9		
A. Clinicians should be aware that risk of poor outcome is increased in women with recurrent DFM presentations.	48,53	B
B. For women who represent with DFM on a second or subsequent occasion manage as per initial presentation, with the addition of ultrasound scan, and individualise care.		√
C. Women ≥39 weeks gestation should be informed that induction of labour is not associated with increased rates of caesarean birth or adverse maternal or fetal outcomes.	54,55	A

* See Appendix D for a description of grading of recommendations used in this guideline.

3.4 Care pathway for women with decreased fetal movements from 28 weeks' gestation (singleton pregnancy)



4. Background

4.1 Maternal perception of fetal movement and adverse events

Maternal perception of fetal movement has long been used as an indicator of fetal wellbeing and vitality[56]. Perception of fetal movement is reassuring for pregnant women and a decrease or cessation of fetal movements causes concern[57]. Maternal perception of DFM can indicate pregnancies at increased risk of adverse outcomes. Studies have reported associations between DFM and low birth weight[19,34,36,41,58-60], oligohydramnios, preterm birth[61,62], threatened preterm labour [61], congenital malformations and chromosomal abnormalities[43,44], feto-maternal haemorrhage[10], perinatal brain injuries and disturbed neurodevelopment[8,63], intrauterine infections[64], low Apgar scores and acidaemia[58,65], umbilical cord complications and placental insufficiency[11,36,59] and increased likelihood that the pregnancy will end in emergency birth, induction of labour and Caesarean section, stillbirths and neonatal deaths[15,48,66]. Fetal growth restriction is a major factor contributing factor to the increased risk of adverse outcomes in these pregnancies[36,40,67]. Even in pregnancies that are initially deemed as low risk, DFM is associated with an increased risk of adverse perinatal outcome, including fetal growth restriction, preterm birth and stillbirth[5,34,36,68].

It is well established that DFM is associated with stillbirth. In up to 50% of stillbirth cases the presenting concern at diagnosis is DFM[7]. However, in most such cases the DFM is presumed to be an indication that fetal death has already occurred. Retrospective studies have indicated maternal perception of decreased fetal movement is associated with a modest increase in odds of late stillbirth. A meta-analysis of five retrospective case-control studies of late stillbirth reported that decreased frequency of fetal movements was associated with an adjusted OR of 2.33 (96% CI:1.73, 3.14)[21]. The same study reported a gradient effect whereby the association with stillbirth was stronger at earlier gestations with an aOR of 6.98 CI 1.63, 29.84 at 28-32 weeks reducing nearer to term (aOR 1.95, CI 1.33, 2.86 at ≥37 weeks). Decreased frequency is the most widely established fetal movement change associated with stillbirth. Greater degrees of reduction including cessation of movement and longer periods of reduced frequency (48 hours or more) are associated with greater risk[15], as is multiple presentations for DFM[53]. Lack of diurnal pattern may also be important. A case-control study in New Zealand[32] found that women who perceived their fetus to be quiet in the evening had increased odds of late stillbirth (aOR 3.8, 1.57, 9.31). Consistent with this, the STARS case-control study reported a reduced risk of stillbirth where the baby was "active at bedtime"[17]. Conversely, maternal perception of increased frequency, and increased strength of fetal movements, as well as perception of fetal hiccups have consistently been shown to be reassuring[21].

DFM is a common cause for maternal concern, with 40 percent of pregnant women reporting concern about DFM one or more times during pregnancy[57], and 4-16% of women contacting their maternity care provider because of concern during the third trimester[5,15]. Presentation with DFM is associated with increased intervention including induction of labour and iatrogenic preterm birth[48,69]. Therefore, a balanced approach to assessment and management of DFM is required; prioritising screening for associated conditions such as placental insufficiency and congenital abnormality, whilst avoiding unnecessary intervention in pregnancies where the fetus is healthy.

4.1.1 The evidence for interventions to improve outcomes for women with DFM

Maternal perception of DFM has low specificity and sensitivity for stillbirth, and evidence to guide clinical management of DFM is uncertain as to any effects on rates of stillbirth[70,71]. Maternal monitoring of fetal movement and intervention when movements are reduced to prevent fetal death has been advocated since the 1970s. The purpose of promoting fetal movement awareness is to identify fetuses with developing compromise in time for intervention. Approaches to promoting maternal awareness of fetal movement can be broadly divided into two main types, formal fetal movement counting and encouraging awareness without counting.

Systematic reviews of fetal movement counting interventions to reduce stillbirth rates have shown no significant reduction in stillbirths with fetal movement counting in high-quality studies[69,72]. In the largest trial of kick counting, no reduction was shown in stillbirth rates, although the trial was criticised for using a fetal movement alarm limit that may have been too extreme, and for not including a protocol for investigating DFM presentations[5]. However, the overall late stillbirth (≥28 weeks' gestation) rate fell during the study period from 4 per 1,000 to 2.8 per 1,000 births. It was postulated that this reduction was due an increased awareness and vigilance of DFM in both arms of the study[73].

Promoting fetal movement awareness without counting has recently been investigated in several high-quality trials including in the United Kingdom, in Australia and New Zealand, and in Sweden. The AFFIRM trial in the UK was designed to evaluate a package of care that included raising awareness of the importance of DFM (in both women and maternity care providers); along with guidelines for assessing and managing fetal wellbeing, when women presented with DFM. The trial involved 33 maternity hospitals and over 400,000 births[48]. The primary outcome of AFFIRM was the stillbirth rate (24 weeks or more gestation), which was 4.06 per 1,000 births in the intervention group and 4.40 per 1,000 births in the control group. This difference was not statistically significant. There was a decrease in the incidence of SGA babies being born after 40 weeks' gestation (1.5% vs 2.0%, p=0.0009) in the intervention compared with control group. However, the AFFIRM intervention also decreased the rate of spontaneous vaginal birth (57.4% vs 59.8%), increased the rate of induction of labour (40.7% vs 35.8%), and of caesarean birth (28.3% vs 25.5%), and increased the rate of a prolonged admission to a neonatal unit (6.7% vs 6.2%) with all differences meeting statistical significance[48].

The My Baby's Movements Trial in Australia and New Zealand was a cluster randomised trial of promoting fetal movement awareness amongst women and maternity care providers including through use of a mobile phone application involving almost 300 000 births. The primary outcome of stillbirth (28 weeks or more gestation) was lower during the intervention phase compared to the control phase (2.2/1000 versus 2.4/1000 births), although this difference was not statistically significant (aOR 1.18, 95% CI 0.93–1.50; *P* = 0.18). The app was not widely used by women, with just 18% downloading it. Reassuringly, there was a decrease in admissions to neonatal nursery and in a composite adverse neonatal outcome, with no increase in obstetric intervention [74].

The Mindfetalness trial in Sweden was a cluster randomised trial of implementation of the mindfetalness method. The method involves educating women about the importance of fetal movements and encouraging them to observe their baby's movements daily for a 15-minute period. Implementation of mindfetalness amongst almost 40 000 women in Sweden was not powered for stillbirth but did report no significant reduction in 5-minute Apgar scores of >7 (included Apgar of 0). Inductions of labour were reduced and fewer SGA babies were born after 41+6 weeks[75].

In summary, none of these trials reported significant reduction in stillbirths by promoting fetal movement awareness. Promoting fetal movement awareness may have some benefits in reducing delayed presentation at hospital for DFM [16], and in some settings reducing adverse neonatal outcomes [74]. Further, fetal movement counting may be reassuring for some women reducing anxiety and promoting maternal-fetal attachment. Further studies are needed to determine the optimal approach to public health messaging around fetal movements to both improve outcomes and avoid harm.

4.2 Stillbirths in Australia and New Zealand

Stillbirth affects around 2,500 families per year across Australia and New Zealand; equating to one stillborn baby (≥20 weeks' of pregnancy) for every 142 births across ANZ[76,77]. Of these around 950 occur at ≥28 weeks of pregnancy. Global stillbirth rates have shown a small reduction in the last decade. However, rates remain high and large variation between countries show lower rates are possible[78]. In comparison, global neonatal mortality rates continue to steadily decline[79].

Both Australia and New Zealand report fetal deaths from 20 weeks (or weight of ≥ 400 grams if gestation unknown) and neonatal deaths up to 28 days after birth. In Australia, the combined rate is reported as a *perinatal mortality rate* (PMR) and in New Zealand it is reported as a *perinatal related mortality rate (PRMR)*.

Based on 2019 data from the National Perinatal Statistics Unit in Australia, there were 303,054 births and 2,897 perinatal deaths in Australia, giving a PMR of 9 per 1000 births [76]. Perinatal mortality comprised 2,187 stillbirths and 714 neonatal deaths, giving a stillbirth rate of 7.2 per 1000 births and a neonatal death rate of 2.4 per 1000 births. The PMR of babies born to Aboriginal or Torres Strait Islander mothers was higher than that of babies born to non-Indigenous mothers (15 versus 9 per 1000 births) [76].

In New Zealand, based on data from the Perinatal and Maternal Mortality Review Committee (2021), in 2018 there were 59,258 births and 604 perinatal deaths, giving a perinatal-related mortality rate of 10.2 per 1000 births [77]. Perinatal mortality comprised 315 stillbirths, 135 late terminations of pregnancy (from 20 weeks gestation), and 154 neonatal deaths. Stillbirth rate (excluding late termination of pregnancy) was 5.3 per 1000 births, fetal death rate (including stillbirths and late terminations) was 7.6, and neonatal death rate was 2.6 per 1000 births [77]. The overall New Zealand perinatal-related mortality rate (years 2014-2018) per 1000 births for Pacific peoples (12.5) and Indian (14.0) mothers, is significantly higher than among Māori (10.7), Other Asian (8.1), Middle Eastern, Latin American or African (9.2), Other European (3.9), and New Zealand European (10.6) mothers [77].

Stillbirths at ≥ 28 weeks in Australia were 2.6 per 1000 in 2019 and in New Zealand 2.4 per 1000 in 2018 [76,77] The large proportion of unexplained antepartum stillbirths worldwide[80] is a major barrier to further reduction of stillbirth and perinatal mortality rates. Wide variation in the reported contribution of unexplained stillbirths relates to the different classification systems used and levels of investigation [80]. The majority of these unexplained deaths occur in late gestation in apparently healthy pregnancies. In Australia (using the PSANZ classification system) [81], 22% of all stillbirths are unexplained, with the proportion higher for term stillbirths (44%)[82], and a similar proportion remaining unexplained in New Zealand [77]. Many of these babies are, however, found to be growth-restricted after birth[83,84], indicating potential for the prevention of some of these deaths if antenatal detection and appropriate intervention had been achieved.

Other factors which are associated with an increased risk of stillbirth in a high-income country setting include: socio-economic deprivation, maternal age older than 35 years; maternal overweight and obesity; maternal smoking; nulliparity; previous stillbirth; and pre-existing maternal diabetes or hypertension[4,77] .

4.3 Clinical assessment of fetal movement concerns

There is a lack of high-quality evidence to guide optimal clinical evaluation of DFM presentations [70]. Regardless, DFM is associated with adverse perinatal outcome including stillbirth and such presentations warrant clinical investigation. Contributing factors relating to suboptimal care account for 30-50% of stillbirths and neonatal deaths [33,85,86]. A number of studies have identified that an inappropriate response to maternal perception of DFM was a common factor contributing to stillbirths [33,85]. Prolonged DFM (>24 hours) as well as sudden loss of fetal movements was reported in 47%-64% of all stillbirths [87,88].

4.4 Investigations for DFM prior to 28 weeks' gestation

There is currently insufficient evidence to inform the management of women who report DFM prior to 28 weeks' gestation. Although rare, fetal growth restriction can occur prior to 28 weeks gestation, and absence of fetal movement can be an indication of congenital abnormality. Between 20 and 28 weeks of gestation, conditions predisposing to DFM, e.g. fetal neuromuscular abnormalities, fetal anaemia, fetal hydrops, congenital infection and early onset fetal growth restriction, may be difficult to recognise clinically. For women 24 to 28 weeks with DFM auscultation of the fetal heart should be undertaken to exclude fetal death.

CTG prior to 28 weeks' can be difficult to interpret due to fetal immaturity and is not routinely recommended. Women who have not had an ultrasound scan for fetal morphology should be offered this.

5. Antenatal education about fetal movements

RECOMMENDATIONS	REFERENCES	RECOMMENDATION GRADE*
RECOMMENDATION 1		
A. All pregnant women should be routinely provided with verbal and written information about fetal movement, including what is considered normal fetal movement, and what to do if fetal movements stop or decrease.	15-17	B
B. Information provided to pregnant women about normal fetal movement should include the following:		
• Perception of fetal movement is a sign of wellbeing.		
• Women can expect to perceive the first fetal movements at around 20 weeks' of pregnancy and regular daily fetal movement from around 28 weeks.	18,19	B
• Normal patterns of fetal movement involve periods of both activity and rest, with activity levels normally higher in the afternoon and evening.	20-23	A
• Near term the fetus has longer rest periods but still moves every day right up to and including during labour.		
• The perception of increasing strength of movement as baby grows, is reassuring.	23,24	B
C. From 28 weeks' gestation clinicians should advise women to contact their care provider if there is a decrease in strength or frequency of fetal movements or if the movements stop.	21	B
	16,21	B
RECOMMENDATION 2		
A. All women who report a concern about fetal movements to their healthcare provider should be invited to the health service for assessment without delay.	9,15,22	B
B. Assessment for DFM should not be deferred to the following day, or the next appointment.	16	B
C. Presentation should not be delayed through efforts to stimulate the baby with food or drink.		
D. Maternal concern about DFM should not be attributed to anterior placenta or maternal body size.	25,26	B
	27,28	√

Antenatal education about fetal movement has been shown to reduce the time from maternal perception of DFM to health care-seeking behaviour [15,30,89].The STARS case-control study found that women with stillbirth were less likely to check on fetal movements or have been advised to do so by health professionals[31]. A reduction in stillbirth rates has been associated with provision of information to pregnant women about normal fetal movements and when to contact care in a quality improvement study in Norway [15,16]. In that study women were recommended to observe fetal movements daily (with or without counting) and advised to contact care providers for assessment the same day if they experienced no fetal movement in 24 hours, or if they felt a decrease in frequency over a day or more. The intervention was associated with a reduction in stillbirth rates, giving an adjusted odds ratio (OR) of 0.67 (95% CI: 0.49-0.94) in the overall study population and an adjusted OR of 0.51 (95% CI: 0.32-0.81) in women with DFM.

Despite the link between maternal awareness of fetal movement, clinical education, and stillbirth prevention, many women do not receive adequate information from their care providers [90-92]. A prospective, descriptive study of 526 pregnant women at a large, metropolitan maternity facility found that more than one-third of

women at 34 weeks gestation or later did not recall receiving information from their maternity care provider about fetal movement [91]. Fetal movement information that is limited to encouraging the woman to take note of what is normal for her and report any change can be unsatisfying for women [18,93]. Most pregnant women preferred to be given as much information as possible, and cited health professionals as a trustworthy source [91].

Women should be informed that perception of fetal movement is a sign of fetal wellbeing. The frequency of maternally perceived fetal movement varies widely between women and there is no set number of movements that are considered normal. A discussion about how different types of movement may feel as pregnancy progresses, may help women learn to observe reassuring and non-reassuring fetal movement features. Maternal perception of fetal movement tends to commence from 20 weeks gestation [94]. Although around a quarter of women do not feel movement until after 20 weeks and some detect movement earlier [18]. These first movements are variably described as a "flutter", "butterflies" or "bubbles" [18]. As pregnancy progresses, description of movements changes to reflect increasing strength, more complex limb and body movements and greater frequency [18]. It is normal for women to perceive a range of fetal movement types including both small and large movements [18,95], groups of movements[26], and occasional short bouts of fetal hiccupping [21]. Bradford and colleagues [26] prospectively evaluated maternal perception of fetal movement strength, frequency and pattern from 28 weeks' gestation in pregnancies with normal outcomes and reported a diurnal pattern with strong or moderate fetal movements felt by 96% of women in the evening and at night-time.

The quality and timing of fetal movements reflects neurobehavioural development and maturation of the fetus and follows a general pattern with advancing gestation [94]. Fetal movements are usually absent during fetal "sleep" cycles and the healthy fetus cycles between periods of activity and rest. Fetal "sleep" cycles occur regularly throughout the day and night and usually last 20 to 40 minutes [45,46], rarely exceeding 90 minutes in a healthy fetus [26,45,46]. Near term fetuses have longer periods of rest between their active times. This has been attributed to both decreasing intrauterine space and neurological maturation [24,96]. Accordingly, some women report feeling less kicks and more rolling, shuffling, pushing or stretching movements approaching term[18,95,97].

Women with DFM who ask for advice are often told that their baby may respond with movements after having something sweet to eat, or after having a cold or fizzy drink. However, there is no evidence available to support this advice [26]. Fetal movements have been shown not to increase by intravenous glucose administration, or by a recent meal [25,98], and in women with a raised BMI fetal movements are more often reported as quiet following a meal [99]. Further, some women with DFM at term are advised by others that this is normal near to birth. Although some changes in type of fetal movements occurs near term with normal development, movements continue to be perceived by women every day and are reported as strong by most women [26,95,97]. Notably, the diurnal pattern of strong or moderate fetal movements in the evening is consistent in both early and late third trimester pregnancies [26].

6. Daily maternal observation of fetal movement

RECOMMENDATIONS	REFERENCES	RECOMMENDATION GRADE*
RECOMMENDATION 1		
A. Pregnant women may choose to observe fetal movements daily from 28 weeks gestation with or without counting movements. Either the woman may choose a time of day when baby is normally active and spend 15 minutes laying on her side and observing fetal movement strength, frequency (without counting) and character. Or the woman may choose to count fetal movements each evening while laying on her side and noting the time taken to count 10 movements. For most this will take around 20 minutes. If 10 movements are not counted in 2 hours, she should contact the care provider.	15,16,20,22,29,30	B
B. Subjective maternal concern about DFM overrides any definition of DFM based on numbers of fetal movements	15,28,31	√

A Cochrane review assessed the effect of fetal movement counting on perinatal death, major morbidity, maternal anxiety and satisfaction, pregnancy intervention and other adverse pregnancy outcomes, using five randomised trials, involving a total of 71,458 women [24]. The review authors concluded that there was not enough evidence to recommend or not recommend formal fetal movement counting for all women or for women at increased risk of adverse pregnancy outcomes and recommended further research in this area. The review was heavily influenced by the findings of the largest trial included by Grant and colleagues, which was subject to some methodological bias due to the use of "within hospital" clusters and fetal movement counting by some women in the control group as part of 'standard care'. Further, the authors of the Grant trial speculated that the definition of DFM used (<10 movements per day for 2 consecutive days) may have been too strict [106].

A number of uncontrolled studies of fetal movement counting have shown that fetal deaths are reduced following introduction of fetal movement counting [5,22]. In a non-randomised quality improvement study across 14 hospitals in Norway, introduction of a quality improvement initiative involving raising awareness of DFM (with optional kick counting) and a standardised protocol for clinical management resulted in fewer stillbirths amongst women with DFM. In this study women with DFM presented for care earlier during the intervention period [15,16]. A subsequent individual participant randomised controlled trial showed that kick counting increased antenatal detection of FGR[29]. Improved detection of SGA is a potential pathway for benefit in fetal movement awareness interventions. Lindqvuist and Molin have shown that fetuses identified as SGA antenatally have better outcomes than those not identified as SGA until birth [100].

An approach frequently promoted by parents' groups involves noting the time taken to count 10 movements during focussed counting at a time when the baby is normally awake. This approach was first advocated by Moore and Piacquadio who demonstrated that women laying on their side between the hours of 7pm and 11pm, when the fetus is known to be more active [23] normally counted 10 movements within 20 minutes (=/-18 minutes), and that 97% of women count 10 movements within 60 minutes. In Moore and Piacquadio's prospective study of evening fetal movement counting, women were advised to present for assessment if they were not able to count 10 movements in 2 hours. During the intervention period fetal deaths reduced significantly compared to prior (2.0 per 1000 vs 8.7/1000, p<0.0000)[22]. Acceptability of the method was high with >90% of eligible women participating in evening counting.

Studies exploring acceptability and impact on maternal psychosocial aspects have found that daily fetal movement observation does not appear to increase maternal concern or anxiety and may promote maternal-feal attachment [57,101]. When counting fetal movements women prefer evening counting methods to counting

throughout the day[102].
A Swedish study compared use of structured or unstructured approaches to daily fetal movement observation and found that use of structured approaches (eg counting) was associated with increased caesarean section and decreased neonatal unit admission. Women using structured approaches were more likely to be non-Swedish, have a high BMI, or have lower educational attainment. This suggests structured approaches may be easier for some women to use when communicating their concerns to care providers. An important consideration given risk of stillbirth is higher these demographic groups[103]. Although, a definition of DFM by fetal movement counts has not yet been determined. A study in Norway found an alarm of fewer than 10 movements in 2 hours of focussed counting was not sufficiently sensitive to identify at-risk fetuses[28].

A recent approach has emphasised advising women to observe their baby's usual fetal movement pattern and report if they notice a change in pattern, the rationale being that both increased and decreased fetal movement are associated with stillbirth. The perception of a single episode of increased fetal movement has been reported retrospectively by some women with stillbirth[6,21]. The cause of this phenomenon is not known but is postulated to indicate an acute hypoxic event or fetal seizures[104]. The movements are likely to be qualitatively different to increased movement in healthy fetuses and have been described as 'frantic' or 'wild', or as a 'death struggle'[31,104]. A single episode of excessive fetal movement is seen more frequently in stillbirths at term than at earlier gestations[21]. However, no study has demonstrated a reduction in adverse outcomes by investigating reports of increased fetal movement. Furthermore, three prospective studies have reported no association of increased fetal movement with adverse neonatal outcome [105-107]. One study found that amongst women reporting increased fetal movements infants were more often large-for-gestational-age [105]. Decreased frequency of fetal movement remains the most widely established fetal movement change associated with stillbirth. However, clinicians should be aware that some women with stillbirth may also have experienced an episode of excessive movement.

Because no definition of DFM has been widely agreed upon, and a range of fetal movement changes have been reported in association with fetal death, the subjective concern about fetal movements should override any definition of DFM based on numbers when determining need for assessment.

7. Which investigations should be undertaken for DFM?

7.1 Clinical history and fetal heart rate monitoring

RECOMMENDATIONS	REFERENCES	RECOMMENDATION GRADE*
RECOMMENDATION 1		
A. Women reporting DFM should be asked about their history of fetal movements including when fetal movements were last felt, previous presentations for DFM, any changes in strength or frequency, and whether the fetus was active last evening.	17,21,32	B
B. When a woman reports DFM, a full antenatal examination should be undertaken to assess for clinical signs of fetal growth restriction, fetomaternal haemorrhage and coexisting conditions such as hypertension and diabetes.	10,33-35	B
C. Medical consultation is needed in the presence of any concerning findings.		√
RECOMMENDATION 2		
A. Listening to the fetal heart rate by handheld Doppler, or electronic fetal heart rate monitoring (EFM) via cardiotocography (CTG), should be performed to exclude fetal death.	7,36,37	A
B. In women 28 weeks or more, CTG should be performed to exclude acute fetal compromise and an urgent medical review should be undertaken where findings are abnormal.	33,36	B
C. If the CTG and clinical assessment are normal, and during the CTG maternal perception of fetal movement resumes, no further investigations are required.	38,39	C

The aim of clinical assessment of DFM is first to exclude imminent or actual fetal demise, by listening to the fetal heart, and then to screen for the presence of any other abnormalities that may indicate increased risk of adverse outcome. A handheld Doppler can immediately confirm the presence of a fetal heartbeat. A cardiotocography (CTG) may be performed to detect a fetal heartbeat and to establish the fetal heart rate (FHR) pattern in women greater than 28+0 weeks' gestation. In both situations, a fetal heartbeat needs to be differentiated from the maternal heartbeat by assessing the maternal pulse rate and noting if this is the same or different from the FHR. If the presence of a fetal heartbeat is not confirmed, then an immediate bedside ultrasound scan assessment of fetal cardiac activity should be undertaken. If fetal death is excluded, a CTG can assess for any signs of immediate fetal compromise.

The presence of a normal FHR pattern (i.e. showing baseline of 110-160 bpm, short term variability of 6-25 bpm, accelerations of 15 bpm for 15 seconds, and the absence of decelerations) is a positive indicator of fetal wellbeing and suggests a normally functioning autonomic nervous system [108]. The fetal heart rate (FHR) accelerates with 92-97% of all gross body movements felt by the mother [109,110]. Other FHR patterns may or may not be associated with fetal compromise. For example, a "flat" FHR pattern showing reduced short-term variability (<5bpm) may be present during the sleep cycle of a healthy fetus, but it is more likely to be associated with fetal compromise if it lasts for >90 minutes [111,112]. If a woman presents with DFM and her CTG has abnormal features, this requires review by an experienced midwife or doctor. If the CTG remains abnormal after 90 minutes, this requires urgent medical review.

Although antenatal CTG has become part of clinical practice, a Cochrane review [113] comprising six trials and 2105 women did not confirm or refute any benefits for routine antepartum CTG monitoring of "at-risk" pregnancies. However, the authors acknowledge several limitations of this review, including the small numbers of women studied, methodological concerns, and also the fact that these trials were largely

conducted in the early 1980s. A 2011 retrospective, population- based cohort study of women presenting with maternal perception of DFM during the third trimester found that the CTG was a reliable screening indicator of fetal wellbeing, and that abnormal pregnancy outcomes were more common when the initial CTG was abnormal or persistently non- reassuring [38].

Recent non-randomised studies have reported benefits of screening low- and at-risk pregnancies using CTG monitoring for the indication of DFM. For example, in a Norwegian study of 3014 women reporting DFM, a CTG was performed in 97.5% of cases and an abnormal result was detected in 3.2% [9]. In an observational study of women presenting with DFM who underwent CTG and an ultrasound scan, 21% had an abnormal result that required action and 4.4% required immediate birth [36]. While the evidence on the effectiveness of CTG monitoring in the identification of "at-risk" babies remains inconclusive, the use of CTG as a screening tool can be justified, as an abnormal FHR pattern may be associated with poor outcomes [114]. Women should be discouraged from using home doppler machines or phone apps to auscultate the fetal heart as several case reports have shown that women may be falsely reassured by a maternal heat beat and defer definitive assessment by a health professional [115].

A review of the woman's clinical and fetal movement history may help to inform management. Risk factors for adverse outcomes (stillbirth or SGA) in context of presentation with DFM are shown in Table 1. In addition, a retrospective cohort study in Sweden reported that amongst women with DFM, those with an SGA fetus, IVF pregnancy, or cigarette smoking were at increased risk of composite adverse neonatal outcome [67].

Table 1. Risk factors for adverse outcome in women presenting with DFM

RISK FACTOR	ADJUSTED ODDS RATIO FOR STILLBIRTH (95% CI)	ADJUSTED ODDS RATIO FOR SGA/FGR (95% CI)	REFERENCE
Abnormal CTG	#7.08 (1.31, 38.18)		Dutton et al. 2012
Advanced Maternal Age (>35)		1.6 (1.1,2.6)	Tveit et al. 2010
Cigarette smoking	2.8 (1.4, 5.7)	2.5 (1.7, 3.7)	Tveit et al. 2010
Maternal obesity or overweight (BMI >25)	1.8 (1.0, 3.2)	1.6 (1.2, 2.1)	Tveit et al. 2010
Past obstetric history of SGA or Stillbirth	#2.58 (1.30, 5.13)		O'Sullivan et al.,2009
Past medical history (eg diabetes or hypertension	#3.02 (1.01, 9.06)		O'Sullivan et al. 2009
Recurrent presentation with DFM (2 or more)	#1.60 (1.04, 2.47)	8.04 (4.63, 13.98)	O'Sullivan et al. 2009 Scala et al. 2009
Delay in reporting DFM (>24 h absent FM/<48h decreased FM	8.3 (3.1, 22.4)	2.1 (1.1, 4.1)	Tveit et al. 2010
Symphysis-fundal height <10th Centile	#21.70 (5.56, 84.69)		O'Sullivan et al. 2009
Raised uterine artery PI in 2nd trimester		5.73 (2.42, 13.55)	Scala et al. 2015

#Composite adverse outcome including stillbirth. All included values are statistically significant in multivariable analysis (MVA).

Dutton et al. 2012[41]: MVA adjusted for gestation, diastolic blood pressure, number of fetal movements, estimated fetal weight centile, maximal pool depth, smoking status.

Tveit et al. 2010[34]: MVA adjusted for smoking, BMI, maternal age, parity

O'Sullivan et al 2010[116]: MVA adjusted for maternal age, BMI, ethnicity.

Scala et al. 2005[53]: MVA adjusted Maternal age, BMI, ethnicity.

7.2 Ultrasound scans and FMH testing

RECOMMENDATIONS	REFERENCES	RECOMMENDATION GRADE*
RECOMMENDATION 1		
A. Ultrasound scan should be included in the assessment of DFM if: 1) SGA or FGR are suspected, or 2) the woman continues to perceive absent or decreased fetal movements during the clinical encounter, or 3) other clinical concerns such as abnormal CTG are present.	15,39,40	B
B. The ultrasound scan should include fetal biometry, estimated fetal weight (and no growth scan has been performed in the last two weeks) and amniotic fluid volume assessment.	16,40-42	B
C. If SGA/FGR is present, umbilical artery Doppler SD or PI should be assessed.		
D. If not already undertaken, and the woman agrees, a morphology scan should be arranged.	43,44	A
E. The timeframe to perform ultrasound scan will depend on clinical urgency.		√
F. Where ultrasound findings are abnormal, discuss with a senior obstetrician.		√
RECOMMENDATION 2		
A. Fetomaternal haemorrhage (FMH) is a rare cause of DFM that is usually indicated by an abnormal CTG. If massive FMH is suspected based on clinical assessment a senior obstetrician should be consulted.	10,45,46	B
B. If FMH is suspected, and immediate delivery is not indicated by CTG findings, senior obstetric input should be sought. Ultrasound assessment of Middle Cerebral Artery peak systolic velocity Doppler and Kleihauer-Betke test should be considered.	46,47	C

Although evidence is currently lacking to recommend ultrasound assessment for all cases of women presenting with DFM, ultrasonography may be used for the detection of conditions that contribute to DFM including placental insufficiency and congenital abnormality where indicated.

The use of ultrasound to assess pregnancies with DFM has not been explored in a randomised trial and evidence of benefit remains uncertain. In a Norwegian study, an investigation protocol of CTG and ultrasound scan was used in the management of women reporting DFM [16]. In this study, the ultrasound scan was conducted to assess fetal biometry, amniotic fluid volume, and fetal anatomy. Identification of FGR increased and importantly, a significant reduction in perinatal mortality was shown (OR 0.51, 95%CI 0.32-0.81) [15]. The addition of umbilical artery Doppler studies did not show any benefit [15]. Although the number of ultrasound scans more than doubled (OR 2.64, 95% CI 2.02-3.45), this appeared to be offset by a reduction in additional follow-up consultations and admissions for induction of labour. The study reported no increase in the number of preterm births, infants requiring transfer to neonatal care, or infants with severe neonatal depression or fetal growth restriction. A recent study reported no increase in overtly abnormal ultrasound findings among women with DFM and a live fetus, compared to controls, concluding that timing of ultrasound in DFM could be individualised [117]. If SGA or FGR are detected on assessment subsequent care should be managed as outlined in the International Federation of Gynecology and Obstetrics (FIGO) initiative of fetal growth: Best practice advice for screening, diagnosis, and management of fetal growth restriction[118].

A Cochrane Review comprising 19 trials and over 10,000 women concluded that the use of Doppler ultrasound of the umbilical artery in high-risk pregnancies reduced the risk of perinatal deaths and resulted in fewer obstetric interventions [119]. However, the review cautioned that current evidence was not of high quality and further studies were required.

Although rare DFM may be a sign of fetomaternal haemorrhage (FMH). FMH occurs in approximately 0.3%

of all live births[10]. Massive feto-maternal haemorrhage has been demonstrated in approximately 4% of stillbirths and in 0.04% of neonatal deaths [120,121]. There is ambiguity over the definition of a clinically relevant volume of haemorrhage, as the rate of blood loss, chronicity of the bleed and gestational age of the fetus all influence the risk of adverse perinatal outcome [122]. Nevertheless, a fetal haemorrhage of between 80 and 150 mls at term[10], or >20mls per/kilo have been shown to predict poor outcome in large case series[120].

A retrospective analysis of clinical data from a multihospital health care system in the US found that decreased or absent fetal movement was reported by pregnant women in 54% of FMH cases and was the most common presenting sign [123]. However, clinical risk factors do not reliably predict the likelihood of massive FMH [10,121,124-126]. Investigation of suspected FMH can be by Kleihauer Betke or flow cytometry tests of the mother's blood, or by Doppler assessment of middle cerebral artery peak systolic velocity (MCA PSV) during fetal ultrasound. Worldwide, Kleihauer Betke test is the most commonly used test for FMH[120]. However, sensitivity of both Kleihauer Betke and MCA PSV are poor for detection of significant FMH in the context of DFM [46,47].

FMH in the context of DFM is rare, and in majority of cases of FMH with adverse outcome the CTG is abnormal [46,126]. A sinusoidal FHR pattern is the classically described CTG sign indicating severe fetal anaemia[125]. However, sinusoidal FHR is not present in all cases and other CTG abnormalities including reduced or absent variability may indicate FMH [46,126]. In a series of 26 cases of DFM with FMH and adverse outcome, 23 cases (88%) had an abnormal CTG on admission [126]. In women with DFM, if FMH is suspected based on history or abnormal CTG, and urgent delivery is not indicated, senior medical specialist input should be sought. Ultrasound assessment of MCA PSV or Kleihauer should be considered[46].

8. Recommendations for management of pregnancies following assessment for DFM

RECOMMENDATIONS	REFERENCES	RECOMMENDATION GRADE*
RECOMMENDATION 1		
A. If no objective evidence of fetal compromise is revealed during the clinical examination for DFM the woman can be reassured that planned birth is not required.	**15,48**	A
B. Women who report DFM should be reassured that they have done the right thing in presenting for assessment and that they are not a 'nuisance' or 'burden' to their care providers, even when no abnormal findings are found.	54,55	√
RECOMMENDATION 2		
A. Clinicians should be aware that risk of poor outcome is increased in women with recurrent DFM presentations.	48,53	B
B. For women who represent with DFM on a second or subsequent occasion manage as per initial presentation, with the addition of ultrasound scan, and individualise care.		√
C. Women ≥39 weeks gestation should be informed that induction of labour is not associated with increased rates of caesarean birth or adverse maternal or fetal outcomes.	49-52	A

In the majority of DFM presentations assessment and subsequent pregnancy outcome is normal with an appropriately grown and non-compromised baby[127]. The most common abnormality identified is FGR with a reported incidence of 16-24% of DFM cases [41,116,128].Therefore, in the absence of indications from clinical assessment women should return to routine antenatal care.

While the adverse outcomes of preterm birth are well understood, it is becoming increasingly apparent that early term birth (37-38 weeks' gestation) is also associated with increased short- and longer-term mortality and morbidity [49] and poorer developmental outcomes [51]. In a cohort study, Bentley et al demonstrated that the risk of being 'developmentally high risk' (scoring in the bottom 10% for 2 or more developmental domains) was significantly increased by birth < 39 weeks' gestation compared to birth at 40 weeks' gestation [51]. Moreover, a dose-response relationship was evident, with the risk of being developmentally high risk increasing as gestation at birth decreased; 34 to 36 weeks 1.26 (1.18–1.34), 37 weeks 1.17 (1.10–1.25), 38 weeks 1.06 (1.01–1.10), 39 weeks 0.98 (0.94–1.02), ≥41 weeks 0.99 (0.94–1.03). Early-term birth (37 and 38 weeks' gestation) has also been linked to increased mortality in infancy, early childhood and young adulthood [49]. Reassuringly, observational, and interventional studies have demonstrated that planned birth at 39 weeks or more is not associated with any increase in adverse maternal or neonatal outcomes[129,130].

A number of studies have reported increased risk of adverse outcome in multiple presentations for DFM [53,131]. A larger retrospective cohort study in the UK, involving 1234 women reporting DFM beyond 36 weeks' gestation, found that 16.6% of these had more than one presentation for DFM. Of women with repeated DFM episodes, 44% birthed an SGA baby, and they were also more likely to have had high second-trimester uterine artery Doppler resistance indices [53]. This study concluded that women presenting with

repeated DFM episodes should be considered at high risk for placental dysfunction irrespective of antenatal ultrasound or Doppler assessment results.

The AFFIRM trial as part of their management protocol tested offering induction of labour to women presenting with recurrent DFM who were ≥37 weeks gestation. The intervention package was associated with an increase in inductions of labour and caesarean and increased neonatal unit admissions[48]. Thus, a

more liberal approach to induction of labour in the context of DFM may have led to more harm, without benefit of lower stillbirth rates. By contrast, the investigation protocol of a Norwegian quality improvement initiative involved prompt and thorough investigation of DFM presentations with planning for delivery based on clinician judgement in relation to additional findings of clinical investigations [15,16]. In that study implementation of the protocol was associated with a reduction in both stillbirths and admissions for induction of labour[15].

A Swedish study found that the primary reason for presenting with DFM was 'worry about the baby'. Yet some women with stillbirth delay reporting DFM due to concern they will appear overly anxious or be a burden to healthcare [132]. Therefore, it is important that women with DFM and a normal assessment are reassured about the findings of the assessment and encouraged to return if they experience DFM again.

While research is limited, with the potential for increased risk, closer surveillance may be considered for women with ongoing concerns of DFM. Any management strategy for DFM needs to take into account the gestational age, the presence of other risk factors for poor outcome amongst women with DFM (see Table 1), and the woman's individual situation and preferences. For further guidance regarding planned birth at >37 weeks gestation refer to the Safer Baby Bundle Position Statement, 'Improving decision-making about the timing of birth for women with risk factors for stillbirth'.

9. Discussion: Implementation and future research

This guideline was developed to promote clinical practice which is based on the best available international evidence, thereby improving information and counselling offered to women during the antenatal period and reducing variation in clinical practice across Australia and New Zealand. Leading international authorities have recommended that women experiencing DFM should notify their maternity care providers as soon as reasonably possible [133,134]. However, beyond this recommendation, there is limited guidance for clinicians on how to manage this presentation, resulting in much variation in clinical management. Cochrane reviews related to fetal movement counting and management of reported decreased fetal movements recommend further research in this area [37,72].

The recommendations of this guideline cover two key areas: 1) information for pregnant women about what is considered normal fetal movements and advice about reporting concerns of a reduction in fetal movements to a maternity care provider; and 2) information for clinicians with regards to the management and investigation of women reporting DFM. In the absence of robust research in this area, the nine key recommendations are largely based on consensus after careful consideration of the available evidence.

Improving the consistency and standard of information provided to pregnant women on fetal movements and on the significance of reporting DFM is likely to reduce concern associated with DFM and, may lead to timely intervention and a reduction in stillbirths. The findings of a Norwegian study [15] were encouraging in their demonstration of a reduction in the stillbirth rate by one-third following the implementation of a guideline and the provision of information about fetal movements to pregnant women. Subsequently, large cluster randomised trials in the UK (AFFIRM) [48], and in Australia and New Zealand (MBM)[74], aimed to reduce stillbirth rates through interventions to a) increase pregnant women's awareness of fetal movement and prompt timely reporting of a decrease in fetal movement; and b) strengthen clinical management plans, have not shown significant reductions in stillbirths [48,74]. In addition, the Mindfetalness trial which aimed to reduce delays in hospital presentation across 63 antenatal clinics in Stockholm did not find a reduction in rates of Apgar <7 [75]. Notably, no trial has compared to promoting awareness of fetal movements to no information or assessment of fetal movements, making comparison of outcomes in intervention and control groups problematic.

There is evidence that promoting awareness can lead to increased intervention and iatrogenic harm in some settings[48,69]. Although this did not occur in the Norwegian quality improvement initiative which achieved a reduction in stillbirths amongst women with DFM, whilst also reducing the admissions for induction of labour [15], the Mindfetalness trial where there were fewer inductions of labour [20] and MBM where inductions of labour were not different and adverse neonatal outcomes were lower[74]. Further research should determine an approach to fetal movement awareness that is acceptable to pregnant women and effective in identifying fetuses at risk. Studies are also needed to inform optimal approaches to assessment of DFM presentations while minimising harm.

10. References

1. Hug L, You D, Blencowe H, et al. Global, regional, and national estimates and trends in stillbirths from 2000 to 2019: a systematic assessment. *The Lancet* 2021; **398**(10302): 772-85.
2. de Bernis L, Kinney M, Stones W. Stillbirths: Ending preventable deaths by 2030. *The Lancet* 2016.
3. Froen JF, Cacciatore J, McClure EM, et al. Stillbirths: why they matter. *Lancet* 2011; **377**(9774): 1353-66.
4. Flenady V, Koopmans L, Middleton P, et al. Major risk factors for stillbirth in high-income countries: a systematic review and meta-analysis. *Lancet* 2011; **377**(9774): 1331-40.
5. Frøen JF. A kick from within--fetal movement counting and the cancelled progress in antenatal care. *J Perinat Med* 2004; **32**(1): 13-24.
6. Erlandsson K, Lindgren H, Davidsson-Bremborg A, Radestad I. Women's premonitions prior to the death of their baby in utero and how they deal with the feeling that their baby may be unwell. *Acta obstetricia et gynecologica Scandinavica* 2012; **91**(1): 28-33.
7. Efkarpidis S, Alexopoulos E, Kean L, Liu D, Fay T. Case-control study of factors associated with intrauterine fetal deaths. *MedGenMed* 2004; **6**(2): 53.
8. James DK, Telfer FM, Keating NA, Blair ME, Wilcox MA, Chilvers C. Reduced fetal movements and maternal medication - new pregnancy risk factors for neurodevelopmental disability in childhood. *J Obstet Gynaecol* 2000; **20**(3): 226-34.
9. Froen JF, Tveit JV, Saastad E, et al. Management of decreased fetal movements. *Semin Perinatol* 2008; **32**(4): 307-11.
10. Wylie BJ, D'Alton ME. Fetomaternal hemorrhage. *Obstet Gynecol* 2010; **115**(5): 1039-51.
11. Warrander LK, Batra G, Bernatavicius G, et al. Maternal perception of reduced fetal movements is associated with altered placental structure and function. *PloS one* 2012; **7**(4): e34851.
12. Levy M, Kovo M, Izaik Y, et al. Reduced fetal movements at term in singleton low risk pregnancies—Is there an association with placental histopathological findings? *Acta obstetricia et gynecologica Scandinavica* 2020; **99**(7): 884-90.
13. National Health and Medical Research Council (NHMRC). A guide to the development, implementation and evaluation of clinical practice guidelines. Canberra: National Health and Medical Research Council, 1999.
14. National Health and Medical Research Council (NHMRC). How to use the evidence: assessment and application of scientific evidence. Canberra: National Health and Medical Research Council, 2000.
15. Tveit JV, Saastad E, Stray-Pedersen B, et al. Reduction of late stillbirth with the introduction of fetal movement information and guidelines - a clinical quality improvement. *BMC Pregnancy Childbirth* 2009; **9**(1): 32.
16. Saastad E, Tveit JV, Flenady V, et al. Implementation of uniform information on fetal movement in a Norwegian population reduces delayed reporting of decreased fetal movement and stillbirths in primiparous women - a clinical quality improvement. *BMC Res Notes* 2010; **3**(1): 2.
17. Warland J, O'Brien LM, Heazell AE, Mitchell EA. An international internet survey of the experiences of 1,714 mothers with a late stillbirth: the STARS cohort study. *BMC Pregnancy & Childbirth* 2015; **15**(172): 1.
18. Raynes-Greenow CH, Gordon A, Li Q, Hyett JA. A cross-sectional study of maternal perception of fetal movements and antenatal advice in a general pregnant population, using a qualitative framework. *BMC Pregnancy Childbirth* 2013; **13**: 32.
19. Saastad E, Ahlborg T, Froen JF. Low maternal awareness of fetal movement is associated with small for gestational age infants. *J Midwifery Womens Health* 2008; **53**(4): 345-52.
20. Akselsson A, Lindgren H, Skokic V, Rådestad I. A decrease in cesarean sections and labor inductions among Swedish women by awareness of fetal movements with the Mindfetalness method. *BMC Pregnancy and Childbirth* 2020; **20**(1): 577.
21. Thompson JMD, Wilson J, Bradford BF, et al. A better understanding of the association between maternal perception of foetal movements and late stillbirth—findings from an individual participant data meta-analysis. *BMC Medicine* 2021; **19**(1): 267.
22. Moore TR, Piacquadio K. A prospective evaluation of fetal movement screening to reduce the incidence of antepartum fetal death. *Am J Obstet Gynecol* 1989; **160**(5 Pt 1): 1075-80.
23. Roberts AB, Griffin D, Mooney R, Cooper DJ, Campbell S. FETAL ACTIVITY IN 100 NORMAL THIRD TRIMESTER PREGNANCIE. *BJOG: An International Journal of Obstetrics & Gynaecology* 1980; **87**(6): 480-4.
24. D'Elia A, Pighetti M, Moccia G, Santangelo N. Spontaneous motor activity in normal fetuses. *Early Human Development* 2001; **65**(2): 139-47.
25. Michaan N, Baruch Y, Topilsky M, et al. The effect of glucose administration on perceived fetal movements in women with decreased fetal movement, a double-blinded placebo-controlled trial. *Journal of perinatology :*

official journal of the California Perinatal Association 2016.
26. Bradford BF, Cronin RS, McKinlay CJD, et al. A diurnal fetal movement pattern: Findings from a cross-sectional study of maternally perceived fetal movements in the third trimester of pregnancy. *PloS one* 2019; **14**(6): e0217583.
27. Bradford BF, Thompson JMD, Heazell AEP, McCowan LME, McKinlay CJD. Understanding the associations and significance of fetal movements in overweight or obese pregnant women: a systematic review. *Acta obstetricia et gynecologica Scandinavica* 2018; **97**(1): 13-24.
28. Winje BA, Saastad E, Gunnes N, et al. Analysis of 'count-to-ten' fetal movement charts: a prospective cohort study. *BJOG* 2011; **118**(10): 1229-38.
29. Saastad E, Winje BA, Stray Pedersen B, Froen JF. Fetal movement counting improved identification of fetal growth restriction and perinatal outcomes--a multi-centre, randomized, controlled trial. *PloS one* 2011; **6**(12): e28482.
30. Koshida S, Tokoro S, Katsura D, Tsuji S, Murakami T, Takahashi K. Fetal movement counting is associated with the reduction of delayed maternal reaction after perceiving decreased fetal movements: a prospective study. *Scientific Reports* 2021; **11**(1): 10818.
31. Heazell AEP, Warland J, Stacey T, et al. Stillbirth is associated with perceived alterations in fetal activity - findings from an international case control study. *BMC Pregnancy Childbirth* 2017; **17**(1): 369.
32. Bradford BF, Cronin RS, McCowan LME, McKinlay CJD, Mitchell EA, Thompson JMD. Association between maternally perceived quality and pattern of fetal movements and late stillbirth. *Scientific Reports* 2019; **9**(1): 9815.
33. Saastad E, Vangen S, Frøen JF. Suboptimal care in stillbirths - a retrospective audit study. *Acta obstetricia et gynecologica Scandinavica* 2007; **86**(4): 444-50.
34. Tveit JV, Saastad E, Stray-Pedersen B, Bordahl PE, Froen JF. Concerns for decreased foetal movements in uncomplicated pregnancies - Increased risk of foetal growth restriction and stillbirth among women being overweight, advanced age or smoking. *J Matern Fetal Neonatal Med* 2010.
35. Heazell AE, Froen JF. Methods of fetal movement counting and the detection of fetal compromise. *J Obstet Gynaecol* 2008; **28**(2): 147-54.
36. Whitty JE, Garfinkel DA, Divon MY. Maternal perception of decreased fetal movement as an indication for antepartum testing in a low-risk population. *Am J Obstet Gynecol* 1991; **165**(4 Pt 1): 1084-8.
37. Hofmeyr GJ, Novikova N. Management of reported decreased fetal movements for improving pregnancy outcomes. *The Cochrane database of systematic reviews* 2012; **4**: Cd009148.
38. Daly N, Brennan D, Foley M, O'Herlihy C. Cardiotocography as a predictor of fetal outcome in women presenting with reduced fetal movement. *European journal of obstetrics, gynecology, and reproductive biology* 2011; **159**(1): 57-61.
39. Ahn MO, Phelan JP, Smith CV, Jacobs N, Rutherford SE. Antepartum fetal surveillance in the patient with decreased fetal movement. *Am J Obstet Gynecol* 1987; **157**(4 Pt 1): 860-4.
40. Dubiel M, Gudmundsson S, Thuring-Jonsson A, Maesel A, Marsal K. Doppler velocimetry and nonstress test for predicting outcome of pregnancies with decreased fetal movements. *Am J Perinatol* 1997; **14**(3): 139-44.
41. Dutton PJ, Warrander LK, Roberts SA, et al. Predictors of poor perinatal outcome following maternal perception of reduced fetal movements--a prospective cohort study. *PloS one* 2012; **7**(7): e39784.
42. Korszun P, Dubiel M, Kudla M, Gudmundsson S. Doppler velocimetry for predicting outcome of pregnancies with decreased fetal movements. *Acta obstetricia et gynecologica Scandinavica* 2002; **81**(10): 926-30.
43. Hsu CD, Feng TI, Crawford TO, Johnson TRB. Unusual Fetal Movement in Congenital Myotonic Dystrophy. *Fetal Diagnosis and Therapy* 1993; **8**(3): 200-2.
44. Lin CC, Adamczyk CJ, Sheikh Z, Mittendorf R. Fetal congenital malformations. Biophysical profile evaluation. *J Reprod Med* 1998; **43**(6): 521-7.
45. Bellussi F, Perolo A, Ghi T, Youssef A, Pilu G, Simonazzi G. Diagnosis of Severe Fetomaternal Hemorrhage with Fetal Cerebral Doppler: Case Series and Systematic Review. *Fetal Diagnosis and Therapy* 2017; **41**(1): 1-7.
46. Athiel Y, Maisonneuve E, Bléas C, et al. Reduced fetal movement during pregnancy: Is the Kleihauer-Betke test really useful? *Journal of Gynecology Obstetrics and Human Reproduction* 2020; **49**(10): 101748.
47. Bataille P, Petit L, Winer N. Performance of the Kleihauer Betke test in the prediction of neonatal anemia. *Journal of Maternal-Fetal & Neonatal Medicine* 2020.
48. Norman JE, Heazell AEP, Rodriguez A, et al. Awareness of fetal movements and care package to reduce fetal mortality (AFFIRM): a stepped wedge, cluster-randomised trial. *The Lancet* 2018; **392**(10158): 1629-38.
49. Crump C, Sundquist K, Winkleby MA, Sundquist J. Early-term birth (37–38 weeks) and mortality in young adulthood. *Epidemiology* 2013; **24**(2): 270-6.
50. Spong CY, Mercer BM, D'Alton M, Kilpatrick S, Blackwell S, Saade G. Timing of Indicated Late-Preterm and

Early-Term Birth. *Obstetrics & Gynecology* 2011; **118**(2 Part 1): 323-33.
51. Bentley JP, Roberts CL, Bowen JR, Martin AJ, Morris JM, Nassar N. Planned birth before 39 weeks and child development: a population-based study. *Pediatrics* 2016; **138**(6).
52. Middleton P, Shepherd E, Morris J, Crowther CA, Gomersall JC. Induction of labour at or beyond 37 weeks' gestation. *Cochrane Database of Systematic Reviews* 2020; (7).
53. Scala C, Bhide A, Familiari A, et al. Number of episodes of reduced fetal movement at term: association with adverse perinatal outcome. *Am J Obstet Gynecol* 2015; **213**(5): 678.e1-6.
54. Georgsson S, Linde A, Pettersson K, Nilsson R, Rådestad I. To be taken seriously and receive rapid and adequate care – Womens' requests when they consult health care for reduced fetal movements. *Midwifery* 2016; **40**: 102-8.
55. Gordon A, Chan L, Warrilow K, et al. #Movements Matter – Evaluation of a public awareness campaign in Victoria. Perinatal Society of Australia and New Zealand (PSANZ) annual congress; 2019; Gold Coast, Australia; 2019.
56. Goodlin RC. History of fetal monitoring. *American Journal of Obstetrics & Gynecology* 1979; **133**(3): 323-52.
57. Saastad E, Winje BA, Israel P, Froen JF. Fetal movement counting--maternal concern and experiences: a multicenter, randomized, controlled trial. *Birth (Berkeley, Calif)* 2012; **39**(1): 10-20.
58. Bekedam DJ, Visser GH. Effects of hypoxemic events on breathing, body movements, and heart rate variation: a study in growth-retarded human fetuses. *Am J Obstet Gynecol* 1985; **153**(1): 52-6.
59. Vindla S, James D, Sahota D. Computerised analysis of unstimulated and stimulated behaviour in fetuses with intrauterine growth restriction. *European journal of obstetrics, gynecology, and reproductive biology* 1999; **83**(1): 37-45.
60. Vindla S, James DK, Sahota DS, Coppens M. Computerised analysis of behaviour in normal and growth-retarded fetuses. *European journal of obstetrics, gynecology, and reproductive biology* 1997; **75**(2): 169-75.
61. Valentin L, Marsal K. Pregnancy outcome in women perceiving decreased fetal movement. *European journal of obstetrics, gynecology, and reproductive biology* 1987; **24**(1): 23-32.
62. Sherer DM, Spong CY, Minior VK, Salafia CM. Decreased amniotic fluid volume at < 32 weeks of gestation is associated with decreased fetal movements. *Am J Perinatol* 1996; **13**(8): 479-82.
63. Naeye RL, Lin HM. Determination of the timing of fetal brain damage from hypoxemia-ischemia. *Am J Obstet Gynecol* 2001; **184**(2): 217-24.
64. Goldstein I, Romero R, Merrill S, et al. Fetal body and breathing movements as predictors of intraamniotic infection in preterm premature rupture of membranes. *Am J Obstet Gynecol* 1988; **159**(2): 363-8.
65. Ribbert LS, Nicolaides KH, Visser GH. Prediction of fetal acidaemia in intrauterine growth retardation: comparison of quantified fetal activity with biophysical profile score. *Br J Obstet Gynaecol* 1993; **100**(7): 653-6.
66. Akselsson A, Lindgren H, Georgsson S, Pettersson K, Radestad I. Increased labor induction and women presenting with decreased or altered fetal movements - a population-based survey. *PLoS ONE [Electronic Resource]* 2019; **14**(5): e0216216.
67. Sterpu I, Pilo C, Koistinen IS, Lindqvist PG, Gemzell-Danielsson K, Itzel EW. Risk factors for poor neonatal outcome in pregnancies with decreased fetal movements. *Acta obstetricia et gynecologica Scandinavica* 2020; **99**(8): 1014-21.
68. Skornick-Rapaport A, Maslovitz S, Kupferminc M, Lessing JB, Many A. Proposed management for reduced fetal movements: five years' experience in one medical center. *J Matern Fetal Neonatal Med* 2011; **24**(4): 610-3.
69. Bellussi F, Po G, Livi A, et al. Fetal Movement Counting and Perinatal Mortality: A Systematic Review and Meta-analysis. *Obstetrics & Gynecology* 2020; **135**(2): 453-62.
70. Hofmeyr GJ, Novikova N. Management of reported decreased fetal movements for improving pregnancy outcomes. *Cochrane Database of Systematic Reviews* 2012; (4).
71. Heazell AEP, Weir CJ, Stock SJE, et al. Can promoting awareness of fetal movements and focusing interventions reduce fetal mortality? A stepped-wedge cluster randomised trial (AFFIRM). *BMJ Open* 2017; **7**(8): e014813.
72. Mangesi L, Hofmeyr GJ, Smith V, Smyth RM. Fetal movement counting for assessment of fetal wellbeing. *The Cochrane database of systematic reviews* 2015; **10**: Cd004909.
73. Grant A, Elbourne D, Valentin L, Alexander S. Routine formal fetal movement counting and risk of antepartum late death in normally formed singletons. *Lancet* 1989; **2**(8659): 345-9.
74. Flenady V, Gardener G, Ellwood D, et al. My Baby's Movements: a stepped-wedge cluster-randomised controlled trial of a fetal movement awareness intervention to reduce stillbirths. *BJOG: An International Journal of Obstetrics & Gynaecology* 2022; **129**(1): 29-41.

75. Akselsson A, Lindgren H, Georgsson S, et al. Mindfetalness to increase women's awareness of fetal movements and pregnancy outcomes: a cluster-randomised controlled trial including 39 865 women. *BJOG: An International Journal of Obstetrics & Gynaecology* 2020; **127**(7): 829-37.
76. Australian Institute of Health and Welfare (AIHW). Australia's mothers and babies 2020. Perinatal statistics series no. 34. Cat. no. PER 101. Canberra: AIHW, 2022.
77. Perinatal, Committee MMR. Fourteenth Annual Report of the Perinatal and Maternal Mortality Review Committee: Reporting Mortality and Morbidity 2018. Wellington: Health Quality and Safety Commission, 2021.
78. Flenady VD, Wojcieszek AMB, Middleton PP, et al. Stillbirths: recall to action in high-income countries. *The Lancet (British edition)* 2016; **387**(10019): 691-702.
79. Hug L, Alexander M, You D, Alkema L. National, regional, and global levels and trends in neonatal mortality between 1990 and 2017, with scenario-based projections to 2030: a systematic analysis. *Lancet Glob Health* 2019; **7**(6): e710-e20.
80. Reinebrant H, Leisher S, Coory M, et al. Making stillbirths visible: a systematic review of globally reported causes of stillbirth. 2018; **125**(2): 212-24.
81. Flenady V, Oats J, Khong Y, et al. The PSANZ classification system for stillbirths and neonatal deaths. In: Perinatal Society of Australia and New Zealand (PSANZ) clinical practice guideline for care around stillbirth and neonatal death. Version 3.1. NHMRC Centre of Research Excellence in Stillbirth, Brisbane, Australia, 2018.
82. Hilder L, Li Z, Zeki R, Sullivan EA. Stillbirths in Australia 1991-2009: Perinatal statistics series no. 29. Cat. no. PER 63. Canberra: AIHW National Perinatal Epidemiology and Statistics Unit, 2014.
83. Huang DY, Usher RH, Kramer MS, Yang H, Morin L, Fretts RC. Determinants of unexplained antepartum fetal deaths. *Obstet Gynecol* 2000; **95**(2): 215-21.
84. Flenady V, Hockey R, Chang A, Walters K. Unexplained fetal death at a large maternity hospital: identification of antenatal risk factors. Perinatal Society of Australia and New Zealand, 8th annual congress Integrating science and perinatal practice: Controversies and Dilemma's; 2004 15th-18th March, 2004; Sydney (NSW), Australia; 2004. p. P166.
85. Draper ES, Kurinczuk JJ, Kenyon S, on behalf of MBRRACE-UK. MBRRACE-UK 2015 perinatal confidential enquiry: term, singleton, normally-formed, antepartum stillbirth: University of Leicester, Department of Health Sciences, Infant Mortality and Morbidity Studies, 2015.
86. Masson VL, Farquhar CM, Sadler LC. Validation of local review for the identification of contributory factors and potentially avoidable perinatal deaths. *Australian and New Zealand Journal of Obstetrics and Gynaecology* 2016; **56**(3): 282-8.
87. Froen JF, Arnestad M, Frey K, Vege A, Saugstad OD, Stray-Pedersen B. Risk factors for sudden intrauterine unexplained death: epidemiologic characteristics of singleton cases in Oslo, Norway, 1986-1995. *Am J Obstet Gynecol* 2001; **184**(4): 694-702.
88. Maleckiene L, Nadisauskiene R, Bergstrom S. Socio-economic, demographic and obstetric risk factors for late fetal death of unknown etiology in Lithuania: a case--referent study. *Acta obstetricia et gynecologica Scandinavica* 2001; **80**(4): 321-5.
89. Wackers KJWM, Wassen MMLH, Zeegers B, Budé L, Nieuwenhuijze MJ. Effect of the use of a national information brochure about fetal movements on patient delay. *Women and Birth* 2019; **32**(2): 131-6.
90. Peat AM, Stacey T, Cronin R, McCowan LM. Maternal knowledge of fetal movements in late pregnancy. *The Australian & New Zealand journal of obstetrics & gynaecology* 2012; **52**(5): 445-9.
91. McArdle A, Flenady V, Toohill J, Gamble J, Creedy D. How pregnant women learn about foetal movements: sources and preferences for information. *Women Birth* 2015; **28**(1): 54-9.
92. Warland J, Glover P. Fetal movements: What are we telling women? *Women Birth* 2017; **30**(1): 23-8.
93. Smyth RM, Taylor W, Heazell AE, Furber C, Whitworth M, Lavender T. Women's and clinicians perspectives of presentation with reduced fetal movements: a qualitative study. *BMC Pregnancy Childbirth* 2016; **16**(1): 280.
94. De Vries JI, Fong BF. Normal fetal motility: an overview. *Ultrasound Obstet Gynecol* 2006; **27**(6): 701-11.
95. Bradford B, Maude R. Maternal perception of fetal movements in the third trimester: A qualitative description. *Women and Birth* 2018; **31**(5): e287-e93.
96. Hayat TTA, Nihat A, Martinez-Biarge M, et al. Optimization and Initial Experience of a Multisection Balanced Steady-State Free Precession Cine Sequence for the Assessment of Fetal Behavior in Utero. *American Journal of Neuroradiology* 2011; **32**(2): 331.
97. Radestad I, Lindgren H. Women's perceptions of fetal movements in full-term pregnancy. *Sexual & reproductive healthcare : official journal of the Swedish Association of Midwives* 2012; **3**(3): 113-6.
98. Esin S, Baser E, Cakir C, Ustun Tuncal GN, Kucukozkan T. Chocolate or orange juice for non-reactive non-stress test (NST) patterns: a randomized prospective controlled study. *J Matern Fetal Neonatal Med* 2013; **26**(9):

915-9.
99. Bradford B, Cronin R, McKinlay C, Thompson J, McCowan L. Maternally perceived fetal movement patterns: The influence of body mass index. *Early Human Development* 2020; **140**: 104922.
100. Lindqvist PG, Molin J. Does antenatal identification of small-for-gestational age fetuses significantly improve their outcome? *Ultrasound in Obstetrics & Gynecology* 2005; **25**(3): 258-64.
101. Delaram M, Shams S. The effect of foetal movement counting on maternal anxiety: A randomised, controlled trial. *Journal of Obstetrics and Gynaecology* 2016; **36**(1): 39-43.
102. Smith CV, Davis S, Rayburn W. Patients' acceptance of monitoring fetal movement. A randomized comparison of charting techniques. *The Journal of reproductive medicine* 1992; **37**(2): 144-6.
103. Akselsson A, Lindgren H, Georgsson S, Warland J, Pettersson K, Rådestad I. Daily structured approach to awareness of fetal movements and pregnancy outcome – a prospective study. *Sexual & Reproductive Healthcare* 2019; **20**: 32-7.
104. Heazell AEP, Stacey T, O'Brien LM, Mitchell EA, Warland J. Excessive fetal movements are a sign of fetal compromise which merits further examination. *Medical Hypotheses* 2018; **111**: 19-23.
105. Huang C, Han W, Fan Y. Correlation study between increased fetal movement during the third trimester and neonatal outcome. *BMC Pregnancy and Childbirth* 2019; **19**(1): 467.
106. Sharp I, Adeyeye T, Peacock L, et al. Investigation of the outcome of pregnancies complicated by increased fetal movements and their relation to underlying causes – A prospective cohort study. *Acta obstetricia et gynecologica Scandinavica* 2021; **100**(1): 91-100.
107. Cohen G, Bogin R, Schreiber H, et al. Are increased fetal movements during pregnancy a predictor of neonatal adverse outcomes? *American Journal of Obstetrics and Gynecology* 2022; **227**(2): 349-51.
108. Keegan KA, Jr., Paul RH. Antepartum fetal heart rate testing. IV. The nonstress test as a primary approach. *Am J Obstet Gynecol* 1980; **136**(1): 75-80.
109. Patrick J, Carmichael L, Chess L, Staples C. Accelerations of the human fetal heart rate at 38 to 40 weeks' gestational age. *Am J Obstet Gynecol* 1984; **148**(1): 35-41.
110. Rabinowitz R, Persitz E, Sadovsky E. The relation between fetal heart rate accelerations and fetal movements. *Obstet Gynecol* 1983; **61**(1): 16-8.
111. Brown R, Patrick J. The non-stress test: How long is enough? *Amer J Obstet Gynecol* 1981; **141**: 646-51.
112. Lee CY, Drukker B. The nonstress test for the antepartum assessment of fetal reserve. *Am J Obstet Gynecol* 1979; **134**(4): 460-70.
113. Grivell RM, Alfirevic Z, Gyte GML, Devane D. Antenatal cardiotocography for fetal assessment. *Cochrane Database of Systematic Reviews* 2015; (9).
114. Malcus P. Antenatal fetal surveillance. *Curr Opin Obstet Gynecol* 2004; **16**(2): 123-8.
115. Chakladar A, Adams H. Dangers of listening to the fetal heart at home. *BMJ* 2009; **339**: b4308.
116. O'Sullivan O, Stephen G, Martindale E, Heazell AE. Predicting poor perinatal outcome in women who present with decreased fetal movements. *J Obstet Gynaecol* 2009; **29**(8): 705-10.
117. Turner JM, Cincotta R, Chua J, et al. Decreased fetal movements – The utility of ultrasound to identify infants at risk and prevent stillbirth is poor. *American Journal of Obstetrics & Gynecology MFM* 2022.
118. Melamed N, Baschat A, Yinon Y, et al. FIGO (International Federation of Gynecology and Obstetrics) initiative on fetal growth: Best practice advice for screening, diagnosis, and management of fetal growth restriction. *International Journal of Gynecology & Obstetrics* 2021; **152**(S1): 3-57.
119. Alfirevic Z, Stampalija T, Dowswell T. Fetal and umbilical Doppler ultrasound in high-risk pregnancies. *Cochrane Database of Systematic Reviews* 2017; (6).
120. O'Leary BD, Walsh CA, Fitzgerald JM, Downey P, McAuliffe FM. The contribution of massive fetomaternal hemorrhage to antepartum stillbirth: a 25-year cross-sectional study. *Acta obstetricia et gynecologica Scandinavica* 2015; **94**(12): 1354-8.
121. Cozzolino M, Magro Malosso ER, Perelli F, Franchi C, Coccia ME. Keep in mind foetomaternal haemorrage in case of reduced foetal movements: a successful obstetric management. *Journal of Obstetrics and Gynaecology* 2017; **37**(1): 100-2.
122. Solomonia N, Playforth K, Reynolds EW. Fetal-maternal hemorrhage: a case and literature review. *AJP reports* 2012; **2**(1): 7-14.
123. Christensen RD, Lambert DK, Baer VL, et al. Severe neonatal anemia from fetomaternal hemorrhage: report from a multihospital health-care system. *Journal of perinatology : official journal of the California Perinatal Association* 2013; **33**(6): 429-34.
124. Maier JT, Schalinski E, Schneider W, Gottschalk U, Hellmeyer L. Fetomaternal hemorrhage (FMH), an update: review of literature and an illustrative case. *Archives of gynecology and obstetrics* 2015.
125. Eichbaum M, Gast AS, Sohn C. Doppler sonography of the fetal middle cerebral artery in the management of

massive fetomaternal hemorrhage. *Fetal Diagn Ther* 2006; **21**(4): 334-8.
126. Haruna Y, Suzuki S. Cardiotocography findings of early-stage chronic fetomaternal hemorrhage after the presentation of reduced fetal movement. *Clinical Case Reports* 2019; **7**(3): 564-7.
127. Higgins LE, Johnstone ED, Heazell AEP. MANAGEMENT OF REDUCED FETAL MOVEMENTS. *Fetal and Maternal Medicine Review* 2013; **24**(4): 201-31.
128. Sinha D, Sharma A, Nallaswamy V, Jayagopal N, Bhatti N. Obstetric outcome in women complaining of reduced fetal movements. *J Obstet Gynaecol* 2007; **27**(1): 41-3.
129. Grobman WA, Rice MM, Reddy UM, et al. Labor Induction versus Expectant Management in Low-Risk Nulliparous Women. *New England Journal of Medicine* 2018; **379**(6): 513-23.
130. Stock SJ, Ferguson E, Duffy A, Ford I, Chalmers J, Norman JE. Outcomes of elective induction of labour compared with expectant management: population based study. *BMJ* 2012; **344**: e2838.
131. Turner JM, Flenady V, Ellwood D, Coory M, Kumar S. Evaluation of Pregnancy Outcomes Among Women With Decreased Fetal Movements. *JAMA netw* 2021; **4**(4): e215071.
132. Malm M-C, Lindgren H, Rådestad I. Losing Contact with One'S Unborn Baby—Mothers' Experiences Prior to Receiving News That Their Baby Has Died in Utero. *OMEGA - Journal of Death and Dying* 2011; **62**(4): 353-67.
133. International Stillbirth Alliance (ISA). Position Statement: Fetal Movement Monitoring. Version 3: International Stillbirth Alliance Fetal Movements Working Group, 2022.
134. Royal College of Obstetricians and Gynaecologists (RCOG). Reduced Fetal Movements. RCOG Green-top Guideline No.57: Royal College of Obstetricians and Gynaecologists, 2011.
135. Coleman K, Norris S, Weston A, et al. NHMRC additional levels of evidence and grades for recommendations for developers of guidelines - consultation draft. Canberra: National Health and Medical Research Council, 2008.
136. National Health Medical Research Council (NHMRC). Procedures and requirements for meeting the 2011 NHMRC standard for clinical practice guidelines. Melbourne: National Health and Medical Research Council, 2011.

11. Appendix

A. Methods for guideline development

In 2010, the Australian and New Zealand arm of the international Fetal Movement Intervention and Assessment (FEMINA) collaboration developed this clinical practice guideline with a working party of clinicians and health service researchers. The process was coordinated by the Mater Mothers' Research Centre (MMRC), Mater Health Services, South Brisbane.

A literature review was undertaken based on questions identified by members of the working party (see B). Relevant papers were identified and classified according to level of evidence (see C). Recommendations were prepared with strength of recommendation grading and were presented to the working party for consensus. Following comment and necessary amendments, a final consultation draft of the guideline was shared with stakeholders and a consumer advisory panel for endorsement and circulation (see F).

The working party adopted the procedures recommended by the NHMRC for developing this guideline. These procedures comprised:

- Review the scope of the guideline for clinical relevance, to identify questions, target groups and health outcomes relevant to the guideline;
- Assess existing guidelines;
- Conduct a systematic graded review of the literature, to identify and evaluate the evidence relating to the effectiveness and appropriateness of the recommended interventions;
- Subject the draft guideline to wider stakeholder consultation, including a consumer advisory panel;
- Refine the guideline and related materials to make them accessible to the target users.

The following steps have also been undertaken in collaboration with PSANZ:

- Disseminate and implement the guideline;
- Monitor, evaluate and maintain the guideline
- Identify gaps in current information for the ongoing refinement of the guideline.

In 2015-16, an update was undertaken to review the literature, evidence and recommendations. Additional clinical resources were highlighted, including 1) patient information brochures, 2) clinician eLearning opportunities, and 3) an updated care pathway to reflect updated evidence for investigation of decreased fetal movement and to add clinical practice points. Further updates have been undertaken in 2018 and 2022.

B. Literature search

Guiding research questions

The following questions were raised by the working party and formed the basis of the search strategy:

- What is the definition of DFM?
- Within what time frame should a woman report concerns of DFM?
- What is the role of formal fetal movement monitoring in reducing adverse pregnancy outcome?
- Which investigations should be conducted when a woman presents with DFM?
- What follow-up care should be provided to women who report DFM?

Search strategy

A literature search was undertaken of major guideline websites (see below) and electronic databases: Medline OVID, CINAHL, Cochrane Library databases and Maternity and Infant Care.

The search of electronic databases was limited to the English language, and searches were undertaken using the following terms:

Medline OVID
((“fetal Movement” OR “foetal movement”).sh,ab,ti. OR (“fetal motility” or “foetal motility”).sh,ab,ti. OR (“fetal activity” or “foetal activity”).sh,ab,ti. OR (“fetal hypomotility” or “foetal hypomotility”).sh,ab,ti. OR (“fetal hypoactivity” or “foetal hypoactivity”).ab,ti. OR (fetal adj2 movement).ab,ti. OR (foetal adj2 movement).ab,ti.))

Cochrane Library
(fetal OR foetal) near/3 (movement* OR activity OR motility OR hypomotility OR hypoactivity).ti,ab. MeSH descriptor Fetal Movement explode all trees

CINAHL
“Fetal Movement” (CINAHL heading) OR (“fetal movement*” OR “foetal movement*” OR “fetal activity” OR “foetal activity” OR “fetal hypoactivity” OR “foetal hypoactivity” OR “fetal hypomotility” OR “foetal hypomotility” OR “fetal motility” OR “foetal motility”).ab,ti

Maternity and infant care
“fetal movement”.de OR (“fetal movement$” OR “foetal movement$” OR “fetal activity” OR “foetal activity” OR “fetal hypoactivity” OR “foetal hypoactivity” OR “fetal hypomotility” OR “foetal hypomotility” OR “fetal motility” OR “foetal motility”).ab,ti
Relevant references provided in bibliographies from various articles were searched manually, as were any references recommended in personal communications with experts in the field.

The relevant existing guidelines were searched at the National Guideline Clearinghouse (http://www.guideline.gov/).

The literature review was updated in 2016 to include evidence published between May 2010 and July 2016. And again in 2019 and 2022.

C. Grading of recommendations

Evidence-based recommendations were prepared and graded on the strength of the evidence. This classification of the evidence and grading of the recommendations was based, as stated below, on criteria advocated by the National Health and Medical Research Committee[13].

Grading of recommendations[135]

GRADE OF RECOMMENDATION	DESCRIPTION
A	Body of evidence can be trusted to guide practice
B	Body of evidence can be trusted to guide practice in most situations
C	Body of evidence provides some support for recommendation(s) but care should be taken in its application
D	The body of evidence is weak and the recommendation(s) must be applied with caution.
√	Body of evidence is inadequate and recommendation is based on consensus for good clinical practice

Body of Evidence Matrix[135]

COMPONENT	A EXCELLENT	B GOOD	C SATISFACTORY	D POOR
EVIDENCE BASE [1]	several level I or II studies with low risk of bias	one or two level II studies with low risk of bias or a SR/ multiple level III studies with low risk of bias	level III studies with low risk of bias, or level I or II studies with moderate risk of bias	level IV studies, or level I to III studies with high risk of bias
CONSISTENCY [2]	all studies consistent	most studies consistent and inconsistency may be explained	some inconsistency reflecting genuine uncertainty around clinical question	Evidence is inconsistent
CLINICAL IMPACT	very large	substantial	moderate	slight or restricted
GENERALISABILITY	population/s studied in body of evidence are the same as the target population for the guideline	population/s studied in the body of evidence are similar to the target population for the guideline	population/s studied in body of evidence differ to target population for guideline but it is clinically sensible to apply this evidence to target population [3]	population/s studied in body of evidence differ to target population and hard to judge whether it is sensible to generalise to target population
APPLICABILITY	directly applicable to Australian healthcare context	applicable to Australian healthcare context with few caveats	probably applicable to Australian healthcare context with some caveats	not applicable to Australian healthcare context

[1] Level of evidence determined from the NHMRC evidence hierarchy;
[2] If there is only one study, rank this component as 'not applicable';
[3] For example, results in adults that are clinically sensible to apply to children OR psychosocial outcomes for one cancer that may be applicable to patients with another cancer.

D. Guideline working group

These updated clinical guidelines have been compiled by the following clinicians, health researchers and representatives from collaborating organisations:

NAME	ROLE AND/OR AFFILIATION
Prof Vicki Flenady*	Director, NHMRC Centre of Research Excellence in Stillbirth, Mater Research Institute, University of Queensland
Dr Billie Bradford*	Senior Research Officer, NHMRC Centre of Research Excellence in Stillbirth, Mater Research Institute, University of Queensland
Dr Robin Cronin	Research Midwife Specialist, Counties Manukau Health and Department of Obstetrics and Gynaecology, University of Auckland
Prof David Ellwood*	Professor of Obstetrics & Gynaecology, Griffith University School of Medicine, and Director of Maternal-Fetal Medicine, Gold Coast University Hospital
Dr Adrienne Gordon*	Neonatal Staff Specialist, Royal Prince Alfred Hospital and NHMRC Early Career Research Fellow, University of Sydney
Prof Alexander Heazell	Senior Clinical Lecturer in Obstetrics, Maternal and Fetal Health Research group, University of Manchester
A/Prof Jane Warland	Associate Professor Midwifery Curtin University and King Edward Memorial Hospital, Perth
A/Prof Alexis Shub	Obstetrician and Maternal Fetal Medicine Specialist Mercy Hospital for Women, Melbourne
A/Prof Sanne Gordijn	Obstetrician and Maternal Fetal Medicine Specialist, University Medical Centre, University of Groningen
Mr Dexter Hayes	PhD Student, University of Manchester
Ms Natasha Cocker	Research Midwife, NHMRC Centre of Research Excellence in Stillbirth, Mater Research Institute, University of Queensland

** Affiliated with the NHMRC Centre of Research Excellence in Stillbirth*

We also acknowledge Dr Sarah Henry, Ms Natasha Meredith, and the Stillbirth CRE coordinating centre for research and administrative support across the development and updating of these guidelines.

Previous versions of the guideline included the following working party members (2017):

Prof Vicki Flenady Director, NHMRC Centre of Research Excellence in Stillbirth, Mater Research Institute – The University of Queensland; Dr Christine Andrews Postdoctoral Research Officer, NHMRC Centre of Research Excellence in Stillbirth, Mater Research Institute – The University of Queensland; Ms Victoria Bowring General Manager, Stillbirth Foundation Australia; A/Prof Fran Boyle Social scientist and health services researcher, Institute for Social Sciences Research, The University of Queensland; Ms Billie Bradford Midwife and Teaching Fellow, School of Nursing, Midwifery, and Health Practice, University of Wellington; Dr Wendy Burton Chair, Mater Mothers' Hospital Alignment; Maternity Lead, Brisbane South Primary Health Network; General Practitioner, Brisbane, Australia; Dr Yogesh Chadha Senior Staff Specialist, Royal Brisbane and Women's Hospital; Brisbane, Australia; Ms Liz Conway Stillbirth and Neonatal Death Support (SANDS) Queensland; Brisbane, Australia; Ms Robin Cronin Midwife educator and researcher, Department of Obstetrics and Gynaecology, University of Auckland; Ms Lisa Daly PhD Candidate, NHMRC Centre of Research Excellence in Stillbirth, Mater Research Institute – The University of Queensland; Brisbane, Australia; Prof David Ellwood Professor of Obstetrics & Gynaecology, Griffith University School of Medicine, and Director of Maternal-Fetal Medicine, Gold Coast University Hospital; Ms Tracy Firth Senior Project Officer, Safer Care Victoria; Dr J Frederik Frøen Head of Research and Perinatal Epidemiologist, Norwegian Institute of Public Health; Oslo, Norway; Ms Claire Foord CEO and Founder, Still Aware; Dr Ruth Fretts Senior staff specialist, Brigham and Women's Hospital and Harvard University Medical School; Boston, USA; Dr Glenn Gardener Director, Mater Centre for Maternal Fetal Medicine, Mater Health, South Brisbane, Qld Australia; Senior Research Fellow, NHMRC Centre of Research

Excellence in Stillbirth, Mater Research Institute – The University of Qld; Brisbane, Australia, Senior Lecturer, Obstetrics and Gynaecology, University of Queensland;

Dr Adrienne Gordon Neonatal Staff Specialist, Royal Prince Alfred Hospital and NHMRC Early Career Research Fellow, University of Sydney; Prof Alexander Heazell Senior Clinical Lecturer in Obstetrics, Maternal and Fetal Health Research group, University of Manchester; Ms Annelise Kirkham Registered Nurse and Midwife, Royal Brisbane and Women's Hospital; Ms Laura Koopmans Fetal movement study group coordinator, Mater Medical Research Institute, Mater Health Services; Brisbane Australia; Ms Kate Lynch CEO, Stillbirth Foundation Australia; Ms Julie MacPhail Mater Medical Research Institute, Mater Health Services; Brisbane, Australia; A/Prof Kassam Mahomed Senior Staff Specialist, Ipswich Hospital, and The University of Queensland; Prof Lesley McCowan Maternal Fetal Medicine specialist and Head of the Department of Obstetrics and Gynaecology, The University of Auckland; Ms Lucy McCudden Clinical midwife specialist, Royal Prince Alfred Hospital; Prof Susan McDonald Professor of Midwifery (Adjunct), La Trobe University and Mercy Hospital for Women, Melbourne; A/Prof Philippa Middleton Perinatal Epidemiologist, South Australian Health and Medical Research Institute; Dr Richard Poll Maternal Feta; Medicine Specialist, Mater Mothers' Hospital; Dr Jane E Norman Professor of Maternal-Fetal Health, University of Edinburgh, Scotland; Prof Jeremy Oats Chair, Victorian Consultative Council on Obstetric and Paediatric Mortality and Morbidity; Professorial Fellow, Melbourne School of Population and Global Health, University of Melbourne; Chair PSANZ/ SANDA; Dr Scott Preston General practitioner, medical educator; Brisbane, Australia; Ms Hilary Rorison Midwifery Advisor, Australian College of Midwives; Dr Sean Seeho Joint Head, Discipline of Obstetrics, Gynaecology and Neonatology, Senior Lecturer and Postgraduate Coordinator Sydney Medical School – Northern, The University of Sydney; Dr Antonia Shand Obstetrician and Gynaecologist, RANZCOG-certified subspecialist in Maternal Fetal Medicine; Head of Maternal Fetal Medicine, Royal Hospital for Women, Randwick; Dr Alexis Shub Obstetrician and Specialist in Maternal-Fetal Medicine, Mercy Hospital for Women, Melbourne; Ms Elisha Swift Clinical Midwife, Royal Brisbane and Women's Hospital; Ms Tomasina Stacey Senior lecturer, School of Midwifery, Auckland University of Technology; Auckland, New Zealand; Prof Sue Walker Head of the Department of Obstetrics and Gynaecology and Director of Perinatal Medicine at Mercy Hospital for Women; A/Prof Jane Warland Associate Professor, School of Nursing and Midwifery, The University of South Australia (UniSA); Ms Megan Weller Research Midwife, NHMRC Centre of Research Excellence in Stillbirth, Mater Research Institute – The University of Queensland; Ms Aleena Wojcieszek Research Associate, NHMRC Centre of Research Excellence in Stillbirth, Mater Research Institute – The University of Queensland.

E. Conflict of interest statement

The working party feels strongly that the identification and management of conflicts of interest are of central importance, to ensure that there is no influence by competing interests that could erode the integrity of recommendations. Under the *Procedures and requirements for meeting the 2011 NHMRC standard for clinical practice guidelines* (the 2011 NHMRC Standard [136]), this working group has been required to identify, document and manage potential competing interests through adherence to the following NHMRC principles:

- transparency in the disclosure of any interests
- managing interests in a manner consistent with the NHMRC policy
- balance and diversity of expertise and perspectives
- balancing the benefit of having persons with expertise against the risks of their interests biasing a process
- the focus on technical knowledge should not override or dominate all other considerations
- the committee or working group is chaired by someone who has no conflicts of interest that could, or could be perceived to, erode the integrity of the recommendations
- ensuring the integrity of the guidelines.

Each member of the group has agreed to comply with the principles about disclosure of interests and also follows their own internal institutional procedures in relation to declaration, identification and management of interests.

F. Stakeholder consultation

Once the working party had achieved consensus around recommendations, consultation was undertaken including the following organisations and individuals:

1. Perinatal Society of Australia and New Zealand (PSANZ), Policy Committee
2. PSANZ Consumer Advisory Panel
3. PSANZ SANDA membership
4. Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG)
5. Australian College of Midwives (ACM)
6. Royal Australian College of General Practitioners (RACGP)
7. New Zealand College of Midwives
8. National SIDS Council of Australia Ltd (Red Nose)
9. Stillbirth Foundation Australia
10. SANDS Australia
11. Still Aware
12. Women's Healthcare Australasia