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Reduced Fetal Movements

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This is the second edition of this guideline. The first edition was previously published in 2011 under the same title.

Key recommendations

- Advise women to report any change of fetal movements to their maternity unit, whether a decrease, cessation or an episode of sudden excessive, vigorous fetal movements. (Grade B)
- There is insufficient evidence to recommend formal fetal movement counting using specified numbers. (Grade A)
- All clinicians should be aware of the association of RFMs with key risk factors such as FGR, SGA fetus, placental insufficiency and congenital malformations. (Grade C)
- When a woman presents with RFM in the community or hospital setting an attempt should be made to auscultate the fetal heart using a handheld Doppler device to exclude fetal death. (Grade C)
- Clinical assessment of a woman with RFM should include assessment of fetal size by measuring symphysis-fundal height, blood pressure and urinalysis. (Grade C)
- In women with RFM, after fetal viability has been confirmed, arrangements should be made for a woman to have a CTG to exclude acute fetal compromise if the pregnancy is ≥ 28+0 weeks of gestation (see section 14 for recommendations prior to this gestation). (Grade B)
- Ultrasound scan assessment should be undertaken as a part of the preliminary investigations of a woman presenting with RFM after 28+0 weeks of gestations if the perception of RFM persists despite a normal CTG, if there are any additional risk factors for FGR and/or stillbirth and if an ultrasound scan has not been performed in the preceding two weeks. (Grade B)
- If abnormalities are present on antenatal cardiotocography, intervention should be discussed with a senior obstetrician and decisions about birth should consider gestation and the degree of abnormality. (GPP)
- If the fetus is found to be SGA and/or there are abnormalities of umbilical artery Doppler or liquor volume, management should be in accordance with the relevant RCOG guideline. (GPP)
- If women who have normal investigations after one presentation with RFM have another episode of RFM, they should be advised to contact their maternity unit for further assessment as indicated in section 8 of this guideline. (Grade B)
- Where there is no objective evidence of fetal compromise (no CTG abnormalities, no evidence of reduced fetal growth, oligohydramnios or umbilical artery Doppler abnormalities) women should be reassured there is no indication for expediting birth. (Grade A)
- A decision to expedite birth should be made on an individual basis in partnership with the woman. If women present with RFM after 39 weeks of gestation expediting birth does not appear to be associated with increased risk to mother or baby. (Grade A)
- When a woman recurrently perceives RFM her case should be reviewed to exclude predisposing causes (Grade C)
- When a woman presents with RFM in a multiple pregnancy investigations to identify developing fetal compromise should be undertaken including cardiotocography, assessment of fetal growth, liquor volume and umbilical artery Doppler. (Grade C)

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- If a woman presents with RFM between 24+0 weeks of gestation and 28+0 weeks of gestation the presence of a fetal heartbeat should be confirmed by auscultation with a Doppler handheld device and a history taken to determine other risk factors for stillbirth or early onset FGR. (GPP)
- If a woman presents with RFM prior to 24+0 weeks of gestations the presence of a fetal heartbeat should be confirmed by auscultation with a Doppler handheld device. (GPP)

1. Purpose and scope

The purpose of this guideline is to provide advice to guide clinicians, based on the best evidence where available, regarding the management of women presenting with reduced fetal movements (RFMs) during pregnancy. This guideline reviews the risk factors for RFMs in pregnancy and factors influencing maternal perception. It provides recommendations as to how women presenting in both the community and hospital settings should be cared for. As is apparent from the low grading of the evidence for many of the recommendations, they have been developed to provide a broad practical guide for midwives and obstetricians in clinical practice. However, it is recognised that, in individual women, alternative approaches may be reasonable.

1.1 Population and setting

Pregnant women in community or hospital settings reporting RFMs.

1.2 Interventions to be studied

Comparison of modalities to detect and manage women perceiving RFMs.

2. Background

Maternal perception of fetal movements is regarded as a sign of fetal wellbeing.[1 2] Maternal perception of fetal activity/movement begins between 16 and 24 weeks gestation and acquires a regular pattern by 28 weeks of pregnancy. It has been suggested that reduced or absent fetal movements may be a warning of impending fetal death via placental dysfunction.[3] Studies of placental structure and function have recurrently demonstrated an association between RFMs and placental pathology.[4-6] A significant reduction or sudden reduction in fetal movement is a potentially important clinical sign identified by multiple observational studies[7-9] and was highlighted by the most recent Confidential Enquiries into Non-Anomalous Term Stillbirths, Intrapartum-related perinatal deaths and Perinatal Deaths in Multiple pregnancies.[10 11] Some studies have also identified a period of extremely vigorous activity preceding stillbirth.[9 12-14] The stillbirth rate in 2018 was 3.51 per 1000 live births, using the Codac classification 35.5% were unexplained and 32.5% were related to placental causes.[15] Importantly, observational studies conducted where protocols are in place for the management of RFM have shown there is no reported increase in stillbirths in women with RFM; other studies report higher incidence of small-for-gestational-age births and other adverse outcomes compared to women with normal movements.[16 17]

3. Identification and assessment of evidence

The Cochrane Library and electronic databases (DARE, EMBASE, Trip, MEDLINE and PubMed) were searched using the relevant Medical Subject Headings (MeSH) terms, including all subheadings and synonyms, and this was combined with a keyword search. Search terms included ‘fetal activity’, ‘fetal movement + detection’, ‘reduced fetal movement’, ‘fetal cardiotocography’, ‘fetal heart auscultation’, ‘umbilical artery Doppler’; the search limited to humans and English language. The search was restricted to articles published until June 2022. The full search strategy is available to view online as supporting information (Appendix S1 and S2).

This guideline was developed using the methodology described in Clinical Governance Advice 1 (a-c). Where possible, recommendations are based on available evidence. In the absence of published evidence, these

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have been annotated as 'good practice points'. Further information about the assessment of evidence and the grading of recommendations may be found in Appendix 1.

3.1 Limitations of data used in this guideline

Interpreting studies of women perceiving RFM is complicated by multiple definitions of normal and abnormal fetal movements (discussed in detail in section 5 of this guideline) and few large scale (>1000 participants) descriptive or intervention studies. There are few randomised controlled trials addressing the management of RFMs, and even those that are available involve different comparisons making meta-analysis difficult. In addition, the main outcome of interest (i.e. stillbirth) is relatively uncommon and adequately powered studies of different management protocols would require large numbers of participants (a 10% reduction in stillbirth from 4.0 per 1000 births to 3.6 per 1000 births would require >370 000 participants in each group). Consequently, many studies are underpowered and have limitations in terms of definition of RFM and outcomes, ascertainment bias and selection bias.

4. What are considered to be normal fetal movements during pregnancy?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Advise women they are likely to feel fetal movements from 20 weeks of gestation.	**2–**	**C**	Observational studies describe onset of fetal movements for most women by 20 weeks of gestation.
Advise women that fetal movements are likely to plateau after 32 weeks of gestation but do not reduce in the third trimester.	**2–**	**B**	Although the quality of fetal movements changes in late pregnancy, there is no reduction of frequency or strength of fetal movements in the third trimester.
Advise women that the presence of regular fetal movements during pregnancy is an indicator of fetal wellbeing.	**2+**	**B**	Presence of regular fetal movements is associated with a significantly reduced odds of stillbirth.

Perceived fetal movements are defined as the maternal sensation of any discrete kick, flutter, swish or roll.[3] Such activity provides an indication of the integrity of the fetal central nervous and musculoskeletal systems. A healthy fetus is active, capable of physical movement and goes through periods of both rest and sleep. The majority of women perceive fetal movements and intuitively view their experience of fetal activity as normal.

Most pregnant women become aware of fetal activity from 18–20 weeks of gestation although some multiparous women may perceive fetal movements as early as 16 weeks of gestation and some primiparous women may perceive movement much later than 20 weeks of gestation.[1] The number of spontaneous movements tends to increase until the 32nd week of pregnancy.[18-20] After this gestation the majority of women (90%) experience either an increase or no change in the frequency and strength of fetal movements until the onset of labour.[21] *[Evidence level 2++]*

However, the nature of fetal movement may change as pregnancy advances in the third trimester;[18-20 22 23] kicks tend to be reduced and replaced by rolling, stretching and pushing movements.[24-26] *[Evidence level 2–]*

Importantly, the frequency of fetal movements does not decrease at term, but the complexity, type and strength varies.[24 26-28] *[Evidence level 2–]*

By term, the average number of generalised movements per hour is 31 (range 16–45) with the longest interval between movements ranging from 50 to 75 minutes.[29] Changes in the number and nature of fetal movements as the fetus matures are considered to be a reflection of the normal neurological development of the fetus. From as early as 20 weeks of gestation, fetal movements show diurnal changes. The afternoon

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and evening periods are periods of peak activity.[30-32] Fetal movements are usually absent during fetal "sleep" cycles which occur regularly throughout the day and night and usually last 20–40 minutes.[33 34] They rarely exceed 90 minutes in a healthy fetus.[33 35,36] *[Evidence level 2–]*

Because of a paucity of robust epidemiological studies on fetal activity patterns and maternal perception of fetal activity in normal pregnancies there is currently no universally agreed definition of normal or RFM. However, a meta-analysis of case-control studies demonstrates that perception of increasing strength or frequency of fetal movements is associated with a significant reduction in stillbirth (aOR 0.18, 95% CI 0.14–0.23).[21] In addition, fetal hiccups are also associated with a reduction in stillbirth (aOR 0.42, 95% CI 0.34–0.53). *[Evidence level 2++]*

5. Advice for women about their perception of this activity

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Advise women to be aware of fetal movements up to and including the onset of labour.	**2–**	**C**	Although type of movement changes there is no reduction of fetal movement in the third trimester of pregnancy.
Advise women to report any decrease or cessation of fetal movements to their maternity unit.	**2++**	**B**	Meta-analysis of observational studies identifies these patterns of fetal activity with increased risk of stillbirth.
Advise women to report any decrease or cessation of fetal movements especially if following an episode of sudden excessive, vigorous fetal movements.	**2++**	**B**	Meta-analysis of observational studies identifies these patterns of fetal activity with increased risk of stillbirth.
Do not attribute RFM to a raised BMI.	**2++**	**B**	Increased BMI is not associated with altered perception of fetal movements. Women with increased BMI have an increased risk of stillbirth.
Do not attribute RFM to an anterior placenta if a change in movement occurs.	**2–**	**C**	Women with anterior placenta perceive fewer movements, but this should not cause a sudden change.

It is well established that women do not perceive all fetal movements. Studies of the correlation between maternal perception of fetal movements and fetal movements concurrently detected on ultrasound scans show a wide variation, ranging from 37–88%, with large body movements and those lasting more than 7 seconds most likely to be felt.[37-44] *[Evidence level 2– to 2+]*

Women's perception of fetal activity is influenced by a wide variety of factors (see Table 1). There is some evidence that women perceive most fetal movements when lying down (except when supine), fewer when sitting and least while standing, and activity appears to be greatest in the evening.[22 31 45] *[Evidence level 2+]*

Table 1. Factors which can alter maternal perception of fetal activity

Evidence suggests positive effect on perception of fetal movement	Evidence suggests negative effect on perception of fetal movement	Unclear effect on perception of fetal movement
Focussed attention on fetal movement	Anterior placenta	Caffeine
Maternal exercise	Drugs (alcohol, benzodiazepines, methadone)	Glucose

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Maternal anxiety	Fetal musculoskeletal or neurological anomalies	Corticosteroids
Mealtimes	Distraction	Raised Body Mass Index

Maternal activity can alter maternal perception of fetal movements. Reports of RFM in singleton pregnancies with good outcomes are increased in women who did not take daily exercise and women who were in employment. Regular mild to moderate exercise appeared to increase maternal perception of fetal movements. Whether this is due to the effects of exercise itself is not known.[45] When attention is paid to fetal activity in a quiet room and careful recordings are made, fetal movements not previously perceived are often recognised clearly.[19,20] The difference in mean time to perceive 10 movements varied between 10 minutes for focussed counting to 162 minutes with unfocussed perception of fetal movements.[25 28 35 46] *[Evidence level 2– to 2+]*

Prior to 28^{+0} weeks of gestation, an anterior placenta may decrease a woman's perception of fetal movements.[28 47 48] *[Evidence level 2–]*

After 28 weeks, one study demonstrated no reduction in women's perception of movements,[49] but another found more women with anterior placenta presented with RFM.[50] *[Evidence level 2-]*

Drugs which cross the placenta such as alcohol, benzodiazepines, methadone and other opioids can have a transient effect on fetal movements.[51 52] *[Evidence level 3]*

Caffeine has been reported to alter fetal activity; two studies reported that coffee consumption was a significant predictor of less movement of fetal limbs.[53] Conversely, another study of women consuming 500mg or more of caffeine per day found increased time spent in active (arousal) state.[54] *[Evidence level 2–]*

Another prospective study detected increased multiple limb movements in fetuses whose mothers were anxious in the second trimester.[53] *[Evidence level 2+]*

Several observational studies have demonstrated an increase in fetal movements following the elevation of the glucose concentration in maternal blood although other studies refute these findings.[55 56] Qualitative interviews with low-risk women have suggested that maternal meals may influence the pattern of fetal activity, with 73.6% saying that movements increased at mealtimes, with fewer fetal movements following a meal suggesting satiation and contentment being the dominant pattern, although 36.8% described greater activity when mothers were hungry or during the period prior to meals.[25] *[Evidence level 2+]*

From 30 weeks of gestation onwards the level of carbon monoxide in maternal blood influences fetal respiratory movements and some authors report that cigarette smoking is associated with a decrease in fetal activity.[25 51 57-59] *[Evidence level 2–]*

The administration of corticosteroids to enhance fetal lung maturation has been reported by some authors to decrease fetal movements and fetal heart rate (FHR) variability detected by CTG over the two days following administration.[60-62] The pathophysiology of corticosteroid changes in fetal movements and FHR variability is still unclear and has not been definitely proven.[60-63] *[Evidence level 2–]*

Fetuses with major malformations are generally more likely to demonstrate reduced fetal activity.[63] However, normal or excessive fetal activity has been reported in anencephalic fetuses.[64 65] A lack of vigorous motion may relate to abnormalities of the central nervous system, muscular dysfunction, or skeletal abnormalities.[66]

Fetal presentation has previously been found to have no effect on perception of movement.[67] A subsequent observational study determined that, although no differences in spontaneous behaviour were noted between fetuses presenting as breech or cephalic, some differences in responses were identified in the presence of either vibroacoustic stimulus or airborne sound. The researchers suggested that this may have

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been associated with conduction through maternal tissues and amniotic fluid to the fetal skull.[68] *[Evidence level 2– to 2+]*

Fetal position might influence maternal perception as 80% of fetal spines lay anteriorly in women who were unable to perceive fetal movements despite being able to visualise them when an ultrasound scan was performed.[48] Observational studies have shown women to perceive a higher proportion of movements where there is contact with the uterus rather than the placenta.[44] *[Evidence level 2–]*

A systematic review and meta-analysis of 10 observational studies found that increased maternal body mass index (BMI) was not associated with altered perception of fetal movements, but that this group of women were more likely to present with RFM.[69] *[Evidence level 1–]*

However, some studies have identified more frequent presentation of perceived RFM in overweight (BMI >25 kg/m^2) or obese women (>30 kg/m^2) and a significant increase in counting time throughout pregnancy before 10 movements are felt.[28 59 70] *[Evidence level 2–]*

Importantly, a cohort study of women who had experienced stillbirth identified that 8% had misinterpreted uterine contractions as fetal movement; this was particularly evident at 28–36 weeks' gestation.[14] *[Evidence level 2+]*

This was also identified in women not experiencing RFM.[71] *[Evidence level 2–]*

A cohort study of 244 women investigated whether experiences of fetal movements were different for women experiencing stillbirth of term singleton pregnancies (>37 weeks) compared with stillbirths between 28 and 36 weeks of pregnancy.[14] *[Evidence level 2-]*

Decreased or weak movements were identified by more women in the term stillbirth category. In 18% of the cohort, there was no indication of a changed pattern of movement, but 23% identified a cessation in activity. The majority of women experienced decreased, weaker or no fetal movements two days before diagnosis of fetal demise; some stated that they had interpreted the warning signs as normal as they had heard that movements decreased in late pregnancy. Delay in presentation may relate to false reassurance provided by family members or friends, or presentation could be delayed due fear of intervention or not being taken seriously by healthcare staff being cited. [48 72] *[Evidence level 2–]*

A period of extremely vigorous activity followed by limited or cessation of movements was also reported by 10% of the participants. Women described this as repeated kicks or twitching, with a sensation of the fetus trying to escape.[9 13 73] *[Evidence level 2+]*

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6. How can fetal movements be assessed?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Fetal movements can only be assessed by subjective perception unless undergoing an ultrasound examination.	**3**	**D**	Not all fetal movements are perceived during pregnancy, but there are no objective means for a woman to reliably assess fetal activity.

Fetal movements are most commonly assessed by maternal perception alone. The subjective nature of maternal perception and variation in normal perception of fetal movement makes interpretation of maternal perception of RFM and associated clinical significance more challenging.

Studies of objective assessments of fetal movements utilise ultrasound techniques to detect fetal movement. These studies report slightly increased sensitivity for fetal movements recorded by ultrasound with 31.4–57.2% of all movements recorded compared to 30.8% for maternal perceived fetal movements.[44 49 74 75] However, the duration of recording is restricted to 20–30 minutes with the mother in a semi-recumbent position. Newer devices have employed accelerometers, actography or fetal vector cardiography to detect fetal movements (see Appendix 2 for descriptions). These devices are largely in early phase studies.[76] One actograph device found that fetal movements can be reliably measured and that measured fetal movements are associated both with fetal size in relation to gestation and umbilical Doppler parameters.[77] There are no studies which have evaluated the use of longer periods of fetal movement counting by objective methods or whether this approach can detect fetuses at-risk of stillbirth.[76] Given the potential detection of false positive signals from maternal abdominal wall movements such as coughing, this may not be a useful means to objectively measure fetal movements in all pregnant women.[78] *[Evidence level 2–]*

7. Should fetal movements be counted routinely in a formal manner?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
There is insufficient evidence to recommend formal fetal movement counting using specified numbers.	**2– to 1+**	**A**	There is insufficient evidence from randomised and non-randomised studies to demonstrate that formal fetal movement counting has a favourable effect on perinatal mortality.
Women should be advised to be aware of their baby's individual pattern of movements.	**3**	**C**	There is significant variation between perceived fetal movements in individual women.
If women are unsure whether movements are reduced after 28^{+0} weeks of gestation, when contacting hospital for another indication, they should be advised to lie on their left side and focus on fetal movements for two hours. If they do not feel 10 or more discrete movements in two hours then they should contact their midwife or maternity unit immediately.	**2– to 1–**	**C**	Maternal activity can reduce perception of fetal movements. Studies using focussed counting for set time periods (2 hours) have demonstrated reduction in perinatal mortality.

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The majority of evidence indicates asking women to monitor fetal movements is not associated with increased maternal anxiety.	**1–**	**B**	Data from meta-analysis of randomised controlled trials suggests there is no significant increase in maternal anxiety and maternal fetal attachment is increased in women who undertaken formal fetal movement counting.

Formal fetal movement counting relies on a woman counting fetal movements and if she perceives fewer movements than a specified number (alarm limit) then contacting her care provider. There are several problems with this strategy. Firstly, there is a wide range of "normal" fetal movements, leading to a wide variability between mothers. Secondly, the most frequently used definition of an "alarm limit" was developed on high-risk patients who counted fetal movements while hospital inpatients, hence these observations may not be applicable to a general population.[79] Ideally, any trigger for concern would be developed using the whole obstetric population and then be proven to reduce stillbirth rates in a prospective study.

There have been seven quantitative studies evaluating maternal fetal movement assessment (see Table 2). Grant *et al.* published a multi-centre study randomising women (n=68 654) to counting fetal movements using the "count-to-ten" chart or a non-counting group.[46] There was an overlap between the two groups as women in the non-counting group were also instructed to count fetal movements if they were deemed high-risk. There was no reduction in perinatal mortality in the group randomised to counting fetal movements, although the number of women presenting initially with a live fetus which was subsequently stillborn was greater in the counting cohort (11 versus 6).[46] The study's authors acknowledged that these intrauterine deaths may have been preventable, resulting from false reassurance from cardiotocography and clinical error. Importantly, the perinatal mortality rate for the whole study population fell to 2.9 per 1000 compared to 4.0 per 1000 reported prior to the study suggesting that participation in the trial may have been beneficial.[80] *[Evidence level 1–]*

Table 2. Summary of seven quantitative studies evaluating the impact of maternal awareness of fetal movements

Author	Study Type	Intervention	Main Finding	Evidence Level
Akselsson et al.	Cluster randomized trial	Mindfetalness technique	Apgar ≤7 5 minutes: 1.1% control vs. 1.1% intervention. SGA: control 10.7% vs. 10.2% intervention. Caesarean Section: control 19% vs. intervention 20% NICU admission: control 6.8% vs. intervention 6.3%.	1+
Saastad et al.	Individual randomized controlled trial	Fetal Movement Counting vs. not counting	No stillbirths in study Apgar <4 1 minute: 2.3% control vs. 0.4% intervention Caesarean section: 6.5% control vs. 7.1% intervention Small for gestational age (SGA) 8.7% control vs. 8.5% intervention	1+
Grant et al.	Cluster randomized trial	Count to 10 charts. Attend if <10 movements in 12 hours	Perinatal Mortality: Control 0.28% vs. Intervention 0.31%	1–
Neldam	Individual quasi-randomized controlled trial	Focus on FM for 2 hours. Attend maternity unit if <3 movements	Stillbirths: Control 0.71% vs 0% Intervention	1–

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Froen et al.	Prospective case-control	Fetal movement counting package of care	Perinatal mortality rate: control 0.3% vs. 0.2% intervention.	2+
Moore and Picaquadio	Retrospective case-control	Counting movements 2 hours/day	Perinatal mortality rate: Control 0.87% vs. 0.36% intervention. Caesarean section: control 0.8% vs. 2.4% intervention	2–
Westgate and Jamieson	Retrospective case-control	Count to 10 charts	Stillbirth rate: Control 1.1% vs. 0.8% intervention.	2–

Neldam randomised 2250 women to focus on fetal movements for 2 hours three times a week or given no information. There were eight intrauterine deaths, all of which were in the control group, leading to a significant decrease in perinatal mortality in women who formally counted fetal movements. Over 75% of this study population were classified as high-risk patients.[81] *[Evidence level 1–]*

Saastad et al. tested the count to ten method of assessment of fetal movements after 28 weeks of gestation against standard care in 1076 women. There was a significant reduction in babies born with an Apgar score <4 at 1 minute of age (0.4% versus 2.3%, RR: 0.2, 95% CI 0.04–0.7). Women in the intervention group had greater identification of FGR (87% versus. 60%, RR 1.5, 95% CI 1.0–2.1). There was no increase in maternal anxiety in women who were allocated to the intervention arm of the study.[82] *[Evidence level 1+]*

Akselsson et al. tested the Mindfetalness method in 67 maternity clinics in Stockholm, Sweden (n=39 865 women). Women in the intervention group received a leaflet about "Mindfetalness" a method to focus on fetal movement,[83] but there was no alteration of the management of RFM. This study found no reduction in stillbirth in the general population, but there was a reduction in small-for-gestational-age (SGA) births and caesarean births in women using the Mindfetalness method.[84] *[Evidence level 1+]*

Moore and Piacquadio used a retrospective case-control design.[35] In a period when women counted fetal movements for 2 hours a day, but were not given any "alarm limits" the perinatal mortality rate was 8.7 per 1000 (n=2519). The study was then extended to 5758 women who were instructed to present for further investigation if they had not felt 10 movements after 2 hours of focussed counting.[87] During this period the perinatal mortality was 3.6 per 1000. This was associated with increased hospital attendances, rates of induction of labour (7.9% versus 4.4%) and emergency caesarean birth for fetal distress (2.4% versus 0.8%). *[Evidence level 2–]*

Westgate and Jamieson compared the rates of stillbirth before and after the introduction of the "count to ten" charts in New Zealand.[88] They describe a significant reduction in stillbirth rate from 10.8 to 8.2 per 1000 total births. Other service improvements introduced over this period may also have had an impact on the perinatal mortality rate. *[Evidence level 2–]*

Froen et al. compared the incidence of stillbirth in Eastern Norway before and after women were given written information about decreased fetal movements and a standard protocol for the management of RFM was introduced. The incidence of stillbirth fell from 3.0/1000 to 2.0/1000 during the intervention period. In women perceiving RFMs the rate dropped from 4.2% to 2.4%.[59 89] *[Evidence level 2+]*

A small cross-over trial investigating the experiences of low-risk women via observation and questionnaires found that the majority preferred the Mindfetalness method to the modified count-to-ten method described by Winje et al, suggesting that concentration on the quality rather than quantity of movements increased the opportunity for mothers to connect with their fetus.[85] Mothers found both methods reassuring and safe, however. Two RCTs in a systematic review noted significantly higher maternal fetal attachment scores (indicating greater attachment between mother and fetus) if women counted fetal movements.[86] While perception of fetal movements is associated with a positive effect on maternal-fetal attachment,[90 91] the effect of monitoring fetal movements is equivocal. Two studies (including one randomised controlled trial

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discussed earlier) reported no adverse effects.[92 93] A small retrospective cohort found 23% of women reported anxiety and a further 16% described this as useless and a nuisance.[94] Clinicians should be aware that perception of RFM itself is associated with increased maternal anxiety.[95 96] Three RCTs in a systematic review showed no evidence of increased maternal concern or anxiety resulting from fetal movement counting.[86] *[Evidence level 1–]*

Clinicians should be aware that the risk of stillbirth (in the absence of congenital anomaly) in the UK is approximately 1 in 300 births (data from 2019).[97] When considering the utility of fetal movements as a screening test, clinicians must take account of potentially negative effects of maternal stress and anxiety. *[Evidence level 2+]*

8. What is the optimal care of women with reduced fetal movements?

A care pathway is shown in Appendix 3.

All women who contact maternity care with perceived reduced fetal movements from 24 weeks gestation should be reviewed according to departmental policy to assess fetal wellbeing.

When a woman presents with RFM the initial goal is to exclude stillbirth, which occurs in <1% of women presenting with RFM.[16 17] Subsequent to this the aim is to exclude fetal compromise and to identify pregnancies at risk of adverse pregnancy outcome while avoiding unnecessary interventions. Cross-sectional survey revealed wide variations in knowledge and practice of both obstetricians and midwives with regard to management of women presenting with RFMs. Although most clinicians recognised the association with intrauterine FGR, this did not translate into practice as professionals seldom undertook further assessment to identify FGR.[98 99] Subsequent evaluation of the implementation of the first iteration of this guideline found significant variation in adherence to different recommendations with all guidelines recommending a CTG be performed and the fewest recommending ultrasound scan for women at greatest risk of stillbirth.[100 101]

8.1 What should be included in the clinical history?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Upon presenting with RFM, a relevant history should be taken to assess a woman's risk factors for stillbirth and fetal growth restriction (FGR).	**2+**	**C**	Several cohort studies have identified factors which increase the risk of adverse outcome after maternal perception of RFM.
All clinicians should be aware of the association of RFMs with key risk factors such as FGR, SGA fetus, placental insufficiency and congenital malformations.	**2+**	**C**	Observational studies have consistently show association between RFM, small for gestational age infants and placental abnormalities.
If after discussion with the clinician it is clear that a woman does not have RFM, there are no other risk factors for stillbirth and the fetal heart is present on auscultation, she can be reassured. However, if she is in the community setting and still has concerns, she should be advised to attend her maternity unit.	**2+**	**C**	Absent or reduced fetal movements are associated with adverse pregnancy outcome.

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Women noticing a change in fetal activity where other risk factors for stillbirth are identified should attend their maternity unit for further investigation. (See section 8.3).	**4**	**GPP**	Women who have risk factors for stillbirth need further investigation (see section 8.3)

A history of RFM should be taken, including the duration of RFM, whether there has been absent fetal movements and whether this is the first occasion a woman has perceived RFM. Assessment should include a comprehensive stillbirth risk evaluation, including a review of the presence of other risk factors which are associated with an increased risk of stillbirth i.e. multiple consultations for RFM, known FGR, hypertension, diabetes, extremes of maternal age, smoking, placental insufficiency, congenital malformation, obesity, racial/ethnic factors, poor past obstetric history (e.g. FGR and stillbirth), genetic factors and access to care issues (see Table 3).[8 102 103] *[Evidence level 2+]*

In women who present with RFM, one study found women with increased BMI have an increased risk of stillbirth (OR 1.8, 95% CI 1.0–3.2) and fetal growth restriction (FGR) (OR 1.6, 95% CI 1.2–2.1), whereas three smaller studies did not show an association between BMI and risk of adverse outcome.[69] *[Evidence level 2++]*

Clinicians should be aware that a woman's risk status is fluid throughout pregnancy and she should be transferred from low-risk to high-risk care programmes if complications occur. If, after discussion with the clinician, it is clear that a woman does not have RFM in the absence of further risk factors and presence of a normal FHR on auscultation there should not be a need to follow up with further investigations.

Table 3. Risk factors for adverse outcome after maternal presentation with RFM*

Factor	Odds Ratio (95% CI)	Reference
Cigarette smoking	1.96 (0.96-4.00)	Dutton et al. 2012
Past Obstetric History of SGA baby or stillbirth	2.10 (1.17–4.14)	O'Sullivan et al. 2009
Past Medical History (e.g. Diabetes/Hypertension)	3.02 (1.01–9.06)	O'Sullivan et al. 2009
Recurrent presentation with RFM (≥2)	1.60 (1.05–2.44)	O'Sullivan et al. 2009
	8.04 (4.63 -13.98)#	Scala et al. 2015
Symphysis-fundal height <10th centile	15.43 (4.20–56.75)	O'Sullivan et al. 2009
Raised uterine artery PI in 2nd trimester	5.73 (2.42-13.55)#	Scala et al. 2015

*Some risk factors for stillbirth in the general population e.g. nulliparity are not included in this list because they were not associated with increased risk of adverse outcome after RFM. Professionals should still assess each case individually.
Odds ratio for the birth of a small for gestational age infant.

8.2 What should be covered in the initial clinical examination?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
If a woman presents with RFM in the community setting with no facility to auscultate the fetal heart the woman should be referred immediately to her maternity unit for auscultation.	**2-**	**C**	RFM is the presenting symptom for approximately half of intrauterine fetal deaths. Auscultation of the fetal heart is needed to confirm fetal viability.
When a woman presents with RFM in the community or hospital setting an attempt should be made to auscultate the fetal heart using a handheld Doppler device to exclude fetal death.	**3**	**C**	Fetal viability can be determine by auscultating the fetal heart in the community.

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Clinical assessment of a woman with RFM should include assessment of fetal size by measuring symphysis-fundal height, blood pressure and urinalysis.	**3**	**C**	RFM can be a symptom of placental dysfunction which may also present as an SGA infant or preeclampsia. Adverse outcome is more common if the fetus is SGA or the mother has increased blood pressure.

The key priority when a woman presents with RFM is to confirm presence of fetal cardiac activity. In most cases, a handheld Doppler device will confirm presence of the fetal heartbeat. This should be available in the majority of community settings in which a pregnant woman would be seen by a midwife or general practitioner. The fetal heart beat needs to be differentiated from the maternal heartbeat. This can be done by noting the difference between the FHR and the maternal pulse rate. If the presence of a fetal heart beat is not confirmed then immediate referral for ultrasound scan assessment of fetal cardiac activity must be undertaken. If the encounter with a woman has been over the telephone and is without the additional reassurance of auscultation of the fetal heart, the woman should be advised to attend the maternity unit for further assessment. *[Evidence level 2+]*

Methods employed to detect the SGA fetus include abdominal palpation, measurement of symphysis-fundal height and ultrasound biometry. Where symphysis-fundal height is measured, it should be plotted on a growth chart (please refer to the RCOG GTG on Small for Gestational Age, Management and Investigation) Consideration should be given to the judicious use of ultrasound scan (USS) to assess fetal size in those women in whom clinical assessment is likely to be less accurate e.g. a raised BMI. As preeclampsia is also associated with placental dysfunction it is prudent to measure blood pressure and test for proteinuria in women with RFM.

8.3 What is the role of cardiotocography?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
In women with RFM, after fetal viability has been confirmed, arrangements should be made for a woman to have a CTG to exclude acute fetal compromise if the pregnancy is ≥ 28^{+0} weeks of gestation (see section 14 for recommendations prior to this gestation).	**2+ to 1–**	**B**	Abnormal cardiotocography (CTG) is associated with adverse perinatal outcome. Computerised CTG appears to improve perinatal outcome.

Cardiotocography (CTG) monitoring of the FHR, initially for at least twenty minutes, provides an easily accessible means of detecting suspected fetal compromise. The presence of a normal FHR pattern (i.e. showing accelerations of FHR coinciding with fetal movements) is indicative of a healthy fetus with a properly functioning autonomic nervous system. The FHR accelerates with 92–97% of all gross body movements felt by the mother.[104 105] Several studies have concluded that if the term fetus does not experience a FHR acceleration for >80 minutes, fetal compromise is likely to be present.[106-108] However, a systematic review did not confirm or refute any benefits for routine CTG monitoring of "at risk" pregnancies after 26 weeks.[109] The authors acknowledged several limitations including limited numbers of women (six trials and 2105 women) and serious methodological concerns including the fact that the trials were conducted in the early 1980s when CTG monitoring was being introduced into routine clinical practice. *[Evidence level 1–]*

Compared to traditional CTG interpretation, computer systems for interpretation of CTG after 26 weeks of pregnancy reduce perinatal mortality, predicting umbilical acidosis and depressed Apgar scores.[109] *[Evidence level 1–]*

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Another systematic review of randomised and non-randomised studies of computerised CTG found no statistically significant reduction in perinatal mortality, but study design prevented pooling of data. The authors note that cCTG provides rapid objective data, reduces intra-observer and inter-observer variation and all non-randomised studies showed reduced investigation and better neonatal outcomes with cCTG.[110] *[Evidence level 1–]*

In a Norwegian study of 3014 women who presented with RFM a CTG was performed in 97.5% of cases with a CTG abnormality detected in 3.2% of cases.[96] In a different observational study of women presenting with RFM who had an initial CTG and an ultrasound scan, 21% had an abnormality detected that required action and 4.4% were admitted for immediate birth.[111] Another study showed that stillbirth rates (corrected for lethal congenital anomalies), after a reactive or non-reactive CTG, were 1.9 and 26 per 1000 births respectively.[112] Lastly, a small study reported that 56% of women in a high-risk pregnancy who reported RFM had an abnormal CTG. This was associated with an unfavourable perinatal outcome in nine out of ten cases.[40] A retrospective cohort study of 524 women with RFM found 497 (95%) had a normal CTG at presentation or a normal CTG after an initially non-reassuring CTG. There was no increase in adverse neonatal outcome in these infants. 5% of infants had a persistently non-reassuring CTG and these infants had evidence of adverse neonatal outcome.[113] A prospective cohort study of 305 women found that 4% had an abnormal CTG at presentation and abnormal CTG increased the risk of adverse outcome by 7-fold (aOR 7.1, 95% CI 1.3–38.2).[102] *[Evidence level 2+]*

8.4 What is the role of ultrasound assessment of fetal biometry, liquor volume and umbilical artery Doppler?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Ultrasound scan assessment should be undertaken as a part of the preliminary investigations of a woman presenting with RFM after 28^{+0} weeks of gestation if the perception of RFM persists despite a normal CTG, if there are any additional risk factors for FGR and/or stillbirth and if an ultrasound scan has not been performed in the preceding two weeks.	**2+**	**B**	The most common adverse outcome identified following RFM is the presence of a SGA fetus. Ultrasound scanning is the best means to detect an SGA fetus.
If an ultrasound scan assessment is deemed necessary, it should be performed at the earliest available opportunity.	**4**	**GPP**	A diagnosis of SGA should be made in a timely manner.
Ultrasound scan assessment should include the assessment of abdominal circumference and/or estimated fetal weight to detect the SGA fetus, assessment of amniotic fluid volume and umbilical artery Doppler.	**2+**	**C**	Adverse perinatal outcome after maternal presentation with RFM is increased if the fetus is SGA, there is oligohydramnios or abnormal umbilical artery Doppler waveform.
Ultrasound should include assessment of fetal morphology if this has not previously been performed.	**1+**	**A**	RFM is associated with neurological and musculoskeletal abnormalities.

There are no randomised controlled trials of ultrasound scan versus no ultrasound scan in women with RFM. Frøen *et al*. conducted a prospective population-based cohort study of 46 132 births in eastern Norway and Bergen over a 17 month period from 2006–2007.[95] In the prospective cohort of 3014 women presenting with RFM, ultrasound scanning was performed in 94% of cases and detection of an abnormality such as FGR,

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reduced amniotic fluid volume, or abnormal fetal morphology or Doppler of the umbilical artery was reported in 11.6% of cases. *[Evidence level 2+]*

A quality improvement programme in Norway, a prospective "before and after" study design, was used to evaluate the combined impact of providing women with information on RFM, and clinicians with clinical practice guidelines. After an initial period of study (n = 19 407) an investigation protocol of CTG and ultrasound scan was introduced in the management of women with RFM (n = 46 143). The guideline recommended that both investigations be performed within 2 hours if women reported no fetal movements, and within 12 hours if they reported RFM. The ultrasound scan was conducted to assess amniotic fluid volume, fetal size and fetal anatomy; the addition of Doppler studies to the investigation protocol did not show any additional benefit. There was a significant reduction in all stillbirths from 3.0/1000 to 2.0/1000, and from 4.2% to 2.4% of women presenting with RFM. The study reported no increase in the number of preterm births, infants requiring transfer to neonatal care, or infants with severe neonatal depression or FGR. There was more than a doubling in the number of ultrasound scans (OR 2.64; 95% CI 2.02–3.45), but this seemed to be compensated by a reduction in additional follow-up consultations and admissions for induction of labour.[59 89] *[Evidence level 2–]*

The AFFIRM study was a cluster randomised trial of 385 552 women in 33 hospitals. This study included giving women an information leaflet about fetal movements, education for staff and a protocol for the management of RFM which included an ultrasound scan for all women who reported RFM (for liquor volume using deepest vertical pocket within 2 hours and fetal biometry ideally on the next working day). This intervention did not significantly reduce stillbirth compared to standard care as defined in the study, but reduced the proportion of women who gave birth to an SGA infant after 39 weeks of gestation and increased the proportion of women having induction of labour and giving birth by caesarean birth (see section 11 for further information about the effects of the AFFIRM intervention). Therefore, ultrasound scan for all women presenting with RFM is not recommended.[114] *[Evidence level 1–]*

In a study of 489 women with RFM, Ahn *et al.* demonstrated that women with RFM but no additional pregnancy risk factor, did not require further follow-up once the CTG and the amniotic fluid volume were confirmed to be normal.[115] However, the study found a 3.7 times greater likelihood of a diminished amniotic fluid volume on scan in their study population. *[Evidence level 2–]*

Two studies have investigated the role of fetal and maternal artery Doppler assessment in women presenting with RFM. Korszun *et al*. reported 888 women, of whom 12 had abnormal umbilical artery Doppler (1.4%), including one infant that later died in utero. Dubiel *et al*. found only one abnormal umbilical artery Doppler waveform in 580 infants (0.2%). Although umbilical artery Doppler is rarely abnormal, it may be a significant abnormality when present. Further studies of the value of umbilical artery Doppler alone or in combination with other measurements are needed. *[Evidence level 2+]*

8.5 Is there any role for using the Biophysical Profile?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
There is insufficient evidence to recommend a BPP in all women with RFM.	**1–**	**B**	The role of biophysical profile (BPP) in the management or investigation of RFM is uncertain, but fetal death is rare after a normal BPP.

The basis of the BPP is the observed association between hypoxia (low levels of oxygen) and alterations of measures of central nervous system performance such as FHR patterns, fetal movement and fetal tone, which have been observed in both human and animal fetuses.[116] A systematic review of the use of BPP in women with high risk pregnancies, including women with RFM, included five low-quality studies with fewer than 3000 patients.[117] The systematic review concluded that there is insufficient evidence from randomised

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controlled trials to support the use of BPP as a test of fetal wellbeing in high-risk pregnancies. *[Evidence level 1–]*

It should be noted however that there is evidence from uncontrolled observational studies that biophysical profile in high-risk women has low false negative rate (0.07%), i.e. fetal death is rare in women in the presence of a normal biophysical profile.[118] *[Evidence level 2–]*

8.6 Is there any role for assessment for fetomaternal haemorrhage?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Fetomaternal haemorrhage is a rare cause of RFM, but should be considered in the presence of a non-reassuring or sinusoidal CTG.	**3**	**C**	RFM is reported as a presenting symptom of fetomaternal haemorrhage.
If CTG is normal and there is clinical suspicion of fetomaternal haemorrhage or fetal anaemia can be assessed by Doppler Velocimetry of the middle cerebral artery or Kleihauer.	**2-**	**C**	Not all fetomaternal haemorrhages are sufficiently large to cause CTG changes. Other tests may be used to identify fetomaternal haemorrhage.

Large fetomaternal haemorrhage is a rare event in pregnancy (estimated to be <0.5% of all pregnancies). It can lead to stillbirth or neonatal death. Fetomaternal haemorrhage can present with RFM.[119] The majority of cases of large fetomaternal haemorrhage had an abnormal CTG (non-reassuring or sinusoidal trace).[119 120] *[Evidence level 3]*

If fetomaternal haemorrhage is suspected then the case should be discussed with a senior obstetrician to determine whether birth is appropriate. If there is uncertainty about whether fetomaternal haemorrhage is present Kleihaur-Betke tests and Doppler velocimetry of the middle cerebral artery are reported to have sensitivity of 76–100% and 100% respectively in this context, but specificity was lower at 80-99% and 99% respectively.[121 122] As Doppler velocimetry can be performed more promptly this would be preferred. *[Evidence level 2–]*

9. What actions should be taken if abnormalities in fetal growth or heart rate monitoring are detected during the assessment?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
If abnormalities are present on antenatal cardiotocography, intervention should be discussed with a senior obstetrician and decisions about birth should consider gestation and the degree of abnormality.	**4**	**GPP**	Intervention is dependent upon the nature and magnitude of the abnormality, the gestation of the pregnancy.
If the fetus is found to be SGA and/or there are abnormalities of umbilical artery Doppler or liquor volume, management should be in accordance with the relevant RCOG guideline.	**4**	**GPP**	

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If there is evidence of suspect acute compromise on the CTG, immediate steps should be taken to expedite birth. In cases where there are lesser degrees of concern base on the CTG, based on NICE guidance further CTG monitoring may be instituted with a plan for frequent reassessment.

Given the association between RFM and histological evidence of placental abnormalities evidence of a small-for-gestational-age fetus, oligohydramnios or abnormalities of the umbilical artery Doppler may indicate underlying placental dysfunction.[102] The management of this should be in accordance with the relevant RCOG guideline.

10. What is the optimal surveillance method for women who have presented with RFM in whom investigations are normal?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Women should be advised about the normal physiological changes in fetal movement throughout pregnancy and actions to take if concerned.	**4**	**GPP**	As fetal movements are assessed subjectively women need to receive accurate information about normal fetal movement.
Healthcare professionals can reassure women with a single episode of RFM that they are unlikely to have an adverse perinatal outcome.	**2+**	**B**	Women may be concerned about their baby's / babies' wellbeing after reporting a single episode of RFM.
There are no data to support formal fetal movement counting (kick charts) after women have perceived RFM and have normal investigations.	**3**	**C**	There are no data that indicate kick counting is superior to maternal awareness of fetal movements.
If women who have normal investigations after one presentation with RFM have another episode of RFM, they should be advised to contact their maternity unit for further assessment as indicated in section 8 of this guideline.	**2+**	**B**	Women with recurrent episodes of reduced fetal movements have an increased risk of adverse outcome.

The majority of women (approximately 70%) who perceive a reduction in fetal movements will have a good outcome to their pregnancy (i.e. above 10th centile, uncompromised baby).[102 123] The commonest finding was birth to a SGA baby in 14.3-23% of women. The frequency of adverse outcomes vary between studies but stillbirths remained low, ranging between 0.3–1% of women with RFM, NICU admission in between 0.7–3.0% of births after RFM and 1.6–2% of infants have an Apgar score <7.[8 102 103 123 124] There are no studies of the follow-up of women who have normal investigations. Some practitioners would advocate commencing formal fetal movement counting in this situation. There is no evidence to support this strategy. Formal fetal movement counting in this situation is subject to the same difficulties as in the general obstetric population. *[Evidence level 2+]*

In several (but not all) cohort and case-control studies perinatal outcome was worse in women who had presented on more than one occasion with RFM.[8 102 103] If a woman experiences a further episode of definite RFMs she should be referred for hospital assessment to exclude signs of compromise through the use of CTG and ultrasound as outlined in section 8. *[Evidence level 2+]*

Education of women is important. This should include explanation of the normal physiological changes in fetal movement and encouragement to be aware of their own individual pattern of activity. Qualitative studies have indicated the intuitive feelings women may experience that all is not well.[73] Some women have

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described premonitions, feelings of discomfort and unease and a subconscious understanding that there was a change in the pregnancy. Some have reported a feeling of emptiness and lack of contact with their baby. Their perception has been of a flatter, shrunken abdomen that had lost its shape, noting that the baby did not keep changing position. One qualitative study also included reports of the baby having moved excessively.[73] This reiterates the importance of women being encouraged to report any sudden change in their normal fetal movements – whether an increase, decrease or cessation, and this should not be delayed. Clear information is needed that fetal movements do not decrease towards the end of pregnancy. Awareness of frequency, intensity, character and duration of fetal movements is needed, as women reporting RFM have experienced a range of differences in each of these patterns.[71 125] *[Evidence level 2–]*

Provision of information through information leaflets or sheets can be helpful in enhancing maternal knowledge; evidence-based information having been shown to increase the likelihood of women presenting within 24 hours of RFM.[125-127] *[Evidence level 2–]*

This has been most influential with nulliparous women.[59] An important finding in one study was that in Norway and Sweden women from minority populations (e.g. women from Black African populations) had lower rates of awareness of fetal activity, changes in maternal behaviour and stillbirth rates despite provision of information in a range of languages. The researchers emphasised the importance of considering a wider range of communication, including involvement of role models and influential family members in their care.[125 128]

Healthcare staff also need to be made aware of the reasons women may not present with their concerns, and be mindful of the impact of their attitudes when they do. This includes a reluctance to question professional judgement or a fear of not being taken seriously.[73 86] They may also have been influenced by friends, relatives, the internet or the media.[72 126] Staff need to be aware of their institutional clinical practice guidelines as standardised care has been shown to be beneficial.

11. What are the indications for intervention if investigations are normal?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Where there is no objective evidence of fetal compromise (no CTG abnormalities, no evidence of reduced fetal growth, oligohydramnios or umbilical artery Doppler abnormalities) women should be reassured there is no indication for expediting birth.	**1+**	**A**	The AFFIRM study offered early term birth for women with RFM demonstrated increased rates of induction of labour and Caesarean section without improving neonatal outcomes.
A decision to expedite birth should be made on an individual basis in partnership with the woman. If women present with RFM after 39 weeks of gestation expediting birth does not appear to be associated with increased risk to mother or baby.	**1+**	**A**	Induction of labour after 39 weeks' gestation does not increase the risk of Caesarean section or adverse fetal or neonatal outcomes.

One component of the intervention tested in the AFFIRM study (see section 9) was an offer of induction of labour for women presenting with recurrent RFM after 37 weeks of gestation. The AFFIRM intervention was associated with an increase in induction of labour and Caesarean section.[114] This may result from induction of labour commencing at early term gestations.[129] In contrast, observational and intervention studies have shown that induction of labour at or after 39 weeks' gestation is not associated with an increase in the proportion of births by Caesarean section or adverse maternal or fetal outcomes.[129 130] Neither Mindfetalness nor My Baby's Movements and Me studies showed increased rates of Caesarean birth.[84 131]

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12. What is the optimal care of the woman who presents recurrently with RFM?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
When a woman recurrently perceives RFM her case should be reviewed to exclude predisposing causes.	**3**	**C**	Various factors can be associated with reduced perception of fetal movements (see section 3).
When a woman recurrently perceives RFM, ultrasound scan assessment should be undertaken as a part of the investigations.	**2+**	**B**	Adverse outcomes including stillbirth and the birth of an SGA baby are more common in women with recurrent RFM.
Clinicians should be aware of the increased risk of poor perinatal outcome in women presenting with recurrent RFM.	**4**	**GPP**	

There is no universal definition of what recurrent RFM means; one region of the UK has adopted a consensus definition of two or more episodes of RFM occurring within a 21-day period after 26 weeks' gestation. Women who present on two or more occasions with RFM after 28 weeks are at increased risk of a poor perinatal outcome (stillbirth (1.4% vs. 0.6% in women with one episode of RFM), FGR (44.2% vs. 9.8% of women with one episode of RFM) or preterm birth) compared to those who only attend on one occasion (OR 8.04; 4.63-13.98).[79103] There are no studies to determine whether intervention (e.g. expediting birth or further investigation) alters perinatal morbidity or mortality in women presenting with recurrent RFM. Therefore the decision whether or not to induce labour at term in a woman who presents recurrently with RFMs when the growth, liquor volume and CTG appear normal must be done after careful consideration by an experienced obstetrician on an individualised basis and in partnership with the woman. *[Evidence level 2+]*

13. What is the optimal care of RFM in multiple pregnancy?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
When a woman presents with RFM in a multiple pregnancy care should taken to determine the chorionicity of the twin pregnancy.	**3**	**C**	RFM was noted in a Confidential Enquiry to be a presenting symptom of twin to twin transfusion syndrome.
When a woman presents with RFM in a multiple pregnancy, investigations to identify developing fetal compromise should be undertaken including cardiotocography, assessment of fetal growth, liquor volume and umbilical artery Doppler.	**3**	**C**	Limited data suggest RFM in twin pregnancies is associated with adverse neonatal outcomes.

Very few studies report on the significance of RFM in multiple pregnancy and no studies of the management of RFM in multiple pregnancy were identified. Levy *et al*. conducted a retrospective case-control study of dichorionic twin pregnancies presenting with an isolated presentation of RFM after 34 weeks' gestation and who gave birth within two weeks. Cases of RFM were matched (by maternal age and gestation) to those with normal fetal activity. Women with RFM were more likely to have a perinatal death (5/166 vs 0/166), neonatal admission or an infant with cerebral morbidity (defined as intra-ventricular haemorrhage, seizures or hypoxic-ischaemic encephalopathy; 10/166 versus 2/166).[132] *[Evidence level 2–]*

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The recent Confidential Enquiry into Stillbirths and Neonatal Deaths In Twin Pregnancies described cases where RFM was the presenting symptom of fetal compromise in twin-to-twin transfusion syndrome in monochorionic twins or fetal compromise in dichorionic twins.[133] *[Evidence level 3]*

A small prospective study compared fetal behavioural development in healthy dichorionic twins and singletons. Key findings were that twin fetuses were less active than singletons throughout pregnancy although breathing activity was higher in twins in the third trimester. There was no evidence of there being a consistently more active 'dominant' twin. Poor synchrony of movements was noted. Twins demonstrated independent occurrence of rest-activity cycles. As in singleton pregnancies, general body movements decreased with advancing gestation.[134] *[Evidence level 2–]*

14. What is the optimal care of RFMs before 28^{+0} weeks of gestation?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
If a woman presents with RFM between 24^{+0} weeks of gestation and 28^{+0} weeks of gestation the presence of a fetal heartbeat should be confirmed by auscultation with a Doppler handheld device and a history taken to determine other risk factors for stillbirth or early onset FGR.	**4**	**GPP**	The majority of data regarding RFM are from studies after 28 weeks of pregnancy. Fetal viability needs to be confirmed and early-onset fetal growth restriction should be considered.
If a woman presents with RFM prior to 24^{+0} weeks of gestation the presence of a fetal heartbeat should be confirmed by auscultation with a Doppler handheld device.	**4**	**GPP**	RFM is the presenting symptom for approximately half of intrauterine fetal deaths. Auscultation of the fetal heart is needed to exclude fetal death.
If fetal movements have never been felt by 24 weeks of gestation, an anomaly scan should be performed if not already completed. Referral to a fetal medicine specialist should be considered if concerns remain.	**4**	**GPP**	Absent or reduced fetal movements are associated with neurological or musculoskeletal abnormalities in the fetus.

There are no studies looking at the outcome of women who present with RFM between 24^{+0} weeks of gestation and 28^{+0} weeks of gestation. The fetal heartbeat should be confirmed to check fetal viability. History must include a comprehensive stillbirth risk evaluation, including a review of the presence of other risk factors which are associated with an increased risk of stillbirth. Clinicians should be aware that placental insufficiency may present at this gestation. There is no evidence to recommend the routine use of CTG surveillance in this group. If there is clinical suspicion of FGR consideration should be given to the need for USS assessment. There is no evidence on which to recommend the routine use of USS assessment in this group.

There are no studies looking at the outcome of women who present with RFM before 24^{+0} weeks of gestation. While placental insufficiency rarely presents before the end of the second trimester, the fetal heartbeat should be auscultated to exclude intrauterine fetal death. There is limited evidence from a number of case reports that women who present having not experienced fetal movements at all may have a fetus with an underlying neuromuscular condition.[135-138] *[Evidence level 3]*

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15. What is the appropriate action following maternal perception of increased fetal movements?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Clinicians should be aware of an association between a single period of exaggerated or excessive fetal movements and stillbirth after 28 weeks' gestation.	**2+**	**B**	Observational studies have shown an association between a single period of excessive fetal movements and stillbirth.
If women are concerned about excessive or exaggerated fetal activity after 28 weeks, fetal wellbeing should be assessed by CTG.	**3**	**C**	Case series have demonstrated CTG abnormalities in women perceiving abnormally increased fetal movements.

Several case-control studies have reported an association between a single episode of increased fetal movement and stillbirth after 28 weeks' gestation. The language used to describe a period of exaggerated activity uses terms such as "intense", "frantic", "wild" or "crazy" compared to "powerful" or "strong".[9 13] The cause for such a pattern of movements is not known, but have been speculated to represent seizures or relate to cord entanglement.[139] Two prospective studies (n=219 and n=64) did not find an association between maternal perception of increased fetal movements and adverse neonatal outcome.[140 141] *[Evidence level 2+]*

Huang *et al*. found that large-for-gestational age infants were more frequent in women with increased fetal movements.[140] This study did not report the results of any investigations after presentation to maternity service. The smaller study found abnormalities of the CTG in 6.3% (4/64) of women and five women had abnormalities detected on ultrasound scan (two oligohydramnios and three were small for gestational age).[141]

16. Recommendations for future research

- Determine whether other tests of fetal wellbeing (e.g. cerebroplacental ratio, umbilical artery Doppler) or placental compromise (e.g. Placental Growth Factor) identify fetal compromise in women presenting with reduced fetal movements.
- Prospective studies of women experiencing a single period of exaggerated fetal activity to confirm or refute an association with adverse neonatal outcome.
- Qualitative studies to describe changes in fetal movements in late pregnancy in order to optimise information given to pregnant women.
- Studies to determine whether objective measures of fetal activity can be reliably obtained and whether these relate to fetal compromise.

17. Auditable topics

- Existence of a unit guideline on reduced fetal movement and evidence of local compliance of practice with guideline (compliance 100%).
- Percentage of women with a confirmed history of RFM over 28^{+0} gestation having a CTG performed to exclude fetal compromise (compliance 100%).
- Percentage of women presenting with confirmed RFM over 28^{+0} gestation having ultrasound scan assessment performed as part of the preliminary investigations if the perception of RFM persists despite a normal CTG or if there are any additional risk factors for FGR/stillbirth (compliance 100%).
- Percentage of women presenting with recurrent RFM over 28^{+0} gestation referred for a growth scan (fetal biometry) and liquor volume assessment (compliance 100%).

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- Percentage of women with uncomplicated RFM (investigation results normal) who do not have IOL before 39 weeks' gestation (compliance 100%).

18. Useful links and support groups

https://www.tommys.org/pregnancy-information/health-professionals/free-pregnancy-resources/leaflet-and-banner-feeling-your-baby-move-sign-they-are-well (Provides information for women about fetal movement in many different languages)

https://www.kickscount.org.uk/your-babys-movements

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Appendix 1: Explanation of grades and evidence levels

Classification of evidence levels

1++	High-quality meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a very low risk of bias
1+	Well-conducted meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a low risk of bias
1–	Meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a high risk of bias
2++	High-quality systematic reviews of case–control or cohort studies or high-quality case–control or cohort studies with a very low risk of confounding, bias or chance and a high probability that the relationship is causal
2+	Well-conducted case–control or cohort studies with a low risk of confounding, bias or chance and a moderate probability that the relationship is causal
2–	Case–control or cohort studies with a high risk of confounding, bias or chance and a significant risk that the relationship is not causal
3	Non-analytical studies, e.g. case reports, case series
4	Expert opinion

Grades of Recommendation

A At least one meta-analysis, systematic reviews or RCT rated as 1++, and directly applicable to the target population; or a systematic review of RCTs or a body of evidence consisting principally of studies rated as 1+, directly applicable to the target population and demonstrating overall consistency of results

B A body of evidence including studies rated as 2++ directly applicable to the target population, and demonstrating overall consistency of results; or
Extrapolated evidence from studies rated as 1++ or 1+

C A body of evidence including studies rated as 2+ directly applicable to the target population, and demonstrating overall consistency of results; or
Extrapolated evidence from studies rated as 2++

D Evidence level 3 or 4; or
Extrapolated evidence from studies rated as 2+

Good Practice Points

✓ Recommended best practice based on the clinical experience of the guideline development group.*

*on the occasion when the guideline development group find there is an important practical point that they wish to emphasise but for which there is not, nor is there likely to be any research evidence. This will typically be where some aspect of treatment is regarded as such sound clinical practice that nobody is likely to question it. These are marked in the guideline, and are indicated by ✓. It must be emphasised that these are NOT an alternative to evidence-based recommendations, and should only be used where there is no alternative means of highlighting the issue.

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Appendix 2. Examples of methods to objectively measure fetal movement

At the time of writing, methods to objectively measure fetal movement are in their infancy, but continue to develop with the aim of quantifying fetal activity.

Actography – Doppler ultrasound (as used for cardiotocography) detects high and low-frequency signals. The low-frequency signals are interpreted as coming from fetal movements. Some computerised CTG machines plot the actograph trace. There is a relationship between the actograph score (proportion of time the actograph records fetal activity) and fetal heart rate accelerations.[1]

Accelerometry – An accelerometer is an electromechanical device that is used to measure acceleration forces, so when applied to the maternal abdomen accelerometers can detect maternal and fetal movements. These have been attached to the maternal abdomen by adhesive tape or within a garment.

Acoustic sensors (microphones) – Have been combined with accelerometers to identify different types of fetal movements by combining the inputs from both modalities.[2]

Vector electrocardiography – The fetal electrocardiogram (ECG) is recorded via the maternal abdomen using adhesive electrodes. Using an array of electrodes in different places on the maternal abdomen, changes in the amplitude of the QRS complex can be used to identify when the fetus has moved, producing a vectocardiogram (VCG). The disadvantage of this approach is that this only detects movements of the fetal trunk, not limbs.[3]

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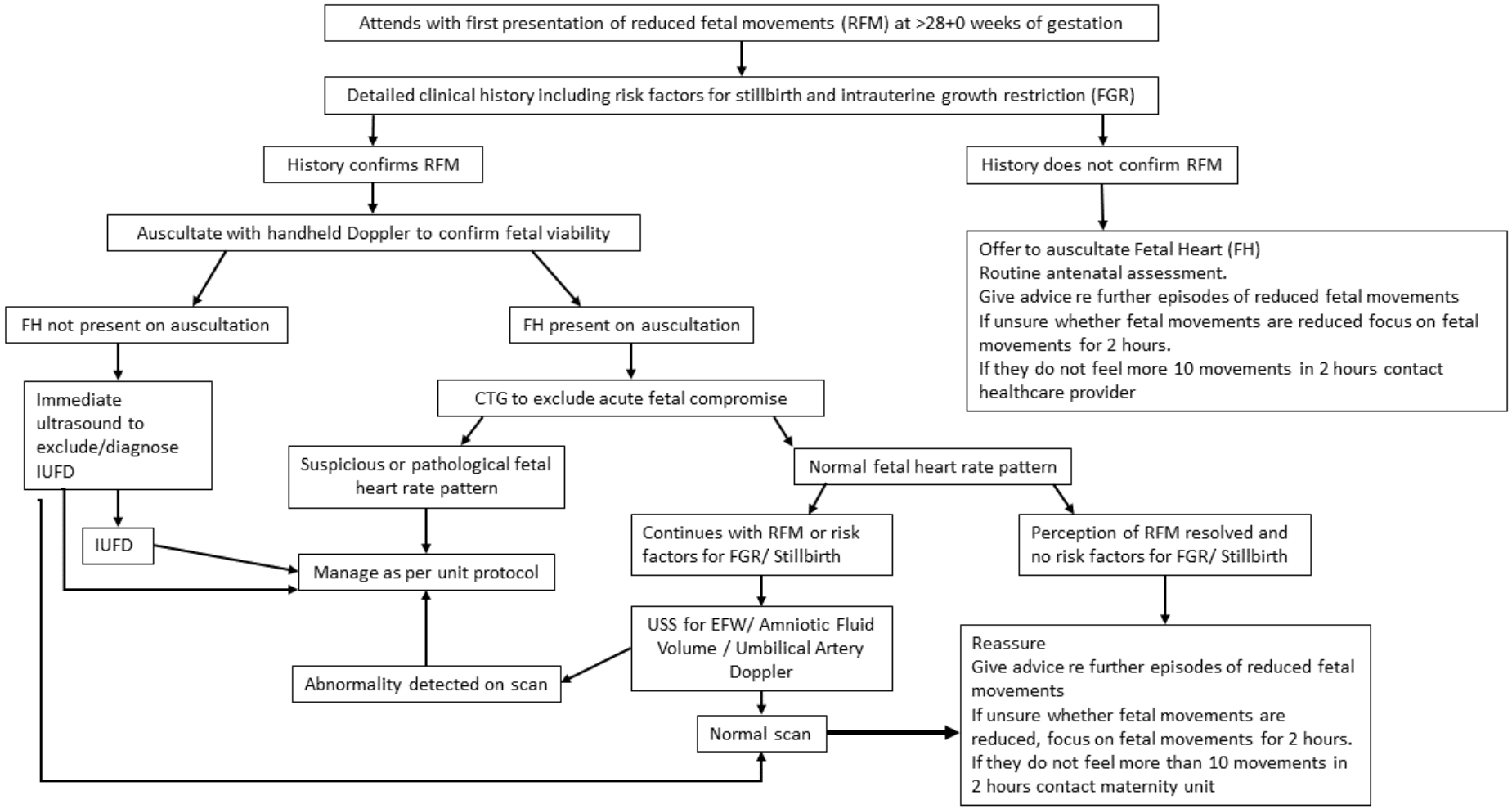
Appendix 3. Care pathway for women with RFM



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The final version is the responsibility of the Guidelines Committee of the RCOG.

The guideline will be considered for update 3 years after publication, with an intermediate assessment of the need to update 2 years after publication.

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This means that RCOG Guidelines are unlike protocols or guidelines issued by employers, as they are not intended to be prescriptive directions defining a single course of management. Departure from the local prescriptive protocols or guidelines should be fully documented in the patient's case notes at the time the relevant decision is taken.

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