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Transvaginal ultrasound in pregnancy: its acceptability to women and maternal psychological morbidity

S. CLEMENT*, B. CANDY*, V. HEATH†, M. TO† and K. H. NICOLAIDES†

**Department of General Practice and Primary Care and †Harris Birthright Research Centre for Fetal Medicine, Guy's King's & St Thomas' School of Medicine, King's College London, London, UK*

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ABSTRACT

Objectives *To assess the acceptability to women of antenatal transvaginal ultrasound scans; to compare the characteristics of women who accept the offer of a transvaginal scan with those who decline; to establish the prevalence of any psychological morbidity associated with the scan.*

Methods *The study was a cross-sectional questionnaire survey. Women were recruited from two hospitals in South London. The sample consisted of 755 pregnant women who had a transvaginal scan at 23 weeks' gestation to assess the risk of preterm delivery and 167 women who were offered the transvaginal scan but declined. Women completed a questionnaire at home. Those who reported finding the scan a difficult experience were sent a questionnaire 4 weeks post-scan to assess its longer term impact. The main outcomes were acceptability (assessed by individual questionnaire items); anxiety before and during the scan (Spielberger State-trait Anxiety Inventory); pain during the scan (Present Pain Intensity Scale of the McGill Pain Questionnaire); psychological trauma (Impact of Event Scale).*

Results *Over half (55.2%) of women accepted the offer of a transvaginal scan, according to hospital records. The majority of study participants who had transvaginal ultrasound reported finding the experience acceptable. Women experienced some anxiety before and during the scan and over a third experienced some (usually mild) pain during the procedure. Twelve women (1.6%) reported clinically significant levels of psychological trauma in relation to the scan.*

Conclusions *Antenatal transvaginal ultrasound for assessing the risk of preterm delivery is an acceptable procedure for the majority of women. A significant minority decline the scan. The procedure has some psychological sequelae for some women. Copyright © 2003 ISUOG. Published by John Wiley & Sons, Ltd.*

INTRODUCTION

Over the last decade, there has been increasing use of transvaginal ultrasound in a wide range of gynecological and obstetric contexts. Only recently, however, has transvaginal ultrasound been offered to unselected women with apparently normal pregnancies, either to screen for fetal abnormality[1] or to assess the risk of preterm delivery[2–4]. Consequently, larger numbers of women will undergo this procedure. Transvaginal ultrasound is an invasive investigation and there are a number of reasons for hypothesizing that it may be a difficult procedure for some women. For example, research has shown that a significant minority of women find vaginal examinations distressing[5] and that, for some women, vaginal examinations may trigger post-traumatic stress symptoms[6]. There have been anecdotal reports that some women have found transvaginal scans very distressing[7], and there have been some medicolegal cases involving transvaginal scans[8]. This suggests that there is a need for research on women's experiences of the procedure, examining both its acceptability to women and whether it gives rise to any maternal psychological morbidity.

A literature search located nine studies which have formally assessed the acceptability of, or psychological morbidity that may arise from, transvaginal ultrasound, either in pregnancy[1,9–11] or in other medical contexts[12–16]. Most of these studies found that transvaginal ultrasound was acceptable to women who had undergone the procedure, with, for example, 95% of women reporting that they would have no concerns about having a future transvaginal scan[1]. Two studies found

Correspondence to: Dr S. Clement, Department of Mental Health, St George's Hospital Medical School, Jenner Wing, Cranmer Terrace, London SW17 ORE, UK (e-mail: s.clement@sghms.ac.uk)

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that women preferred transvaginal to transabdominal scans[12,13], although one study found that women preferred transabdominal scans[9]. Uptake rates varied widely, from 43%[15] to 96%[12], suggesting that acceptability is context-specific. Four studies reported data on levels of pain or physical discomfort during transvaginal scans, with 41%[9], 48%[1], 40–50%[11] and 76%[16] of women experiencing some degree of pain. The level of pain was usually mild, with 1%[1], 6%[11] and 26%[16] of women rating their pain as more than mild. Two studies investigated anxiety at the prospect of a transvaginal scan and found that the majority (63%[14] and 76%[15]) reported some degree of anxiety; another study found that 64% of women were anxious immediately prior to the scan[10]; and one study found that 21% of women were anxious during the scan[1]. We found no studies which had examined the prevalence of any psychological trauma associated with transvaginal ultrasound. However, three papers reported that a small proportion of women (3/83[12], 1/95[9] and 1/141[1]) developed acute vaginismus prior to the insertion of the probe, which suggests these women found the procedure psychologically traumatic.

It is important to note, however, that the existing studies had some serious methodological weaknesses which limit the confidence that can be placed on their findings. Firstly, in many of the studies[1,11–13,16] the questionnaire was completed by women whilst they were still in the hospital setting. This is problematic because patients are less likely to express dissatisfaction in this setting, and are more likely to give socially desirable responses[17], and so these studies are likely to have overestimated levels of acceptability. A second methodological weakness of the existing studies was their failing to use validated measures of, for example, anxiety[1,10,14,15] and pain[1,9,11]. Thirdly, sample sizes in these studies tended to be small with four studies having fewer than 100 participants[9,10,12,13]. Furthermore, many of them[9,10,11,13] gave questionnaires only to those who had the transvaginal scan, but to gain a clearer picture of its acceptability we need to examine the views or characteristics of women who decline transvaginal ultrasound, as well as those who accept.

Our present study aimed to avoid the weaknesses of existing research. The research had two main objectives: (1) to provide a rigorous and comprehensive assessment of the acceptability to women of antenatal transvaginal ultrasound scans, including comparing the characteristics of women who accept the offer of a transvaginal scan with those who decline; (2) to establish the presence/prevalence of any psychological morbidity that may be associated with the procedure in pregnancy, specifically anxiety and worry before, during and after the scan, pain during the procedure, and psychological trauma (symptoms of intrusion and avoidance) 4 weeks after the procedure.

METHODS

The study was a cross-sectional questionnaire survey. It took place in two hospitals in south-east England. Hospital A is a teaching hospital in a socially deprived inner-city area and Hospital B is a district hospital in a socially mixed suburban area. In these hospitals all women who attend the routine 23-week abdominal scan are offered a transvaginal ultrasound scan to measure cervical length as part of a research program to screen for severe prematurity. The transvaginal scan is carried out at 23 weeks' gestation, following the routine abdominal scan. The transvaginal scan is carried out by obstetricians in Hospital A and by sonographers and midwives in Hospital B. The majority of the professionals carrying out the transvaginal scans during the study period were female, but one was male. Women attending for the routine abdominal scan during a 6-month period at Hospital A and a 3-month period at Hospital B were invited to participate in the questionnaire survey. The sample included women who declined the offer of the transvaginal scan as well as those who accepted it. Women who were not fluent in English and those who had a positive transvaginal ultrasound result (i.e. high risk of preterm delivery) were excluded.

Immediately after the transvaginal scan (or after the abdominal scan for those who declined the transvaginal scan), women were invited to take part in the questionnaire survey by the project's research associate (B.C.) or by the health professional who carried out the scan when B.C. did not attend a clinic. The research associate or health professional gave the women an information sheet and a verbal description of the research, and written consent to participate was obtained. Consenting women were given a questionnaire to complete at home and to return by post (a freepost envelope was provided). Women who indicated on their returned questionnaire that they had found the transvaginal scan a difficult experience were sent a postal questionnaire 4 weeks after the scan to assess the longer term impact of the scan. Questionnaires were returned to the research team at a department which was not in either of the participating hospitals and women were assured that their questionnaire would not be seen by hospital staff. The questionnaires contained no identifying information other than a code number. Non-responders were sent two postal reminders at fortnightly intervals to maximize response rates. The project was approved by the local research ethics committees that covered the participating hospitals.

The study aimed to assess both the acceptability of antenatal transvaginal ultrasound to women and the extent of any psychological morbidity (anxiety, pain, and trauma) associated with transvaginal scans. To assess the acceptability of transvaginal scans, we examined the rate of uptake of transvaginal ultrasound, using hospital records for the study period. We also examined responses to individual questions on: whether women would have a transvaginal scan in a future pregnancy (definitely, probably, don't know, probably not, definitely not); women's perceptions of the value of the scan (definitely worth having, probably worth having, probably not worth having, definitely not worth having); whether the scan

was a difficult experience for them (rating scale 0 = not a difficult experience at all, 5 = a very difficult experience); how they felt the scan compared to other medical procedures (rating scale as above). No definition of 'difficult' was given, so women were free to interpret these questions as referring to either psychological difficulty or physical difficulty, or both.

Two questions about perceptions of the likelihood of having a preterm delivery (rating scale 0 = not at all likely, 5 = very likely) and worry about having a premature baby (rating scale 0 = not at all worried, 5 = very worried) were included to examine, along with other variables, why women might decline the transvaginal scan.

The six-item short-form of the state scale of the Spielberger State-trait Anxiety Inventory (STAI)[18] was used to assess women's retrospective reports of their levels of anxiety before and during the transvaginal scan.

Women were also asked to rate (retrospectively) their level of worry about having a premature baby before they knew about the transvaginal scan, and their current level of worry about this now that they had had the scan (rating scale as above).

The Present Pain Intensity Scale of the McGill Pain Questionnaire[19] was used to measure levels of pain or discomfort during the scan.

The Impact of Event Scale[20], which assesses subjective distress related to a specific event (i.e. the transvaginal scan) by asking about the presence of symptoms of avoidance and intrusion, was used to give an indication of any psychological trauma experienced by the women in the sample. A score of over 19 on the Impact of Event Scale suggests a clinically significant level of psychological distress (symptoms of intrusion and avoidance)[21].

All the above scales have been shown to have good reliability and validity. The questionnaires also included items about the sociodemographic characteristics of the sample.

The outcomes listed above were assessed by means of the three questionnaires used in the study: the Accepters Questionnaire completed by those who had the transvaginal scan, the Decliners Questionnaire completed by those who chose not to have the transvaginal scan, and the Impact of Event Questionnaire completed 4 weeks after the scan by those who found the scan a difficult experience (i.e. rated difficulty of experience as 1 or more on 0–5-point scale). The questionnaires were piloted before use.

The data were analysed using SPSS version 7.5 (SPSS, Chicago, IL, USA). To correct for multiple significance testing the Bonferroni method was used, giving the level of probability at which findings were considered significant as $P < 0.002$ (as 30 tests were undertaken).

RESULTS

During the study period, 2287 women attended for their 23-week abdominal scan, 1263 were invited to participate in the study, and 1256 agreed to take part. Of these 1256 women, 986 had the transvaginal scan and 270 declined it. The questionnaire response rates for those who agreed to participate were 76.6% (755/986) for the Accepters Questionnaire, 61.9% (167/270) for the Decliners Questionnaire, giving a total of 922 participants in the study, and 79.3% (256/323) for the Impact of Event Questionnaire.

There were no significant differences in outcome between women who had been given their questionnaire by the research associate (653/922, 70.8%) and those who had been given their questionnaire by the health professional who carried out the scan (the remainder of the women) (data available from the authors on request).

The sociodemographic and obstetric characteristics of the women in the sample can be seen in Table 1.

Acceptability

The first indicator of acceptability examined was the transvaginal scan uptake rate. Hospital record data for the study period showed that the overall rate of uptake of transvaginal ultrasound during the study period was 55.2% (1262/2287). This rate was different from that amongst the study participants (81.9%). This may have been due to the geography of the main clinic which made it more difficult to approach decliners, or to accepters being more likely to be invited to participate given the nature of the study. We found no evidence of selection bias. Most women had little difficulty deciding whether or not to have the transvaginal scan, with 88.6% (661/746) of accepters and 85.4% (140/164) of decliners reporting finding the decision quite or very easy to make.

We compared the characteristics and perceptions of women who declined the transvaginal scan with those who accepted the scan (see Table 1). Using the Bonferroni-corrected significance level of $P < 0.002$, three significant differences between accepters and decliners were found. The women who accepted were found to be significantly more likely to be primiparous and to be from black African ethnic groups, and were significantly more worried about prematurity. None of the other variables examined differentiated between accepters and decliners.

To investigate why parity and ethnic group may be associated with differing levels of uptake we examined the relationship between these variables and: perceptions of the likelihood of having a premature baby (Mann–Whitney $U = 94\,679.5, P = 0.430$ for parity; and Kruskal–Wallis H = 2.232, $P = 0.526$ for ethnic group); extent of worry about having a premature baby (Mann–Whitney $U = 99\,265, P = 0.658$ for parity; and Kruskal–Wallis $H = 8.063$, $P = 0.045$ for ethnic group); perceived difficulty of having a cervical smear (Mann–Whitney $U = 86\,566, P = 0.912$ for parity; and Kruskal–Wallis $H = 8.663, P = 0.034$ for ethnic group).

The questionnaire for accepters contained three questions about acceptability (see Table 2). Most (85.9%) women who had the transvaginal scan said they would definitely or probably have one in a future pregnancy, most (95.9%) felt that the scan had definitely or probably

Table 1 Comparison of the characteristics and perceptions of women who accepted the transvaginal scan (TVS) vs. those who declined

Variable	*Accepted TVS (n = 755) (% (proportion) or mean [SD])*	*Declined TVS (n = 167) (% (proportion) or mean [SD])*	P*
Parity			
Primiparous	89.8 (440/490)	10.2 (50/490)	< 0.001
Multiparous	73.1 (312/472)	26.9 (115/472)	
Had transvaginal scan before			
Yes	45.2 (338/748)	41.5 (68/164)	0.434
No	54.8 (410/748)	58.5 (96/164)	
Age (years)	29.9 [5.70]	30.9 [5.44]	0.026
Age (years) at finishing full-time education			
16 or under	81.5 (145/178)	18.5 (33/178)	0.085
17 or 18	78.2 (244/312)	21.8 (68/312)	
19 or over	84.6 (352/416)	15.4 (64/416)	
Ethnic group (self-rated)			
White	79.3 (461/581)	20.7 (120/581)	0.001
Black African	94.9 (112/118)	5.1 (6/118)	
Black Caribbean	76.9 (40/52)	23.1 (12/52)	
Other	81.9 (85/852)	18.1 (16/852)	
Hospital attended†			
Hospital A	56.0 (807/1442)	44.0 (635/1442)	0.348
Hospital B	53.8 (455/845)	46.2 (390/845)	
Perceived likelihood of prematurity‡	1.3 [1.26]	1.2 [1.26]	0.031
Level of worry about prematurity‡	1.7 [1.52]	1.3 [1.29]	0.001
Perceived difficulty of cervical smear‡	2.5 [1.43]	2.7 [1.62]	0.042
Perceived difficulty of blood sample‡	2.0 [1.60]	1.8 [1.57]	0.105
Perceived difficulty of dental filling‡	2.9 [1.57]	2.6 [1.56]	0.026
Perceived difficulty of abdominal scan‡	0.4 [0.89]	0.7 [1.07]	0.003
Informed of TVS before day of scan	62.8 (466/742)	63.4 (104/164)	0.883
Discussed TVS before day of scan			
with midwife	9.1 (42/422)	9.7 (10/103)	0.834
with hospital doctor	3.9 (18/464)	1.0 (1/102)	0.223
with general practitioner	1.3 (6/463)	1.9 (2/101)	0.642

*Chi-square tests or Fisher's exact tests were used for all categorical variables, as appropriate, and Mann–Whitney U-tests for all ordinal variables apart from age, for which a *t*-test was used. †Data from hospital records for all women who attended during the study period. ‡Rating scales for each of these variables were from 0 (not at all ...) to 5 (very ...).

been worth having, and the majority did not find it a difficult experience since the mean rating of perceived difficulty was 1.3 on a scale from 0 to 5. Women rated having the transvaginal scan as being significantly less difficult than having a cervical smear (Wilcoxon $Z = 16.6$, $P < 0.001$), than having a dental filling (Wilcoxon $Z = 15.5$, $P < 0.001$) and than having a blood sample taken (Wilcoxon $Z = 8.8$, $P < 0.001$). They did, however, find it a more difficult experience than having an abdominal scan (Wilcoxon $Z = 14.3$, $P < 0.001$).

However, a minority of women who had the transvaginal scan did not find it an acceptable experience. Forty-four (5.9%) of the women who had transvaginal ultrasound thought they would decline a transvaginal scan in a future pregnancy; 4.1% thought it had not been worth having the scan; 7.2% (50/696) rated the difficulty of the experience as 4 or 5 on a 0–5-point scale.

Findings relating to psychological morbidity are shown in Table 2. Anxiety levels before and during the transvaginal scan were similar. Having prior experience of transvaginal ultrasound had no significant effect on how anxious women were before the scan (Mann–Whitney $U = 47\,573.5$, $P = 0.030$).

The transvaginal scan was found to allay rather than create worries about prematurity in women who had the scan, since women reported being significantly less worried after the scan than they were before they knew they could have the scan (Wilcoxon's test, $P < 0.001$), with mean worry ratings being reduced from 1.71 to 0.90 (on 0–5-point scale), although the magnitude of this difference is relatively small.

Over a third (36.6%) of women in the sample experienced some pain or physical discomfort during the transvaginal scan. However, the level of pain experienced was low since most (91.6%) of those who experienced pain described it as 'mild' or 'discomforting'. A small minority found the scan more painful, describing their pain as 'distressing' (4.6%), 'horrible' (2.7%) or 'excruciating' (1.1%) (Table 2).

The mean Impact of Event score, which indicates the level of psychological trauma (symptoms of avoidance and intrusion), was low at 4.3 out of a possible maximum score of 40. However, 12 individuals (4.7% of those who answered the Impact of Event Scale and 1.6% of all those who had the transvaginal scan) gave responses that suggested clinically significant

Table 2 Acceptability and psychological morbidity in women who had a transvaginal scan at 23 weeks' gestation to assess the risk of severe preterm delivery ($n = 775$)

Variable	*Mean (SD)*	*% (proportion)*
Acceptability		
Would have transvaginal scan in future pregnancy?		
Definitely		48.9 (365/747)
Probably		37.1 (277/747)
Don't know		8.2 (61/747)
Probably not		4.3 (32/747)
Definitely not		1.6 (12/747)
Worth having transvaginal scan to discover preterm delivery risk?		
Definitely worth it		69.4 (520/749)
Probably worth it		26.4 (198/749)
Probably not worth it		3.6 (27/749)
Definitely not worth it		0.5 (4/749)
Rating of perceived difficulty of experience (0–5)*		
Transvaginal scan	1.3 (1.3)	
Cervical smear	2.5 (1.4)	
Blood sample	2.0 (1.6)	
Dental filling	2.9 (1.6)	
Abdominal scan	0.4 (0.9)	
Anxiety		
Anxiety score: immediately before scan (6–24)	13.1 (2.0)	
Anxiety score: during scan (6–24)	12.9 (2.1)	
Worry about preterm delivery before they knew they could have scan (0–5)	1.7 (1.5)	
Worry about preterm delivery after scan (0–5)	0.9 (1.2)	
Pain		
Experienced any pain/physical discomfort during scan?		
Yes		36.6 (272/744)
No		63.4 (472/744)
Level of reported pain/physical discomfort		
Mild		48.7 (128/263)†
Discomforting		43.0 (113/263)
Distressing		4.6 (12/263)
Horrible		2.7 (7/263)
Excruciating		1.1 (3/263)
Trauma		
Impact of Event score (0–40)	4.3 (7.53)	
Clinically significant level of psychological trauma (i.e. Impact of Event score > 19)		4.7 (12/253)‡

*Figures in parentheses after the variable show the lowest and highest possible scores for the variable. †The denominator is smaller here than elsewhere because only those who reported some pain were asked to give the level of their pain. ‡The denominator here is smaller than elsewhere because only those who reported finding the scan difficult were asked to complete the Impact of Event Scale.

distress (i.e. were above the level for 'caseness' for psychological trauma). The distribution of Impact of Event scores was highly skewed (skewness = 2.6) and non-normal (Kolmogorov–Smirnov = 0.3, $P < 0.001$), with a standard deviation of 7.5 (Figure 1).

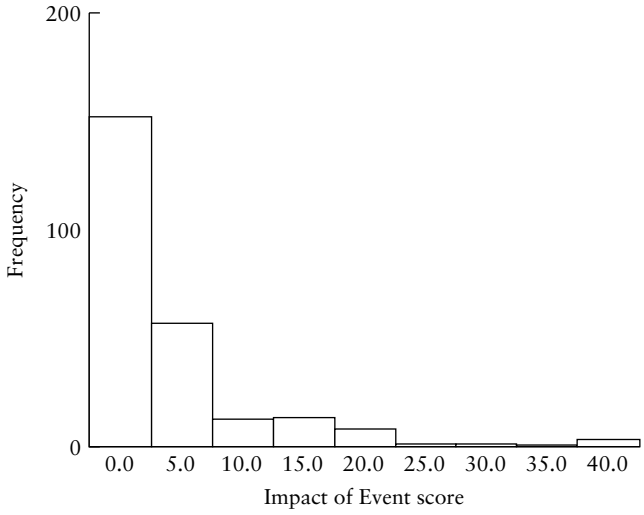

Figure 1 Distribution of Impact of Event scores (mean, 4.3; SD, 7.53; $n = 254$).

DISCUSSION

This study has demonstrated that most women who have a second-trimester transvaginal scan to screen for preterm delivery find it an acceptable and worthwhile procedure and most would willingly have it again in a future pregnancy. Women typically found the transvaginal scan less difficult than other common procedures such as cervical smears, blood tests and dental fillings. However, we found that women often experience a degree of anxiety before and during the scan. The anxiety scores found in our study, which used the short form of the STAI,

can be transformed into a score equivalent to that of the full-length STAI enabling anxiety levels in this study to be compared with those in other studies[18]. In our study the transformed anxiety scores were 43.7 before the scan and 43.0 during the scan. This is higher than the mean anxiety score (36.7) before a routine antenatal HIV blood test[22], but lower than the mean anxiety level (47.7) immediately after receipt of an abnormal alpha-fetoprotein screening result[18]. Over a third of women experience some, usually mild/discomforting, pain during the procedure. A small minority of women found the transvaginal scan distressing, reporting, for example, high levels of pain, or clinically significant levels of psychological trauma. Further research is merited on the characteristics and views of this subgroup. Discovering ways to identify such women, and ways to prevent or minimize negative psychological outcomes, would be of benefit to both women and scan operators.

A sizeable minority of women (44.8%) declined the offer of the transvaginal scan. We identified three factors which differentiated women who declined transvaginal ultrasound from those who accepted it. Decliners were significantly less likely to be worried about prematurity, which suggests that it may be the purpose rather than the procedure that deters some women. The finding that primiparous women and women from black African ethnic groups were more likely to take up the offer of transvaginal ultrasound is open to a number of possible interpretations. For example, these groups may differ from other groups in their perceptions regarding prematurity, in their acceptance of vaginally invasive procedures in general, or in their confidence about declining unwanted procedures. Our data were able to test the first two possibilities, and found no evidence that these factors can explain the differential uptake rates.

Our findings extend the existing literature on women's experiences of transvaginal ultrasound in a number of important ways. We have addressed many of the weaknesses inherent in previous studies, producing a more robust account of women's experiences and views. For example, we used many validated scales, our sample was large, women completed questionnaires at home rather than in the healthcare context, and we examined the views of those who declined, as well as those who accepted, transvaginal ultrasound. We have also undertaken a more comprehensive investigation of the psychological morbidity that may be associated with transvaginal ultrasound, examining previously unresearched areas such as psychological trauma, and have provided a more comprehensive assessment of acceptability. Compared to previous studies, we found slightly lower levels of acceptability, and a slightly lower proportion of women reporting some pain during the scan. Our finding that women rate the transvaginal scan as being a more difficult experience for them compared with the transabdominal scan contradicts two studies[12,13] but is in line with a third[9]. In the studies in which women preferred the transvaginal to the abdominal scan[12,13], women were required to have a full bladder for the abdominal scan, and it is likely that the discomfort of this accounted for the preference for the transvaginal scan. In the hospitals involved in our study, women were not required to have a full bladder for their abdominal scan, which may account for the disparity between the findings.

It is important to note the limitations of our study. Women who had a positive screening result were excluded from our study. The views and psychological outcomes of these women may well be very different from those of women in this study who all received a negative screening result. Acceptability and psychological morbidity outcomes for women with positive results (less than 2% of those screened[3]) require evaluation if we are to understand the full psychosocial impact of antenatal transvaginal ultrasound. The questionnaire to assess psychological trauma 4 weeks after the scan was only sent to women who had indicated on the initial questionnaire that they found the scan a difficult experience to some degree. This was because it was felt inappropriate to send a detailed questionnaire about negative feelings to women who had not reported finding the scan difficult. This procedure would not, therefore, have identified women for whom difficult feelings arose after completion of the initial questionnaire. Although our study involved two centers, with different population mixes and scanning procedures, the findings cannot necessarily be generalized to all UK hospitals. However, the fact that the scans were undertaken in a research context is unlikely to have had a major effect on the generalizability of the findings since all scans were undertaken by routine National Health Service staff, who had not received any special training in counseling women undergoing transvaginal ultrasound. It should also be noted that our findings cannot necessarily be generalized to women having transvaginal ultrasound in early pregnancy, or when not pregnant, nor to women having the scan for indications other than prematurity screening. A further limitation of this study is that, although response rates were good and were higher than would be expected for a largely inner-city population[23], not all eligible women participated, and women who declined the transvaginal scan were under-represented in the sample. Therefore the sample may not be truly representative of all women offered transvaginal scans in the participating hospitals.

This study has a number of implications for practice. Its findings enable those considering introducing antenatal transvaginal ultrasound screening to base the decision on evidence about likely levels of acceptability and psychosocial outcomes as well as clinical factors. The findings may also be used by those preparing information material for women undergoing transvaginal ultrasound, enabling them to give women a realistic picture of how they might feel. The findings that most women find it easy to make the decision whether to have or not to have transvaginal ultrasound, and that receiving information in advance and talking to a health professional before the day of the scan did not differentiate accepters from decliners, suggests that the provision of standard information is unlikely to influence uptake. The

association between worry about prematurity and uptake suggests that information or discussion might usefully focus on the purpose (as well as the procedure) of the scan. Further research is needed into the reasons behind the high uptake rates in certain social groups. Finally, the research has also highlighted the small minority of women who find having a transvaginal scan a very difficult experience, and an awareness of the existence of this subgroup is likely to enhance the care that scan operators give before, during and after transvaginal scans.

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