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Midwives' and obstetricians' knowledge and management of women presenting with decreased fetal movements

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Abstract

Background. Maternal perception of decreased fetal movements (DFM) affects 5–15% of pregnancies. DFM is associated with intra-uterine fetal death (IUFD) and intra-uterine growth restriction (IUGR). It has been proposed that maternal perception of DFM may be used as a screening tool for IUFD or IUGR. However, this proposal is complicated by variations in definitions and management of DFM. *Hypothesis*. We hypothesised that uncertainties in the definition and management of women presenting with DFM leads to variation in clinical practice. *Methods*. A postal questionnaire was sent to midwives and consultant obstetricians in the UK. *Results*. The majority of respondents enquired about the presence of fetal movements after 28 weeks gestation. There was little agreement on a definition of DFM, with a maternal perception of decreased movements for 24 h gaining the greatest acceptance. Few practitioners used formal fetal movement counting, with the majority of respondents stating they were ineffective in the prevention of IUGR or IUFD and led to increased intervention. There was large variation in the knowledge of associations with DFM and management of women presenting with DFM. *Conclusions*. There were wide variations in the practice of obstetricians and midwives with regard to women presenting with DFM; many aspects of practice were not based on the available evidence. The variation in practice may result from a lack of robust evidence on which to base the provision of care. Further research is needed to provide and disseminate evidence to direct the management of women presenting with DFM.

Key words: *Fetal movements, evidence-based medicine, current clinical practice, intra-uterine fetal death, intra-uterine growth restriction*

Introduction

Maternal perception of fetal movements is the oldest and most commonly used method to evaluate fetal wellbeing. Maternal perception of normal fetal movements is a highly specific indicator of fetal viability. Conversely, intra-uterine fetal death (IUFD) has been reported to be preceded by a reduction in fetal movements for 24 h prior to diagnosis (1,2). A reduction in fetal movement is associated with a wide variety of pregnancy pathologies, including small for gestational age (SGA) (3,4), intra-uterine growth restriction (IUGR) (5), oligohydramnios (6), neuro-developmental disability (7), and fetal anomalies, particularly those affecting neurological or musculoskeletal systems (8–11). However, several non-pathological entities are also associated with reduced perception of fetal movements, including upright maternal position (12), anterior placenta and maternal obesity (13). The use of fetal movements to detect fetal compromise is complicated by a wide variation in the amount of fetal movements perceived by mothers, ranging from 4 to 94% of movements demonstrated by ultrasound (14).

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Due to the increased incidence of perinatal morbidity and mortality in women perceiving reduced fetal movements, formal counting of fetal movements has been proposed as a screening tool to identify 'at risk' pregnancies. Recent guidelines from the National Institute for Clinical Excellence (NICE) have proposed that formal fetal movement counting should not form part of routine antenatal care in the UK (15). However, this guideline also states that women who experience decreased fetal movements (DFM) should present for further assessment of fetal wellbeing, although no guidance is offered as to what care should be given in this instance. In contrast, guidelines are available from the US which recommend fetal movement counting for all pregnancies (16). Despite the differing recommendations regarding formal fetal movement counting, a decrease in perceived fetal movements is a common reason for women to seek medical attention. One recent study found that 6.1% of women presented during the third trimester with a primary complaint of reduced or absent fetal movements (17).

A recent meta-analysis found that there was a lack of evidence to direct recommendations for practice with regard to DFM (18). Indeed, there are significant areas of uncertainty regarding the definition of DFM, with published criteria ranging from <3 movements in 1 h to 10 movements in 12 h (5). There is further uncertainty regarding the management of women presenting with DFM; the UK NICE guidelines make no specific recommendations for practice (15), although other available guidance suggests various investigations including cardiotocography (CTG), measurement of symphysio-fundal height (SFH), ultrasound scan for fetal growth or biophysical profile and umbilical artery Doppler, to confirm fetal viability and diagnose SGA or IUGR (16).

We hypothesised that uncertainty in the definition and management of women with DFM leads to variation in clinical practice. We also hypothesised that the practices of midwives and obstetricians would differ. We aimed to describe clinicians' knowledge and practice with regard to monitoring fetal movements and definitions and management of DFM.

Methods

A postal questionnaire was sent to 225 midwives by the Royal College of Midwives with a routine mailing, and distributed to 50 midwives attending Advanced Life Support for Obstetrics (ALSO™) courses. The same questionnaire was sent to 400 consultant obstetricians in England and Wales in specific NHS regions selected to obtain a wide cross-section of practice. The questionnaire used was adapted from a previous study of obstetricians in Australia and New Zealand (19). The questionnaire was broken down into five sections. The first section requested demographic details, the second asked how DFM should be identified, asking which women should be asked about fetal movements, practitioners use of kick chars and their knowledge and attitudes towards formal fetal movement counting. The third section concerned the definition of reduced fetal movements. The fourth section asked about the management of women presenting with DFM. The fifth section asked about practitioners' knowledge regarding associations with DFM. Where possible, participants were invited to provide reasons and justification for their responses. Statistical differences in responses from the midwives and obstetricians were assessed using the χ^2-test, and a p value <0.05 was considered statistically significant.

Results

The overall response rate was 30% for obstetricians and 34% for midwives. Of those who responded, eight consultants were excluded as they no longer practiced obstetrics. The majority of respondents were involved in full-time obstetric (81%) or midwifery (65%) practice (Table I), with 9% of obstetricians and 35% of midwives working part-time, the remaining 10% of obstetricians practiced feto-maternal medicine full-time. Most practitioners worked full-time in the public sector, with 13% of obstetricians and 4% of midwives working at least part-time in the private sector. There was a wide range of experience of respondents, although most possessed 11–20 years experience in their speciality.

There was significant diversity in almost all aspects of fetal movement counting assessed by the questionnaire, including the definition, management and associations of DFM. In response to almost all statements, there was a spectrum of answers ranging from strong agreement to strong disagreement. In addition, a significant proportion of respondents were unsure regarding the definition of DFM (4.7–12.4%) and the role of formal fetal movement counting (7.8–24.8%).

The majority of obstetricians and midwives enquired about fetal movements in consultations with women after 28 weeks gestation, with midwives more likely to enquire at early gestations (28^{+0}–31^{+6}/40) (97 compared to 84%, $p<0.001$). After 37 weeks, almost all practitioners asked women

Table I. Demographic details of participants in fetal movement questionnaire study.

	Obstetricians	Midwives	All participants
Hours			
Full-time obstetrics	105		105
Part-time obstetrics	11		11
Full-time maternal-fetal medicine	13		13
Full-time midwifery	–	61	61
Part-time midwifery	–	33	33
Years of practice (years)			
<10	0	14	14
11–20	75	40	115
21–30	45	34	79
>31	9	6	15
(Total)	(129)	(94)	(223)
Type of practice			
NHS	112	90	202
NHS and private practice	15	2	17
Private practice only	2	2	4
(Total)	(129)	(94)	(223)

about the presence of fetal movements. A minority of respondents only enquired in patients who were designated as 'high-risk' (Figure 1). The spectrum of written responses highlights the variation in practice. Some clinicians were very positive about enquiring about fetal movements stating 'fetal movements are the best test of fetal wellbeing' and 'In my opinion, it is one of the best indicators for further intervention if fetal movements are decreased or absent'. Furthermore, some felt that counting and recognising fetal movements empowered women as '(fetal movement counting) allows women to be involved in their care' or 'good way for women to keep an eye on their pregnancy'. However, other clinicians regarded an enquiry about fetal movements as routine practice as promoted by the NICE guidelines 'sheer habit – reassures myself and the patient' and 'it's just something we ask'. A minority were negative with regard to enquiring about fetal movements stating 'fetal movements have a very poor predictive ratio' or 'too non-specific and insensitive'.

Clinicians' views on the definition of DFM varied significantly, with a significant minority (4.7–12.4%) of obstetricians and midwives unsure regarding specific criteria (Table II). Regarding formal definitions of DFM, the majority of obstetricians and midwives favoured the definition of <10 movements in 12 h. The definition of DFM as <10 movements in 2 h had the least support with only 2.3% of obstetricians and 3.2% of midwives agreeing with this designation. There was more support among practitioners for definitions based around the subjective perception of DFM, although any maternal perception of DFM was more often regarded as an adequate definition by midwives (79%) compared to 66% of obstetricians ($p < 0.05$). If the definition of the perception of DFM is increased to >24 h, acceptance increased to 74 and 81% of obstetricians and midwives respectively, making this the most widely accepted definition of DFM. If there is absence of fetal movements, the majority of obstetricians and midwives (77 and 79%, respectively) regarded a shorter period of 12 h to be of concern, although responses varied from 2 to 48 h (Figure 2).

Those clinicians providing written responses indicated a greater trust of maternal perception rather than specific numbers 'Babies behave differently and I believe a mother knows how hers moves and can note a difference'. However, some respondents cited the need for formal fetal movement counting to increase the objective assessment of fetal movements stating 'without formal quantification fetal movement counting is even less specific' and 'although I don't use kick charts, if the mother had filled one in I would look at it'. Other clinicians were unsure, indicating that they felt 'there was no evidence for these answers'. Interestingly, only one respondent indicated that the evidence for their answers related to the count-to-ten chart developed by Pearson and Weaver.

Although 16.3% of obstetricians and 21.3% of midwives stated that formal fetal movement counting is helpful in routine antenatal practice (Table III), few practitioners used systems of fetal movement counting, such as 'kick charts', with only 5% of obstetricians and 3% of midwives using them in routine antenatal care. A significant proportion of midwives (25%) and obstetricians (16%) use 'kick charts' for high-risk pregnancies. The majority of obstetricians and midwives held negative views regarding 'kick charts', with the greatest proportion

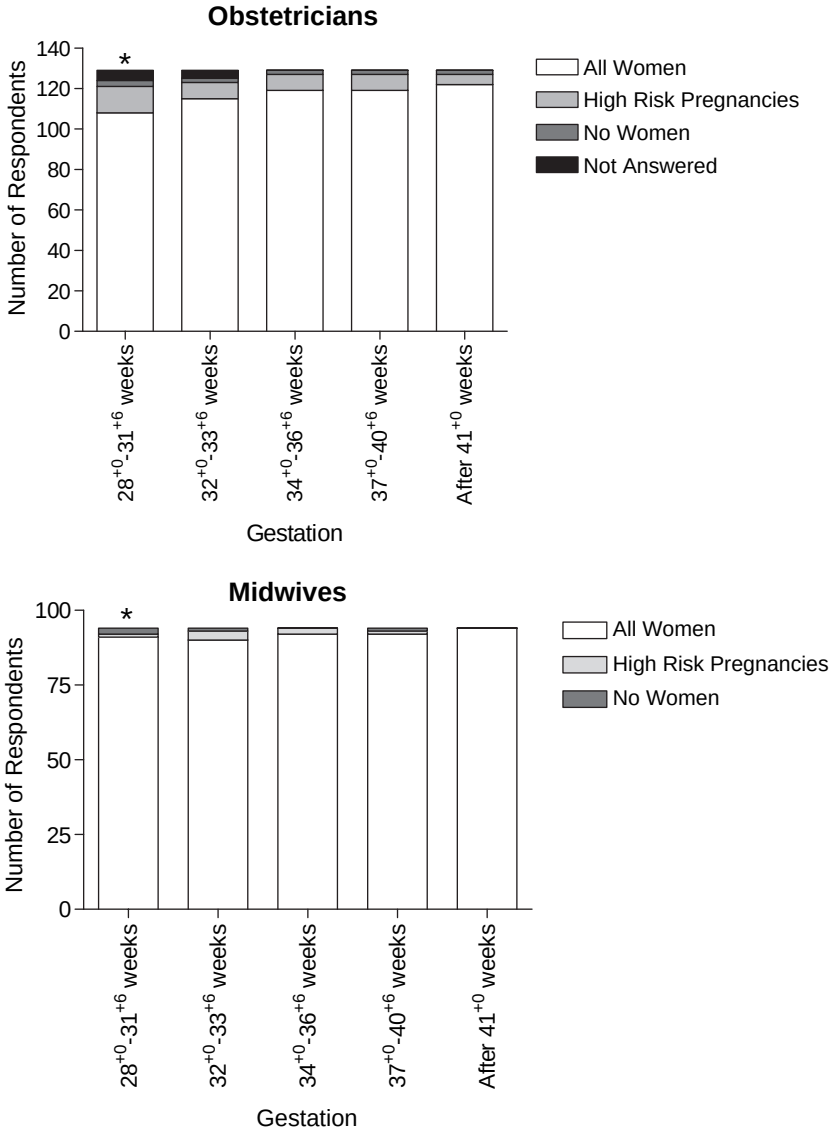

Figure 1. Histograms demonstrating the proportion of respondents enquiring about fetal movements from 28 weeks' gestation onwards. As gestation progresses more respondents enquire regarding fetal movements. Between 28 and 31 + 6 weeks gestation, midwives compared to obstetricians more likely to enquire regarding fetal movements ($*p < 0.001$).

stating that their use did not aid the detection of IUGR and may result in unnecessary intervention (Table III). The proportion of practitioners indicating negative views towards 'kick charts' was greater in obstetricians; 83.7% of obstetricians stated that 'kick charts' did not assist in the detection of IUGR compared to 59.6% of midwives ($p < 0.001$). 27.1% of midwives believed that 'kick charts' could reduce unnecessary consultations for DFM, whereas only 8.5% of obstetricians held this view. Furthermore, a significant proportion felt that 'kick charts' have been proven ineffective in the prevention of stillbirth, although a sizeable group were unsure about this statement.

The majority of obstetricians and midwives had institutional guidelines for the management of women presenting with DFM (70 and 74%, respectively). Few respondents would confirm the reduction in fetal movements by the use of a kick chart. Following presentation with DFM, the majority of respondents would undertake CTG and measure SFH (Table IV). Conversely, investigations such as vibro-acoustic stimulation and Kleihauer–Betke's test were rarely used, although midwives were more likely to use vibro-acoustic stimulation ($p < 0.001$). Depending on the risk status of the patient or initial results, investigations may also include ultrasound measurement of fetal growth, umbilical artery

Table II. Obstetricians' and midwives' views on the definition of decreased fetal movements.

	Obstetricians ($n=129$)				Midwives ($n=94$)				
Definition of decreased fetal movements	Yes	No	Unsure	Unanswered	Yes	No	Unsure	Unanswered	p Value
<3 movements per hour for 12 h	7 (5.4)	89 (69.0)	16 (12.4)	17 (13.1)	7 (7.4)	62 (66)	7 (7.4)	18 (19.1)	NS
<10 movements in 2 h	3 (2.3)	95 (73.6)	14 (10.9)	17 (13.1)	3 (3.2)	66 (70.2)	7 (7.4)	18 (19.1)	NS
<10 movements total in 12 h	85 (65.9)	21 (16.3)	11 (8.5)	12 (11.1)	54 (57.4)	22 (23.4)	6 (6.4)	12 (12.8)	NS
<10 movements in 12 h for 2 days	59 (45.7)	32 (24.8)	15 (11.6)	23 (17.8)	50 (53.2)	21 (22.3)	8 (8.5)	15 (16)	NS
Mothers perception of reduced fetal movement for 12 h	89 (69.0)	18 (14.0)	11 (8.5)	11 (8.5)	69 (73.4)	8 (8.5)	8 (8.5)	9 (9.6)	NS
Mothers perception of reduced fetal movement for 24 h	95 (73.6)	12 (9.3)	6 (4.7)	16 (12.4)	76 (80.9)	2 (2.1)	6 (6.4)	10 (10.6)	<0.001
Any maternal perception of reduced fetal movements	85 (65.9)	23 (17.8)	9 (7.0)	12 (9.3)	74 (78.7)	9 (9.6)	7 (7.4)	4 (4.3)	<0.05
Maternal perception of reduced fetal movements with recorded data (e.g. kick chart)	75 (58.1)	21 (16.3)	14 (10.9)	19 (14.7)	64 (68.1)	6 (6.4)	10 (10.6)	14 (14.9)	<0.01

Percentages shown in parentheses. NS, not significant.

Doppler or full fetal biophysical profile, with the majority of respondents indicating that 'further investigation is dependent on results of CTG, symphysio-fundal height and clinical situation'. The most frequently reported management option for midwives and obstetricians was to consider admission of the mother and delivery of the infant. Midwives were more likely to admit a woman to hospital following presentation with DFM ($p<0.05$). Despite the majority of respondents stating that they had institutional guidelines, several respondents highlighted the paucity of evidence to guide the management of women presenting with DFM, indicating that their management was based on 'common sense and a lack of evidence for any one approach'.

Practitioners' knowledge of reported associations with DFM was variable, with only 68% of obstetricians and midwives correctly identifying the positive association between DFM and maternal obesity, falling to 40 and 45%, respectively, for the association between DFM and anterior placental site. While the majority of obstetricians and midwives were aware of the association between IUGR, fetal hypoxia and DFM, a similar proportion (66 and 69%, respectively), believed that women presented with DFM for an additional ultrasound scan. Both obstetricians and midwives recognised that presentation with DFM was associated with increased maternal anxiety, with 88 and 89% identifying this link, respectively.

Discussion

This study describes wide variations in the knowledge and practice of both obstetricians and midwives towards women presenting with DFM. The presence of fetal movements remains a popular test of fetal viability, as the majority of respondents enquired about the presence of fetal movements from 28 weeks gestation onwards. The identification of women with DFM is much less clear; most practitioners favoured a subjective definition of DFM, specifically – a maternal perception of DFM for 24 h. This is currently proposed as the most appropriate method to identify DFM, although there are no formal trials to support this strategy (5). Underlying the uncertainty regarding the definition of DFM is a lack of evidence to support most definitions, especially those relying on subjective maternal perception of DFM. With regard to published definitions, most respondents favoured the definition of <10 movements in 12 h used in the largest trial of formal fetal movement counting (1,20). The perception of absent fetal movements for 12 h was regarded as abnormal by most

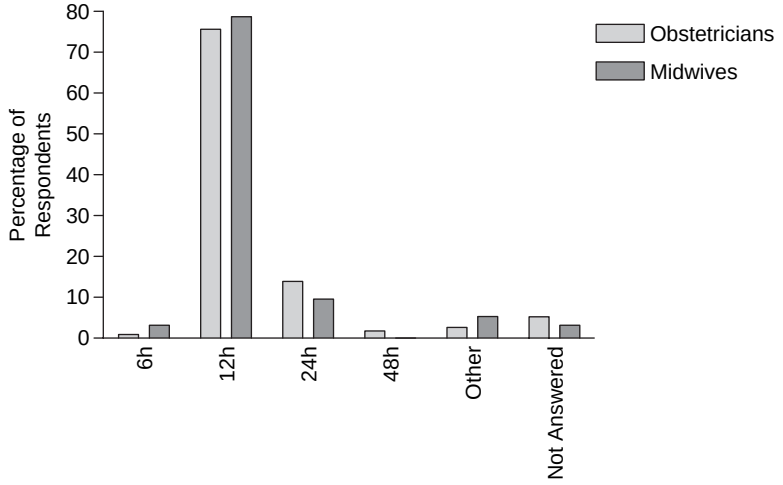

Figure 2. Histogram indicating practitioners beliefs regarding the duration of time after which women should report *absent* fetal movements.

respondents; this was initially described as a 'movement alarm signal' to identify IUFD and IUGR in 1983 (21). Both these definitions of DFM were developed in high-risk inpatient populations counting all perceived fetal movements throughout the day, making their application to a normal obstetric population counting for a brief period problematic. The only study of normal fetal activity in a low risk population described that during focused counting, <10 movements in 2 h represented a reduction of 5 SD from the mean (22). However, this method of identifying reduced fetal movements has failed to gain acceptance, with only 2.3% of obstetricians and 3.2% of midwives regarding this as an appropriate definition of DFM. If <10 movements in 2 h of focused fetal movement counting is abnormal, then relying on the complete absence of fetal movement for 12 h before asking women to present to the obstetric service may be excessive and opportunities for intervention to prevent IUFD may be missed.

The use of formal fetal movement counting was rarely used by obstetricians and midwives in routine antenatal care, although a significant proportion of respondents used kick charts in the management of high-risk pregnancies. This practice may reflect guidance from NICE introduced in 2003 (15). The majority of respondents held negative views regarding the use of kick charts, stating they were ineffective in the prevention of stillbirth and associated with increased obstetric intervention. We did not explore the origins of these views, but they may result from the outcome of a large multi-centre trial of low- and high-risk patients cited in the NICE guidelines which described no reduction in the perinatal mortality rate (PNMR) in women using a 'kick chart' (20). Although this trial remains the largest study of its kind, other studies of formal fetal movement counting have identified a reduction in the PNMR in women using a formal fetal movement counting (23–25). Further evidence that assessment of fetal movements may provide a strategy to reduce the PNMR may be extrapolated from these studies, as even patients in the control group (who had increased awareness of fetal movement counting) had a lower PNMR that that reported in the whole obstetric population in these locations (20,24,25). Therefore, in common with the definition of DFM, the negative views regarding the accuracy and ability of 'kick charts' to detect DFM are not based on all the available evidence.

There was also significant variance between respondents' knowledge of conditions reported to be associated with DFM and their practice. First, practitioners' knowledge of reported associations was variable, a low proportion of respondents identified the association between DFM and primigravidae or women with anterior placental site, although, the association between DFM and maternal obesity reported by the same paper was much more widely accepted (13). The frequently reported association between IUGR and presentation with DFM was also correctly identified by 66% of respondents, but this did not translate into assessment to identify IUGR, as only 20.2% of obstetricians and 14.9% of midwives would initiate assessment of fetal growth and liquor volume. Interestingly, the greatest number of midwives and obstetricians associated maternal perception of DFM with a wish for an additional ultrasound scan; this has not been reported in the literature, but may reflect a need for maternal reassurance for anxiety following a perception of DFM.

Table III. Obstetricians' and midwives' views on formal fetal movement counting.

Statement	Obstetricians ($n=129$)						Midwives ($n=94$)						
Formal fetal movement counting is ...	Strongly agree	Agree	Unsure	Disagree	Strongly disagree	Unanswered	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree	Unanswered	p Value
... helpful in routine antenatal care	6 (4.7)	15 (11.6)	10 (7.8)	68 (52.7)	25 (19.4)	5 (3.9)	4 (4.3)	16 (17)	12 (12.8)	43 (45.7)	17 (18.1)	2 (2.1)	NS
... helps women to remember to notice movements every day	9 (7.0)	43 (33.3)	17 (13.2)	43 (33.3)	13 (10.1)	4 (3.1)	8 (8.5)	36 (38.3)	11 (11.7)	27 (28.7)	11 (11.7)	1 (1.1)	NS
... assists in detecting intra-uterine growth restriction	0 (0)	6 (4.7)	10 (7.8)	87 (67.4)	21 (16.3)	5 (3.9)	0 (0)	15 (16)	22 (23.4)	40 (42.6)	16 (17)	1 (1.1)	<0.001
... avoids unnecessary consultations for reduced fetal movements	3 (2.3)	8 (6.2)	18 (14.0)	78 (60.5)	17 (13.2)	5 (3.9)	2 (2.1)	24 (25.5)	8 (8.5)	46 (48.9)	13 (13.8)	1 (1.1)	<0.001
... is proven not to prevent stillbirth	16 (12.4)	52 (40.3)	32 (24.8)	21 (16.3)	4 (3.1)	4 (3.1)	8 (8.5)	30 (31.9)	34 (36.2)	12 (12.8)	9 (9.6)	1 (1.1)	NS
... is only useful for women considered to be at high risk of problems	4 (3.1)	25 (19.4)	26 (20.2)	59 (45.7)	7 (5.4)	8 (6.2)	4 (4.3)	12 (12.8)	20 (21.3)	47 (50)	10 (10.6)	1 (1.1)	NS
... results in unnecessary intervention	12 (9.3)	50 (38.8)	20 (15.5)	37 (28.7)	5 (3.9)	5 (3.9)	3 (3.2)	21 (22.3)	25 (26.6)	39 (41.5)	5 (5.3)	1 (1.1)	<0.001
... is of no benefit	14 (10.9)	35 (27.1)	28 (21.7)	42 (32.6)	6 (4.7)	4 (3.1)	7 (7.4)	17 (18.1)	13 (13.8)	45 (47.9)	11 (11.7)	1 (1.1)	<0.001

Percentages shown in parentheses. NS, non-significant.

Table IV. Obstetricians' and midwives' management of women presenting with decreased fetal movements.

Management of women presenting with decreased fetal movements	Obstetricians ($n=129$)				Midwives ($n=94$)				p Value
	Always	Sometimes (e.g. high risk)	Never	Unanswered	Always	Sometimes (e.g. high risk)	Never	Unanswered	
Commence 'kick chart'	18 (14.0)	36 (27.9)	59 (45.7)	16 (12.4)	19 (20.2)	30 (31.9)	38 (40.4)	7 (7.4)	NS
Measure SFH	107 (82.9)	9 (7.0)	5 (3.9)	8 (6.2)	81 (86.2)	8 (8.5)	2 (2.1)	3 (3.2)	NS
CTG	116 (89.9)	8 (6.2)	0 (0)	5 (3.9)	90 (95.7)	2 (2.1)	1 (1.1)	1 (1.1)	NS
Vibro-acoustic stimulation	4 (3.1)	18 (14.0)	88 (68.2)	19 (14.7)	15 (16)	13 (13.8)	46 (48.9)	20 (21.3)	<0.001
Ultrasound scan for growth	26 (20.2)	94 (72.9)	1 (0.8)	8 (6.2)	14 (14.9)	75 (79.8)	4 (4.3)	1 (1.1)	NS
Ultrasound biophysical profile	13 (10.1)	75 (58.1)	27 (20.9)	14 (10.9)	12 (12.8)	64 (68.1)	9 (9.6)	9 (9.6)	NS
Kleihaur-Betke's test	0 (0)	28 (21.7)	78 (60.5)	23 (17.8)	0 (0)	18 (19.1)	51 (54.3)	25 (26.6)	NS
Umbilical artery Doppler	22 (17.1)	91 (70.5)	7 (5.4)	9 (7.0)	10 (10.6)	72 (76.6)	3 (3.2)	9 (9.6)	NS
Admit to hospital	0 (0)	94 (72.9)	19 (14.7)	16 (12.4)	4 (4.3)	82 (87.2)	3 (3.2)	5 (5.3)	<0.05
Consider delivery	0 (0)	109 (84.5)	5 (3.9)	15 (11.6)	1 (1.1)	83 (88.3)	5 (5.3)	5 (5.3)	NS

Percentages shown in parentheses. NS, not significant.

The management of women presenting with DFM also showed much variation even though many respondents stated that they used institutional guidelines for the management of women presenting for DFM. The majority of practitioners would undertake basic investigations to identify fetal viability, such as CTG. Given the association between DFM and SGA/IUGR, it might be expected that respondents would screen for evidence of this condition. This is the case for SFH, but not ultrasonographic assessment of fetal growth or umbilical artery Doppler for all women presenting with DFM. Most respondents would reserve more costly and time-consuming investigations for women defined as high-risk. Interestingly, a large proportion of respondents would consider delivery or admission to hospital for women presenting with DFM, even though a much smaller number identified these patients as at increased risk of pregnancy complications. These apparent inconsistencies in the management of DFM may result from the variable knowledge-base of both obstetricians and midwives described in this study.

The low response rate for this study of 32% is comparable to similar postal questionnaire studies, reporting response rates between 28.2 and 34% (26,27). The low response rate may result from the low importance attached to fetal movement monitoring by some clinicians leading to responder bias in these data. If this is the case, it is unlikely that the non-responders had a greater knowledge and more evidence-based management than those who did respond, potentially making practice more varied than described here.

The principal finding of this questionnaire study is that there is wide variation in the knowledge and practice of obstetricians and midwives when presented with a case of DFM. This may result from the lack of robust studies to determine an accurate definition of DFM and to direct subsequent management of patients presenting with DFM. Notwithstanding this lack of evidence, practitioners are not always aware of the evidence that is available, especially with regard to the definition of DFM and associated pregnancy pathologies. The recent Cochrane review of the management of DFM highlighted the need for further prospective studies, especially with regard to the definition and management of DFM (18). Preliminary data of such a study suggests that increasing women's awareness of fetal movements and instituting a standardised scheme of investigations can reduce the late gestation stillbirth rate. Until further studies are carried out, women, obstetricians and midwives should be educated as to the potential associations with DFM, and the need

to present for further assessment which may be possible by information contained within the hand-held records. As a significant majority of institutions have guidelines for the management of DFM, it may also be useful to develop nationally agreed guidelines based on the limited evidence currently available, and update such guidelines when further studies are completed. Currently, it remains a hope that maternal perception of DFM may be used constructively to identify pregnancies at risk of IUFD or IUGR, and appropriate management may reduce the PNMR.

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References

1. Pearson JF, Weaver JB. Fetal activity and fetal wellbeing: an evaluation. Br Med J. 1976;1(6021):1305–7.
2. 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.
3. Heazell AE, Sumathi GM, Bhatti NR. What investigation is appropriate following maternal perception of reduced fetal movements? J Obstet Gynaecol. 2005;25(7):648–50.
4. Sinha D, Sharma A, Nallaswamy V, Jayagopal N, Bhatti NR. Obstetric outcome in women complaining of reduced fetal movements. J Obstet Gynaecol. 2007;27(1):41–3.
5. Heazell AE, Froen JF. Methods of fetal movement counting and the detection of fetal compromise. J Obstet Gynaecol. 2007 (in press).
6. Sherer DM, Spong CY, Minior VK, Salafia CM. Decreased amniotic fluid volume at <32 weeks gestation is associated with decreased fetal movements. Am J Perinatol. 1996;13(8): 479–82.
7. 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.
8. Hsu CD, Feng TI, Crawford TO, Johnson TR. Unusual fetal movement in congenital myotonic dystrophy. Fetal Diagn Ther. 1993;8(3):200–2.
9. Stoll C, Ehret-Mentre MC, Treisser A, Tranchant C. Prenatal diagnosis of congenital myasthenia with arthrogryposis in a myasthenic mother. Prenat Diagn. 1991;11(1):17–22.
10. Chen H, Blackburn WR, Wertelecki W. Fetal akinesia and multiple perinatal fractures. Am J Med Genet. 1995;55(4): 472–7.
11. Hoffmann R, Lohner M, Bohm N, Leititis J, Helwig H. Restrictive dermopathy: a lethal congenital skin disorder. Eur J Pediatr. 1993;152(2):95–8.
12. Cito G, Luisi S, Mezzesimi A, Cavicchioli C, Calonaci G, Petraglia F. Maternal position during non-stress test and fetal heart rate patterns. Acta Obstet Gynecol Scand. 2005;84: 335–8.
13. Tuffnell DJ, Cartmill RS, Lilford RJ. Fetal movements; factors affecting their perception. Eur J Obstet Gynecol Reprod Biol. 1991;39(3):165–7.
14. Gettinger A, Roberts AB, Campbell S. Comparison between subjective and ultrasound assessments of fetal movement. Br Med J. 1978;2(6130):88–90.
15. National Collaboration Centre for Women's and Children's Health. Antenatal care: routine care for the healthy pregnant woman. London: RCOG Press; 2003: 105–6.
16. Department of Veteran Affairs. DoD/VA clinical practice guideline for the management of uncomplicated pregnancy. 2002 (cited 26 September 2007). Available from: http://www.oqp.med.va.gov/cpg/UCP/up_cpg/content/algorithms/algo_fr.htm.
17. Sergent F, Lefevre A, Verspyck E, Marpeau L. Decreased fetal movements in the third trimester: what to do? Gynecol Obstet Fertil. 2005;33(11):861–9.
18. Mangesi L, Hofmeyr GJ. Fetal movement counting for assessment of fetal wellbeing. Cochrane Database Syst Rev CD004909. 2007; 1.
19. Flenady V, Gardener G, MacPhail J, Chadha Y, King J, Cole S, et al. Fetal movement monitoring: practice in Australia and New Zealand. In 9th Annual Congress Perinatal Society of Australia and New Zealand, 2006, Perth, Australia.
20. 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.
21. Sadovsky E, Ohel G, Havazeleth H, Steinwell A, Penchas S. The definition and the significance of decreased fetal movements. Acta Obstet Gynecol Scand. 1983;62(5):409–13.
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. Westgate J, Jamieson M. Stillbirths and fetal movements. NZ Med J. 1986;99(796):114–6.
24. Neldam S. Fetal movements as an indicator of fetal wellbeing. Dan Med Bull. 1983;30(4):274–8.
25. Lobb MO, Beazley JM, Haddad NG. A controlled study of daily movement counts in the prevention of stillbirths. J Obstet Gynaecol. 1985;6(2):87–91.
26. Power ML, Zinberg S, Schulkin J. A survey of obstetrician-gynecologists concerning practice patterns and attitudes toward hormone therapy. Menopause. 2006;13(3):434–41.
27. Faas–Fehervary P, Schwarz K, Bauer L, Melchert F. Caesarean section on demand: influence of personal birth experience and working environment on attitude of German gynaecologists. Eur J Obstet Gynecol Reprod Biol. 2005;122(2):162–6.