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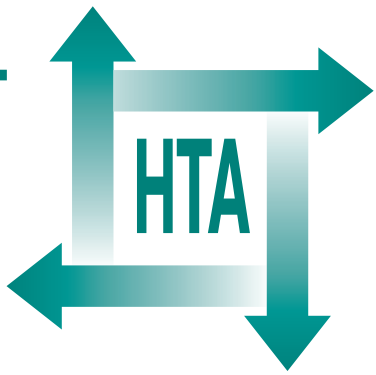

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Routine examination of the newborn: the EMREN study. Evaluation of an extension of the midwife role including a randomised controlled trial of appropriately trained midwives and paediatric senior house officers

J Townsend,[1*] D Wolke,[2] J Hayes,[3] S Davé,[3] C Rogers,[4] L Bloomfield,[3] E Quist-Therson,[5] M Tomlin[4] and D Messer[2]

[1] Public and Environmental Health Research Unit, London School of Hygiene and Tropical Medicine, London, UK
[2] Department of Psychology, University of Hertfordshire, Hatfield, UK
[3] Centre for Research in Primary and Community Care, University of Hertfordshire, Hatfield, UK
[4] Department of Midwifery and Child, University of Hertfordshire, Hatfield, UK
[5] Mount Vernon and Watford Hospitals NHS Trust, Watford, UK

* Corresponding author

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Abstract

Routine examination of the newborn: the EMREN study. Evaluation of an extension of the midwife role including a randomised controlled trial of appropriately trained midwives and paediatric senior house officers

J Townsend,[1*] D Wolke,[2] J Hayes,[3] S Davé,[3] C Rogers,[4] L Bloomfield,[3] E Quist-Therson,[5] M Tomlin[4] and D Messer[2]

[1] Public and Environmental Health Research Unit, London School of Hygiene and Tropical Medicine, London, UK
[2] Department of Psychology, University of Hertfordshire, Hatfield, UK
[3] Centre for Research in Primary and Community Care, University of Hertfordshire, Hatfield, UK
[4] Department of Midwifery and Child, University of Hertfordshire, Hatfield, UK
[5] Mount Vernon and Watford Hospitals NHS Trust, Watford, UK
* Corresponding author

Objectives: To assess the implications and cost-effectiveness of extending the role of midwives to include the routine (24-hour) examination of the healthy newborn usually carried out by junior doctors.
Design: The study included a prospective randomised controlled trial (RCT) with mother and baby dyads randomised to either senior house officer (SHO) or midwife for the routine examination of the newborn. Midwives and SHOs were also videoed while performing the examinations and the videos were rated by an independent consultant and senior midwife. In addition extensive interviews, surveys, consultations and assessments were carried out.
Setting: A District General Hospital (for the RCT), a London Teaching Hospital, general practices and mothers' homes (for interviews); questionnaires were sent to all maternity units in England (for the National Survey).
Participants: A total of 826 mother and baby dyads in a District General Hospital in south-east England. Midwives and SHOs, as well as midwifery managers, paediatric consultants; general practitioners (GPs) and representatives of key organisations.
Interventions: A routine examination of a newborn baby was carried out at about 24 hours from birth and a further examination for half the babies in each group, at 10-days at home by the community midwife.
Main outcome measures: Referrals assessed as appropriate and as major or minor by three independent consultants. Problems identified during the first year of life assessed as identifiable at 24 hours. Quality assessment by video against an agreed written proforma. Maternal satisfaction. Opinion of professionals and mothers about aspects of the examination.
Results: There was no statistical difference between SHO and midwife examinations in appropriate referral rates to hospital or community or in inappropriate referral rates to hospital. Videoed assessments were assessed as carried out more appropriately by the midwives than by the SHOs. Overall maternal satisfaction was high and higher when a midwife rather than an SHO examined. Few new health problems were identified at the 10-day examination. From the National Survey, it was estimated that about 2% of babies in England are examined by a midwife. If midwives were to examine all babies where there were no complications of birth or antenatal history, there would be savings of about £2 per baby born, equivalent to savings of £1.2 million nationally. Were midwives to examine all babies on normal wards savings would increase to about £4.30 per baby born or £2.5 million nationally. Representatives of the professional bodies were of the opinion that having trained midwives carrying out the examination would be valuable.
Conclusions: All component aspects of the study were consistent in showing benefits or at least no significant barriers to suitably qualified, trained midwives carrying out the examinations. Developing the role of the

midwife to include examination of the newborn is likely to result in improved quality of examinations and higher satisfaction from mothers. It would slightly reduce overall health service costs, with some increased resources needed by midwifery departments, and some decrease in resource needs of paediatric departments. There is a need for further research into the value of the examination being carried out at home rather than in hospital; the overall unsatisfactory quality of the examination of the hips; and appropriate inclusion criteria for which babies' midwives should examine.

Contents

Glossary and list of abbreviations

Technical terms and abbreviations are used throughout this report. The meaning is usually clear from the context, but a glossary is provided for the non-specialist reader. In some cases, usage differs in the literature, but the term has a constant meaning throughout this review.

Glossary

Abduction The movement of the leg with the knees bent, towards the baby's body.

Adduction The movement of the leg with the knees bent, away from the baby's body.

Advanced Neonatal Nurse Practitioner A nurse/midwife who has specialised training in the neonatal field.

Apgar score A set of criteria for assessing the well-being of the baby at birth. Scored 0–10.

Auditory brain stem response Method used to screen for hearing problems.

Auditory evoked response Method used to screen for hearing problems.

Augmentation/acceleration Speeding up labour artificially with drugs and/or by rupturing the membranes.

Barlow test Clinical assessment to evaluate if hips are dislocatable – that is, the head of the femur will move out of the acetabulum.

Baby hippy A lifelike model of the lower torso and limbs of a newborn female, designed for teaching professionals the skills for screening for developmental dysplasia of the hip. It has a dislocated left hip for practice of the Ortalani jerk sign and a lax right hip for the Barlow's manoeuvre.

Brachial pulse Sensation felt on feeling over the brachial artery in the groin.

Brain evoked response Method used to screen for hearing problems.

Cephalhaematoma A swelling on the baby's head due to bleeding under the bone covering of the head.

Changing Childbirth Government maternity policy for England.

Clicky hips A sensation felt or heard during the Ortolani or Barlow's test.

Developmental dysplasia of the hip A range of disorders of the hip joint that may be present at birth or develop later.

Dysmorphic features Appearance that is outside of what is considered usual.

Edinburgh Postnatal Depression Scale A screening tool that has been developed to identify women who are at risk of depression in the postnatal period.

Erythema toxicum A rash of unknown origin commonly seen in newborn babies.

Femoral pulse Sensation felt on feeling over the femoral artery in the groin.

Meconium stained liquor The fluid that surrounds the baby being stained as a result of the baby having opened its bowels.

Mongolian blue spot A bluish discoloured area commonly seen over the buttocks.

Moulding A normal change in shape of the baby's head due to the ability of the skull bones to overlap during labour.

Ortolani test Clinical assessment to evaluate if hips are dislocated – that is, the head of the femur is not in its normal position.

Otoacoustic emissions test Method used to screen for hearing problems.

Red reflex A reaction seen when shining a light into the eye.

Special Care Baby Unit Unit within a hospital that provides specialist care to sick newborn babies.

Talipes Refers to an abnormality of the relationship between the foot and the leg.

List of abbreviations

AIMS	Association for Improvements in the Maternity Services
ANNP	advanced neonatal nurse practitioner
CI	confidence interval
df	degrees of freedom
EMREN	Evaluation of the Midwife's Role extension in the Examination of the Newborn
ENB	English National Board
FTE	full-time equivalent
ITT	intention-to-treat
N96	Neuro-behavioural Physiological Assessment of the Newborn
NCT	National Childbirth Trust
NICU	Neonatal Intensive Care Unit
NMC	Nursing and Midwifery Council (new statutory body for nursing midwifery and health visiting, replaced UKCC)
OR	odds ratio
RCGP	Royal College of General Practitioners
RCM	Royal College of Midwives
RCPCH	Royal College of Paediatrics and Child Health
RCT	randomised controlled trial
SCBU	Special Care Baby Unit
SD	standard deviation
SHO	senior house officer
VSD	ventricular septal defect

All abbreviations that have been used in this report are listed here unless the abbreviation is well known (e.g. NHS), or it has been used only once, or it is a non-standard abbreviation used only in figures/tables/appendices in which case the abbreviation is defined in the figure legend or at the end of the table.

Executive summary

Objectives

To assess the implications and cost-effectiveness of extending the role of midwives to include the routine (24-hour) examination of the healthy newborn. The main comparison is examination by a midwife specifically trained for the examination (ENB N96), with standard practice, which is routine examination by a paediatric senior house officer (SHO).

To assess the value of a repeat examination by a community midwife at home at 10 days.

Design

The study included a prospective randomised controlled trial (RCT) with mother and baby dyads randomised to either SHO or midwife for the routine examination of the newborn. In addition, a sample of midwives and SHOs were videoed while performing the examinations and the videotapes were rated by an independent consultant and senior midwife. Interviews were held with health professionals and mothers for qualitative assessments of their opinions; a National Survey of current practice was conducted; there were consultations with representatives of professional bodies and relevant consumer bodies and cost implications were assessed.

Setting

A District General Hospital (for the RCT), a London Teaching Hospital, general practices and mothers' homes (for interviews); questionnaires were sent to all maternity units in England (for the National Survey).

Subjects

Mother and baby dyads in a District General Hospital in south-east England who fitted the inclusion criteria for examination by midwife were potentially included in the RCT; all midwives and SHOs examining during the research period were included in the video study; a midwifery manager and a named paediatric consultant in each midwifery/paediatric unit in England were included in the National Survey; purposively selected samples of 10 midwives, SHOs, general practitioners and new mothers; representatives of the Royal College of Midwives, the Royal College of Paediatric and Child Health, the Royal College of General Practitioners, the Nursing and Midwifery Council, the English National Board, the Maternity Alliance and the Association of Improvement of Maternity Services for the interviews.

Interventions

The intervention consisted of a routine examination of a newborn baby at about 24 hours from birth and a further examination for half the babies in each group, at 10 days at home by the community midwife; 826 mother and baby dyads were included in the study.

Main outcome variables

Maternal satisfaction assessed on a range of aspects, shortly after the examination, and again at 3 months. Referral assessed as appropriate and as major or minor, by three independent consultants. Problems identified during the first year of life assessed as identifiable at 24 hours. Quality assessment by video, rated independently by two consultants and two senior midwives against an agreed written proforma. Opinion of professionals and mothers about aspects of the examination.

Results

There was no statistical difference between SHO and midwife examinations in appropriate referral rates to hospital or community or in inappropriate referral rates to hospital. Midwives made more informal community referrals to general practitioners or community midwives. For problems occurring in the first year of life, there were no significant differences between the groups in problems either identified or not identified at 24 hours.

In the audio-visual quality assessment, for each item where significant quality differences between examinations were identified, the item was rated as carried out more appropriately by the midwives than by the SHOs. Major differences were found for examination of the heart and lungs, for overall quality of the examination and in communication skills. Overall quality of the physical examination by midwives was rated as good or very good by the midwife raters for 73% of the examinations and by paediatric consultant raters for 23%. Corresponding figures for SHO examinations were 12 and 0%.

Overall maternal satisfaction was high, with 81% (547/674) of mothers reporting that they were satisfied or very satisfied with the newborn examination. However, mothers were more satisfied when a midwife rather than an SHO examined their babies. The discussion of healthcare issues by the examiner and continuity of care were both significantly related to higher satisfaction. Midwives were significantly more likely to discuss healthcare issues such as feeding, sleeping and skin care than were SHOs (61 versus 33%), and could provide continuity of care. After controlling for both of these factors and for history of miscarriage, maternal satisfaction was no longer significantly related to randomised group.

Few new health problems were identified at the extra 10-day examination.

From the National Survey, it was estimated that about 2% of babies in England are examined by a midwife, although 44% (74/167) of midwifery units had midwives (median of two) with a postregistration qualification in the examination of the newborn. Of these units, 51% (38/74) reported that all and 18% (13/74) reported that some of these trained midwives conducted the examination. About one-third (23/74) of those so trained were not examining at all. Reported referral rates were very similar at 6.8% for SHOs and 6.6% for midwives. In 60% (103/173) of units, all babies were examined before discharge. In the remaining 40% (70/173), a median of 3% were transferred home without the examination and were examined mostly by a GP. About 1% of babies born in hospital were examined at home. None of the consultants or midwifery managers had major objections to midwives examining; with training and resources, midwife examination was acceptable.

Twelve universities in England were identified as approved to train professionals for the N96 programme with 286 completions over 4 years. Nearly all those trained were midwives, although the courses were open to other professionals, notably doctors and health visitors.

In the interviews with health professionals and mothers, there was general agreement that either SHOs or midwives were appropriate to carry out the examinations if trained; most mothers had no preference provided that the person was qualified and trained. SHOs reported that they had received little training for the examination.

Costs

Costs were considered in terms of three different scenarios suggested in the interviews with the representatives of the professional organisations. If midwives were to examine all babies where there were no complications of birth or antenatal history (i.e. about 50% of newborns), there would be savings of about £2 per baby born, equivalent to savings of £1.2 million nationally per annum. Were midwives to examine all babies on normal wards (i.e. about 90% of newborns as recommended by some of the professional bodies), with other babies examined by registrars, there would be savings of about £4.30 per baby born or £2.5 million nationally per annum.

Were there no extension of midwife examination, but registrars were to examine instead of SHOs, there would be an extra cost of about £1 per baby or £0.4 million nationally per annum. There were differences of opinion between the paediatric representatives and the midwives about whether all or only selected midwives should examine. This would have implications, particularly for costs of training, and these issues would need to be agreed by the professional bodies concerned. There would be likely costs of training of £0.1 million nationally for 4 years for midwives or £0.56 million (£0.47–0.65 million) ongoing annually for SHO training. Overall, the economic implications of any of the scenarios were not major but mostly would imply some net costs to midwifery departments.

Professional opinion

All the representatives of the professional bodies were of the opinion that having trained midwives, carrying out the examination would be valuable. Concern was expressed about the SHOs examining without formal training, although the

need for them to have experience of examining healthy babies was stressed. Midwife representatives of professional bodies suggested that certain other aspects of both training and practice could be omitted to allow time for midwives to examine the newborn.

Conclusions

All component aspects of the study were consistent in showing benefits or at least no significant barriers to suitably qualified, trained midwives carrying out the examinations. It was surprising, given the findings, that midwives currently examine only 2% of babies and that some N96 trained midwives are not carrying out examinations.

Implications for the health services

Developing the role of the midwife to include examination of the newborn would slightly reduce overall health service costs, with some increased resources needed by midwifery departments, and some decrease in resource needs of paediatric departments. This is likely to result in improved quality of examinations and higher satisfaction from mothers. There would be need for appropriate training of midwives, possibly as part of core preregistration training. Consideration would need to be given to how and when midwives would be trained and the criteria for babies to be examined. An overall improvement in examination of babies' hips is needed.

Recommendations for further research

There is a need for research into:

- the value of the examination being carried out at home rather than in hospital
- the overall unsatisfactory quality of the examination of the hips
- appropriate inclusion criteria for which babies' midwives should examine.

Chapter 1
Introduction

This study was undertaken in response to the NHS HTA panel's call for an evaluation of the extension of the midwife role in the routine examination of the newborn, that is, an assessment of the implications of a move away from junior doctors and towards midwives carrying out the examination. A detailed examination of the newborn in the early perinatal period is recommended as an integral part of Child Health Surveillance.[1] Although some doubt has been raised about the purpose and value of the newborn examination,[2,3] it is widely accepted as good practice.[1,4,5] The examination is a screening tool with a number of different components, including health education and to reassure parents. With the exception of examination of the hips and heart, there has been little research on its value, appropriate timing or the relative advantages of the examination being performed by different health professionals. A UK policy of universal screening for developmental dysplasia of the hip was formally introduced in 1969[6] and reinforced in 1986.[7] Current guidelines[1] recommend clinical examination within 48 hours of birth by the Ortolani–Barlow test to detect infants with dislocated or dislocatable hips, at discharge from hospital and at 6 weeks. The Report of the Expert Working Party[7] in 1986 recommended that infants be examined within 24 hours of birth and again at hospital discharge or 10 days. Currently the routine examination and discharge examination are usually combined because of only a brief hospital stay. The examination is usually performed in hospital by a senior house officer (SHO) in paediatric rotation who would mostly proceed to specialise in paediatrics or general practice. Because of the current short postnatal hospital stay, some mothers and babies may be discharged from hospital without a full discharge examination, or be kept in hospital waiting for a junior doctor to carry out the examination. Because hospital stay is now often limited to only a few hours after the birth,[8] this may now apply not only to the hospital discharge examination, originally introduced when the stay was 7–10 days, but also to the initial 24-hour examination.

The original recommended timings of 24 hours and discharge examination were introduced to accommodate traditional staff availability rather than to optimise benefit from the examination. However, the timing of the examination may affect accurate diagnosis of problems, and studies have subsequently attempted to determine the best time to screen for developmental dysplasia of the hip and congenital heart defects, to minimise the risk of false negatives and unnecessary distress caused by false-positive diagnosis. There have been no clear conclusions. The cost-effectiveness of a second hospital examination as recommended by the Expert Working Group[7] has been questioned,[4,5] particularly where early transfer home is usual.

Recent changes in the delivery and organisation of maternity care and in junior doctors' hours have focused attention on the examinations and on the most appropriate person to perform them. Government proposals directed at improving the quality of maternity services have advocated better utilisation of the skill and expertise of the midwives.[9] In response, there has been a change in the organisation and provision of maternity care, with midwives taking greater responsibility. Other activities that were initially part of the enhanced or 'extended' role, for example performing and suturing episiotomies and venopuncture and canulation were traditionally the responsibility of the doctor, are now an integral part of the student midwives' preregistration programmes. Hall[1] has concluded that a midwife can undertake the examinations of the newborn if clear guidelines, adequate training and paediatric support are provided. Midwifery-led beds and units have evolved, but the midwives responsible for them have sometimes encountered difficulties in arranging paediatric examinations because of the inaccessibility of hospital paediatricians or reluctance of GPs.[10] The above developments have provided the impetus for the introduction of the English National Board (ENB) N96 postregistration course in the Examination of the Newborn, known as the N96 or the Neuro-behavioural Physiological Assessment of the Newborn.[11] This course has received professional endorsement and academic accreditation from the provider institutions. It is open to health visitors, midwives and doctors, and is the only course specifically for the routine examination, although

preparation for the examination is included also as part of the advanced course for neonatal practitioners.[12]

Referral of problems

One of the major purposes of the examination is to screen for health problems, which may result in a referral for a minor or potentially major problem. Referral may be immediate to a registrar or a consultant for a diagnostic test or, for problems such as undescended testes that may resolve naturally, be delayed for GP or community midwife examination. However, for some potentially major problems, the examination has neither high sensitivity nor specificity. For example, although babies are tested for congenital heart disease, the examination is not considered to be a serious screening device for this, as many neonatal heart problems are not apparent at this early stage; the neonatal prevalence rate is about 0.5%, but only about one-third are identifiable at the routine examination.

The incidence of developmental dysplasia of the hip is estimated at between 0.6 and 1.8 per 1000, with most presenting late. However, about 60% of hips identified as displaced at the newborn examination are normal by 1 week of age. This test therefore has complex sensitivity and specificity, as hip problems are both difficult to detect early and are likely to resolve naturally or become apparent at a later stage. Referral for some other conditions such as jaundice will depend on the degree of severity of the condition; referral is not always obviously appropriate or not, but will depend on judgement and ultimately on the diagnostic test. False-positive referral rates would ideally not be near zero for safe and correct practice. Few studies have assessed the frequency and type of problems identified at the routine examination of the newborn,[13] with the exception of studies specifically evaluating the detection of cardiac abnormalities.[14]

There are other methodological difficulties surrounding the confirmation of referrals. Referral may be immediate to a trainee paediatrician (SHO), registrar or consultant, or for a diagnostic test. In cases such as orthopaedic referrals, the baby is most likely to be reviewed as an outpatient, and although dislocation or abnormality may not be confirmed at the initial consultation, the baby is often followed up until 1 year of age or until walking, when gait can be observed. Confirmation of undescended testes is often delayed until the routine 6–8-week examination conducted by the GP and health visitor. If the testes are descended at this examination it is not possible to confirm the correctness of a diagnosis at first examination. Similarly, cardiac murmurs may develop or resolve in the first week of life, and therefore confirmation of a correct referral or identification of a false-positive or false-negative diagnosis is not possible.

Existing research into the value of the neonatal examination is limited. Although Hall concluded that the yield of the examination is high both for the detection of abnormalities and in providing reassurance to parents,[1] the value has not been demonstrated in any formal evaluation. The Hall report[1] discusses the key role of parents in the detection of defects, but stresses that some defects, including developmental dysplasia of the hip and congenital heart disease, are unlikely to be recognised even by the most astute parents and require a special search by health professionals. It is acknowledged in the literature that early examination within the first 24 hours may not be the most appropriate; feeding problems and gastrointestinal problems may also not become apparent until more than 24 hours after birth and jaundice may not become clinically evident until day three of life.[15] However, the practicalities of performing an examination at a more appropriate time, given that at present the examination is most often performed by the hospital paediatric team, could result in many infants not being screened. Several studies conclude that a first examination should be carried out immediately after birth with a second examination, at least of the hips, being carried out at 7–10 days from birth rather than at the very variable time of discharge.[2,4] We follow this course in our trial, which for simplicity and correspondence is called the EMREN (Evaluation of Midwife Role extension in the routine Examination of the Newborn) trial, the aim of which is to assess the implications and cost-effectiveness of SHOs compared with midwives carrying out the initial routine examination, and of a second examination at 10 days.

The evaluation uses a number of different approaches and methodologies. It does not assess the overall value of the examination, as it was not considered ethical or acceptable to have an arm of the trial in which the newborn babies were not examined. The study also does not compare or assess the identification of specific problems examined for, such as heart or hip problems, because this would involve an extremely large sample, which was beyond the resources of this study.

The study assesses and compares all relevant dimensions of the examinations in terms of: maternal satisfaction with the examination, reported in Chapter 3; quality of the examination in terms of execution of the prescribed elements of the examination, assessed from audio-visual recordings, and reported in Chapter 4; rates of appropriate referral, reported in Chapter 5; opinions of examiners and mothers about the examinations, their value, timing, content and implications of who examines, reported in Chapter 6; a National Survey of all maternity units in England to ascertain current practice and training, reported in Chapter 7; interviews with representatives of Royal Colleges, professional and training bodies and consumer groups for their opinion on the implication of our findings for future policy, practice and training, reported in Chapter 8; and cost implications of their suggested scenarios for further practice, reported in Chapter 9. These triangulated evaluations are brought together in the conclusion in Chapter 10.

The next chapter sets out the basic methodologies of the study.

Chapter 2
Methods

Introduction

In order to assess the several aims of the examination, including the imprecise screening aspect, it was necessary to use a variety of methods in the evaluation. The study therefore includes a randomised controlled trial (RCT) design, a National Survey and qualitative research techniques to assess the implications and cost-effectiveness of alternative health professionals carrying out the initial routine examination of the healthy newborn. The principal comparison was examination by a midwife, with specific training for the examination (N96), compared with the standard practice of routine examination by an SHO. Main end-points, agreed with the NHSE funders, were rates of appropriate referral, mothers' satisfaction with the examination and independent assessment of the quality of the examination using videos. Other inter-related issues, such as time and place of the examination, were addressed as they might affect numbers of examinations, referral rates, professional opinion and costs. In addition, qualitative in-depth interviews were undertaken with paediatricians, midwives, GPs, parents and representatives of the relevant Royal Colleges and other professional and consumer bodies. The possible effects of changes in policies on training needs and on demands on paediatricians' and midwives' time are considered. Finally, a national survey of current practice and training was undertaken to inform policy makers.

Figure 1 sets out the different components of the trial, the outcome measures or purpose of each component and how these are brought together for the conclusions of the study.

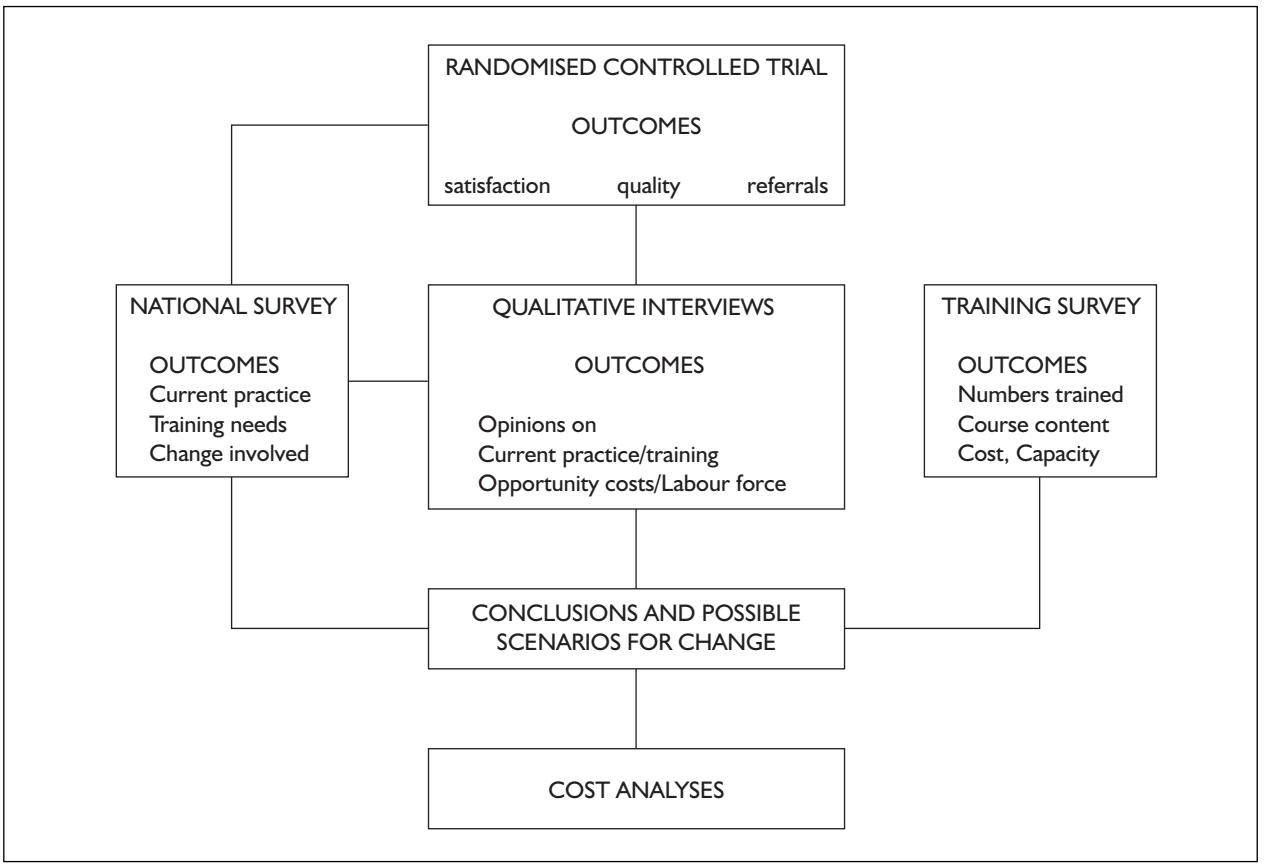

FIGURE 1 *EMREN trial design overview*

The RCT

The RCT was set to assess differences in outcome of examination by a doctor or a midwife at 24 hours and the value of a further examination by a midwife at 10 days. The main outcome measures were maternal satisfaction with the examination as assessed shortly after the examination (day 1 or 2) and again at 3 months, rates of appropriate referral, and quality of the examinations assessed by video.

The study was carried out in south-east England in a district general hospital setting with approximately 3000 deliveries per year. Recruitment took place between May 1999 and August 2000. Women who were present on the postnatal ward between the hours of 08.00 and 16.00 on at least one of the minimum of 5 days of recruitment per week were potential study participants. The research midwife provided written information and explained the study to all eligible women, and all who agreed to participate were asked to provide signed consent. The consent form stated that the data would be held in strictest confidence in accordance with the Data Protection Act.

Intervention

The randomised interventions were routine examination of the newborn by an SHO or by a community midwife. The routine examinations consist of a full physical examination including checking shape of head, face, fontanelles, eyes, nose, mouth, palate, umbilicus, genitalia, descent of testes (if male), femoral pulses, hands, feet, spine, skin, hips, chest and heart and checks on activity and feeding. They also include eliciting and considering concerns of parents and a review of family history, pregnancy and birth. Data for each of these dimensions as assessed by doctors or midwives are routinely collected at present, and were used in the RCT to compare problems identified and referrals, together with details of reasons for consultation and the outcome of these referrals.

All the community midwives who conducted the examination had completed the N96 course and were mainly working in the community setting. SHO training for the newborn examination was more informal and had been carried out by registrars or a consultant paediatrician. Babies included in the study were those who would have been eligible normally for a midwife examination, according to locally agreed criteria formulated by senior paediatric and midwifery staff at the hospital. These criteria were already in place and were not set up for the study. Exclusion criteria were maternal problems, including chronic disease, infection, drug dependency, medication with known side-effects taken during pregnancy, family history of genetic or inherited diseases, and infant problems, including emergency or elective Caesarean section under general anaesthetic, instrumental or operative delivery with perinatal complications, Apgar < 5 at 1 minute and/or resuscitation required at birth, gestation under 37 weeks, birth weight < 2.5 or > 4.5 kg, abnormalities detected antenatally or at birth needing follow-up, jaundice, problems since birth requiring medical investigation, abnormal neurological responses, dysmorphic features, admissions to the Special Care Baby Unit and history of symptomatic meconium stained liquor. All other births were potential candidates for inclusion in the study. Using these exclusion criteria, it was estimated that about half of all births would be eligible for the trial. Eligibility for the trial was assessed by the midwife managing the postnatal ward as part of the usual procedure for admitting the healthy newborn. Newborn examinations were usually carried out between 6 and 24 hours after birth, which is considered an optimal period by paediatric and midwifery management at the hospital, and is also the time recommended by Hall.[1] Examinations by midwives were carried out either in hospital (84%) or at the mother's home (16%), depending on the duration of her postnatal stay in hospital. All examinations by SHOs were carried out in hospital. Referrals as a result of the examination were recorded by the examiner on the specially designed newborn examination form which was redesigned for the trial (Appendix 1) Referrals to either a registrar, consultant or outpatient department were traced subsequently via the medical notes for outcome. Ethics approval for the study was granted by the Local Research Ethics Committee and by the University Ethics Committee.

Randomisation

A research midwife working on the postnatal ward provided written information and explained the study to eligible women. Women who agreed to participate were asked to provide signed consent. Each consenting mother and baby pair was individually assigned to an intervention group using random numbers generated by a

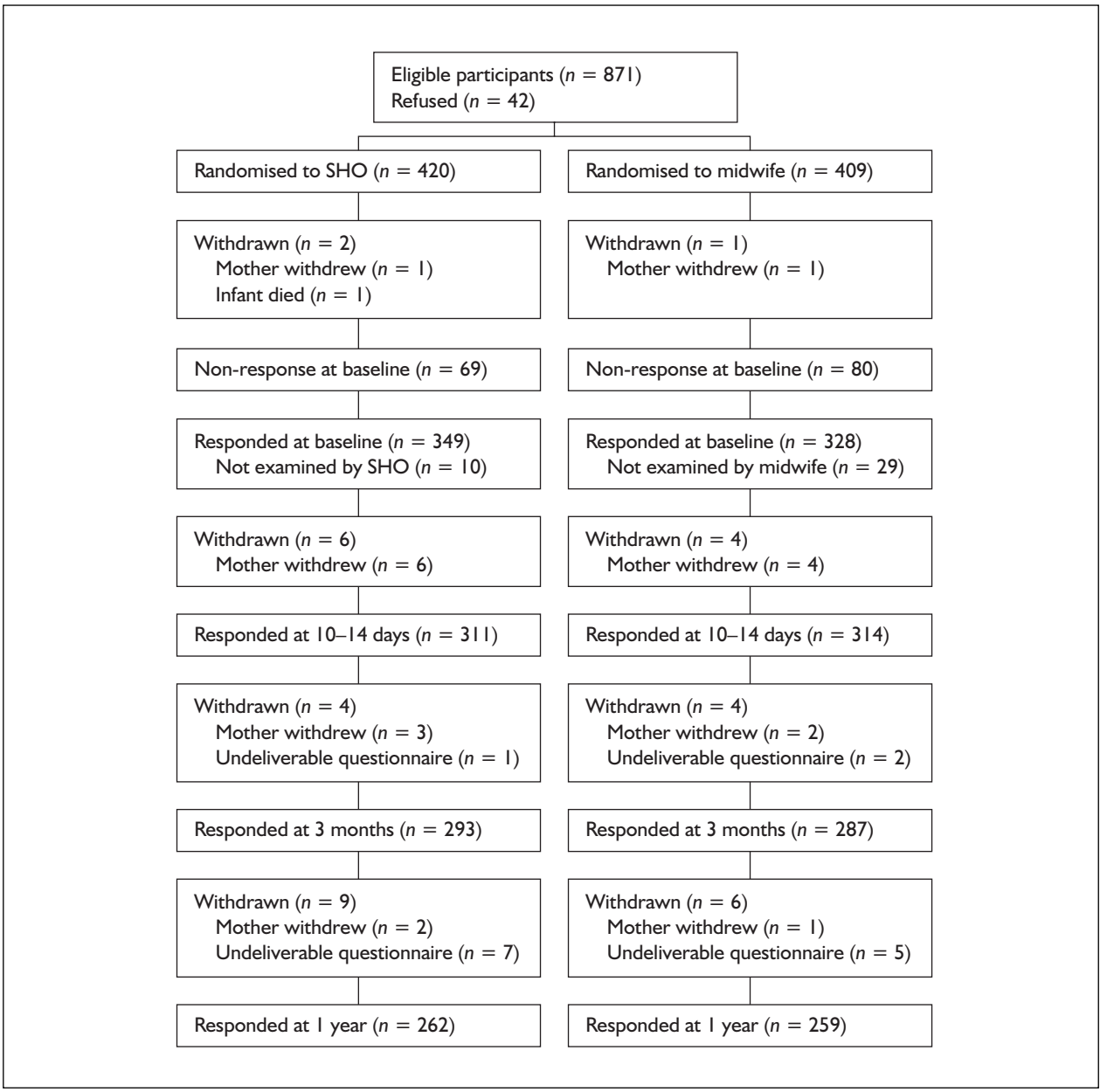

FIGURE 2 *Participant flow through the study (newborn assessment)*

coordinator of the study using a statistical software package. An identification sticker was placed on the front cover of the infant notes to ensure that babies were examined by the allocated examiner. Examiners were therefore not blinded to trial participation, and it was not possible to conceal the identity of the examiner from mothers. The flow of mothers through the study is given in *Figure 2* and the detailed methods for the five main elements of the study are given in the relevant chapters.

Data storage

All questionnaires returned were identifiable only by a unique identifier number. All documentation was stored in a lockable filing system. Electronic data were stored in a secure file. Only the project manager and statistician had access to individual data.

Chapter 3

A RCT of maternal satisfaction with the routine examination of the newborn: day 1 and 3 months later

Key messages

- Overall maternal satisfaction with the routine newborn examination is high.
- The quality of midwife examination is judged by mothers as being at least as satisfactory as that of SHOs, and this perception is maintained over a 3-month period.
- The discussion of healthcare and newborn behaviour during the examination significantly enhances maternal satisfaction with the examination – it is a window of opportunity for sharing information.
- Continuity of care by midwives and maternal experience of miscarriage affect maternal satisfaction neonatally but not in the long term.
- Concurrent maternal depressive mood affects maternal retrospective reports of satisfaction with the newborn examination.

Introduction

In the literature, it is considered by many that evaluations of examinations by different professional groups should consider parental satisfaction and provision of information as major outcomes.[3,16–20] Satisfaction is a reflection of the degree of congruency between a customer's expectations of ideal care and his/her perception of the actual care received.[17,21] Components influencing customer satisfaction include perceived technical–professional competence of the healthcare provider, relationship to and communication with the customer and the provision of information for educating the customer.[21–26]

Part of the RCT was to determine whether midwife versus SHO examination has differential effects on maternal satisfaction immediately after the assessment (day 1) and again 3 months later. Secondary analysis was undertaken to evaluate (1) whether any specific factors during the newborn examination (health education, problems identified, duration of examination) explained day 1 satisfaction and (2) whether process variables, identified in the newborn period, or intervening health service contacts and mental health factors could account for maternal satisfaction as rated by mothers 3 months later.

Methods

Outcome measures

The primary outcome measure was maternal satisfaction with the newborn examination.

Day 1 satisfaction measure

Since no tool measuring maternal satisfaction with the routine examination of the newborn existed, a self-completion questionnaire was developed by the multi-disciplinary research team (comprising psychologists, a health economist, paediatric and midwifery staff, health services researchers and a statistician), which was piloted on 60 mothers. In addition to measuring overall satisfaction with the examination, the questionnaire was designed to determine the degree of satisfaction with specific aspects including the manner and communication style of the examiner, information given and handling of the baby, using a seven-point Likert-type scale ranging from 'very dissatisfied' (–3), to 'very satisfied' (+3). Satisfaction with care during labour and since delivery, maternal mood and bonding with the baby were also assessed.

The mother was handed the questionnaire and a prepaid envelope after the newborn examination had been carried out. Participants had the option of either leaving their completed questionnaire in a specially placed box at the ward reception or completing it at home.

Principal components analysis with varimax rotation on all respondents with complete data set (n = 645) was used to indicate which questions assessed satisfaction with aspects of the newborn examination. The analysis identified seven of the questions, loading on a first factor, which assessed

satisfaction with the newborn examination. These items in the scale loaded relatively equally (loading: 0.82–0.90), so mean scores were calculated by summing the actual scores for the respective questions and dividing by seven. A Cronbach's alpha coefficient of 0.94 indicated that the mean satisfaction scale had high internal reliability. Two other factors were identified; these represented the mood of the mother and bonding with the baby (factor 2) and satisfaction with care during and since labour and delivery (factor 3). Factors 2 and 3 had only weak correlations with the newborn-satisfaction scale (Spearman's rank correlation, 0.15, $p < 0.001$ and –0.09, $p = 0.02$ for factors 2 and 3, respectively), indicating that the satisfaction scale had high discriminatory validity.

Three months' satisfaction

A postal follow-up questionnaire was piloted and sent to all mothers 3 months after delivery asking about health services usage, referrals and satisfaction with the care and support they had received since the birth of their baby. To determine if maternal satisfaction with the newborn examination was sustained over time, mothers were asked again to indicate their degree of overall satisfaction in a single question on this 3-month questionnaire using a Likert-type scale. This questionnaire was very similar to that used at day 1, with the following additions.

Additional measures: day 1 to 3 months

The Edinburgh Postnatal Depression Scale[27] was included in the postal questionnaire to be completed at 10–14 days after the birth and again at 3 months to assess mothers' current emotional status. Where the score suggested concern about possible depression, the mother was contacted and it was suggested to her that she might contact her health visitor or GP. This depression score at 3 months was included as a possible significant factor during the analysis. A score of 12 or above out of a maximum of 30 is considered high and may be indicative of postnatal depression.[28] Further detailed questions to the mother on healthcare use and advice between day 1 and 3 months were included in the questionnaire, such as the discussion of behavioural childcare issues at the 6–8-week postnatal examination, referrals for hip or heart abnormalities or jaundice, inpatient hospital stay or contact with their GP since delivery.

Non-respondents to the day-1 and 3-month questionnaires were sent a written reminder, followed by a telephone call. Respondents and non-respondents at day 1 were compared regarding a range of medical and social variables and 3-month non-respondents furthermore in respect of their satisfaction scores at day 1.[29]

Eligibility

A retrospective census was conducted on 100 consecutive births at the study hospital, to determine the potential number of babies that were eligible for midwife examination according to the exclusion criteria.

Statistics

A pilot study indicated that around 1000 subjects could be recruited within 15 months at the study site, sufficient to detect a 9% difference in satisfaction scores. Analysis of the first 100 cases in the study indicated a 15% difference in satisfaction levels, which could be detected at 80% power and 5% significance using approximately 260 subjects. Interim results were presented to the HTA review committee, who agreed that recruitment could stop after 650 participants had been recruited. Recruitment was in fact continued until 829 participants had been recruited.

The day 1 and 3-month satisfaction scales were dichotomised *a priori* into two categories: low satisfaction scores (33% lowest scoring of sample) and medium to high satisfaction scores, to deal with skewness of the distribution. The **primary analysis** of treatment differences was by **intention-to-treat** (ITT) to predict low satisfaction at day one and 3 months. **Adjusted analyses** were performed using a maximum likelihood logistic regression model to predict low satisfaction at day 1 and at 3 months using **actual examiner** rather than ITT. Socio-demographic, obstetric and health variables were tested as potential confounders, and examination-specific variables (healthcare issues discussed, length of examination, continuity of care, referrals made and place of examination) were tested as potential factors explaining intervention group differences in satisfaction. Additional variables were tested as confounders in the 3-month analysis, including the discussion of behavioural childcare issues at the 6–8 week postnatal examination, referrals for hip or heart abnormalities or jaundice, inpatient hospital stay, contact with their GP since delivery and a high postnatal depression score at 10–14 days and at 3 months.

Trends in satisfaction were analysed using Spearman's rank correlation, Wilcoxon matched-pairs signed rank tests and McNemar's test. Statistical analysis was performed using Stata 6.0 software and two-sided alpha values are reported.

Results

The participant flow through the study is shown in *Figure 2*. Forty-two out of 871 (5%) women approached refused to participate. Of those who consented, 420 were randomised to an SHO and 409 were randomised to a midwife. Three women (0.4%) were withdrawn from the study, two because they so requested and the other because her baby had died. Mother and baby hospital documentation was obtained for 98% of the study participants; however, a number of records contained missing data. Those who consented to participate in the study had a mean age of 30 years [standard deviation (SD) = 5, n = 823]; 87% were white Caucasian (n = 799), 42% were primigravida (n = 822), 74% were house owners (n = 749) and 77% had delivered by spontaneous vaginal delivery with no instrumental intervention (n = 825).

Table 1 shows the socio-demographic, obstetric and health profile of respondents and early feeding choice distributions, by ITT by SHO or midwife. A comparison of these variables between respondents (n = 677) and non-respondents (n = 149) was carried out. Of 16 variables tested (*Table 1*), only housing tenure and ethnic status were related to questionnaire response. Respondents were significantly more likely to be house owners [471/619 (76%) vs 83/131 (63%), p = 0.002], and were more likely to be of white ethnic status [582/653 (89%) vs 113/146 (77 %), $p < 0.001$] than non-respondents. Respondents and non-respondents did not differ significantly with respect to other socio-demographic, obstetric and medical factors.

Day 1 maternal satisfaction

A total of 677 (82%) women completed and returned the questionnaire; 10/349 (3%) babies assigned to an SHO were examined by a midwife and 29/328 (9%) subjects assigned a midwife were examined by an SHO. In most cases this was because the allocated examiner was not available at the time of discharge from hospital.

Overall satisfaction with the newborn examination was high; 81% (547/674) of women (85% in the midwife group and 78% in the SHO group) reported a mean score of +2 or +3 (high or very high satisfaction).

Differences by ITT

Table 2 shows the relative distribution of low and medium/high satisfaction by ITT. Although overall satisfaction was high, women in the midwife group were significantly less likely to report a low satisfaction score than were women in the SHO group {midwives 27% vs SHOs 40%: χ^2 [degrees of freedom (df) = 1] = 11.3; odd ratio (OR) = 0.54, 95% confidence interval (CI) 0.39 to 0.75, n = 645}.

Confounders and examination-specific variables

Table 1 shows that despite randomisation, the SHO group had more women who were primiparous (χ^2 = 5.3, p = 0.02) and fewer women with spontaneous vaginal delivery (χ^2 = 12.4, $p < 0.001$).

Four out of five examination-specific variables differed between midwives and SHOs (*Table 3*). A total of 65% of midwives versus 32% of SHOs (χ^2 = 71.3, $p < 0.001$) were reported to have discussed healthcare issues during the newborn examination, with feeding, skin care, jaundice, sleeping, stools and nappy care being the most commonly discussed issues. The average length of the routine newborn examination was longer in the midwife group than in the SHO group (median 15 versus 10 minutes, Wilcoxon rank sum z = –6.33, $p < 0.001$) (*Table 3*).

Continuity of care was defined as the same midwife clerking the mother at the initial antenatal visit and conducting the neonatal examination. There were 100/301 midwives who provided some continuity of care, and none of the SHOs had contact with the mother or baby prior to the routine examination. In all, 97 out of 306 babies were examined at home by a midwife rather than in hospital.

Adjusted model

Neither parity (crude OR = 1.11, 95% CI 0.80 to 1.55, n = 645) nor type of delivery (crude OR = 1.04, 95% CI 0.70 to 1.53, n = 645) was related to maternal satisfaction with the examination. Out of 16 factors (*Table 1*) only history of miscarriage was significantly associated with satisfaction rating, with experience of a miscarriage being associated with lower satisfaction with the newborn examination (crude OR = 1.68, 95% CI 1.14 to 2.48, n = 645, *Table 4*).

Women who reported that healthcare issues had been discussed during the examination were less than half as likely to report low satisfaction with the examination (crude OR = 0.43, 95% CI 0.30 to 0.60, n = 645). Neither length of the examination (crude OR = 0.96, 95% CI 0.92 to 1.00, n = 470) nor examination at home (crude OR = 0.89, 95% CI 0.56 to 1.42 n = 644) were

TABLE 1 *Socio-demographic, obstetric, medical and early infant feeding profile of respondents, by ITT*

Variable	Proportion[a]		
	SHO	**Midwife**	**Total**
Maternal age: > 30 years	180/347 (52)	176/330 (53)	356/677 (53)
Marital status: married	254/324 (78)	233/317 (74)	487/641 (76)
Ethnic status: non-white	32/337 (10)	39/316 (12)	71/653 (11)
Housing tenure: owner	241/320 (75)	230/299 (77)	471/619 (76)
Parity: primiparous	158/345 (46)	121/329 (37)	279/674* (41)
History of miscarriage: yes	80/346 (23)	62/329 (19)	142/675 (21)
Smoking status at first antenatal visit: yes	49/343 (14)	50/326 (15)	99/669 (15)
Alcohol consumption status at first antenatal visit: yes	70/341 (21)	83/325 (26)	153/666 (23)
Mode of delivery: spontaneous vaginal delivery	247/347 (71)	272/330 (82)	519/677*** (77)
Median length of labour: minutes	346 (n = 316) (95% CI 312 to 396)	349 (n = 314) (95% CI 309 to 385)	346 (n = 630) (95% CI 317 to 378)
Epidural or pethidine administered: yes	138/346 (40)	123/330 (37)	261/676 (39)
Complications during labour: yes	181/323 (56)	156/302 (52)	337/625 (54)
Past medical history of problems: yes	235/345 (68)	218/324 (67)	453/669 (68)
Past history of depression: yes	34/345 (10)	33/324 (10)	67/669 (10)
Has put baby to breast: yes[b]	273/345 (79)	265/321 (83)	538/666 (81)
Feedings intentions: solely breastfeeding[b]	158/343 (46)	149/327 (46)	307/670 (46)

* $p \leq 0.05$; *** $p \leq 0.001$.
[a] Percentages in parentheses.
[b] Reported by the mother on the maternal satisfaction questionnaire.

significantly related to maternal ratings of satisfaction. If the midwife who clerked the first antenatal visit also performed the routine newborn examination, women were 67% less likely to report low satisfaction than if a different midwife or an SHO carried out the examination (crude OR = 0.33, 95% CI 0.18 to 0.58, n = 645).

In *Table 4(a)*, the adjusted ORs for predicting satisfaction with the newborn examination on an

TABLE 2 *Relative distribution of low and medium/high satisfaction with the newborn examination, by ITT (n = 645)*

Relative satisfaction score	SHO[a]	Midwife[a]	Total[a]
Low	133 (40)	83 (27)	216 (33)
Medium/high	199 (60)	230 (73)	429 (67)
Total	332 (100)	313 (100)	645 (100)

Crude OR (low satisfaction) = 0.54 (95% CI 0.39 to 0.75, $p < 0.001$)
[a] Percentages in parentheses.

ITT basis are shown. After adjusting for history of miscarriage, discussion of healthcare issues and continuity of care ITT (midwife versus SHO) no longer independently predicted satisfaction (adjusted OR = 0.82, 95% CI 0.57 to 1.20, $n = 645$). In contrast, even after adjustment for the other variables, the discussion of healthcare issues during the examination (adjusted OR = 0.49, 95% CI 0.34 to 0.70, $n = 645$), a history of miscarriage (adjusted OR = 1.61, 95% CI 1.08 to 2.40, $n = 645$) and continuity of care (adjusted OR = 0.43, 95% CI 0.23 to 0.81, $n = 645$) remained significantly associated with satisfaction with the newborn examination. Whether the baby was examined at hospital or at home was not related to satisfaction.

To ascertain whether the discussion of healthcare issues, continuity of care and experience of previous miscarriage were explanatory factors, the analysis was repeated according to actual treatment received by SHOs versus midwives. The results [*Table 4(b)*] were virtually the same as those for the ITT analysis.

Eligibility census

In the eligibility census, the records for 9% of babies were unobtainable. Of the 91 records that were found, it was determined that 48 (53%) babies were eligible for midwife assessment according to the criteria formulated by midwives and paediatricians at the trial hospital (see 'Methods', p. 5). Fifteen out of 48 (31%) of these eligible cases were recruited into the trial.

Three months' satisfaction: changes and explanation

Non-responder analysis

A total of 677 (82%) women completed and returned the day 1 questionnaire, 72% of women returned the 3-month questionnaire and 483 (58%) of all eligible women returned both day 1 and the 3-month questionnaires. Respondents and non-respondents at 3 months were compared with respect to satisfaction at day 1 to check for attrition bias. Day 1 satisfaction scores of the 192 non-respondents at 3 months (who had taken part at 1-day after delivery) were not significantly different from those reported by respondents (low satisfaction: non-respondents 38% (71/189) vs

TABLE 3 *Examination-specific variables, by status of examiner*

	Proportion[a]		
Variables	**SHO**	**Midwife**	**Total**
Healthcare issues discussed during examination: yes[b]	112/355 (32)	196/304 (65)	308/659*** (47)
Median length of examination: minutes[c]	10 ($n = 232$) (95% CI 10 to 10)	15 ($n = 257$) (95% CI 13 to 15)	10 ($n = 489$)*** (95% CI 10 to 12)
Hospital referrals made on examination: yes[c]	17/364 (5)	11/304 (4)	28/668 (4)
Newborn examination by midwife who clerked first antenatal visit: yes	NA	100/301 (33)	100/664 (15)
Newborn examined by midwife at home: yes[b]	NA	97/306 (32)	97/668 (15)

*** $p \leq 0.001$.
[a] Percentages in parentheses.
[b] Reported by the mother on the maternal satisfaction questionnaire.
[c] Recorded by the examiner on the newborn examination form.

TABLE 4 *Predicting low maternal satisfaction with the newborn examination using the maximum likelihood logistic regression model*

Factor	Crude OR (95% CI)	Adjusted OR (95% CI)
(a) ITT		
ITT (midwife vs SHO) (n = 313/645)	0.54 (0.39 to 0.75)***	0.82 (0.57 to 1.20)
Healthcare issues discussed (yes) (n = 297/645)	0.43 (0.30 to 0.60)***	0.49 (0.34 to 0.70)***
Previous miscarriage (yes) (n = 135/645)	1.68 (1.14 to 2.48)**	1.61 (1.08 to 2.40)*
Newborn examination by midwife who clerked first antenatal visit (yes) (n = 95/645)	0.33 (0.18 to 0.58)***	0.43 (0.23 to 0.81)**
(b) Actual treatment by SHOs vs midwives		
Status of examiner (midwife vs SHO) (n = 291/645)	0.56 (0.40 to 0.78)***	0.91 (0.62 to 1.35)
Healthcare issues discussed (yes) (n = 297/645)	0.43 (0.30 to 0.60)***	0.48 (0.33 to 0.68)***
Previous miscarriage (yes) (n = 135/645)	1.68 (1.14 to 2.48)**	1.61 (1.08 to 2.40)*
Newborn examination by midwife who clerked first antenatal visit (yes) (n = 95/645)	0.33 (0.18 to 0.58)***	0.41 (0.22 to 0.77)**

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$.

33% (157/483) respondents, $\chi^2 = 1.55$ (df = 1), $p = 0.21$).

Changes in satisfaction

Overall satisfaction was high also at 3 months; 79% (380/483) of mothers (in both the midwife and SHO group), reported a mean score of +2 or +3 (high or very high satisfaction). Satisfaction reported at 3 months was moderately well correlated with day 1 ratings (Spearman's rank correlation, 0.54, $p < 0.001$). McNemar's test comparing low versus moderate/high satisfaction at the two time points showed that maternal satisfaction had not significantly changed over the 3 months ($\chi^2 = 0.12$, $p = 0.72$). However, analysis across the scale points using the Wilcoxon matched pairs rank test indicated that satisfaction had slightly reduced, with fewer mothers being very satisfied ($z = 4.27$, $p < 0.001$). The scores thus remained relatively stable over time with a slight shift downwards on the scale, indicating slightly lower retrospective satisfaction. At 3 months, satisfaction did not significantly differ by ITT (crude OR = 1.06, 95% CI 0.69 to 1.62, n = 382). Further analysis was carried out using actual examiner variables to identify process variables.

Adjusted model by actual examiner: 3 months

Table 5 shows that by 3 months actual status of examiner was not associated with lower satisfaction whether expressed as crude OR (crude OR = 0.89, 95% CI 0.58 to 1.37, n = 382), or adjusted for by confounders and newborn examination factors or postnatal depression (adjusted OR = 1.28, 95% CI 0.77 to 2.14, n = 382). Type of delivery was not related to low maternal satisfaction with the examination (crude OR = 0.98, 95% CI 0.59 to 1.64, n = 382). The discussion of health care issues during the newborn examination remained negatively associated with low satisfaction (adjusted OR = 0.62, 95% CI 0.39 to 0.98, n = 382). Previous miscarriage (adjusted OR = 1.35, 95% CI 0.80 to 2.27, n = 382) was not significantly associated with low satisfaction. Continuity of care remained negatively associated with low satisfaction; however, this just failed to be statistically significant (adjusted OR = 0.53, 95% CI 0.25 to 1.13, n = 382, $p < 0.10$) (*Table 5*).

Of the additional factors assessed at 3 months only the postnatal depression score was related to satisfaction, where women with a high postnatal depression score at 3 months were more than 2.5 times as likely to report lower satisfaction (adjusted OR = 2.58, 95% CI 1.19 to 5.59, n = 382) (*Table 5*). In contrast, high postnatal depression score 10–14 days after delivery (crude OR = 1.09, 95% CI 0.48 to 2.49, n = 299), discussion of behavioural childcare issues with the health visitor or GP at the 6–8-week postnatal examination (crude OR = 0.83, 95% CI 0.53 to 1.30, n = 382), postnatal inpatient hospital stay (crude OR = 0.90, 95% CI 0.36 to 2.25, n = 378) or contact with the GP in the first 10–14 days after

TABLE 5 *Predicting low maternal satisfaction with the newborn examination at 3 months by actual status of examiner, using the maximum likelihood logistic regression model*

Factor	Crude OR (95% CI)	Adjusted OR (95% CI)
Status of examiner (midwife vs junior paediatrician) (n = 186/382)	0.89 (0.58 to 1.37)	1.28 (0.77 to 2.14)
Healthcare issues discussed (yes) (n = 186/382)	0.62 (0.40 to 0.96)*	0.62 (0.39 to 0.98)*
Previous miscarriage (yes) (n = 81/382)	1.41 (0.85 to 2.35)	1.35 (0.80 to 2.27)
Newborn examination by midwife who clerked first antenatal visit (yes) (n = 56/382)	0.59 (0.31 to 1.15)	0.53 (0.25 to 1.13)
High postnatal depression score (yes) (n = 29/382)	2.43 (1.13 to 5.21)*	2.58 (1.19 to 5.59)*

* $p \leq 0.05$.
Note: the smaller number of observations in this model is due to a reduced amount of data for the postnatal depression questionnaire, which was not sent to a number of mothers while it was under ethics committee review.

delivery (crude OR = 0.62, 95% CI 0.38 to 1.03, n = 289) were not significantly related to satisfaction at 3 months.

Discussion of maternal satisfaction

Mothers' overall satisfaction with the newborn examination was high both neonatally and 3 months after the examination, with some 81 and 79%, respectively, reporting that they were satisfied or very satisfied. High satisfaction has been found with other maternal services within the NHS.[17,18] The stability in maternal satisfaction ratings over the 3-month period was moderate. It was notable that satisfaction had shifted slightly downwards compared with the assessment of satisfaction in the newborn period, at a time of high emotional arousal.

At day 1, mothers whose babies were examined by midwives were 46% less likely to report lower satisfaction with the newborn examination than those examined by SHOs. However, once continuity of care, history of previous miscarriage and discussion of healthcare issues during the examination were taken into account, no significant differences in maternal satisfaction with the examination between midwives and junior paediatricians remained. That is, the differences in maternal satisfaction at day 1 were not explained by the profession of the examiner, but by whether the examiner discussed healthcare issues during the examination or provided some continuity of care, both of which were more likely for examination by midwife.

In contrast, on the retrospective report of maternal satisfaction at 3 months, no differences in midwife versus SHO newborn examination were found on an ITT basis. Mothers were as satisfied with midwife as with junior paediatrician examinations. Analysed by actual examiner, satisfaction ratings at 3 months were not influenced by whether the baby had required postnatal inpatient care or had contact with the GP in the first 10–14 days after delivery. Also, the satisfaction ratings were not influenced by the discussion of childcare issues during the 6–8-week check-up in the GP practice. The maternal satisfaction ratings were therefore not biased by later experiences of contact with the health service.

Consistent contributor to maternal satisfaction

The factor identified as a moderate predictor of maternal satisfaction with the newborn examination both on day 1 and 3 months later was the discussion of healthcare issues during the newborn examination. Contact during routine child health surveillance provides an important opportunity to discuss healthcare issues and address parental concerns[1,3,30] and has been found to be an important contributor to consumer satisfaction in various fields of healthcare.[21,31,32] Our findings on day 1 and in reports 3 months later indicate that healthcare advice – on feeding, skin care, infant sleeping, stools and nappy care – is highly salient to mothers and appears highly valued. The newborn period and the newborn examination provide a special window of opportunity for a midwife or doctor to reassure families.[33] Physical and behavioural care issues are the major parental concerns for otherwise healthy newborns at this time. The examination of the newborn provides an important and inexpensive opportunity for education on infant physical and emotional care.[30,34]

Different influences on day 1 and 3-month satisfaction ratings

First, midwives but not SHOs may have contact and care for the mother during pregnancy. Walker[30] proposed that the established relationship between midwife, mother and child should be built on to create a seamless flow of reassuring care and advice. The newborn examination could be seen as part of that process. In this study, 30% (95/318) of examinations on an ITT basis were performed by a midwife who had met the mother antenatally at initial booking. Even using this relatively crude measure of continuity of care, mothers were more satisfied with the examination immediately after the examination if the same midwife was present at antenatal booking and examined her newborn, rather than a different midwife or SHO. However, continuity of care did not significantly determine maternal retrospective reports of satisfaction with the examination at 3 months. Hence the impact of continuity of care appears to be short rather than long lasting.

Second, women who experienced previous miscarriages have been reported to be more anxious, both generally and specifically, about the possibility of something being wrong with the baby.[35–37] Being treated sympathetically by the healthcare staff after miscarriage has been considered as an important contributor to satisfaction with care.[38] This study found that mothers who had had previous miscarriages were 58% less satisfied with the newborn examination immediately after the examination, independent of whether carried out by an SHO or midwife. Hence new mothers with a history of miscarriage may need special reassurance not currently provided during the newborn examination. However, 3 months later with most infants being healthy, mothers with previous miscarriages did not feel less satisfied with the newborn examination than those with no previous miscarriages.

At 3 months, concurrent maternal depressive feelings were strongly associated with reports of low satisfaction with the newborn examination. For ethical reasons no measures of depression were taken a day after birth. Mothers with depressive symptoms at 3 months reported relatively low satisfaction with the newborn examination much more often than did mothers without depressive symptoms. Depressive feelings that were present shortly after birth, but mostly resolved by 3 months, did not affect maternal ratings. There is increasing evidence that those affected by current depression are more likely to be biased in their perception of past events congruent to their current emotional state.[39] A depression distortion bias has been repeatedly found in depressed mothers' reports of their child's behaviour problems, that is, depressed mothers tend more often to report problem behaviours in their children[40–42] or to experience motherhood less positively.[43] In this RCT, depression rates were similar in both trial arms and did not impact on ITT. However, in future observational research or audits relying on parent report measures of satisfaction, current parental mental health should be taken into account when interpreting findings.[40]

Methodological issues

Our findings are unlikely to be accounted for by allocation bias or selective sample attrition. The randomisation had worked well with no differences found in 15 of 16 social or obstetric factors investigated. However, more newborns that had experienced an instrumental delivery were allocated to SHOs than midwives. This may well have occurred by chance considering the number of comparisons carried out. Nevertheless, we included instrumental delivery as a confounder for adjustment in subsequent analyses. No influence of delivery mode on day 1 or 3-month maternal satisfaction ratings with the newborn examination was found. Similarly, St James-Roberts and Wolke[44] reported that delivery type did not affect maternal perception of newborn behaviour. Delivery type therefore had no biasing effect.

There was significant attrition in response to the 3-month satisfaction questionnaire. However, those lost to follow-up did not differ from those who remained in the study according to initial (day 1) maternal satisfaction ratings.

The major outcome measure was a seven-item scale of satisfaction with the newborn examination (day 1) that was specifically developed for this study. The internal reliability of the scale was high (0.94), exceeding that reported for patient satisfaction scales in investigations of maternity care[31] or general practice.[45] Principal component analysis and the low and non-significant correlations with other scales relating to satisfaction with labour and postnatal care ($r = -0.09$) or maternal mood and bonding to her newborn ($r = 0.15$) indicate high construct and discriminant validity. That is, the major outcome measure assessed satisfaction specifically with the newborn examination independent of other care experiences or maternal well-being, and findings cannot be attributed to systematic bias.[46] The scale developed and tested here may be highly suitable

for assessing satisfaction with the newborn examination in clinical practice for audit purposes or research.

Finally, the RCT was analysed by ITT. However, to test whether other and examination-specific factors explain maternal satisfaction ratings, analysis according to those who were actually treated by a midwife or SHO was conducted. The results were virtually the same whether analysed by ITT or actual treatment and support the interpretation of findings.

Conclusions

We conclude that from the mother's perspective, the quality of midwife examination is at least as satisfactory as that of SHOs, when adequate training and paediatric support have been provided. This perception of satisfaction is maintained for 3 months. Information on healthcare issues such as infant feeding, skin care, jaundice, sleeping, stools and nappy care in the neonatal period are highly valued by mothers and are a good and inexpensive way to increase the quality of care.

On a cautious note, it is important to note that according to the exclusion criteria agreed by midwives and paediatricians in this trial, only about half (53%) of all newborns were eligible for midwife examination. Furthermore, although maternal satisfaction is important, it is only one of several possible indicators of quality of care. Full recommendations are made at the end of the report after presenting the longitudinal evaluation on the safety, observed quality and cost-effectiveness of midwife versus SHO examination, and also a national survey of current practice, and qualitative analysis of stakeholders' views of the newborn examination are fully reported. The inclusion criteria may be reviewed with more newborns potentially eligible for midwife examination.

Chapter 4

Quality of routine examinations using video assessment

Key messages

- The quality of midwife examinations exceeded that of SHOs.
- There is a lack of well-defined 'gold standards' for elements of the examination.
- There was moderate to good agreement between raters for only half the items on the videotapes.
- Screening for hip problems, particularly using the Barlow's test, was often poor.

Introduction

This arm of the study used video recording as an objective audio-visual record of the examinations and developed and validated a proforma for use in evaluating their quality. The proforma was designed in relation to the aims of the examination as identified by Hall,[1,3] to include the physical components, health education and parental reassurance, with quality assessed in terms of whether items were carried out or not. The null hypothesis tested was that there was no difference between SHOs and midwives in quality of examination. Assessing accuracy of testing in this way was important owing to the difficulties in rigorously assessing outcomes in terms of specific problems, which are relatively rare, and would require an extremely large sample and would be limited by problems of false positives and negatives.

Methods

Subjects

Eleven midwives and eight SHOs participating in the RCT, gave signed consent to be videoed while performing examinations. Babies were included in the study if they fulfilled the Trust's inclusion criteria and if mothers had agreed to participate in the RCT. Signed consent specifically to video the baby's examination was obtained also from the mother. Each examiner was videoed on two separate occasions. In total, 39 newborn examinations were recorded, including one pair of twins, of which 22 were conducted by midwives and 17 by SHOs.

Procedure

All video-taped examinations were carried out in hospital, on the postnatal ward at the mother's bedside. All sessions were videoed with a hand-held video camera focusing on the baby and the examiner's hands. Care was taken to ensure that the camera and operator did not interfere with the examination and that the identity of the examiner was kept anonymous. Before the tapes were rated by the independent observers, they were edited to remove any verbal or visual reference to the examiners' identities.

A consultant paediatrician and a senior midwifery lecturer on the research team piloted the proforma using a number of videoed newborn examinations. The scoring format was adjusted and instructions clarified for items where there was rating disagreement.

Four observers, two consultant paediatricians and two senior midwives, with extensive and current experience of the newborn examination, rated the recordings using a written proforma developed by the research team. The raters were from three different hospitals, not including the study hospital, and none knew the videoed staff. One consultant and one midwife independently assessed the tape of 20 examinations and the other consultant and midwife the tape of the remaining 19 examinations. Each examination was therefore independently rated by one consultant and one midwife.

The written proforma included criteria for rating each physical component of the examination, each aspect of communication and the examiner's response and sensitivity to the mother (Appendix 2). It included 61 items to be observed and these were behaviourally coded. Fifty-four of these items required a response from the raters of 'yes' (it was done), 'no' (it was not done) or 'unable to judge', according to whether the rater observed the item to have been carried out or not. 'Unable to judge' was selected if the behaviour was not

observable, for example due to background noise or being obscured by the examiner's body. Six items including 'how much did the baby cry or fuss during the examination?' required a rating on a four-point Likert scale, with responses ranging from 'not at all' to 'most or all of the time'. One item, 'How would you judge the overall quality of the physical examination in terms of technical competence?', required rating on a seven-point scale from 'very poor' to 'very good'. A further item (62) was constructed from the comments of the raters about whether the Barlow's test for neonatal hip instability had been carried out or not. Raters were encouraged to comment where appropriate. Items relating to the examination of the hips were adapted from a form designed to highlight the essential components.[47] Guidelines, including instructions, diagrams and rating scales, were given to the raters to facilitate use of the proforma. The four independent raters attended a briefing day prior to assessing the videos; each rated the same two videotapes so that the rating criteria could be standardised.

Analysis

Identification of items with acceptable inter-rater reliability

For each item, the level of agreement between raters was assessed using the Cohen kappa coefficient.[47] Items with $\kappa \geq 0.4$ were considered to have moderate to good agreement; those with $\kappa < 0.4$ were interpreted as having poor to fair rater agreement.[47] The percentage level of agreement between raters was also assessed, but not used as a criterion of agreement as this does not discriminate between actual agreement and agreement that arises due to chance, nor does it account for bias. Where one rater had rated an item as 'unable to judge' or had failed to enter a rating, that item for that examination was excluded from further analysis.

Evaluation of examinations

The differences between appropriate examination by the midwives and SHOs were then tested for each item using Fisher's exact test. Items rated on a four-point Likert scale were dichotomised as categories, for example, 'how much did the baby cry or fuss during the examination' was recorded as either 'not at all/rarely' or 'frequently/most or all of the time'.

Results

Comparisons of the observed skills and competence of the examiners

The comparisons of the observed skills of the midwives and SHOs are shown in three tables, as follows: items for which there were significant differences between the examiners and good agreement between the raters (Fisher's exact test, $p < 0.05$ and $\kappa \geq 0.4$) (*Table 6*); items for which there were no significant differences found between the examiners and good agreement between the raters (Fisher's exact test, $p > 0.05$ and $\kappa \geq 0.4$) (*Table 7*); and items for which there were significant differences between the examiners although not good agreement between the raters (Fisher's exact test, $p < 0.05$ and $\kappa < 0.4$) (*Table 8*). The tables differentiate results for the consultant paediatrician and senior midwife raters. For the remaining items

TABLE 6 *Significant differences in numbers of appropriately completed examination items by midwives and SHOs (for items where moderate to good agreement between raters)*

	Rated by consultant pediatrician			Rated by senior midwife		
	Midwives (%)	SHOs (%)	*p*	Midwives (%)	SHOs (%)	*p*
Technical items						
Sternal borders auscultation	100.0	62.5	*	92.9	77.8	
Brachial pulses palpated	100.0	0.0	***	100.0	0.0	***
Communication items						
Explain why there	100.0	78.6		94.7	64.7	*
Soothe the baby	95.0	68.8		100.0	46.7	***
Health or childcare issues	50.0	23.5		59.1	5.9	**
Explaining what doing	95.5	64.7	*	100.0	58.8	**
Responding to mother	100.0	81.8		100.0	75.0	*

Midwives rated higher by consultant paediatricians 100% items. Midwives rated higher by senior midwives 100% items.
Fisher's exact test (differences between midwives and SHOs).
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

TABLE 7 *No significant differences in appropriately completed examination items by midwives and SHOs (for items where moderate to good agreement between raters)*

	Rated by consultant pediatrician		Rated by senior midwife	
	Midwives (%)	**SHOs (%)**	**Midwives (%)**	**SHOs (%)**
Technical items				
Baby wearing vest – auscultation	36.4	41.2	31.8	41.2
Relaxed – palpation pulses	42.9	37.5	36.4	41.2
Spine	100.0	88.2	100.0	87.5
Eyes	90.0	100.0	95.5	78.6
Pacing, stepping	52.4	60.0	52.4	64.7
Relaxed hip examination	35.0	13.3	45.5	23.5
Flat surface	100.0	88.2	100.0	82.4
Nappy off	100.0	88.2	95.5	81.3
Manoeuvred simultaneously	95.0	82.4	100.0	82.4
Abduction 60–90 (left) – Ortolani	77.3	88.2	72.7	70.6
Abduction 60–90 (right)	77.3	88.2	72.7	76.5
Stirring (no) – Ortolani	86.4	76.5	86.4	76.5
More than one attempt (no)	45.5	41.2	50.0	35.3
Pelvis stabilised (yes or N/A)	87.5	100.0	100.0	87.5
Baby cry or fuss (no)	36.4	23.5	27.3	35.3
Screening neurology	89.5	73.3	90.9	76.5
Communication items				
History of heart problems	10.5	28.6	14.3	17.6
History of hip problems	21.1	20.0	22.7	23.5
History of other problems	10.5	21.4	15.0	35.3
Baby issues discussed	90.5	93.8	95.2	93.8

Midwives rated higher by consultant paediatricians 55% items. Midwives rated higher by senior midwives 60% items.
Fisher's exact test (differences between midwives and SHOs).
$p > 0.05$ on all items.

TABLE 8 *Significant differences in appropriately completed examination items by midwives and SHOs (for items where poor to fair agreement between raters)*

	Rated by consultant pediatrician			Rated by senior midwife		
	Midwives (%)	**SHOs (%)**	***p***	**Midwives (%)**	**SHOs (%)**	***p***
Technical						
Aortic auscultation	87.5	50.0		93.8	50.0	*
Respiratory assessment	85.0	83.3		94.7	63.6	*
Pulmonary auscultation	83.3	70.0		87.5	42.9	*
Screening for heart disease	76.2	75.0		93.3	11.1	***
Awkward handling baby (no)	95.5	88.2		95.5	64.7	*
Examiner opportunistic	77.3	6.7	***	90.5	52.9	*
Overall quality (good/very good)	22.7	0.0	*	72.7	11.8	***
Communication						
Talked to baby	40.9	5.9	*	95.5	35.3	***
Commenting on baby	90.9	43.8	**	95.5	50.0	**

Midwives rated higher by paediatricians 100%. Midwives rated higher by midwives 100%.
Fisher's exact test (differences between midwives and SHOs).
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

TABLE 9 *Levels of agreement between rater pairs*

	No. of items	Range of agreement (%)	Range of κ scores
Moderate or good agreement	27	76.9–100	0.43 to 1.0
Poor or fair agreement	29	43.6–90.3	–0.07 to 0.39

there were no significant differences between examiners or good agreement between the raters, and these are not shown separately but are included in the numbers in *Table 9*.

For every item where significant differences between examiners were identified, the item received a higher rating for the midwife examinations than for the SHOs. There were major differences between midwives and SHOs in quality of the examination of both the heart and the lungs, for the overall quality of the examination and in areas of communication skills, including discussing healthcare issues and soothing the baby (*Tables 6* and *7*). There were no significant differences identified between examiners for components of Ortolani's test of the hips, palpation of pulses, screening for neurological problems or examination of the eyes and spine. Neither were there significant differences in history taking or discussion of baby issues (*Table 7*). On the overall quality of the physical examination, midwives were rated as good or very good by the senior midwife raters for 72.7% of the examinations and by the consultant paediatrician raters for 22.7% of the examinations; SHOs were rated good or very good by midwife raters for 11.8% of the examinations and by paediatrician raters 0% of the examinations (*Table 8*).

Child healthcare issues were more frequently rated as discussed by midwives. Cord care, feeding, sticky eyes and nail cutting were discussed by the SHOs, whereas a wider range of issues were discussed by the midwives including feeding, sleeping position, cord care, bathing, stools, cot death, skin care and jaundice.

Inter-rater agreement

Agreement between the raters ranged from poor to excellent (κ between –0.07 and 1.0) for different items with a mean value of $\kappa = 0.42$ across all items, indicating moderate agreement overall. The percentage agreement between raters ranged from 44 to 100%, with a mean of 81.5%. For a number of examinations, raters said that no Barlow's procedure for neonatal hip instability was observed, resulting in 22.6% missing data for the six items relating to the Barlow's test, which were therefore excluded from further analysis.

For 27 (48.2%) of the remaining 56 items included in the analysis, the κ values were greater than or equivalent to 0.4, that is, there was moderate to good agreement between raters (*Table 9*). Eighteen of these items related to technical components of the examination, including elements of the Ortolani's test for neonatal hip instability and screening for neurological problems; nine items related to the communication skills of the examiner, including explaining what they were doing during the examination, responding to the mother and soothing the baby. The 29 items with $\kappa < 0.4$, poor to fair agreement, also included technical elements such as the overall screening for hip problems, heart disease and cataracts, in addition to communication aspects such as inviting questions and explaining any problems identified.

Discussion of the quality assessment

The two major findings of this video assessment were that all statistically significant differences in quality of examinations were in favour of the midwives, and that despite a training day and briefing, there was moderate to good agreement between raters for only half the items on the videotapes. Midwife examinations were rated as being of higher quality than SHO examinations, for both technical administration and communication skills. We consider that the lack of well-defined 'gold standards' for procedures partly explains why only poor to fair agreement was found on half the items on what was a relatively straightforward rating format. It was not the role of the study to develop 'gold standards', but during the training day for the raters it was found that 'gold standards' for certain examination components, such as Barlow's test, differed between the two consultant paediatricians and between the consultant paediatricians and the senior midwives. This indicates that for certain components of the examination, particularly for Barlow's examination of the hips, tighter and

clearer 'gold standards' need to be agreed within and between professional groups. The lack of clear 'gold standards' has been reported previously as a major obstacle to judging and improving the quality of certain assessments.[47] The original Barlow paper of 1962 did not suggest examination of one hip at a time, although this is now standard practice in the UK and USA, and where both hips were examined together this was assessed by some assessors as if the procedure were not carried out, which accounted for some of the problems with assessment of Barlow's examination. Senior midwives tended to give higher ratings than did the consultant paediatricians, indicating a significant bias in clinical judgement between the professional groups. Despite this bias, it was clear that both consultant paediatricians and senior midwives rated the quality of midwife examinations more highly. Even where differences in the quality of examinations were not statistically significant, the trend was still in favour of midwives for most aspects of the examination.

These ratings of the video analysis accord with the results of parents' satisfaction with the newborn examination[48] presented in the previous chapter. Mothers reported higher satisfaction when a midwife rather than an SHO carried out the examination, and reported that midwives discussed physical and behavioural healthcare issues more often, again in accordance with the video-recorded observations. The direct observation and the mothers' views provide consistent results. The results also accord with a recent comparison of trainee paediatricians with advanced neonatal nurse practitioners (ANNPs) concerning the detection rate for abnormalities, which found the latter to be more effective.[12] The findings of higher quality of examinations by midwives and more effective examinations by ANNPs may be due to the more intensive and formal training that they receive compared with that received by SHOs.

For certain components of the examination, neither midwives nor SHOs were rated highly. In particular, the screening for hip problems, particularly using Barlow's test, was often poor, family history of problems was rarely discussed and the baby was often not relaxed during the hip examination or during the auscultation of the heart. In many instances, Barlow's test was rated as not performed and the items had to be excluded from the analysis. Previous studies have also highlighted poor examiner skills in relation to screening for developmental dysplasia of the hip.[47]

Analysis of videotapes allows objective assessments of the same behaviours by different observers, but it has limitations. It is possible that despite the removal from the tapes of all visual and verbal reference to the examiner's identity, the raters may have partly 'guessed' the examiner's profession on the assumption that most midwives are female. However, many of the SHOs were also female, and as the midwives were rated higher, we conclude that no bias was evident. The observer of the videotaped examinations is not necessarily able to see what the examiner sees, for example when screening for cataracts, or to hear what the examiner hears, for example when screening for heart disease. Therefore, for some aspects of quality control, additional methods of assessment, such as audio playing of different heart recordings to assess the correct detection rates of heart murmurs, are required.

Conclusions on quality assessment

This part of the study suggests, in accordance with Hall,[1,3] that with adequate training and support the examinations may be carried out by midwives. In fact, the quality of midwife examinations may not only be as good as but exceed the quality of current examinations by SHOs. The findings strongly suggest that SHOs would benefit from a formalised introduction and training for the newborn examination similar to that provided for midwives. Furthermore, greater emphasis in training could be placed on communication skills and health education. There is scope in the current training to enhance the quality of newborn assessments concerning, for example, screening for developmental dysplasia of the hip and family history taking. The use of video recordings for purposes of training and supervision[47,49] and to ensure objectivity of assessors could become an integral part of training and is likely to improve the performance of examiners of the newborn.

Chapter 5
Referrals

Summary

Appropriate referrals are an important output of the newborn examination. No significant difference was detected between SHOs and midwives in appropriate referrals to hospital for major or minor problems (4.6% for SHOs vs 5.9% for midwives, OR = 1.2, $p = 0.54$) or for appropriate community referrals (3.1% for SHOs vs 4.2% for midwives, OR = 1.25, $p = 0.55$). Neither was there a significant difference in inappropriate referrals to hospital (1.0% SHOs vs 1.2% midwives, OR = 1.2, $p = 0.8$). The only significant difference was for inappropriate community referrals to midwives or GPs (0% SHOs vs 2.5% midwives), which were informal and would be part of routine visits. Few new problems were identified at the 10-day examination. Problems identified during the first year of life were assessed as 'identifiable' or not 'identifiable' at the routine examination of the newborn, as an attempt to check false-negative referral rates. There was close similarity between SHOs and midwives on rates of problems presenting in the first year, which were identifiable and were actually identified at the newborn examination. There is therefore no evidence of a significant difference in appropriate referral between the two professional groups, although there was some indication of more heart murmurs detected at 3 months but not identified by SHO examinations.

Introduction

One of the major purposes of the routine examination is to screen for health problems and this may result in a referral for a minor or potentially major problem. Owing to the relative rarity of major conditions, including of the heart or hips, and the problems with early progression, the trial is not set to test differences in rates of identification for individual conditions between the randomised arms. Rather, differences in accuracy of testing were assessed by quality control using videos, as reported in the previous chapter, and here we consider overall appropriate referral rates. The research hypothesis is that there is no significant difference between SHO and midwife examiners in the rate of appropriate referral from the routine newborn examination.

In view of the examination being only a weak screening procedure, with many problems not manifesting until later or resolving spontaneously, it is clear that it would not be possible to test for false- or true-positive or -negative referral rates. We nevertheless used various methods to make useful comparisons between the randomised groups. It was decided and agreed with the HTA funders that in order to assess and compare safety between examination by midwife or SHOs, the study would focus on appropriateness of referrals rather than on the outcome of referrals. The aim of this part of the study was to identify and compare rates of appropriate referral as judged by independent consultant paediatricians and rates of problems missed. Data were also collected by questionnaire from GPs and mothers to identify further problems and use of health services. Results of referrals were checked by hospital note search and from GPs.

An appropriate referral was defined as one where there was indication that the child might be at risk or require further diagnosis, intervention, monitoring, or reassurance required to the parents, and which if missed could be detrimental to the child's health. Appropriate referrals have been further classified as potentially major or minor according to the judgement of the independent consultant paediatricians.

As a measure of safety, the study assessed appropriate referral:

- within 24 hours of delivery at the neonatal discharge examination (routine examination of the newborn)
- 10–14 days after birth for 50% of the sample who received a second detailed neonatal examination.

To assess the rate of problems missed, data were also collected for problems identified during the first

- 3 months, which included problems identified at the 6–8-week check

- 12 months, which included problems identified at the 6–9-month check.

Expert independent consultant paediatric opinion was taken to ascertain if any of the problems identified at these times could or should have been detected in the 24-hour check and so would be potentially 'missed' problems.

At the 24-hour examination, a number of referral options were available to the examiner (*Figure 3*).

Procedure for referral and problem identification

At the initial 24-hour examination the midwife or SHO completed the examination pro forma (Appendix 1) and recorded on the neonatal discharge record any problem identified. The examiner coded problems as requiring a referral (a second opinion, referrals to the registrar or consultant or a non-routine follow-up with a community practitioner) or as not requiring a referral. A similar procedure was followed for the additional 10–14-day neonatal examination, which was conducted by a midwife at home on 50% of the original cohort.

In the questionnaires which were sent at 3 months and 1 year, mothers were asked

- if any problems had been identified during the routine health checks (6–8 weeks and 6–9 months)
- if the baby had been referred to another health professional at any time up to then and the reason for the referral
- if the baby had been an inpatient at any time preceding the questionnaire and the reason for admission and the length of stay.

All problems identified at the newborn and the 10–14-day examinations were copied verbatim in a table, carefully collated by the researchers and assessed by the two independent consultant paediatricians to determine whether in their opinion the referral was appropriate as defined above, whether the referral was to the appropriate person and whether or not they considered the problem to be potentially major or minor. Information from the mothers was similarly reproduced verbatim in a table. If an abnormality identified during the course of the neonatal examination was referred to another professional, the two independent consultant paediatricians were asked if they considered the pathway to be correct, that is, whether a referral was required at all for this problem. For problems which were identified but not referred, they were asked to assess whether a referral should have been made. Problems identified at 3 months and 1 year after birth were assessed by the independent

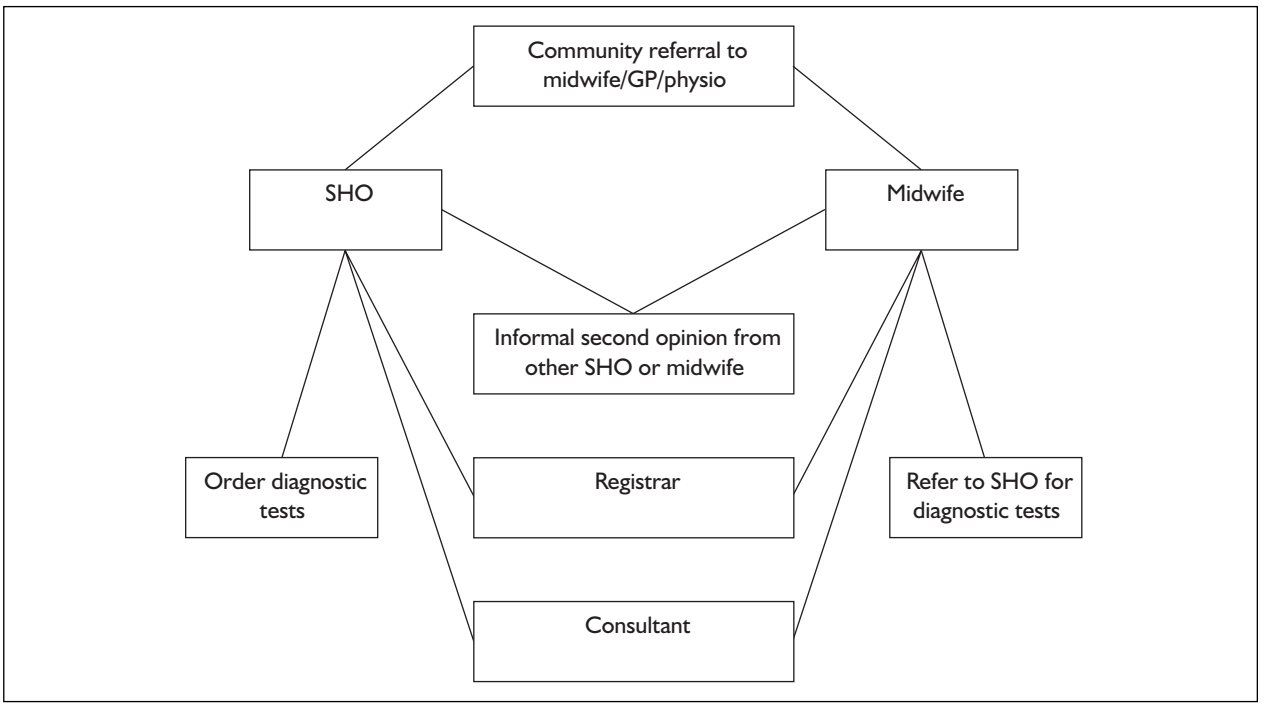

FIGURE 3 *Representation of referral process available for examiner at routine neonatal examination*

paediatricians as to whether or not they could potentially have been detected at 24 hours or 10 days. Where referrals were made, the outcome of the referral was checked through the baby's hospital notes or by a letter to the GP.

Results

Agreement between the two independent consultant paediatricians on the appropriateness of referrals and of the professional to whom the problem was referred ranged from 74 to 83% and agreement on whether problems were potentially major or minor ranged from 78 to 81%. When there was a disagreement, the problem was independently assessed by a third clinician for majority agreement.

Data were collected from 826 valid routine examinations of the newborn. Some problem or abnormality was detected in 32% of the sample (n = 262 babies); most of these were noted but not referred; more problems were noted by midwives but not referred; SHOs tended to note problems only if they were to be referred. Eleven paediatrician and 27 midwife examinations were not conducted by the allocated examiner (see Chapter 2). *Table 10* illustrates the common problems identified. Only a few of these noted problems were in fact referred.

Appropriate referrals to hospital specialist (*Table 11*)

From 418 examinations, SHOs made 19 appropriate referrals of babies to a hospital specialist (4.6%). From 408 examinations midwives made 24 appropriate referrals of babies to a hospital specialist (5.9%). There was no significant difference in these referral rates (OR = 1.2, 95% CI 0.66 to 2.26, p = 0.5). Seven of the SHO referrals were for potentially major problems, as were 15 of the midwife referrals. These differences were not statistically significant (OR = 2.1, 95% CI 0.84 to 5.12, p = 0.12).

Appropriate community referrals (*Table 11*)

SHOs made 13 appropriate community referrals from the 418 examinations (3.1%) and midwives made 17 from 408 examinations (4.2%). The difference was not significant (OR = 1.2, 95% CI 0.60 to 2.63, p = 0.5). Of the above, 8/418 of the SHO community referrals and 7/408 of the midwife referrals were potentially major. Again the difference was not significant (OR = 0.8, 95% CI 0.03 to 2.32, p = 0.73).

Overall appropriate referrals to hospital or community were made in 32 out of 418 SHO examinations and in 41 of 408 midwife examinations. The difference was not significant (OR = 1.27, 95% CI 0.85 to 2.03, p = 0.25).

TABLE 10 *Most frequently identified problems by status of examiner at routine neonatal examination (mostly not referred)*

Specific problem identified (as reported on pro forma)	Frequency of problem (%)	
	Randomised to midwife	Randomised to paediatrician
Tinge jaundice	43 (21.5)	7 (6.4)
Jaundice	8 (3.9)	7 (6.4)
Undescended testes	14 (6.9)	8 (7.3)
Mongolian blue spot	14 (6.9)	2 (1.8)
Talipes	12 (5.9)	3 (2.8)
Sacral dimple	9 (4.4)	4 (3.6)
Hips	9 (4.4)	6 (5.4)
Erythema toxicum	7 (3.5)	7 (6.5)
Cephalohaematoma	4 (2.0)	6 (5.4)
Not passed urine/meconium	2 (1.0)	7 (6.4)
Puffy eye	3 (1.5)	5 (4.6)
Sticky eye	2 (1.0)	5 (4.6)
Hydrocoele	6 (3.0)	2 (1.8)
Heart murmur	4 (2.0)	3 (2.8)
Birthmark	4 (2.0)	2 (1.8)
Moulding	4 (2.0)	0 (–)
Watery eyes	3 (1.5)	0 (–)
Vaginal skin tag	3 (1.5)	0 (–)

There was no significant difference in minor problems appropriately referred to either hospital (OR = 0.7, 95% CI 0.03 to 1.70, $p = 0.4$) or community (OR = 1.9, 95% CI 0.65 to 5.70, $p = 0.2$).

Inappropriate referrals (*Table 11*)

Inappropriate referrals to hospital were made in 4/418 SHO examinations and in 5/408 midwife examinations (OR = 1.2, 95% CI 0.32 to 4.49, $p = 0.8$). There was no significant difference. The only significant difference in referrals was of inappropriate referrals for minor conditions to the community. No such referrals were made by SHOs but 2.5% (10/408) were made by midwives.

From the midwife examinations, 21% (12/56) problems were confirmed and required further intervention or follow-up and 18% (10/56) problems were confirmed but did not require any further attention. From the paediatrician examinations, 17% (6/36) were confirmed and required further intervention or follow-up and 25% (9/36) were confirmed but did not require any further attention. These values should be viewed with reservation for the reasons discussed in the Introduction that problems may resolve spontaneously.

The independent consultants were asked to assess whether they felt referrals should have been made for problems identified but not referred. They identified 36 problems (19.4%) which they felt should have been referred. These comprised undescended testes ($n = 12$), not passed urine ($n = 3$), puffy and or bloodshot eye ($n = 6$), hair over sacrum ($n = 1$), talipes ($n = 11$), facial palsy ($n = 1$), not passed meconium ($n = 1$) and abnormal ear ($n = 1$).

Heart murmurs

Seven babies were referred for heart murmurs, four by midwives and three by junior paediatricians. The outcome for three of these

TABLE 11 *Referral rates of SHOs and midwives and odds ratios*

	SHOs (rate/100 babies)	Midwives (rate/100 babies)	OR (*p*-value)
All appropriate referrals	32/418 (7.7)	41/408 (10.05)	1.27 (0.25)
All hospital referrals	23/418 (5.5)	29/408 (7.1)	1.20 (0.50)
All community referrals	13/418 (3.1)	27/408 (6.6)	2.21 (0.02)
Appropriate hospital referrals	19/418 (4.55)	24/408 (5.88)	1.21 (0.54)
Appropriate community referrals	13/418 (3.1)	17/408 (4.2)	1.25 (0.55)
Appropriate hospital referrals for major problems	7/418 (1.7)	15/408 (3.7)	2.05 (0.12)
Appropriate community referrals for major problems	8/418 (1.9)	7/408 (1.7)	0.84 (0.73)
Appropriate hospital referrals for minor problems	12/418 (2.9)	9/408 (2.2)	0.72 (0.45)
Appropriate community referrals for minor problems	5/418 (1.2)	10/408 (2.5)	1.91 (0.24)
Inappropriate hospital referrals for minor problems	4/418 (1.0)	5/408 (1.2)	1.19 (0.79)
Inappropriate community referrals for minor problems	0/418 (0)	10/408 (2.5)	3.98 (0.00)

referrals was that the murmur was not confirmed and the hearts were considered normal; one was considered mild by the SHO who referred to the GP and there was no further action; in one the murmur ceased by day 2; one was considered an innocent cardiac murmur and one was referred to Harefield Hospital where a small hole in the heart was diagnosed, but was expected to resolve naturally. None, therefore, was of major concern which required immediate or long-term treatment or surgery.

Ten-day examination

In order to assess whether a 10-day examination would result in additional appropriate referrals, 50% of each group of the original cohort (349 babies) were randomised for a second routine examination at 10–14 days. These could be conducted only by the community midwife as the mother and baby were at home. There were 81% (283/349) valid and completed examination forms returned. Five babies were referred to hospital and three of these were assessed by the independent paediatric consultants to be potentially major; these were sternal recession and irregular heartbeat, clicky hip and heart murmur. One, the heart murmur, was confirmed at referral and referred to the Brompton Hospital. Appropriate referral rate to hospital was therefore 1.8% from the 10-day examination.

A further eight problems were referred to the GP, mostly for infections. Seven of these referrals were considered to be appropriate, none of which were potentially major.

At the time of the 10-day examination, women had seen their GPs a median of one time (95% CI 0 to 1, range 0–6). A total of 55% of women had received one visit from their GP and 0.6% had received six or more visits; 59% of the women had visited the GP for their own health problems. Women had seen their midwives a median of six times (95% CI 5–6, range 0–16) at the time of the 10-day examination. There were no significant differences in GP and midwife contacts based on whether the baby was examined by a midwife or an SHO at newborn routine examination.

Three-month follow-up and referrals

At the time of the 3-month follow-up, 808 (98%) women remained in the study and were sent a follow-up questionnaire including questions concerning problems which may have been detected at the 6–8-week baby examination using a checklist adapted from the hand-held personal child health record. This included problems with hearing, vision, growth, heart and hip abnormalities. Details were also requested about any inpatient admissions and outpatient referrals during the first 3 months of life. Details were requested on the number of GP, health visitor and practice nurse contacts for a number of common problems for the baby such as rashes, coughs, diarrhoea, sleeping problems and crying, and also for the mother including post-natal depression, wound infections, incontinence and sleeping. For women not returning the 3-month questionnaire, infant hospital medical records were searched for details of in- and outpatient contacts. Data on GP contacts and 6–8-week baby checks were not available for non-responders. Infant medical records for babies with referrals for orthopaedic and cardiac problems were examined to identify whether the problem had been confirmed or not.

A total of 72% (580/808) of mothers returned the questionnaire. Of the 534 responding to this question, 99.4% (531) reported that their baby had received a 6–8-week examination; 81.4% (432) of the examinations were conducted by a GP, 4% (21) by a health visitor and 13% (69) by both professionals. At the 6–8-week examination, 84 babies (15.7%) were reported to have 91 problems. Nine of these problems had previously been identified and referred and required no further action. Twenty-eight problems requiring referral were newly identified, including three clicky hips (0.3%) and five heart murmurs (0.5%). None of the clicky hips were confirmed as problematic by consultant orthopaedic surgeons. For a 10% subsample of babies, the GP was contacted and asked to complete a questionnaire asking for details of any problems detected at the 6–8-week baby examination as a check on the mothers reporting. GPs identified five additional problems, one of which was referred for crying and abdominal colic, and one which had been previously identified at birth (strawberry naevus); the remaining problems were not referred.

Health service usage in first 3 months

There was a median of two visits (range 0–20) to the GP, four (range 0–40) to the health visitor and one (range 0–5) to the practice nurse for the baby in the first 3 months. The reasons for these visits are given in *Table 12*. There was no significant difference in consulting according to whether an SHO or midwife had carried out the newborn examination. For mothers' consultations for themselves there was a median of one visit (range 0–11) to the GP, zero (range 0–45) to the health visitor and zero (range 0–3) to the practice nurse.

TABLE 12 *Number of visits to GP, health visitor and practice nurse for a specific range of problems of the baby reported at 3 months*

Type of problem	GP visits	Health visitor visits	Practice nurse visits	Total
Rashes and skin problems	145	104	4	253
Colds and coughs	122	24	3	149
Feeding problems	27	117	2	146
Snuffles and runny nose	55	29	1	85
Problems with crying	15	35	1	51
Diarrhoea	25	17	1	43
Problems with sleeping	4	29	0	33
Breathing problems	25	4	0	29
Something else	128	43	8	179
Total number of contacts	546	402	20	968

TABLE 13 *Number of visits to GP, health visitor and practice nurse for a specific range of problems of the mother reported at 3 months*

Type of problem	GP visits	Health visitor visits	Total
Advice on contraception/sexual problems	239	26	265
Problems feeding baby	12	66	78
Baby blues/postnatal depression	24	51	75
Sore/cracked nipples	20	29	49
Wound infections	34	3	37
Urinary infections	24	3	27
Problems sleeping	6	11	17
Removal of stitches	9	5	14
Stress incontinence	8	1	9
Something else	76	7	83
Total number of contacts	452	202	654

The reasons for these visits are given in *Table 13*. There was no significant difference in consulting by examination group.

Primary care consultations within the first 3 months were therefore mainly for minor ailments such as coughs and colds and skin rashes. Advice on feeding, crying and sleeping problems for the baby and on postnatal depression and sore or cracked nipples for the mother was most commonly sought from the health visitor. Mothers sought advice from their GP most frequently regarding skin problems or respiratory problems for the baby and for contraception for themselves. These are issues which healthcare professionals should be aware of in the early post-partum period and discussion of these healthcare issues should be an integral part of maternal and child follow-up.

Three of the 14 cardiac problems reported by mothers at the time of the 3-month follow-up had previously been detected. Two had been referred from the routine examination and one at the additional 10-day examination. The remainder were new problems identified within the first 3 months. Two were referred to Harefield Hospital for follow-up and one was diagnosed as a moderate to large peri-membraneous outlet ventricular septal defect (VSD) with collapsing aortic valve.

Inpatient admissions

There was a total of 53 inpatient stays (6.6%) from 51 infants, with nine infants having missing data from the maternal questionnaire. The mean length of stay was 2.7 days (SD 3.3) with a range of 1–22 days. Fourteen admissions were for respiratory problems, nine each for metabolic and intestinal problems such as vomiting, seven for other infections, four for neurological problems and 10 for other problems. There was no significant difference between groups.

'Missed' problems

Data were examined for the status of the randomised examiner at the first neonatal examination for problems which could potentially have been detected at 24 hours. Where a midwife had been allocated to perform the first routine examination, three clicky hips reported by mothers at 3 months had been previously identified either at 24 hours or at the 10-day examination, but an additional four clicky hips had not been previously identified. Five out of six

TABLE 14 *Level of agreement between consultant paediatricians on whether problems for which babies were referred during their first year of life should have been identified at 24 hours* (n = *149)*

	Number of problems that should have been identified at 24 hours		
	Yes	**No**	**Don't know**
All agreed (*n* = 84)	7	74	3
Two out of three agreed (*n* = 56)	8	27	21
None agreed (*n* = 9)	NA	NA	NA
Total	15	101	24

cases of jaundice were not identified by the allocated midwife and one case each of undescended testes, plageocephaly, tongue tie, clubfoot, small head circumference, fast heart beats, ears different shape and birthmark.

Where the initial examination had been allocated to an SHO, none of the nine cases of jaundice had been identified, 12 out of 14 cases of heart murmurs were not identified, nor were a clicky knee, a clicky shoulder, a tongue tie, a large fontanelle, a venous abnormality to eyelid, a funny-shaped head, an erythema or a flat head. Two cases of clicky hips were identified at the initial examination, as were two clicky knees and one case of undescended testes.

There was no significant difference between the status of the examiner and whether problems were missed or not ($p < 0.05$).

Assessment of referrals reported by the mother at 1 year

Three consultant paediatricians were asked to assess the 149 problems for which babies had been referred in their first year of birth. The level of agreement between the assessors is shown in *Table 14*.

There was agreement about 140 of these referrals and, of these referrals, it was assessed that 15/140 (11%) should have been detected at the 24-hour examination. (At least two out of three consultants unambiguously agreed that the problem should have been detected at the initial assessment. There were a further 24 problems where two or more assessors were unable to judge whether the problem should have been detected at 24 hours.) The 15 problems were as follows: clicky hip, tongue tie, cephalic haematoma, undescended testes, talipes, hypospadias, birthmark, small head, clicky knees, skin tag ear, left ankle turns in, clubfoot, gap in stomach muscles, bump on spine and ears different shapes. A total of 59/826 (7%) babies were referred for one or more of the above problems as reported at 1 year (total number of problems = 61); 17/61 (28%) of these referrals were reported both at 24 hours and at 1 year; 44/61 (72%) were newly detected during the year. Nineteen additional problems were detected at 24 hours but not at 1 year. This indicates that in some cases mothers did not report problems at 1 year which had been identified at 24 hours, or they were not found in the notes of non-responders.

The detection of these problems did not significantly differ by ITT (*Table 15*) or by status of examiner (*Table 16*).

TABLE 15 *Problems identified in first year of life and detectable at 24 hours (by randomisation to examination by SHO or midwife (ITT)* (n = *61)*

	Randomisation group[a]	
Detected at 24 hours	**SHO**	**Midwife**
Yes	8 (28)	9 (28)
No	21 (72)	23 (72)
Total	29 (100)	32 (100)

$\chi^2 = 0.0022$, $p = 0.96$.
[a] Percentages in parentheses.

TABLE 16 *The detection of problems by status of examiner* (n = *58)*

	Status of examiner[a]	
Detected at 24 hours	**SHO**	**Midwife**
Yes	7 (26)	10 (32)
No	20 (74)	21 (68)
Total	27 (100)	31 (100)

$\chi^2 = 0.279$ $p = 0.597$.
[a] Percentages in parentheses.

Discussion and conclusion on referrals

The problems of using referrals to assess the relative safety of SHOs and midwives examining the newborn is complex owing to the nature of problems developing after the examination or resolving naturally. Nevertheless, as this is an important aspect of the procedure, we tried in various ways to compare the relative ability to identify problems. No difference was detected in appropriate hospital or community referral rates for major or minor problems or for inappropriate referrals to hospital. The only significant difference was for the few inappropriate community referrals to midwives or GPs which were made by midwives but not by SHOs. These were informal referrals which would be part of routine visits. Few new problems for appropriate referral were identified at the extra 10-day examination by the midwife. These would potentially be identified at the 6–8-week routine examination by the GP.

An attempt was made to assess false-negative referral rates by looking at problems identified during the first year of the infant's life and obtaining independent consultant paediatric opinion about whether these could have been identified at 24 hours. There was very close agreement between the SHO and midwife examiners on the proportion of problems that could have been detected at 24 hours and those that actually were, and this was so whether the analysis was by intention to treat or by actual status of the examiner.

Glazener and colleagues[5] reported a mean number of congenital problems diagnosed of 8.3% at the first routine examination. These were mainly attributable to musculoskeletal problems such as hip anomalies and foot and limb deformities. Wren and colleagues[14] evaluated the performance of the routine examination and the 6-week routine examination for detecting congenital heart disease, and concluded that the routine examination failed to detect more than half the babies with heart disease, and that the 6-week examination missed one-third. This is in agreement with our results. They recommended that babies with identifiable murmurs should be referred for cardiological opinion, to confirm an abnormality or for parental reassurance. Ainsworth and colleagues[50] also assessed the prevalence and clinical significance of cardiac murmurs detected at the time of the routine examination and reported that murmurs were detected in 0.6% of their sample, with a further 0.4% found to have a cardiac malformation before 1 year of age.

Moss and colleagues[4] suggested that a second examination conducted in the early neonatal period is not justified, as the detection level of significant problems and abnormalities is low; their study did not extend beyond hospital discharge. Hughes and colleagues[51] also concluded that one examination was sufficient as opposed to two examinations in the immediate postnatal period. On the other hand, Cartlidge[2] recommended a second examination be conducted at 7–10 days after birth, as two examinations within a very short period after birth may place undue risk on the hips. This recommendation was agreed by Glazener and colleagues[13] who suggested a particular focus on hips, heart and jaundice in the second examination. Our results do not suggest that this would result in major problems being identified.

Gregory and colleagues[52] reported that cardiac murmurs were detected in 1% of babies at the 6-week routine baby examination, with a structural cardiovascular malformation in nearly half of those referred. Thompson and colleagues[53] reported that the majority of the problems for which a doctor or health visitor were consulted in the first 6 months were respiratory (51%). The median GP consultation rate was two consultations in the first 6 months. Some 16% required referrals to secondary care, of which 48% were emergencies and 7% were admitted to hospital. Glazener and colleagues[5] also followed up babies at their 8-week and 8-month community health assessments, and reported no difference in abnormal findings between babies who received one or two examinations in the early postnatal period.

Glazener and colleagues[5] also reported on consultations at 1 year for a 10% subsample. GPs reported a median of nine contacts in the first year of life with 15% admitted as inpatients, including 3.8% who were admitted more than once. Hampshire and colleagues[54] examined the results of child health surveillance over 1 year. At the 6–8-week examination 35% of the sample had a physical problem recorded and 39% at the 8–9-month review. A referral to hospital was required for 7% of these problems and 30% were followed up in primary care, which is similar to our findings. The most frequent physical problems recorded in the child health record at 6–8 weeks were skin problems, birth marks, wheeziness, umbilical hernias and nappy rash. At 6–9 months the most common problems reported were hearing concerns, visual concerns and abnormal

hip examinations. An Australian study in 1996[55] reported that 57% of consultations with medical practitioners in the first 6 months of life were for the babies; mothers' consultations accounted for 43%. This is similar to our findings. They reported a mean number of 3.5 visits to the GP for the mother and 4.2 visits relating to the baby.

It is therefore concluded that there is no evidence of a significant difference in appropriate referral by SHOs and midwives examining the newborn, although there was some indication of more heart murmurs detected at 3 months but not identified by SHO examination.

Chapter 6

Qualitative study of the opinions of SHOs, midwives, GPs and mothers

Key messages

- The examination is considered to be a useful screening tool, providing reassurance to parents.
- SHOs and midwives are seen, by all groups interviewed, to be appropriate professionals to carry out the newborn examination, if adequately trained.
- Perceived benefits of midwives examining include improved quality of care and continuity of care.
- It was reported by SHOs and other professionals that the SHOs do not receive formal training in the newborn examination.

Introduction

This qualitative arm of the study was aimed at addressing a number of questions to those directly involved in the examination, such as SHOs, midwives, GPs and new mothers, about their attitudes to the routine examination. Opinions were asked about who should carry it out, its overall purpose and value and the timing of the examination.

Method

For this study, the research team developed interview guides which identified core topics to be included in all the semi-structured interviews. The topic guides were developed to explore the key issues from the literature[3,4] and so to elicit opinions about the current system of examination by the SHOs and to find out how people viewed change. The topics included the perceived purpose and value of the neonatal examination, when and where it should be conducted, the appropriateness of discussing healthcare issues, the appropriate health professional to conduct the examination, perceived advantages and disadvantages of midwives examining, implications of paediatricians examining or not examining, weaknesses of the examination and suggestions for its improvement. The topic guides were adapted to include key issues specific to each of the professional groups or mothers and were used as briefing documents for the interviews (Appendices 7, 8). Ethical approval was granted by the Local Research Ethics Committee, which covered all other interviews.

Four samples were purposively selected for interview, to include 10 each of midwives, SHOs, GPs and recently delivered mothers. The samples were selected to provide a range of diversity of experience and opinions of those performing the examination of the newborn baby, and were selected from a range of environments to cover a breadth of experience, knowledge, attitudes, behaviour and location. The four interviewers for this study were trained in qualitative interviewing by the National Centre for Social Research. Each interviewer conducted 10 interviews, five with each of two different groups.

Mothers were recruited on the postnatal ward of the district general hospital; each was given a letter outlining the study and permission was requested to contact her by telephone 10–14 days later to arrange an interview. Interviews were generally conducted in the mother's home and signed consent was obtained beforehand. One mother declined an interview. All other interviewees were recruited and interviewed at their place of work. SHOs were currently working in paediatric departments of a district general hospital or teaching hospital and their experience ranged from several months to several years. Midwives included both those trained in the newborn examination and currently conducting examinations, and those not so trained and not carrying out the examination. Most of the midwives had been qualified for over 10 years and had a wide range of clinical experience in hospital and community settings. The GPs were from 10 practices in two Health Authorities and all had some experience of conducting neonatal examinations. Of the mothers, a few had their babies examined at home by midwives, others in hospital by an SHO. Mothers included those with a family history of problems relevant to the examination, those with previous pregnancy complications and others with no problems or

complications. Some were first-time mothers. All interviews were conducted in private and were audio-recorded; anonymity and confidentiality were explained and assured. The interviews took between 20 minutes and 1 hour. All midwives and SHOs invited to take part agreed, but one GP declined through lack of time and was replaced by a GP fitting the same criteria.

The interviews were transcribed and a matrix-based approach was used to allow between- and within-case analysis.[56] The transcripts for each professional group were analysed independently by one researcher and cross-checked by another for consistency and rich interpretation, that is, for inclusion of all new information. A systematic content analysis, which identified constructs and allowed data to be classified, was conducted for each sample. Thematic charts were constructed based on the themes central to each sample. Areas of agreement or diversity of opinion between interviewees were identified.

Findings

Purpose and value of examination

In the interviews, midwives, SHOs, GPs and mothers identified a range of issues about the purpose and value of the examination:

- as a screening tool
- providing reassurance to parents
- for health promotion and education.

Screening tool

There was general agreement among the health professionals that the examination was a valuable screening tool to identify major and minor abnormalities, especially concerning hearts and hips, although there was recognition that problems could be missed or might not appear until later. SHOs saw the examination as a useful screen for major anomalies, particularly cardiac murmurs, syndromes and hip problems. Some of the GPs examined occasionally following home births or early discharge; others had done so in the past. Several said they had never identified problems during the examination, for example over 10 years. Most were content with the examination. "Not too shallow, not too deep. Not missing loads nor producing loads of referrals!" (GP 6). One GP said that many cardiac problems were probably missed.

Some midwives identified the examination as an important opportunity to pick up problems early so that appropriate referrals could be made prior to discharge. Although the majority of midwives viewed screening for abnormalities as important, many acknowledged the limited value of the examination in respect to the detection of abnormalities. One midwife said, "I must admit I don't undertake the examination expecting to find any major abnormalities because I think any major abnormalities already evident would have been picked up" (midwife 2).

Mothers saw the purpose of the baby examination as making sure that everything was alright; that there were no problems or abnormalities, "to make sure they are fit and healthy" (mother 5). Most did not know the content of the examination; however, they saw the examination of the hips as the most salient part, followed by eyes and reflexes. Although some mothers were aware of the limitations of the examination, they expressed little knowledge of which abnormalities might present later; others said that everything could be detected at the examination.

Providing reassurance to parents

There was general agreement that an important role of the examination was to provide reassurance to parents, although concern was expressed that it should not offer false reassurance about problems that might manifest later. "I think reassuring the mother, that is quite important, about the normality of the child" (SHO 2). Midwives considered the examination an ideal opportunity to discuss issues and to give women information and reassurance. Communication with parents was viewed by many midwives as an important component of the examination: "once I have completed the examination I will talk to the mother about what I have found … address any concerns that she may have … It may be that she has identified a feeding problem that she needs assistance with … It is very much a stepping stone and if done properly it begins a trusting relationship; if done badly then it makes people become very wary" (midwife 1). Mothers expressed the view that examiners should explain what they were doing and what they were looking for during the examination, and some suggested that written information about the examination in the form of a leaflet would be very useful. Reassurance that everything was all right was considered important for nearly all mothers.

Health education and promotion

There were mixed opinions about whether healthcare issues and health education should be included. Some GPs said that the examination was

too early to discuss health education as the mother would be tired; others said that issues should have been addressed before the examination. It was thought to be more of a role for midwives than SHOs: "quick SHO check is not going to give you any education" (GP 6). It was said by some GPs, however, that discussion of health issues was most important. SHOs also expressed mixed views about health education. This was the area with probably the widest disagreement between SHOs. There was a difference between those who always asked if there were any problems or concerns, checked the mother's history and discussed breastfeeding at least, and thought this was the most important aspect. Others said they were not proactive about discussing issues. Midwives considered the examination an ideal opportunity to discuss issues and to give women information, although a couple said that health education and promotion were not important elements of the examination, as this was part of the routine care of the newborn. Some of the mothers also said that the baby examination was not the most appropriate time to discuss healthcare issues, or were confident and did not feel the need to discuss anything. Others said they had found it useful to discuss issues such as feeding, asthma, cleaning their baby and cord care.

When and where the examination should be conducted

There was a range of opinions, particularly among GPs and SHOs, about the most appropriate time for the examination from "as near as possible to delivery" (GP 7) to "defer for 48 hours because otherwise you detect insignificant transient murmurs and cause anxiety and distress to parents" (GP 5). Concern was expressed by SHOs about very early examinations before 6–8 hours: "the baby gets cold, and I think it is a bonding time" (SHO 10), "the baby may not have fed or passed urine or meconium" (SHO 3). Midwives thought the ideal time was 24 hours or later with a minimum of 6 hours: "There are a lot of 6 hours discharges on the delivery suite at the moment. The baby can be checked out before they go home and the community midwife can do another check after 24 hours because it is a bit early at 6 hours to do a baby check" (midwife 3). Overall it was said by mothers that the examination should be done fairly soon in case of problems, "but not too soon, so that the mother is aware and involved" (mother 5).

It was said by SHOs that the examination could be performed at home or in hospital, with the advantage of hospital being seen as its convenience, knowing that the examination has been done, ease of referral, and there being back-up. "I think it is easier in hospital because if there are problems you have the services there to refer" (SHO 10). Some GPs thought it very important that it was done in hospital for efficiency and continuity, with "senior colleagues there for an emergency" (GP 9) and to avoid missing the examination. Others would accept home examinations. The advantages of home examination were seen as offering a more relaxed situation and timing of the examination, with the mother more likely to take in advice. Generally midwives said that the examination could be performed at home or in hospital, although some said that the examination should be undertaken prior to discharge. It was felt by some that it should be performed in a private area where women could raise any concerns or anxieties. Most mothers did not mind where the baby was examined though several had a preference: "Well being at home is far nicer than being in hospital, the hospital is so busy and there are so many people coming and going … home is nicer … you would ask more questions" (mother 4).

Most appropriate person to conduct the examination

The participants discussed a range of issues about the most appropriate person to conduct the examination:

- expertise and training
- quality of care
- organisation of care.

Expertise and training

SHOs said that either SHOs or midwives were suitable and appropriate examiners. Some of the SHOs were concerned that certain mothers might not consider midwives to be well enough medically qualified to say that the baby is alright. They said that handling a normal healthy baby and listening to the sound of a normal heart were important and essential experiences for an SHO. Broadly the view was that any midwife, if trained, could do it, "nothing I do you could not train them to do; midwives should be trained to do them" (SHO 5) and another said "Doctors have more important things to do" (SHO 2). It was evident that the SHOs had received very little, if any, training and the usual procedure reported was to be shown once and left to get on with it. Nevertheless most said they were now fairly or very confident and enjoyed doing the examination and dealing with well babies. They expressed problems about the

difficulty of identifying heart murmurs, also identifying which clicks were important when checking hips. One SHO said "hips should certainly be taught by someone senior" (SHO 3). Feeling the femoral pulse was difficult initially and some SHOs expressed the concern that the time taken to find the pulse made the mother anxious. Their other major problem regarded the red reflex; some said they had difficulty in getting the baby's eyes open, "didn't know if it was my technique – but have now found the right equipment for the eyes" (SHO 3). Many complained that the examination was too rushed, with too many babies to examine in one go, and of the danger of forgetting something. The GPs mostly thought it appropriate for either SHOs or midwives, "if confident" (GP 1), to examine, and all said that midwives would need training. GPs said that it was sensible for midwives to examine (GP 4), that they were "ideally placed and should have an equal role" (GP 3). However, they expressed some concerns about midwives doing the examination, especially their ability to detect heart murmurs, as these are difficult for doctors (GPs 4, 9, 10). It was felt that some parents might have more confidence in a doctor (GP 8) and one GP said that midwives may either miss trivial problems or refer too many trivial problems, causing extra work for the GP (GP 6). There were also some concerns about SHOs becoming "deskilled" (GP 1) and there were suggestions that SHOs should have a quota of examinations to maintain skills (GPs 7, 9). One GP however said that "the examination should not be education for an SHO but for benefit of baby" (GP 3). Little was said about training and what was said was mostly negative, "I do not think hips can be taught properly and mostly we do it wrong" (GP 5), "hip examination done badly, people do it unsupervised" (GP 4).

Several midwives said they were better trained to do the examination than were the SHOs or GPs and expressed concerns about SHOs training, "I feel confident because the training was very thorough … I undertake the examination to a higher standard than some of the other professionals" (midwife 4). "I don't think the SHOs have a lot of co-operation or training" (midwife 1). It was suggested that SHOs should be working alongside registrars to facilitate the development of their knowledge and skills in the examination. Midwives said that if they were to undertake the newborn examination it would have both a positive and negative impact on the role and development of the paediatrician. Assisting with workload was cited as a main benefit to paediatricians, "it means that they are not required to be in ten different places at once" (midwife 2). This in turn would leave them more time for training, would improve the overall quality of their learning experience and leave the SHO more time to work with the registrar. It was suggested that training for the examination could become part of the pre-registration midwifery education. The majority of mothers had no preference about who should conduct the baby examination as long as the person was qualified and trained to know what to look for. Nearly all mothers said they would be happy for midwives to examine babies; some said they had more confidence in midwives than SHOs, though one said that the midwives' role was "not medical but to maintain healthiness and welfare" (mother 5). Most mothers said that midwives are capable and have nearly as much training and knowledge as doctors have. Generally, mothers felt that babies with problems should be examined by doctors, who they trust and see as knowledgeable, qualified and professional, though a few said that midwives could examine all babies (mothers 8, 10).

Quality of care

Some SHOs said that midwives know the mother better, are more experienced and have more rapport with mothers. Several SHOs said that midwives could safely examine far more babies, that there were too many exclusions for midwives and "there was in any case a low threshold for referral so it would be safe" (SHO 9). GPs had no strong objections to examining by midwives. "Midwives are well trained – as well as any doctor" (GP 3). "Mother has enormous confidence in midwife" (GP 6). GPs also said that "SHO always in a terrible rush" (GP 8).

Midwives were generally negative about the examinations being performed by paediatricians, "it is done like a conveyer belt … they have probably nine to ten baby checks a day … perhaps they have not been done very well" (midwife 9), "they have a quick word with the mother and say everything is alright and off they go … the mother has to speak to the midwife in any case and ask what the doctor was doing, she has to explain to the mother what the doctor has done, what he has found" (midwife 3). Midwives were however sympathetic to the competing demands on the doctor's time, which resulted in such problems. One midwife said "maybe their time is better spent with sick babies rather than well babies" (midwife 4). Although they expressed concerns about the potential impact on their own workload, the majority of midwives were in favour of

undertaking the newborn examination. "In an ideal world it should be the midwife, all midwives should be able to perform the examination; we are people who care for normal healthy women and I think it should continue on to the infants as well" (midwife 2). Midwives also said that it would be more convenient for mothers; however one midwife opposed midwives extending their role in this area, "I am not trying to say midwives couldn't do it … I just worry about our workload and our role" (midwife 9). Continuity of care was generally seen as a major advantage, enabling midwives to give continuity and total care to their clients. Midwives also said that mothers express their concerns and anxieties about the baby or themselves more easily to a midwife, "they have grown to trust the midwife and have quite good rapport with them" (midwife 2).

Mothers said that continuity of care was important to them in terms of being able to build a relationship with one midwife who would understand their problems and concerns. "I think it is nice to build up a relationship with someone you feel comfortable talking with … so it's nice to have a single relationship rather than be passed from pillar to post" (mother 4). It was viewed that allowing a relationship to develop with one midwife would offer the mother greater support, while on the other hand seeing more midwives "gives a broader spectrum of knowledge" (mother 2). Mothers felt that if midwives examined more babies it would help them to build on their knowledge and would be good for them to have more authority and to see the care right through. Mothers saw an advantage to themselves, as they could go home early and might feel there was more time and opportunity to ask questions. Compared with doctors, midwives were viewed by mothers as approachable and easy to talk to and ask questions of.

Organisation of care

SHOs said that they nearly always examined babies in block with protected time. This worked well and meant their time was usually not interrupted from other activities, although some had experienced a less organised regime at other hospitals. If not doing examinations, the SHOs would be on the ward, in the special care unit, in clinic, on a ward round or on community work. The paediatric wards were said to be very busy. Although midwives saw advantages for them in undertaking the newborn examination, they were also concerned about the extra demands it would create on their workload and the increased accountability.

Discussion and conclusion on qualitative interviews

The major finding of this qualitative study is that midwives and SHOs are perceived by all groups as appropriate to carry out the newborn examination if trained. The positive benefits of midwives examining concur with benefits suggested in the literature[57–60] and include improved quality of care and continuity of care. A further benefit would be to ease the SHOs' workload, but the increased demands that this would place on midwives may require re-examination of their current role and responsibilities. It is evident that SHOs do not receive formal training in the newborn examination. This accords with the conclusions of the previous chapter that SHOs would benefit from a formalised introduction and training for the newborn examination similar to that provided for midwives. There was general agreement that midwives are well placed to examine babies, provided that they are adequately trained. Midwives were clearly perceived as more willing and active in discussing healthcare issues than were SHOs, and to have a better rapport with mothers. While providing reassurance to parents was considered to be an important aspect of the examination, it was also considered important that parents were not given false reassurance and misled into believing that all problems could be detected at this stage.

All groups considered the examination to be a useful screening tool and to provide reassurance to parents, although there were mixed views about the appropriateness of discussing healthcare issues at the examination. The SHOs were clearly comfortable with the idea and experience of midwives carrying out the newborn examination either in hospital or at home. They thought it important that paediatricians should have some experience of handling normal babies and that they should have some formal tutoring before examining, especially for hearts, hips, eyes and femoral pulses. The majority of midwives were happy about extending their practice in this area as it facilitated continuity of care and was within the scope of normal midwifery. Midwives were concerned about how it would impact on their workload and the competing demands on their time. The view of GPs was important, as many of these SHOs would specialise as GPs. There was a consensus that midwives were appropriate professionals to carry it out and possibly more so than SHOs or GPs, but should be trained, especially to detect heart murmurs and congenital dislocation of the hips.

Chapter 7
The National Survey

Summary

National Survey Questionnaires were returned by 86% (197) maternity units in England; 44% had at least one midwife trained in the newborn examination and in 31% some examinations were carried out by midwives. However, one-third of midwives with the N96 qualification were not examining babies. Nationally only about 2% of babies were examined by midwives. Rates of referral were reported to be similar between SHOs and midwives. Examinations were carried out between 4 and 48 hours from birth, with most units considering 6 hours to be an acceptable minimum. An estimated 1% of babies were transferred home without routine examination; these babies were mostly examined by GPs. A second examination was carried out prior to discharge in 12% of units. Consultant paediatricians and midwifery managers were in favour of midwives carrying out the examination provided that they were adequately trained.

Introduction

The purpose of the National Survey was to establish the extent to which midwives or other practitioners were undertaking the examination in practice. If future policy is to consider a move in the direction of more midwives examining, it is important to have baseline data about existing practice. The National Survey was designed to identify which professionals currently conduct the examination, what their training is, the criteria for determining which professional examines and local policies and guidelines with respect to the newborn examination. It also provided an opportunity to survey the opinion of paediatric consultants and midwifery managers on the issues explored in the previous chapter.

Methods

National survey questionnaires were developed to identify which professionals in maternity units in England were carrying out the routine examination, and the procedures and management followed, including for babies at 'high risk' for developmental dysplasia of the hip, congenital heart defects and visual and auditory defects. They also aimed to find out professional paediatric and midwifery opinion about midwives conducting the routine examination and the value of the examination as a screening tool. The questionnaires were developed by a multi-disciplinary research team comprising psychologists, paediatric and midwifery staff, health services researchers, a health economist and a statistician, and piloted in three units before being used nationally. The survey related to the examination of the healthy newborn and was not designed to include premature babies or babies admitted to Special Care Baby Units (SCBUs). One questionnaire was designed for consultant paediatricians or neonatologists and a second version slightly adapted for midwifery managers or senior midwives. This was to cover the different roles of the paediatricians and midwives relating to carrying out the examinations in different units. It also had the advantage of providing corroboration of answers. In the few cases where there were contradictory replies, these are reported but were excluded from the analysis.

Questionnaires were sent out during the period November 2000 to January 2001 to a named consultant paediatrician or neonatologist and to a midwifery manager or senior midwife in every unit in England. Where a Trust included more than one unit, separate questionnaires were sent to each. A list of all midwifery units was provided to us by the ENB. A written reminder was sent after 3 weeks, followed by a telephone reminder 3 weeks later if no reply was received. Respondents listed all units for which they were responsible and provided details of staffing and procedures.

Educational survey

A questionnaire was sent to all course organisers of the N96 course to ascertain the structure, content and cost of training for the examination. Details of University Departments providing the course were again provided by the ENB and are shown later in *Figure 7*.

TABLE 17 *Return rate for National Survey Questionnaire*

Profession	Number of units sent questionnaires	Number of questionnaires returned	Return rate (%)
Midwifery managers	228	170	75
Consultant paediatricians	193[a]	116	60
All units[b]	228	197	86

[a] Thirty-five units were midwifery-led and did not have consultant paediatrician input.
[b] At least one questionnaire sent/returned to/from midwife and/or consultant.

Results

Response rate

Questionnaires were sent to maternity managers and consultant paediatricians in 228 maternity units in England and were returned by 197 units (86%). The return rate by profession is given in *Table 17*.

Professionals performing the routine examination

Figure 4 shows the health professionals who were involved in the routine examination of the newborn. In 83% (160/193) of units SHOs performed the examinations, in 35% (68/193) GPs did so and 26% (51/193) of units reported that midwives conducted examinations. Of the midwife-led units, 27/30 (90%) reported that GPs carried out examinations, 10/30 (33%) that midwives conducted examinations and 6/30 (20%) that junior doctors carried out examinations. The percentages do not total 100% as multiple answers were possible, indicating that in many units more than one professional carried out the examinations.

Midwives currently conducting the examination of the newborn and their training

Some 44% (74/167) of midwifery managers reported that their unit included at least one midwife with the N96 qualification; the median number of midwives with N96 qualification in these units was two (95% CI 2 to 3); 51% (38/74) and 18% (13/74) of these units, respectively, reported that all or some of these qualified midwives actually conducted the examination. This means that whereas 31% (51/167) of units had at least some newborns examined by midwives, about one-third of the midwives who were qualified to carry out the examination were not currently doing so. Midwifery managers were asked if competency to perform the examination was decided by the individual midwife, or if midwives had to examine a specified number of babies annually. Of the 50 units responding to this question, 17 (34%) reported a requirement for a minimum number of examinations to be conducted. Eleven of these units specified a number the median of which was 25 (95% CI 11 to 96) examinations per year.

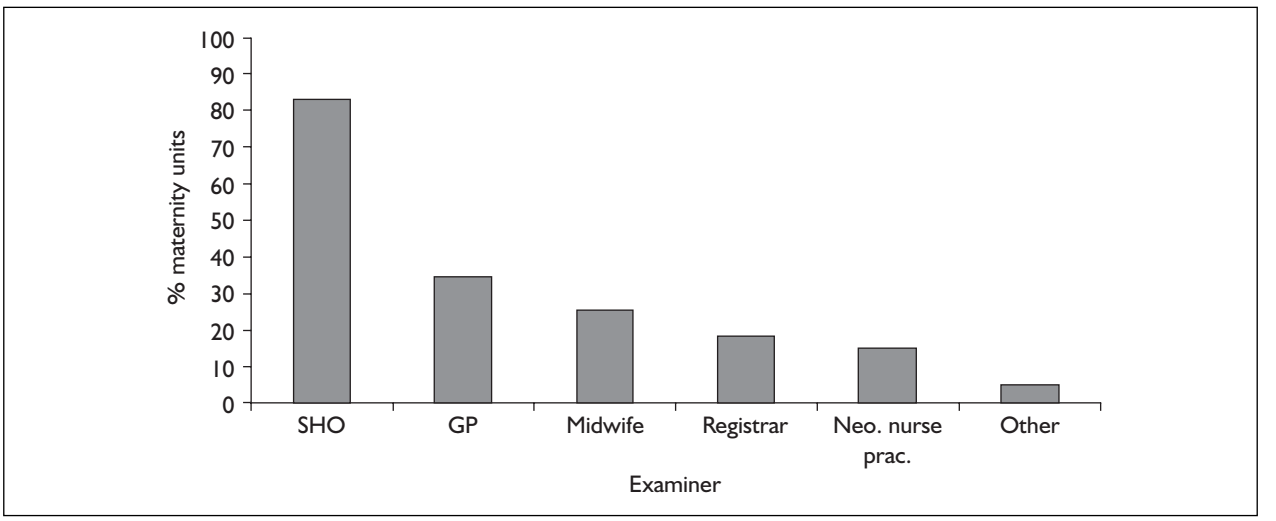

FIGURE 4 *Percentage of units reporting professionals currently performing the routine examination of the newborn (*n *= 193). Note: percentages add up to more than 100 as multiple answers were possible.*

In units where midwives conducted examinations, the consultant paediatricians and midwives were asked who decided the suitability of newborns to be examined by a midwife. This was most frequently decided by the midwife in charge of the ward (28/72, 39%), the midwife admitting the mother to the postnatal ward (16/76, 21%), and in some cases the delivery room staff (11/77, 14%) or a paediatrician (5/77, 7%).

Training of SHOs for the examination

All consultants were asked what training their junior doctors (SHOs), who were carrying out the examinations, received in order to carry them out correctly; 56% (65/116) of the consultants answered this question. Of those who answered, 89% (58/65) said that the training was informal, 9% (6/65) that it was formal and one did not know; 44% (51/116) of the consultants did not answer this question.

Percentage of babies examined by doctors and midwives

Data on the percentage of babies examined by different health professionals were available from 161 units. Overall, SHOs examined a median of 92% (95% CI 90 to 95, n = 161). In only 26 units (16%) did midwives carry out as many as 5% or more of the examinations; even in these 26 units midwives carried out a median of only 10% (95% CI 5.5 to 25.5) of the examinations. Data were available on the number of births and the proportion of babies examined by a midwife in 158 units. From these data it was estimated that about 2% of babies born in England in 2000 were currently examined by a midwife.

Timing of the routine examination

Data on when the examination was carried out were provided by consultant paediatricians and/or midwives, sometimes by both for the same unit; a single or agreed estimate was provided for 116/153 (76%) units; this ranged from 4 to 48 hours from birth (*Figure 5*), with the majority of these units (84/116, 72%) specifying 6 hours as a minimum time. For the remaining units there was some inconsistency in the data provided; in 34/41 (83%) of these units, midwives said there was a minimum time but the consultants said not; for seven units the consultants said there was a minimum time but the midwives said not.

Examination prior to discharge

About 60% (103/173) of units reported that all babies in the unit were examined prior to transfer home. In the remaining 40% of units answering this question, a median of 3% (95% CI 2 to 5, n = 78) of babies were reported to be transferred home without routine examination in hospital; in 83–93% of these units a GP was responsible for the examination in the community, in 10–23% midwives were responsible and in 4–7% babies were taken back to the hospital to be examined by a junior doctor in hospital (range of estimates indicate variation between reports from consultant paediatricians and midwife managers).

Second examination of the newborn

Some 77% (150/194) of units reported that only one examination was conducted, 23/194 units (12%) reported that a second examination, including the heart and hips, was also conducted prior to discharge home. For the remaining 11% (21/194), there was disagreement between the midwife and consultant reports; 4/21 of these midwives and 17/21 of these consultants reported a second examination prior to discharge.

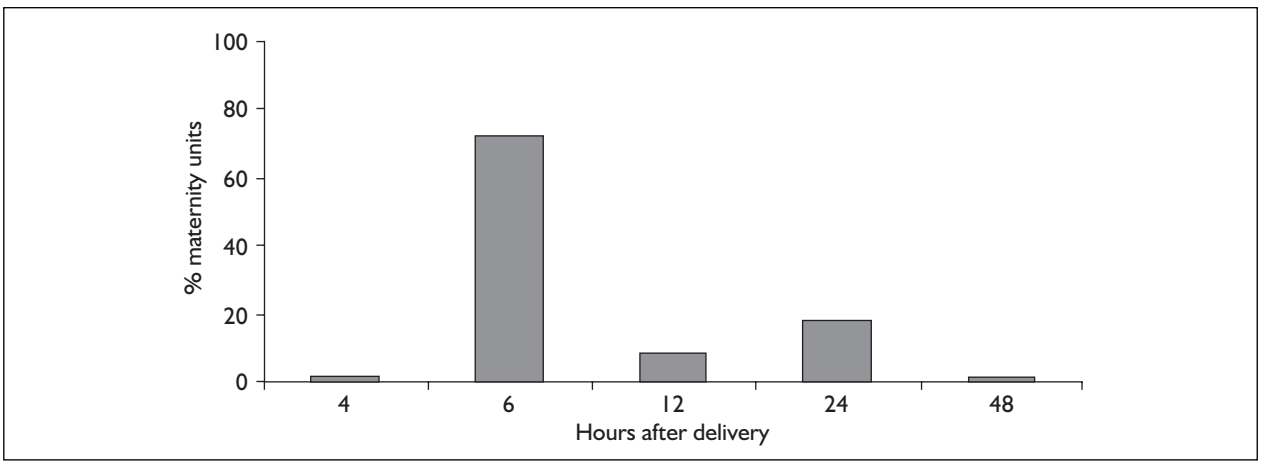

FIGURE 5 *Relative frequency distribution of reported minimum times for conducting the newborn examination (n = 116). Note: data are based on responses from both midwives and consultant (13%), midwife only (70%) and consultant only (17%). Data for the units where there was inconsistency are not included.*

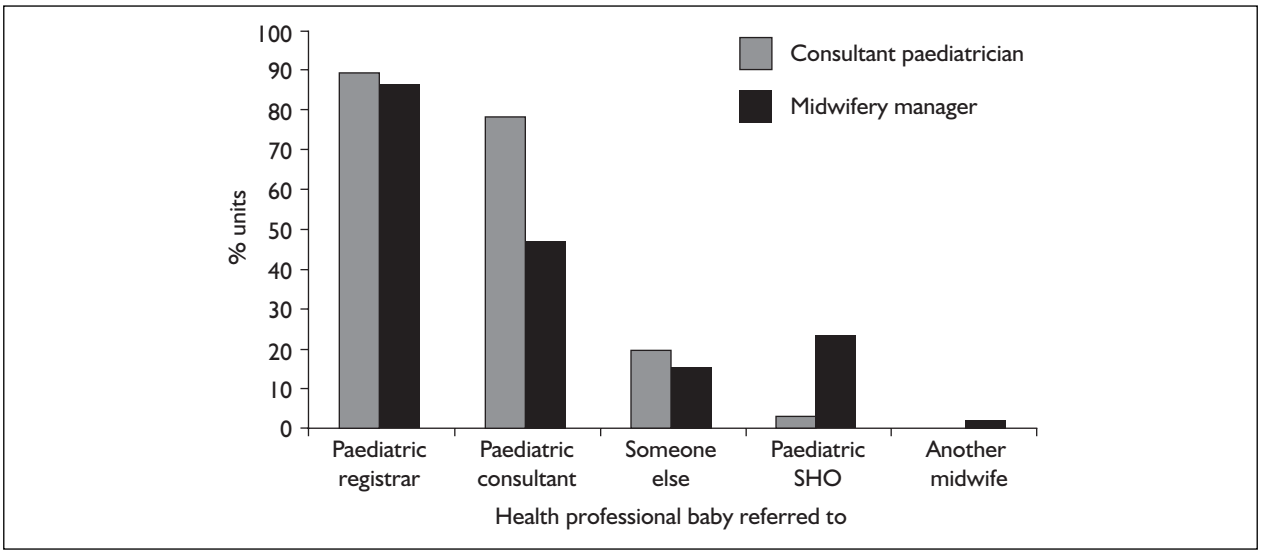

FIGURE 6 *Professionals to whom referrals are usually made by midwives (units = 51) and SHOs (units = 110). Note: percentages total to over 100 as multiple answers were possible.*

Referral rates

Units were asked to provide approximate referral rates to other health professionals resulting from the routine examination. The response rate to this question was very low, at 12% (19/151) for midwifery referrals and 23% (22/94) for SHO referrals. Nevertheless, the perceived referral rates for both professions were very similar at 6.6% for midwives and 6.8% for SHOs. *Figure 6* sets out to whom referrals were made, the majority being made to registrar or equivalent, or consultant level.

In some units midwives referred to SHOs for diagnostic tests and outpatient appointment; in 31/51 (61%) midwifery units responding, midwives were able to refer directly for all or some diagnostic tests such as serum bilirubin and ultrasound scanning, or were able to make out-patient appointments for follow-up.

Guidelines, policies and procedures for examination

All units were asked to provide documentation indicating their policies or guidelines associated with the routine examination of the newborn; 60/228 (26%) did so. The quality and content of these documents were variable; 25/60 provided details of guidelines written specifically for junior doctors and 19/60 provided guidelines specifically for which babies midwives could examine. Of the 19 units providing guidelines for midwife examination, five specified set criteria, three specified no criteria, five specified that the examination could be conducted only following an uncomplicated pregnancy, labour and puerperium and six allowed midwives to use their own judgement about which babies they should examine. The set criteria reported by the five units included full-term pregnancy, birthweight > 2.5 kg, normal delivery, no congenital abnormalities, Apgar score of ≥ 8 at 5 minutes, no birth injuries, not intubated and no meconium-stained liquor; two of the units added exclusion criteria of admissions to the SCBU, breech presentation, Apgar score < 3 at 5 minutes, birthweight < 2 kg or > 4.5 kg, abnormalities detected antenatally, abnormal neurological responses and maternal problems such as chronic disease, infection, drug dependency, medication with known side-effects taken during pregnancy and a family history of genetic or inherited diseases.

Policies for referral of infants 'at risk' of congenital heart disease, dysplasia of hip and visual and auditory defects

The paediatric consultants were asked to provide details of their unit policies and procedures for referral of infants identified as 'at risk' of congenital heart disease, congenital dysplasia of the hip and visual and auditory defects. There was some consistency between units with regard to the identification and management of babies identified as at 'high risk' for congenital heart disease or identified as having cardiac murmurs. Additional tests such as ultrasound scanning and recording of blood pressure were rarely used universally. There was consistency also regarding babies at high risk of congenital dysplasia of the hip, with usual referral to orthopaedic consultant or for ultrasound scanning where a dislocated or unstable hip was suspected.

Criteria identifying a baby to be 'at risk' for visual defects included maternal/paternal or other familial relevant medical history, birthweight < 1.5 kg, gestation < 32 weeks, absent red reflex, other congenital abnormalities, parental or professional concern, clinical findings on examination and SCBU or Neonatal Intensive Care Unit (NICU) admission. Some 67% of units (113/169) stated that babies with identified problems would usually be referred to a consultant ophthalmologist. Referrals to paediatric consultant or registrar were made in 22% (37/169) of units and 15/169 units (9%) referred babies to another hospital. The latter were mostly midwifery-led units and babies were referred to a regional hospital with consultant cover.

The criteria used to indicate a baby to be at 'high risk' for hearing defects were clearly established in the majority of the units responding (n = 82) and included maternal/paternal or other familial relevant medical history, congenital abnormality, prenatal infection, meningitis, required ventilation, hyperbilirubinaemia up to exchange levels, birthweight < 1.5 kg, receipt of ototoxic drugs such as gentamycin and glycosides, gestation < 33 weeks, associated syndromes, encephalopathy, admission to SCBU or NICU, perinatal infection and low Apgar score at 5 minutes. Babies at 'high risk' for hearing defects were referred to a consultant audiologist (74/167 units, 44%), a paediatrician (25/167 units, 15%) and a regional unit in the case of midwifery-led units (15/167 units, 9%). The main method of screening was by Otoacoustic Emissions (OAE) (44/167, 26%); Brainstem Evoked Response (BSER) (11/167 units, 7%); Auditory Evoked Response (AER) (10/167 units, 6%) and Auditory Brainstem Response (ABR) (14/167 units, 8%). Universal screening of all babies for hearing defects was reported in nine units (5%), most of which were participating in a national study of universal hearing screening.

Opinions of the examination as a screening tool

The consultant paediatricians and midwifery managers were asked their opinions concerning the neonatal examination as a screening tool for detecting problems in the newborn. Overall 51% (46/91) of paediatric consultants said it was valuable, necessary or adequate within acknowledged limitations; many, however, considered it to be poor as a screening tool, with 41% making comments such as, "of limited value", while others said that the examination obviously missed many hidden abnormalities – cardiac, renal and gastrointestinal, and some are missed by inexperienced SHOs. The mixed opinions extended to the value of the examination of the hips and heart, with some reporting it as a "useful exam for particularly screening heart and hip problems", whereas others said that the Barlow/Ortolani test has not resulted in a reduction in open hip reduction over 20 years. Midwifery managers had a slightly higher opinion of the overall examination, with 61% making a positive statement about it, although some said that the value was limited by the timing of the examination. "Useful tool but can only detect any abnormality which occurs at that particular time. On-going monitoring will identify problems which develop later."

Issues surrounding the optimum time to perform the examination, the limiting effects of early discharge, especially on the detection of cardiac abnormalities, and concern that the examination could give false reassurance to parents were mentioned by some paediatricians and midwives: "It is important to inform the parents that this is the first examination and that it is not a guarantee that the baby may not have problems or abnormalities." Some paediatricians and midwives, however, saw it as an important means of reassuring parents that all was well with their baby.

Improved or additional training was the primary recommendation of both paediatricians and midwifery managers for improvements in practice. A few midwifery managers emphasised the need for standardised timing of the examination, although there was no agreement about the recommended time. Several consultants noted the value of neonatal nurse practitioners' involvement in the examination working alongside SHOs. Midwifery managers and some consultants recommended that national guidelines or standards should be put in place for training, content and timing of the examination.

Opinions regarding midwives carrying out the newborn examination

Few of the respondents stated any major objection to midwives conducting the routine examination of the newborn, although appropriate training was the predominating issue for paediatricians, with 37% of respondents raising this as an issue. Some consultants perceived other limitations to midwives conducting the newborn examination, including poor diagnostic skills. They were also concerned that if many professionals conducted the examination it would reduce the pool of babies available, thus diluting the experience and training of SHOs. The midwifery managers

tended to have different perspectives based more on improving service provision for the mother and baby than on the diagnostic issues surrounding the examination itself. One in three mentioned that continuity of care would be improved if midwives were to conduct the newborn examination and that the waiting time for the mother and baby would be reduced. The ability of midwives to perform the examination was also seen as being part of a holistic approach to care. Some specified the importance of adequate training and appropriate updating of skills but to a lesser extent than did the paediatric consultants.

About 17% of midwives and 8% of paediatricians acknowledged the additional resources and time required for midwives who were already working with restricted staffing levels. Some of the midwifery managers perceived the examination to be "… very time consuming for very busy midwives" and others voiced concerns about adding "… to midwives' current role with no increases in staffing levels".

National Survey of Education for English National Board (ENB) N96 course on neuro-behavioural physiological examination of the newborn

The N96 programme is available to midwives on Part 10 of the register (midwives). A minimum of 6 months' experience as a registered midwife is a requisite. Data on the number of annual completions for the N96 programme were provided by the ENB and are given in *Table 18*.

Figure 7 shows the 12 universities in England that have been approved to conduct the programme and the spread of 69 hospitals currently participating in the N96 course. We thank the Small Area Health Statistics Unit (SAHSU), Department of Epidemiology and Public Health, Imperial College, London, for help with the map.

TABLE 18 *Number of completions for N96 programme 1996–2000*

Year	Number of completions
1996–97	42
1997–98	33
1998–99	81
1999–2000	72
2000–01	54

Figures based on the financial year April to March.

Questionnaires were completed and returned by 11/12 universities. The main impetus for the development of the N96 course were extension of the midwife's role, continuity of care, changes in junior doctors' hours, timely discharge into the community and improved quality of the examination. Many said that training had been requested by their NHS Trust. Almost all the N96 students were midwives, with two units reporting that neonatal nurse practitioners had also enrolled. Students had a median of 52.5 (95% CI 34.1 to 235.4, $n = 8$) contact hours and a median of 144 (95% CI 67.4 to 236.9, $n = 7$) non-contact hours on the course.

All 11 universities answering the questionnaire reported that paediatricians were involved in teaching and assessment of the N96 course; however, their contact time varied greatly, from 5 to 120 hours. All units said that students received training in screening for developmental dysplasia of the hip, usually in the form of a practice demonstration on a baby hippy, and lectures by consultant paediatricians. Five of the 11 units reported that midwives had to perform a specific number of examinations annually to maintain competence to practice the examination; only one university specified the number, which was 6–8 examinations per month.

Discussion of national and educational surveys

The survey identified that about 2% only of babies in England are currently examined by a midwife, despite the fact that some 44% of midwifery units have at least one midwife with postregistration qualification in the routine examination of the newborn, and 31% of units have at least some newborns examined by midwives. About one-third of the midwives qualified to do so were not examining at all. The reasons for this non-use of qualified midwives was not clear. The survey confirmed the evidence from the trial that referral rates between midwives and junior doctors are similar.

The consultant paediatricians and midwifery managers who took part in the survey were articulate about the strengths and weaknesses of the examination as a screening tool, with just over half considering it to be valuable, necessary or adequate within its limitations. Few paediatricians or midwifery managers stated any major objection to midwives carrying out the examinations given appropriate training, although there were some

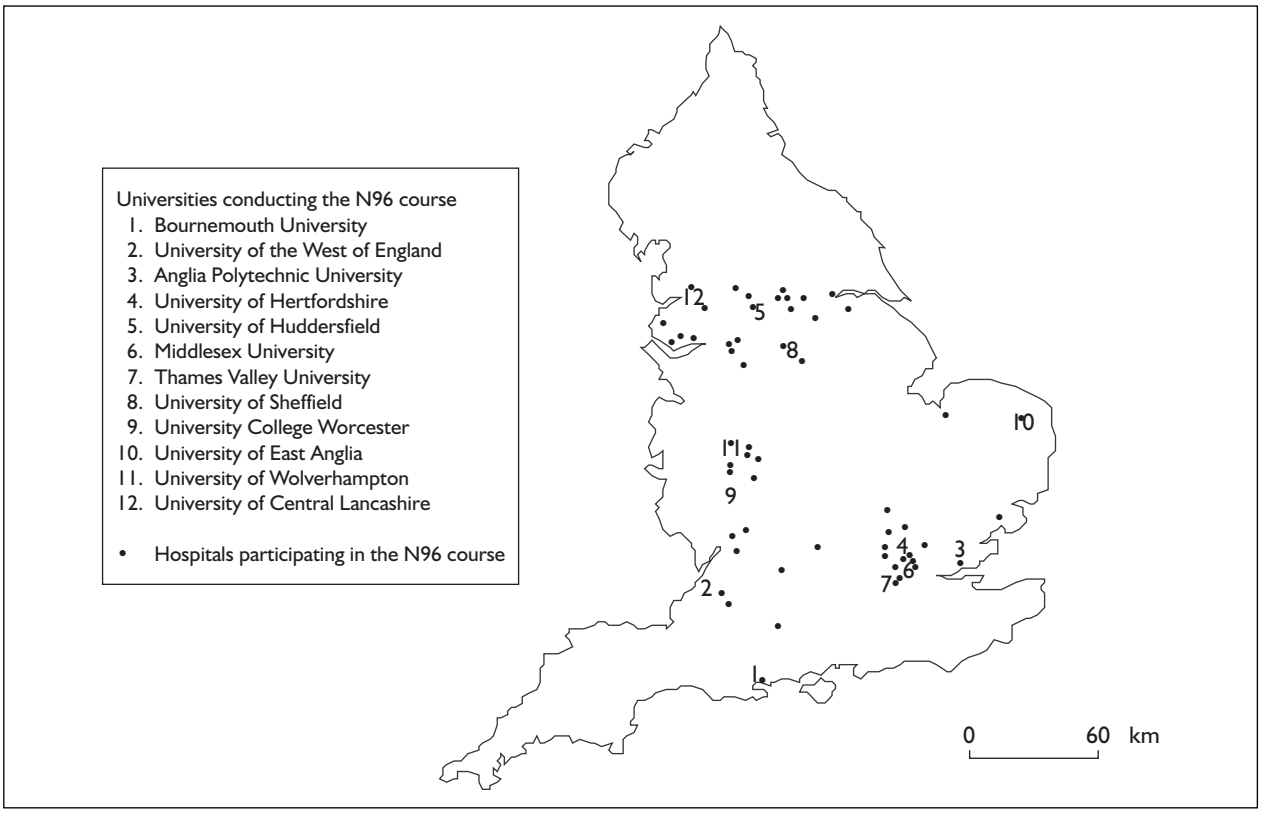

FIGURE 7 *Universities in England which conduct the N96 course and the spread of hospitals*

concerns about competency, time available and effects on the experience of junior doctors, as discussed by Hall.[1] There was an emphasis on the need for midwives to be appropriately trained. No concern was expressed about SHOs' training, although only 9% of the consultants who answered the question said that the SHOs who were carrying out the examinations had had any formal training to do so. Midwife examiners, on the other hand, all had substantial formal training. From the video quality control study reported in Chapter 4, the competence of midwives in this area appears to be higher than that of SHOs. There is an implication that carrying out the examination is in itself training for SHOs.

The examination was carried out between 4 and 48 hours from birth, although for the large majority of units the reported minimum age was 6 hours. Despite the trend for a short stay in hospital following the birth, and research by Glazener and colleagues[13] indicating that a second examination is not effective, as many as one in eight units reported carrying out a second examination prior to discharge.

The consensus opinion of the consultant paediatricians and midwife managers was consistent with that of the health professionals carrying out the examinations and of mothers, as reported in the previous chapter, in that with additional training and resources, extending the role of the midwife to include the routine examination of the newborn was acceptable. This concurs with recommendations in the literature.[9,61] Whereas no consistent recommendations for improvements were made by either group, the continued theme of training emerged as important.

The survey of education indicated that whereas universities offering the N96 course provide training for Trusts across much of England, there are still many areas not covered, including much of northern England, the south and the south-west.

Conclusions

Given the number of midwives with relevant (N96) postregistration training, a far higher percentage of babies could be examined by suitably trained midwives than are at present. However, were midwives routinely to undertake the examinations of normal babies, more midwives would need to be trained. Many paediatric consultants and midwifery managers report that they agree with such a development.

Chapter 8

Interviews with representatives of Royal Colleges, training bodies, professional bodies and consumer groups; response to findings of the EMREN study and opinion about the examination of the newborn

Key messages

- There is strong support from all the organisations for the newborn examinations to be carried out by midwives.
- Benefits of midwives examining were seen in terms of health education, continuity of care and communication with the mother.
- Agreement from representatives that criteria for midwives to examine could be considerably broadened.
- Support for training for the newborn examination to be included in core preregistration midwife training; the exception was the RCPCH, which suggested specialist training so that a few specialist midwives in each unit would carry out the examinations. There was some support for a reduction in the length of specialist training for the examination.
- Recognition that clear procedures for referral should be adopted.
- Recognition that the implications for the training of SHOs would need to be considered were most examinations to be carried out by midwives.

Introduction

Before this final report was written, a summary of the results was sent to representatives of the organisations below. We asked, in the light of the EMREN findings and of their experience, their opinion about the value of the newborn examination, who should undertake it, how it should be organised and what implications they saw for education, training and professional development. The responses in these interviews are organised in relation to the following themes that emerged: the value of the examination, extension of midwives' roles, criteria for which babies midwives could examine, implications for SHO and other staff, training of midwives and organisational issues.

Methodology

Semi-structured interviews were held with representatives of the following professional bodies and other organisations with particular interest in the examination of the newborn. The initials of the research team members who conducted the interviews are given in parentheses.

- Royal College of Paediatrics and Child Health (RCPCH). The representatives of the RCPCH were identified by inviting the President of the College to nominate members of the College who were knowledgeable on the subject and would represent the view of members of the college. The issue was considered to be of such importance that the president of the RCPCH himself and the President of the British Association of Perinatal Medicine and a further five senior members from around the UK were selected by the two associations to attend the joint interview with us (DW, EQ-T).
- Royal College of General Practitioners (RCGP). A representative GP board member was identified by the Chair of the RCGP (DW, EQ-T).
- Royal College of Midwives (RCM). A representative was identified by the College (CR).
- Nursing and Midwifery Council (NMC). A midwife representative was identified by the Council (JT, CR).
- English National Board (ENB). A midwife representative was identified by the Board (JT, CR).
- National Childbirth Trust (NCT). The representative interviewed was Head of Policy Research and was recommended by the Chief Executive (LB, SD).

- Association for Improvements in the Maternity Services (AIMS). The Chair was interviewed (LB, SD). In all cases, interviews were recorded, transcribed and summarised and the summaries sent to those interviewed for agreement.

Results

A summary of the views expressed by the representatives is given in *Table 19*. This shows a high level of agreement between the representatives about the major issues discussed at the interviews.

The value of the newborn examination

The RCM and RCPCH representatives saw the major role of the examination as confirming normality and as a screening tool rather than to make a diagnosis. Representatives of mothers were very positive about the examination, which they considered a vehicle for health education, providing parents with reassurance about the health of the newborn and giving an opportunity to ask questions. The NCT representative said that the examination gave an important opportunity "to help people be positive parents" and that continuity of care was important as women felt more confident to ask questions from someone they knew. The representative from AIMS said that for the mother, "it is reassurance that the baby is OK". The RCGP representative questioned the value of the examination as a screening tool, mentioning the lack of evidence supporting the hip examination and the fact that there was in any case an opportunity to repeat these examinations at the 6-week examination. The NMC representative also questioned the value of the examination, saying that it is not a good screening instrument, although she did stress the benefits of midwives being involved in the examination to give health education.

The extension of midwives' role

Representatives of all the organisations were very supportive of the extension of midwives' role to include undertaking newborn examinations. No fundamental issues were raised about such a change. The representative of the RCM saw this enhancement of their role fitting naturally into the midwives' current role. The RCPCH group were clear that trained midwives could carry out the routine examination of the newborn and considered that, "midwives are not just better communicators, they are better informed about breast feeding and baby care and the SHOs just haven't got that knowledge and experience".

Exclusion criteria

Most of the representatives considered that the criteria for newborn examinations conducted by midwives could be widened with the result that more babies could be examined by midwives. The RCPCH and RCGP representatives said that all infants who were fit enough to be on a postnatal ward could be examined by midwives and that this would mean that only about 7–12% of babies need be excluded. The NMC representative thought that there should be clear exclusion criteria but that midwives could conduct examinations of all

TABLE 19 *Summary of representatives' opinions*

	RCPCH	RCGP	NCT	AIMS	ENB	RCM	NMC
Favour extension of examination to midwives	✓	✓	✓	✓	✓	✓	✓
All/some midwives should be trained to carry out examination	Some	?	–	–	All	All	All
Training of midwives in core preregistration course	Postregistration	?	–	–	Preregistration	Preregistration	Preregistration
Criteria for midwives examining should be extended	✓	✓	✓	✓	✓	✓	✓
Referral should be to senior paediatricians	✓	✓	–	✓	–	✓	–

✓, Agree with proposal; –, no opinion expressed on issue; ?, uncertain about issue/no strong feelings.

babies born at term who had an uncomplicated delivery and normal postnatal profile, including uncomplicated Caesarean section or instrumental delivery. The ENB representative was of the opinion that midwives could carry out examinations where there was no obvious abnormality of the baby. The AIMS representative said that "all babies should be examined by midwives".

The implications for SHOs and other medical staff

The ENB representative thought that if midwives were to examine, it would free up GPs and she argued that when the examination was carried out by a paediatrician, it should be at registrar level with SHOs learning from the registrar. The RCPCH group suggested that "it is obvious that the person we should be employing to train our SHOs are midwives", and was in unanimous agreement that SHOs could not receive 3 months' training before being certified to carry out the newborn examination. They suggested that SHOs could have a very short (1- or 2-day) focused course. There was agreement that this training should not be done at Medical School, owing to the variations in their teaching, but within hospitals. The AIMS representative said that there would be a loss to SHOs were midwives to examine because they would lose the opportunity to see fit and healthy babies. The representative from the RCGP discussed the training and needs of GPs. He stated that the College view on SHO hospital training was that it is too hospital service oriented and not geared towards the needs of the future GP outside hospitals. The College is reviewing training and does not want a situation where there was pressure on GPs not to be part of the newborn examination because it is an important part of family medicine.

The training of midwives

Most of the representatives said that all midwives should be trained at preregistration to carry out the newborn examination. It was pointed out that the ENB and its courses ceased at the end of March 2002 and that therefore new arrangements for training would be needed. The RCM representative said that the newborn examination could be part of preregistration training and that national standards could be set by the new Nursing and Midwifery Council. The ENB representative also said that the training for the examination should become part of the core preregistration course, with short courses continuing for catch-up by already registered midwives. She did not see this as having to result in an increase in the training time, as midwives already carry out 100 examinations and would only need to add the neurological assessment and testing of hearts and hips. She thought that the number of examinations required for training could be dramatically reduced. The RCGP representative also said that the newborn examination could be incorporated into midwives' core training, but did not have a strong preference for this policy or the alternative of having a few specialist midwives trained postregistration. The RCPCH group, on the other hand, said that a small group of appropriately selected midwives could be trained to carry out the examinations. They thought that the ENB N96 course was longer than necessary, and did not seem to be standardised between providers.

Organisational issues

There was concern expressed by several representatives about whether midwives would be willing to take on an additional role and whether some existing elements of their work and training would need to be delegated or omitted. The RCPCH group were concerned that midwives would not want to carry out the newborn examination, as there were already too few midwives to deliver babies. Similarly, the NCT representative recognised a concern that "with a limited number of midwives practising at the moment" and "the difficulties of providing one-to-one care during labour", extending their role in this area might not be a priority. The AIMS representative was also concerned about the impact of additional midwife commitments. There were several suggestions about the way in which the midwives' role could be restructured to enable them to carry out newborn examinations. The RCM representative had similar suggestions in relation to government thinking about extending midwifery responsibilities to around 6 weeks and focusing care more on public health and women's health.

Other comments were made about the timing and organisation of the newborn examination. The NCT representative said that ideally the baby should not be examined before 24 hours to allow the mother and baby opportunities to be together and have loving physical contact. She saw midwives examining as enabling mothers to go home earlier and to have their baby examined at home. The RCGP representative said that if midwives were examining this would still be carried out mainly in hospital and would have little impact on GPs' workloads, but he could see that the work of the hospital SHO would be made

easier. The NMC representative saw no problem with accountability if midwives were to refer any babies with problems. Similarly, the RMC representative had no major concerns about accountability, although she was aware that some midwives do have these worries. She said that cover from employers would solve any such difficulties.

Conclusion

It was clear throughout these diverse interviews with representatives of the Royal Colleges and professional, teaching and consumer bodies that there was unanimous and strong support for midwives to carry out the examinations and serious concern about inadequately trained SHOs doing so. The only topic of disagreement was about training, where the general view was that all midwives should be trained to carry out the examination as part of their core preregistration training, but the paediatricians thought that the need was for a small number of midwives with specialist training associated with each ward. There was general agreement across all the representatives that appropriately trained midwives could examine all babies on the normal wards where mothers were caring for their babies and that some of the current exclusion criteria were unnecessary. This would suggest, as the RCPCH representatives said, that midwives could examine all but 7–12% of babies. There was widespread recognition of the benefits that midwives would bring in terms of experience, training, rapport, health education and continuity of care, and their potential for training SHOs, but that some extra resources may be necessary.

Chapter 9

Cost implications of midwives examining the newborn

Summary

Costs were considered in terms of three different scenarios suggested in the interviews with the representatives of the professional organisations. If midwives examined all babies where there were no complications of birth or antenatal history, there would be savings of about £2 per baby born, equivalent to savings of £1.2 million nationally.

Were midwives to examine all babies on normal wards, with other babies examined by registrars, there would be savings of about £4.30 per baby born or £2.5 million nationally. Were there no extension of midwife examination, but registrars were to examine instead of SHOs, there would be an extra cost of about £1 per baby or £0.4 million nationally.

There were differences of opinion between the paediatric representatives and the midwives about whether all or only selected midwives should examine. This would have implications, particularly for costs of training, and these issues would need to be agreed by the professional bodies concerned. There would be likely costs of training of £0.1 million nationally for 4 years. Overall, the economic implications of any of the scenarios were not major but would imply some net costs to midwifery departments.

Introduction

This economic analysis sets out to address the question of what would be the cost implications of possible policy changes suggested by representatives of the professional bodies as a response to the results of this trial, the National Survey and interviews. Various scenarios are considered. The cost implications are presented on the basis of implications for the costs nationally, for an average unit and per baby; training cost implications are presented on a national basis.

Methods

The results from each of the substudies indicated that midwives carry out the examination at least as well as do SHOs. It is clear that they receive more formal training, have more continuing experience and are observed to carry out examinations to a higher level of technical competence and communication. The present arrangement of examination by inadequately trained SHOs was considered to be less than satisfactory by all the professional groups and the representatives of the professional bodies interviewed. There was no direct evidence of difference in safety as indicated by referrals between the two examining groups, but there was increased maternal satisfaction with midwives, related to discussion of healthcare issues and continuity of care. This evaluation is therefore a cost analysis or cost-minimisation analysis, rather than a cost-effectiveness study. Data are used from each of the studies and the implications are costed using the unit costs published by the Personal Social Services Research Unit for 2001.[62] Three different scenarios of change are considered and costed on the basis of the cost comparison with the current examination system as identified by the National Survey.

Scenario A: midwives examine 50% of babies

The assumption of change for scenario A is that midwives would extend their practice to examine babies where there are no complications of birth or antenatal parental history; where there are problems, these babies would be examined by (a) an SHO as at present or (b) a registrar as proposed by some professional groups. The criteria of exclusion for midwife examination is assumed to be as for the trial Hospital Trust, that is, where there are maternal problems including chronic disease, infection, drug dependency, medication with known side-effects taken during pregnancy, family history of genetic or inherited disease and infant problems including emergency or elective Caesarean section under general

anaesthetic, instrumental or operative delivery with prenatal complications, Apgar < 5 at 1 minute and/or resuscitation required at birth, gestation under 37 weeks, birth weight < 2.5 kg or > 4.5 kg, abnormalities detected antenatally or at birth needing follow-up, jaundice, problems since birth requiring medical investigation, abnormal neurological responses, dysmorphic features, admissions to the SCBU and history of symptomatic meconium-stained liquor. In the main trial Trust, this excluded 50% of births as given in Chapter 2. Under scenario A, specially trained midwives would examine half the babies and SHOs or paediatric registrars would examine the other half who fall into an exclusion criterion. A national average of 2560 babies are born annually in each unit. The average total time for each examination, including administration, is 15 minutes; this was estimated from the examination sheet on which time of starting and finishing the examination were entered. Further details of administration time were obtained during the interviews with SHOs and midwives (in the analysis of mothers' satisfaction, no relationship was found between mothers' satisfaction with the examination and length of the examination).

Scenario B: midwives examine newborns on normal wards (90%) and registrars examine newborns on special care baby units (10%)

It was suggested by the representatives of some of the professional bodies, and by some of the junior doctors that the exclusion criteria used in scenario A above for midwife examination are stricter than necessary and that midwives should be able to examine all babies who are well enough to be cared for on the normal wards, that is, babies not admitted to the SCBU. Under this scenario, midwives would examine about 90% of babies with paediatric registrars examining the remaining 10%.

Scenario C: SHOs do not examine at all

The problem of SHO examinations was highlighted in the results of the RCT analyses and in the interviews with individual professionals and with the professional bodies. It has been suggested that paediatricians' examinations should be carried out by registrars rather than by SHOs, with SHOs taking an apprenticeship/training role, and this is in line with much of current thinking about the role of the SHO. Scenario C assumes that this is the only change, and that there is no increase in examining by midwives.

Results

Cost of scenario A per annum

On the above assumptions, the average midwifery hours required for examination of 50% of babies would be 320 hours per year per unit. Midwives work on average a 37.5-hour week for 42 weeks p.a.,[62] so this would require 0.2 full-time equivalent (FTE) midwifery time per unit at a cost of £6400 p.a. or £5.00 per baby. This cost includes salary, on costs, equivalent annual cost of education, hospital overheads and capital overheads.[62]

The average hours required for SHOs to carry out the other 50% of the examinations would similarly be 320 hours per year per unit. SHOs work on average 50 hours per week for 38 weeks p.a.,[62] so this would cost £11,840 or £9.25 per baby, equivalent to 0.17 FTE SHOs (costs include salary, on costs, equivalent annual cost of education, overheads, ongoing training and capital costs).[62]

Alternatively, were registrars to examine these 50% of babies, it would take 320 hours p.a. Given that a registrar works 49 hours per week for 37 weeks p.a., this is equivalent to 0.18 FTE specialist registrar, at a cost of £13,760 or £10.75 per baby, which is only marginally higher than the cost for SHOs.

Present cost

The evidence from the National Survey reported in Chapter 7 suggests that on average 2% of babies are examined by a midwife and 98% equally between SHOs and registrars. The current average cost per unit is seen to be £25,344 per year or £9.90 per newborn.

Savings by moving to scenario A

The net saving from scenario A (a) (50% SHO and 50% midwife) is therefore £ 7104 p.a. per unit, £2.80 per newborn or £1.6 million saving nationally.

The net saving from Scenario A (b) (50% special registrar and 50% midwife) would be £5184 p.a. per unit, £2 per newborn or £1.2 million saving nationally.

Scenario A (a) may not be considered an appropriate option as it requires SHOs to examine babies where there is some complication.

Cost of scenario B per annum

The average midwifery hours required for the examinations would be 576 hours per year per

unit. At £20 per hour this would cost £11,520. (0.36 FTE midwife).[62]

The average registrar hours required for the examination would be 64 hours per year per unit. At £43 per hour this would cost £2752 (0.036 FTE registrar).[62]

The total costs of scenario B would be £14,272 per unit or £5.58 per newborn. The present costs are estimated to be £25,344 per unit or £9.90 per newborn.

The net saving from moving to Scenario B is therefore £11,072 p.a. per unit, £4.32 per newborn or £2.5 million saving nationally.

Costs of scenario C per annum

Midwifery costs (midwives examining on average 2% as at present) would be £256.

Registrar costs for 627.2 hours at £43 per hour would be £26,970.

The total costs of Scenario C would be £27,226. The present costs are estimated to be £25,344.

The net costs of Scenario C are therefore £1882 per unit, £0.74 per newborn or £0.4 million extra cost nationally.

Implications of costs

The main resource implications for hospitals and maternity units of extending the role of the midwife to examining more newborns, that is, scenario A or B, would be the need for some movement of resources from paediatric to midwifery departments of £6150–11,300 per year per average unit (£32.40–4.41 per newborn), with a potential net saving per hospital of £5000–7000 or £2–3 per baby. In the case of scenario C, where midwives do not extend their role but registrars carry out 98% of examinations, extra costs of £2000 to the average paediatric unit (£1 per baby) would be incurred.

Follow-up costs

There were no significant differences in referral rates in hospital from the RCT or reported in the National Survey, and there is no reason to expect any of the scenarios to involve differential follow-up costs. Midwives did make more informal community referrals to midwives or GPs by suggesting to the mother that she checks a minor problem with them, but such follow-ups would be part of routine visits and would be unlikely to incur significant costs. There was no difference between midwife and paediatric examined babies in subsequent use of any health services.

Training costs

There would, however, be potential training costs for midwives and/or SHOs. Costs would depend on the policy followed and the timescale adopted. If training for the examination were to become part of routine preregistration training for all midwives, as has been recommended by the midwifery professional bodies, it would involve training to examine hearts and hips and neurological systems to be added to the midwives' core training course, which already includes the other elements of the routine examination of the newborn. We were advised by the midwifery professional bodies that this could be incorporated as part of the development of the course, with other elements of the course possibly being omitted. If this were to become policy, all newly registered midwives would be qualified to carry out the examination, with the pool of those so qualified gradually increasing to include all midwives. Were this policy supplemented by increasing the number of existing midwives taking the postregistration N96 course or its equivalent, the numbers of appropriately qualified midwives would grow more quickly.

The median cost of the course reported by N96 course organisers for 2001 was £515 (range £225–1200). This has a large variance reflecting differing approaches and durations. There may be other costs related to inputs at hospital level from paediatric staff considered as standard training costs. Were postregistration training increased to train four midwives per year on 25% of units over 4 years, this would cost on average £515 (range £225–1200) per unit per year or £110,000 (range £48,000–256,000) nationally for a period of 4 years, and would ensure a base core of qualified midwives in each unit, which would rapidly grow as the preregistration trained midwives took up posts.

An alternative solution would be for SHOs to receive training in the examination of the newborn. This has been proposed and costed for the trial Trust District General Hospital. The costs are estimated at £200–250 per SHO plus consultant training input and certification by the Royal College of Physicians of £10–50. The proposed structure was for five SHOs to be trained at a time on a 5-day in-house course, with university teaching at the Trust in the mornings and practical supervision in the afternoons. This would be counted as study leave for the SHOs. One Hospital Trust in Scotland currently runs a structured training programme for SHOs.

The major problem with this pathway would be that as SHOs rotate every 6 months, an ongoing cost would be incurred of some £2500 (range £2100–2900) per unit or £560,000 (range £470,000–650,000) nationally. This is far higher than the projected cost for training midwives, who with refresher courses would be able to examine for the period of their working lives.

Conclusion

There was a difference of opinion between the paediatric representatives and the midwifery representatives about whether all or only selected midwives should examine. The midwives were almost universally of the opinion that if midwives were to develop their role to include the examination, this should be done by all midwives based on the professional principle of continuity of care. Paediatric representatives, on the other hand, envisaged midwives organising the examinations in a similar way to the SHOs so that a few specialist midwives only carried out the examinations as part of a midwifery speciality. These issues would need to be agreed by the professional bodies concerned.

Overall, it is clear that the economic implications of any of the above changes would not be major, and were it decided to extend the role of the midwives this would have overall cost savings to the unit of £2–£3 per baby born in the unit, with net costs to midwifery and savings for paediatric departments.

Chapter 10
Conclusions

This study was carried out in response to interest within the NHS and is the first to look systematically at the implications of midwives examining the newborn. One of the striking results is that despite widespread support for midwives to examine, and the quality of their examinations being as good as or better than the standard procedure of examination by SHO, only 2% of babies are currently examined by midwives. It is evident that only two-thirds of midwives with the N96 qualification are examining at all. This suggests a need for some organisational reform.

There were limitations to the evaluation as it was not deemed ethical or clinically safe either not to examine or to have the same baby examined by an SHO and a midwife. There were difficulties in assessing it as a screening tool. We therefore carried out a number of studies around the evaluation to triangulate the results. We did not anticipate that all these studies would so clearly indicate the same conclusions.

There were no differences in examining by midwives or SHOs in terms of safety, appropriate referral rates or potential problems missed. The audio-video analysis, however, indicated that midwives adhered more closely to the examination protocols, and all noted differences in quality between SHO and midwife examinations, including overall quality, favoured the midwives' examinations. Maternal satisfaction was also higher when midwives examined; this was primarily related to midwives being more likely to discuss healthcare issues and to provide continuity of care.[63] Information on issues such as infant feeding, skin care, jaundice, sleeping, stools and nappy care in the neonatal period were seen to be highly valued by the mothers and are a good and inexpensive way to increase quality of care. The value of this healthcare advice was confirmed by the professionals and mothers in the qualitative interviews, although some in each of these groups queried its value at this time.

The differences in satisfaction and quality could be due partly to differences in formal training, which was received by the midwives but not by the SHOs. It would be possible for SHOs to receive similar training, although there may be limitations to this during their 6-month rotation period; SHOs clearly are not in a position to provide continuity of care and by the nature of their position have more limited experience with mothers and babies.

The conclusions of the professional bodies, that midwives should examine most babies in future and that where there are problems the baby should be examined by a senior paediatrician rather than by an SHO, are suggested by the findings of this study. This is by no means a judgement of the relative ability of the two professional groups, but of the appropriateness in the interest of the babies and the mothers – the consumers' perspective. It is acknowledged by junior and senior paediatricians that midwives have relevant experience in infant care issues which are not included in the SHOs' present training. Discussion of such issues is highly valued, as expressed by Platt in an editorial to a publication from this study[64] that it should make all paediatricians pause to think, "how and what we teach our senior house officers in relation to the newborn examination"; SHOs, whether they proceed to a specialism in paediatrics or general practice, would benefit from more formal training rather than the current predominant approach of 'learning by doing'.

There was considerable discussion about issues of when the examination should be carried out, with general agreement that there should be an early examination in the first 24 hours either in hospital or at home. The 10-day examination did not identify many problems, other than what would be found during the normal midwife care or at the 6-week examination by the GP. The sample size here did not allow for evaluation of detection rates for the two major conditions that other authors propose could be identified later in the neonatal period.

A far larger sample would have been needed for a proper evaluation of the detection of false positives and false negatives. So there

remains a question about the overall value. It is clearly not a perfect screening procedure, even where carried out well, owing to the variation in developmental profiles of children and the fact that new problems may arise whereas others may resolve naturally. However, this does not mean that the examination is without value. Problems are identified in the examination and are acted upon, mothers are well satisfied with the examination and mothers, professionals and representatives of professional bodies saw its value for identifying problems, giving healthcare advice and reassuring the mother.

There are some real problems with the execution of some aspects of the examination and in particular with the examination of the hips. The findings of this study support earlier conclusions regarding a lack of clinical competence in this area, in particular the performance of Barlow's test.[47,65,66] Although midwives performed better in all aspects of the hip examination, the results indicate a worrying lack of skill among both groups and demonstrate a need to review the training programmes for all professionals involved. The lack of agreement between the clinical experts who rated the audio-video tapes supports the need for 'gold standards' to be agreed in relation to hip examinations, particularly given the controversy surrounding the value and logistics of routine screening with ultrasound.[67,68] A number of countries are now relying on ultrasound scanning and some have banned certain manipulative procedures such as the Ortolani, owing to reports of possible injury. In Germany, for example, the Ortolani procedure is not generally applied as it carries a significant risk of injury if not conducted properly. All babies receive a basic hip examination at 7–10 days and an ultrasound scan of the hips at 4–6 weeks. Some have it earlier if there is concern at the basic examination. There are, however, concerns about the high level of false positives with ultrasound scanning. In Germany, about one in four babies have an abnormal or query scan, and invasive action is rare with most babies being monitored.

Although the issue of legal liability was introduced as a problem by some midwives and doctors, there was assurance from the professional bodies that this would not be a problem as employing Trusts would have ultimate responsibility in this as in other aspects of midwife care.

Our findings are unlikely to be accounted for by allocation bias or selective sample attrition. The randomisation in the RCT worked well, with no differences in 15 of the 16 social and obstetric factors investigated. Only for mode of delivery was there a significant difference in numbers randomised to the two groups, and this was not found to be a confounder in the analysis.

The results are confirmed by a recent study of effectiveness of ANNPs, in which all infants referred to specialist orthopaedic, ophthalmology and cardiology clinics were examined by an SHO or ANNP, which concluded that advanced neonatal nurse practitioners were significantly more effective than were trainee paediatricians (SHOs) in detecting abnormalities during the neonatal examination.[12] Similarly, a study of preoperative assessment in elective general surgery recently concluded that there was no reason to inhibit the development of fully nurse-led pre-operative assessment, provided that the nurses are appropriately trained and maintain sufficient workload to retain skills.[69]

The outcome measure of satisfaction was valid and reliable in assessing maternal satisfaction with the newborn examination, independently of other care experiences or maternal well-being. The scales developed and tested here may be highly suitable for assessing quality and satisfaction with the newborn examination for future audit or research purposes.

Implications for the health services

Developing the role of the midwife to include examination of the newborn would be likely to result in improved quality of examinations and higher satisfaction from mothers. It would be likely to reduce overall health service costs slightly, with some increased resources needed by midwifery departments and some decrease in resource needs of paediatric departments. There would be a need for appropriate training of midwives, possibly as part of core preregistration training. Consideration would need to be given to how and when midwives would be trained and the criteria for babies to be examined. Overall improvement in examination of babies' hips is needed.

This study has tried to assess and weigh all aspects of a move to midwives extending their role to the examination of the newborn. The evidence from all components of the study is consistent in showing no barrier to suitably qualified trained midwives carrying out the examinations and that there could be improved quality, satisfaction and cost savings. Several of the component studies are published.[48,70–74]

Recommendations for further research

There is a need for research into

- the value of the examination being carried out at home rather than in hospital
- the overall unsatisfactory quality of the examination of the hips
- appropriate inclusion criteria for which babies midwives should examine.

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Contributions of the authors

Joy Townsend (Professor in Primary Healthcare) lead, worked on all aspects of the study and drafted the report, Dieter Wolke (Professor in Lifespan Psychology) worked on all aspects, Julie Hayes (Project Manager) managed project, National Survey and contributed to writing, Shreya Davé (Research Fellow) statistical analysis and management and contributed to writing, Catherine Rogers (Consultant Midwife/Senior Lecturer) midwifery issues, video study, interviewing and contributed to writing, Linda Bloomfield (Research Fellow) relief project manager, video analysis, interviewing and contributed to writing, Emmanuel Quist-Therson (Consultant in Paediatrics) paediatric issues, video study and National Survey, Maggie Tomlin (Senior Lecturer) midwifery issues and mothers' satisfaction, and David Messer (Professor of Psychology) psychological aspects and contributed to writing.

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Appendix 1

Twenty-four-hour satisfaction questionaire

Baby Examination Study

Mount Vernon and Watford Hospitals Trust and Centre for Research in Primary and Community Care, University of Hertfordshire

Congratulations on the birth of your baby. We would be grateful if you would complete this questionnaire as part of a NHS study to look at the examination of new-born babies. You may remember agreeing to take part in this study during your ante-natal care.

We would like to ask you some questions about the *examination your baby has just had*. This will help to improve mother and baby services here and at other maternity units.

All the information you provide is completely confidential and your questionnaire will not be seen by the hospital staff.

Please return your completed questionnaire to the 'Baby Examination Questionnaires' box at the reception desk in the envelope provided.

Today's date: . . / . . / .... **The time now** ..... **(am/pm)**

Your name .....

Your baby's name ..... **Baby's sex: girl/boy**

Your baby's date of birth ..... **Time of birth** ..... **(am/pm)**

Date of examination ..... **Time of examination** ..... **(am/pm)**

Study ID Number ☐☐☐☐ **(Office use only)**

(5–8)

Please give only one answer to each of questions 1 to 3 by ticking a box.

Office use only.

Your baby's examination

1. Were you present during your baby's examination?

No ☐ Some of the time ☐ All of the time ☐ (9) ☐

2. Who carried out the examination?

Midwife ☐ Doctor ☐ Nurse ☐ Don't know ☐ ☐

Other ☐ ☐

Specify: .....

3. Please specify where your baby was examined:

On ward ☐ Side room ☐ Other ☐ ☐ ☐

Details: .....

4. Other than the person examining your baby was anyone else present during the examination?

Please tick appropriate boxes

No one ☐ Midwife ☐ Doctor ☐ ☐ ☐ (1)

Your partner ☐ Relative/ friend ☐ Other patient ☐ ☐ ☐

Student ☐ Other ☐

specify .....

Study ID Number ☐☐☐☐ **(Office use only)**

For each of the statements below please show by circling *one number* how satisfied or dissatisfied you feel about the way your baby was examined. (The minus numbers –3 to –1 indicate levels of dissatisfaction and the plus numbers +1 to +3 indicate levels of satisfaction).

How do you feel about:	Very dissatisfied			neither			Very satisfied	Office use only.
5. how the examiner introduced him/herself	–3	–2	–1	0	+1	+2	+3	☐
6. how the examiner explained the reason for the examination	–3	–2	–1	0	+1	+2	+3	☐
7. how the examiner handled your baby	–3	–2	–1	0	+1	+2	+3	☐
8. how thoroughly your baby was examined	–3	–2	–1	0	+1	+2	+3	☐
9. how friendly the examiner was	–3	–2	–1	0	+1	+2	+3	☐
10. opportunities you had to ask questions	–3	–2	–1	0	+1	+2	+3	☐ (8–14)
If you asked questions: **11. how well the examiner answered your questions**	–3	–2	–1	0	+1	+2	+3	☐
	Not applicable ☐							
12. Overall how satisfied were you with the examination	–3	–2	–1	0	+1	+2	+3	☐
13. How much did your baby cry or fuss during the examination?	Not very much 0	1	2	3	4	5	A lot 6	☐ (18–27)
14. How distressed did you feel watching the examination?	0	1	2	3	4	5	6	☐

Study ID Number ☐☐☐☐ **(Office use only)**

Office use only.

15. Did the examiner say your baby had any problems? ☐ YES ☐ NO (2) ☐

15a. *If yes*, how well was the problem explained to you

Not very clearly			neither			Very clearly
–3	–2	–1	0	+1	+2	+3

☐

16. Were any other health or childcare issues discussed during the examination, e.g. feeding, skin care ☐ YES ☐ NO ☐ Don't know ☐

16a. If yes, which issues?.....
.....

☐☐
☐☐
☐☐

16b. How well were the issues explained to you

Not very clearly			neither			Very clearly
–3	–2	–1	0	+1	+2	+3

☐

17. Were you satisfied with the privacy available to discuss any satisfied childcare, personal or other issues with the examiner?

Very dissatisfied			neither			Very
–3	–2	–1	0	+1	+2	+3

(38) ☐

Your feelings about your own care

How satisfied or dissatisfied are you with your care:

Very dissatisfied			neither			Very satisfied

18. during labour and delivery

–3	–2	–1	0	+1	+2	+3

☐

19. since having your baby

–3	–2	–1	0	+1	+2	+3

☐

You and your baby

20. How have you felt since the birth of your baby?

Very unhappy			neither			Happy
–3	–2	–1	0	+1	+2	+3

☐

21. How much did your baby move in the last month of pregnancy when you were sitting down?

Very little						Constantly
0	1	2	3	4	5	6

☐

22. How well do you think you have bonded with your baby so far? ☐☐☐☐

Not at all						Very much
0	1	2	3	4	5	6

☐

Study ID Number **(Office use only)**

Office use only.

23. Have you put your baby to the breast yet? YES ☐ NO ☐ (4) ☐

24. What are your intentions about how you want to feed your baby?

Solely breast ☐
Mainly breast ☐
50/50 breast and formula ☐
Mainly formula ☐
Formula only ☐

25. Were you delayed in going home because you had to wait for the examination?

Not at all ☐
< 30 minutes ☐
30 minutes to 1 hour ☐
1 hour to 2 hours ☐
2 to 3 hours ☐
3 hours or more ☐

Not applicable my baby was examined at home
Please give details of the date and time of examination ☐
……

26. How satisfied are you with the length of time you have had to wait for the doctor/midwife to come and examine your baby?

Very dissatisfied						Very satisfied
–3	–2	–1	0	1	2	3

Please write any additional comments you would like to make on this page about the examination, the information you were given or your health care.

Please write your comments here

Thank you very much for completing this questionnaire.

Please put the completed questionnaire in the "Baby Examination Study Box" at the reception desk.

If you have any queries about this project then please contact Dr Julie Hayes on 01707 284693

Study ID Number ☐☐☐☐ **(Office use only)**

Appendix 2

Three-month satisfaction questionaire

Baby Examination Study

Mount Vernon and Watford Hospitals Trust and Centre for Research in Primary and Community Care, University of Hertfordshire

You may remember agreeing to take part in this study during your ante-natal care and completing a questionnaire after your baby was born. We would be grateful if you would complete this questionnaire as part of a NHS study which is assessing extending the role of midwives in examining newborn babies. This is being conducted at the Mount Vernon and Watford Hospitals Trust in collaboration with the University of Hertfordshire.

By completing this questionnaire you will help us to improve maternity and baby services at our local and other maternity units.

All the information you provide is completely confidential.

There is room at the end of the questionnaire for any additional comments you have.

When you have completed the questionnaire place it in the pre-paid envelope and return it to the University of Hertfordshire. You will NOT need a stamp to return the envelope.

If you have any queries then please contact:
Dr Julie Hayes (Project Manager)
CRIPACC
University of Hertfordshire
College Lane, Hatfield AL10 9AB
Tel: 01707 284693

Today's date: . . / . . / . . . .

ID Number ☐☐☐☐ **(Office use only)**
(5–8)

Office use only.

1. How much does your baby weigh now?

☐ . ☐☐ (kgs/gm) or ☐☐ . ☐☐ (lbs/oz) ☐ (9)

Usually a midwife examines babies at about 10–14 days after they are born. We would now like to ask you some questions about this examination.

2. For your baby did this examination include checking your baby's hips and listening to their heart?

YES ☐
Don't know ☐ ☐
NO ☐

For the following questions please circle the appropriate number on the scale.

3. How satisfied were you with the examination your baby received at 10–14 days after he/she was born? ☐

Very dissatisfied			Neither			Very satisfied
–3	–2	–1	0	+1	+2	+3

4. If your baby did not have his/her hips and heart checked at 10–14 days would you have liked this to have been included in the physical examination your baby did receive at this time? ☐

Not at all						Very much so
0	1	2	3	4	5	6

Not applicable ☐

5. How satisfied do you feel about the opportunities to ask questions about the examination? ☐ (13)

Very dissatisfied			Neither			Very satisfied
–3	–2	–1	0	+1	+2	+3

6. If you asked questions how satisfied were you with how well the midwife answered your questions? ☐

Very dissatisfied			Neither			Very satisfied
–3	–2	–1	0	+1	+2	+3

Not applicable ☐

7. How much did your baby cry or fuss during the examination? ☐

Not very much						A lot
0	1	2	3	4	5	6

ID Number ☐☐☐☐ **(Office use only)**

8. What health or childcare issues were discussed with you by your midwife on the visit at around 10 to 14 days after your baby was born?

Feeding ☐	Feelings about your baby ☐	Travelling/car seats ☐
Crying ☐	Bathing ☐	Contraception ☐
Sleeping ☐	Baby's weight ☐	Exercise ☐
Sleeping position ☐	Stools/nappy care ☐	Smoking ☐
Room temperature ☐	Cot death ☐	Sex ☐
Monitoring baby's health ☐	Skin care ☐	Can't remember ☐
Umbilical cord care ☐	Post-natal depression ☐	Something else ☐
		(Give details below)

Please give further details if possible:

9. What, if any, health or childcare issues would you have liked the midwife to discuss further with you?

10. How satisfied have you been with the opportunities you have had to ask your midwife about health and childcare issues?

Very dissatisfied			Neither			Very satisfied
–3	–2	–1	0	+1	+2	+3

11. How well were these issues explained to you?

Not very clearly			Neither			Very clearly
–3	–2	–1	0	+1	+2	+3

Not applicable ☐

12. How satisfied have you been with the care you have received since the birth of your baby?

Very dissatisfied			Neither			Very satisfied
–3	–2	–1	0	+1	+2	+3

Office use only.

(41)

ID Number ☐☐☐☐ **(Office use only)**

Office use only.

13. How many times have you seen your GP since the birth of your baby (Write O if not seen)? ..... ☐

14. Did the GP visit you? **YES** ☐ **NO** ☐ **Not Applicable** ☐ ☐

15. Did you visit the GP? **YES** ☐ **NO** ☐ **Not Applicable** ☐ ☐ (41)

16. How many times have you seen your midwife since the birth of your baby (Write O if not seen)?..... ☐

17. How have you felt since the birth of your baby?

Very unhappy			Neither			Very happy
–3	–2	–1	0	+1	+2	+3

☐

18. How well do you think you have bonded with your baby so far?

Not at all			Neither			Very much
–3	–2	–1	0	+1	+2	+3

(41) ☐

19. What is the longest continuous sleep your baby has on average at night (e.g. last night)?

<1hr	☐	5–6 hrs	☐
1–2 hrs	☐	6–7 hrs	☐
2–3 hrs	☐	7–8 hrs	☐
3–4 hrs	☐	>8 hrs	☐
4–5 hrs	☐		

☐

21. How often does your baby wake between midnight and 6am?

None	☐	Three times	☐
Once	☐	Four times	☐
Twice	☐	More than four times	☐

☐ (49)

22. For how long does your baby cry or fuss during an average day (e.g. yesterday)?

a) During the morning (6am to noon) .....hrs .....mins ☐☐☐

b) During the afternoon (noon to 6pm) ....hrs .....mins ☐☐☐

c) During the evenings (6pm to midnight) .....hrs .....mins ☐☐☐

d) During the night (midnight to 6am) .....hrs .....mins ☐☐☐

23. On what milk is your baby fed at present?

Solely breast milk	☐
Mainly breast milk	☐
(50/50) breast and formula milk	☐
Mainly formula	☐
Solely formula	☐

☐

ID number ☐☐☐☐ **(Office use only)**

Please write any additional comments you would like on this page.

Office use only.

Thank-you very much for completing this questionnaire.
Please place it into the pre-paid envelope provided and return it to
Dr Julie Hayes, CRIPACC, University of Hertfordshire, Hatfield AL10 9AB.
You will NOT need a stamp to return the envelope.

If you have any queries about this project then do not hesitate to contact Dr Julie Hayes at the above address or you can telephone her on 01707 284693

Please write any additional comments you have in this box

(63)

ID Number ☐☐☐☐ **(Office use only)**

Appendix 3

Three-month follow-up

Baby Examination Study

Mount Vernon and Watford Hospitals Trust and Centre for Research in Primary and Community Care, University of Hertfordshire

You may remember completing some questionnaires for us soon after the birth of your baby. We would now like to find out a little more about your baby's and your own general health and how satisfied you are with the health care you and your baby have received since your baby was born. Please try to complete all of the questions if possible. Please use your child health record to help or remind you where necessary.

Office use only.

1. Today's date . . / . . / ....

2. How much does your baby weigh now?

☐ . ☐☐ or (kgs/gm) ☐☐ . ☐☐ (lbs/oz)

3. How satisfied have you been with the care you have received since the birth of your baby?

Very dissatisfied			Neither			Very satisfied
–3	–2	–1	0	1	2	3

☐

4. How have you felt since the birth of your baby?

Very unhappy			Neither			Very happy
–3	–2	–1	0	1	2	3

☐ (5)

5. How well do you think you have bonded with your baby so far?

Not at all yet						Very much so
–3	–2	–1	0	1	2	3

☐

ID Number ☐☐☐☐ **Office use only (5–8)**

Office use only.

Your baby will have undergone a physical examination by a doctor or a midwife before he/she left hospital. This examination would have included checking your baby's hips and listening to his/her heart.

6. Do you remember this examination?

YES ☐ NO ☐ Don't know ☐ (12) ☐

If yes, how satisfied were you with this examination?

Very dissatisfied			Neither			Very satisfied
–3	–2	–1	0	1	2	3

(13) ☐

Not Applicable ☐

Are there any comments you have about this examination?

Please detail: ☐

6–8 week baby check by your GP or Health Visitor.
(Don't forget to refer to your child health record)

7. Did your baby have the 6–8 week baby check? (15)

YES ☐ NO ☐ ☐

8. Was the check carried out by:

Your GP ☐ Health Visitor ☐ Both ☐ Can't remember ☐ ☐

9. At this time did your GP or Health Visitor identify any problems with your baby (<u>You may wish to look at your child health record</u>)?

	YES	NO		
Hearing	☐	☐		☐
Vision	☐	☐		☐
Locomotion (movement, posture)	☐	☐		☐
Feeding	☐	☐		☐
Speech /language (sounds, vocalisations)	☐	☐		☐
Behaviour (smiling back, alertness)	☐	☐		☐
Hips	☐	☐		☐
Heart	☐	☐		☐
Undescended testes (if male)	☐	☐	Not Applicable ☐	☐
Growth	☐	☐		☐

ID Number ☐☐☐☐ **(Office use only)**

Anything else
Please give details of any problems below

.....

.....

.....

Office use only.

☐

10. What health or childcare issues were discussed with you at this time?

Feeding	☐	Feelings about your baby	☐	Travelling/car seats	
Crying	☐	Bathing	☐	Contraception	
Sleeping	☐	Baby's weight	☐	Exercise	
Sleeping position	☐	Stools/nappy care	☐	Smoking	
Room temperature	☐	Cot death	☐	Sex	
Monitoring baby's health	☐	Skin care	☐	Can't remember	
Vaccinations	☐	Post-natal depression	☐	Something else *(Give details below)*	

(29–49)

Please give further details if possible:

☐ (50)

11. How satisfied are you with how well these issues were explained to you?

Very dissatisfied			Neither		Very satisfied	
–3	–2	–1	0	1	2	3

Not applicable ☐

☐ (51)

12. Has your baby been referred to see another health professional?

YES ☐ NO ☐

☐ (53)

If YES, to whom was your baby referred?

Paediatrician ☐ A specialist (e.g. heart, renal, orthopaedic) ☐

Other (e.g. physiotherapist, occupational therapist) ☐ ☐

Please give details if you can of the person your baby was referred to, approximate date of referral, the reason and, if you have seen the health professional, then the outcome of your visit/s

.....

.....

.....

☐

ID Number ☐☐☐☐ **(Office use only)**

Vaccinations
(Remember to refer to your child health record)

Office use only.

13. Has your baby received any of the following vaccinations (jabs) yet?

	YES	NO	
Diptheria	☐	☐	☐
Tetanus	☐	☐	☐
Polio ☐☐☐☐	☐	☐	☐
Whooping Cough	☐	☐	☐
Hib (Haemophilus Influenzae b)	☐	☐	☐

13. How many times has your baby been vaccinated now?

None	☐
Once	☐
Twice	☐
Three times	☐

☐

Contact with health professionals

We would like to know what kind of contact you and your baby have had with health professionals or institutions in <u>the three months since the birth of your baby</u>. You may wish to refer to your child health record to answer the following questions.

14. How many times has your baby been seen by your GP, health visitor or practice nurse since the birth of your baby?

(61–63)

GP	☐☐	times ☐
Health Visitor	☐☐	times ☐
Practice Nurse	☐☐	times ☐

15. Please give details if you can of the times you have seen the following health professionals for your *<u>baby</u>* for the following problems.

Problem	Number of times seen GP	Number of times seen health visitor	Number of times seen practice nurse	
Rashes and skin problems				☐☐☐
Colds and coughs				☐☐☐
Runny nose/snuffles				☐☐☐
Diarrhoea				☐☐☐
Feeding problems				☐☐☐
Problems with crying				☐☐☐
Problems with sleeping				☐☐☐
Breathing problems				☐☐☐
Something else (please give details)				☐☐☐

ID Number ☐☐☐☐ **(Office use only)**

If you can please give some details of what the outcome of your visit was (e.g. antibiotics, inhalations, referred to baby clinic, referred to specialist)

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16. Please give details if you can of the times you have seen the following health professionals for *yourself* for the following problems

Problem	Number of times seen GP	Number of times seen health visitor	Number of times seen practice nurse	
Removal of stitches				☐☐☐
Baby blues/post-natal depression				☐☐☐
Sore/cracked nipples				☐☐☐
Advice on contraception/sexual problems				☐☐☐ (95-122)
Wound infections				☐☐☐
Urinary infections				☐☐☐
Stress incontinence				☐☐☐
Problems feeding your baby				☐☐☐
Problems with sleeping				☐☐☐
Something else (please give details)				☐☐☐ (123)

If you can please give some details of what the outcome of your visit was (e.g. What treatment you received or what advice you were given) (124)

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ID Number ☐☐☐☐ **(Office use only)**

Office use only.

17. Has your baby had an in-patient hospital stay since being born?

YES ☐ NO ☐ ☐

If Yes then please give details of:

the hospital: .....

the consultant's name (if known): .....

the reason for admission: ..... ☐

.....

and the length of stay in the hospital.....

18. How satisfied have you been with the information and advice, as well as emotional support you have received from the following people since the birth of your baby?

	Information and advice							**Emotional support**							
	Very dissatisfied						Very satisfied	Very dissatisfied						Very satisfied	
Midwife	–3	–2	–1	0	1	2	3	–3	–2	–1	0	1	2	3	☐☐
GP	–3	–2	–1	0	1	2	3	–3	–2	–1	0	1	2	3	☐☐
Health visitor	–3	–2	–1	0	1	2	3	–3	–2	–1	0	1	2	3	☐☐
Your partner (if applicable)	–3	–2	–1	0	1	2	3	–3	–2	–1	0	1	2	3	☐☐
Your friends	–3	–2	–1	0	1	2	3	–3	–2	–1	0	1	2	3	☐☐
Your family /relatives	–3	–2	–1	0	1	2	3	–3	–2	–1	0	1	2	3	☐☐
Somebody else	–3	–2	–1	0	1	2	3	–3	–2	–1	0	1	2	3	☐☐

(Please specify)..... ☐

.....

19. What is the longest continuous sleep your baby has on average at night (e.g. last night)?

<1hr	☐	5–6 hrs	☐
1–2 hrs	☐	6–7 hrs	☐
3–4 hrs	☐	7–8 hrs	☐
4–5 hrs	☐	>8 hrs	☐

☐

ID Number ☐☐☐☐ **(Office use only)**

Office use only.

20. How often does your baby wake between midnight and 6am?

None	☐	Three times	☐
Once	☐	Four times	☐
Twice	☐	More than four times	☐

☐ (142)

21. For how long does your baby cry or fuss during an average day (e.g. Yesterday)?

a) During the morning (6am to noon) .....hrs .....mins ☐☐☐

b) During the afternoon (noon to 6pm) .....hrs .....mins ☐☐☐

c) During the evenings (6pm to midnight) .....hrs .....mins ☐☐☐

d) During the night (midnight to 6am) .....hrs .....mins ☐☐☐

22. On what milk is your baby fed at present?

Solely breast milk	☐
Mainly breast milk	☐
(50/50) breast and formula milk	☐
Mainly formula	☐
Solely formula	☐

☐

Please write below any other comments you have or issues that you would have liked to have been discussed with you by a health professional.

Please write your comments here:

(156) ☐

Thank you very much for taking the time to fill in this questionnaire. Make sure that you have answered all of the relevant questions. Place all the questionnaires in the pre-paid envelope and return to the University. **You do NOT need a stamp**. If you have any problems completing this questionnaire then please contact

Dr Julie Hayes (Project Manager)
CRIPACC
University of Hertfordshire
College Lane, Hatfield AL10 9AB
Tel: 01707 284 693.

ID Number ☐☐☐☐ **(Office use only)**

Appendix 4

Video analysis proforma

Baby Examination Study

Office use only.

Mount Vernon and Watford Hospitals Trust and Centre for Research in Primary and Community Care, University of Hertfordshire.

Video analysis proforma

Name of viewer

Status Consultant paediatrician ☐ Midwife ☐ Other ☐ ☐

Video number ☐

1. Introduction	yes	no	unable to judge	
Did the examiner explain why he/she was there?	☐	☐	☐	☐

2. Antenatal, perinatal and family medical history	yes	no	unable to judge	
Did the examiner ask the mother specifically about:-				
any family history of heart problems?	☐	☐	☐	☐
any family history of hip problems?	☐	☐	☐	☐
any family history of other problems?	☐	☐	☐	☐

Did the examiner ask the mother any questions, or were any issues discussed about the baby? e.g. feeding, passing urine/meconium

yes	no	unable to judge	
☐	☐	☐	☐

If yes, please say which issues ..... ☐

.....

3. Which of the following were observed during the neonatal examination:-

Cardiovascular assessment

Was the baby wearing a vest during the auscultation of heart sounds? yes ☐ no ☐

	yes	no	unable to judge	
site of auscultation:				
apex	☐	☐	☐	☐
aortic	☐	☐	☐	☐
pulmonary	☐	☐	☐	☐
sternal border(s)	☐	☐	☐	☐
Femoral pulses palpated	☐	☐	☐	☐
Brachial pulses palpated	☐	☐	☐	☐

Office use only.

How relaxed was the baby during the auscultation of heart sounds?

quiet			crying
1	2	3	4

Coding:
1 quiet, no resistance
2 whimpering, no resistance
3 crying, slight resistance

How relaxed was the baby during the palpation of pulses?

quiet			crying
1	2	3	4

	yes	no	unable to judge	
Head and face for shape and abnormalities	☐	☐	☐	☐
Respiratory assessment using stethoscope	☐	☐	☐	☐
Integrity of gastrointestinal tract (including mouth, palate, abdomen, anus)	☐	☐	☐	☐
Genitalia (e.g. assessment for undescended testes – Hypospadias in male infants)	☐	☐	☐	☐
Spine (e.g. examination for sacral dimpling)	☐	☐	☐	☐
Eyes using opthalmoscope				
Reflexes				
moro	☐	☐	☐	☐
grasp	☐	☐	☐	☐
sucking	☐	☐	☐	☐
pacing/stepping	☐	☐	☐	☐

4. Handling the baby

How much did the examiner talk to the baby during the examination?

not at all			most or all of the time
1	2	3	4

Coding:
1 not at all
2 rarely
3 frequently
4 most or all of the time

Was the examiner at times awkward in handling the baby?

not at all			most or all of the time
1	2	3	4

	yes	no	unable to judge	
Did the examiner have the tools needed for the examination ready to hand?	☐	☐	☐	☐
Was the examiner opportunistic?	☐	☐	☐	☐

Office use only.

5. Problems identified during the examination

Were any problems/complications identified during the examination? ☐ ☐ ☐ N/A ☐

If yes, were the problems explained? ☐ ☐ ☐ ☐ ☐

was subsequent management explained? ☐ ☐ ☐ ☐ ☐

Any comments on dealing with problems ..... ☐

.....

6. How much did the baby cry or fuss during the examination?

not at all			most or all of the time
1	2	3	4

Coding:
1 not at all
2 rarely
3 frequently
4 most or all of the time

☐

Did the examiner try to soothe the baby ? yes ☐ no ☐ n/a ☐ unable to judge ☐ ☐

7. Did the mother/parents raise any questions and/or concerns? yes ☐ no ☐ ☐

Any comments on dealing with questions and concerns? ..... ☐

.....

8. Were any health or childcare issues for the future discussed? yes ☐ no ☐ ☐

If yes, which issues?

Feeding	☐	Baby's weight	☐	Immunisation	☐
Crying	☐	Stools/nappy care	☐	Diet	☐
Sleeping	☐	Cot death	☐	Hips	☐
Sleeping position	☐	Skin care	☐	Jaundice/colour	☐
Room temperature	☐	Post-natal depression	☐	Sticky eye	☐
Monitoring baby's health	☐	Travelling/car seats	☐	Tongue tie	☐
Umbilical cord care	☐	Contraception/sex	☐	Rash	☐
Feelings about baby	☐	Exercise	☐	Undescended testes	☐
Bathing	☐	Smoking	☐	Cutting nails	☐
				Other (*details below*)	☐

Any comments on dealing with health or childcare issues..... ☐

.....

Office use only.

9. In your opinion has the examiner performed a competent and thorough screening for the following:-

Congenital heart disease	yes	☐	no	☐	unable to judge	☐
Congenital hip problems	yes	☐	no	☐	unable to judge	☐
Congenital cataracts	yes	☐	no	☐	unable to judge	☐
Neurology	yes	☐	no	☐	unable to judge	☐

10. How would you judge the overall quality of the physical examination in terms of technical competence?

Very poor			Neither		Very good	
–3	–2	–1	0	1	2	3

☐

11. Was the examiner sensitive in response to the mother?

	yes	no	unable to judge	
By inviting questions and concerns	☐	☐	☐	☐
By explaining what he/she is doing	☐	☐	☐	☐
By responding to the mother's concerns	☐	☐	☐	☐
By commenting on the baby	☐	☐	☐	☐
By providing opportunities for the mother to speak	☐	☐	☐	☐

Please provide any additional comments about your observations of the examination here:

.....

.....

.....

☐

☐

PLEASE ENSURE YOU HAVE COMPLETED ALL THE QUESTIONS

Appendix 5

Examination of the hips

How relaxed was the baby?

quiet crying

1 2 3 4

Coding:
1 quiet, no resistance
2 whimpering, no resistance
3 crying, slight resistance

Office use only. ☐

	yes	no	unable to judge	Office use only.
was the baby laid on a flat surface?	☐	☐	☐	☐
was the nappy off?	☐	☐	☐	☐
were both hips manoeuvred simultaneously?	☐	☐	☐	☐

Ortolani's test

hip flexion	under flexion	appropriate	over flexion	unable to judge	Office use only.
	☐	☐	☐	☐	☐

degree of abduction	<30°	30–60°	60–90°	unable to judge	Office use only.
	☐	☐	☐	☐	☐

	yes	no	unable to judge		Office use only.
stirring movements	☐	☐	☐		☐
more than one attempt	☐	☐	☐		☐
examined pelvis stabilised	☐	☐	☐	☐ N/A (if both hips simultaneously)	☐
correct positioning of examiner's hands	☐	☐	☐		☐

Barlow's test

hip flexion	under flexion	appropriate	over flexion	unable to judge	Office use only.
	☐	☐	☐	☐	☐

	yes	no	unable to judge		Office use only.
stirring movements	☐	☐	☐		☐
more than one attempt	☐	☐	☐		☐
examined pelvis stabilised	☐	☐	☐	☐ N/A (if both hips simultaneously)	☐
correct positioning of examiner's hands	☐	☐	☐		☐

Any comments on hip examination .....

.....

Appendix 6

Instructions for completing the video analysis proforma

NB Only questions which need further clarification are included in this document

PLEASE ANSWER EVERY QUESTION BY TICKING ITS APPROPRIATE BOX.

Yes	=	Observed and completed
No	=	Not done or not completed
Unable to judge	=	Not observable, e.g. not filmed so could not see, too much background noise to hear, baby's clothing obstructing vision, examiners voice not clear, poor sound quality.
N/A	=	not applicable

IT IS MOST IMPORTANT THAT YOU TICK 'UNABLE TO JUDGE' FOR ANY ELEMENT OF THE EXAMINATION THAT YOU ARE UNCERTAIN ABOUT OR CANNOT ACTUALLY OBSERVE OR HEAR

Please watch each examination as many times as necessary to answer all the questions. At times the questions may be answered out of sequence if, for example, explanations are given later.

Video number Refers to the baby examination number displayed at the start of each examination

1. Introduction
To protect the examiner's anonymity their names and job titles have been removed from the videos.
Did the examiner explain why he/she was there? i.e. begin by introducing themselves and then explain why they were there, e.g. to do a baby check, baby examination, for screening/diagnostic purposes?

2. Antenatal, perinatal and family medical history
Did the examiner ask the mother questions or did the mother mention issues and the examiner ask for more details? This is specifically asked for family history of heart and hip problems. Other possible problems include congenital abnormalities, cleft palate, hearing, vision and limb problems or any pregnancy complications, e.g. bleeding, hypertension.

3. Which of the following were observed during the neonatal examination?

Cardiovascular assessment

Was the baby wearing a vest during auscultation of heart sounds?
If the baby was wearing a vest and therefore auscultation was conducted under the vest, tick 'UNABLE TO JUDGE' for all questions relating to the cardiovascular assessment, as it will not be possible to confidently identify the site.
Also tick 'UNABLE TO JUDGE' for any site of auscultation if the examiner was in a position that obstructed vision.

How relaxed was the baby during auscultation of heart sounds?
How relaxed was the baby during palpation of the pulses?
Refer to the coding on the questionnaire and circle whichever number is applicable for that part of the cardiovascular assessment.

Respiratory assessment
N.B. This may be difficult to judge. Please tick 'yes' if the examiner listens widely on the chest area. If the baby was wearing a vest, tick 'UNABLE TO JUDGE'. Also tick 'UNABLE TO JUDGE' if the examiner obstructed vision or the quality of the video does not allow you to make an assessment.

Integrity of gastrointestinal tract
If examination was not complete tick 'no'.

Eyes
If both eyes examined tick 'yes', if none or only one eye examined tick 'no'.

Reflexes
If the baby demonstrates reflexes incidentally, e.g by grasping examiner's or mother's finger, then tick 'yes', as well as if it is formally tested. If the examiner attempts to illicit pacing/stepping reflexes, please tick 'yes'.

Examination of the Hips
How relaxed was the baby during all the examination of the hips?
Refer to the coding on the questionnaire and circle whichever number is applicable.

Ortolani's Examination
Refer to diagram.

Barlow's Examination
Refer to diagram.

More than one attempt
This is asked for both Ortolani's test and Barlow's test. If more than one attempt tick 'yes', if one attempt only then tick 'no'.

Pelvis stabilised
This refers to both Ortolani's test and Barlow's test. Two techniques are acceptable:
1. Gentle downward pressure on knee or thigh with adduction.
2. Thumb over symphysis pubic bone and fingers under buttocks.

If both hips are examined simultaneously please tick 'N/A'.

Comments on hip examination
Any relevant comments
Although adduction is an important part of the examination it may be difficult to identify on video. However it would be useful if you could add anything appropriate in the comments section.

4. Handling the baby
How much did the examiner talk to the baby during the examination?

Refer to the coding on the questionnaire and circle whichever number is applicable

Was the examiner at times awkward in handling the baby?
Refer to the coding and circle whichever number is applicable.

Was the examiner opportunistic?
For example by examining appropriate elements of the examination, particularly heart and lungs, when the baby was quiet, examining the palate when the baby is crying and the eyes when the baby is quiet and looking around.

5. Problems identified during the examination
This question relates to problems identified by either the examiner or the mother/parents that require further investigation or treatment, for example, clicky hip, talipes, jaundice, cleft palate, undescended testes. If no problems identified tick 'No' and then 'N/A' for problems explained and for subsequent management explained.

6. How much did the baby cry or fuss during the examination?
This question relates to the entire baby examination. Refer to the coding on the questionnaire and circle whichever number is appropriate.

Did the examiner try to soothe the baby?
Soothing may include rocking, cuddling, caressing, talking, putting baby's finger in mouth, putting own or mother's finger in baby's mouth.

7. Did the mother/parents raise any questions and/or concerns?
This question relates to normal, common situations/conditions that require an explanation but no investigation or treatment, for example, mongolian blue spot.

8. Were any health or childcare issues for the future discussed?
This refers to opportunities taken during the examination for health promotion or childcare issues. Tick any issues which were actually discussed rather than just mentioned or referred to.

9. In your opinion has the examiner performed a competent and thorough screening for the following:
For each element of the examination specified, did the examiner perform the screening correctly and sufficiently to detect any problems?

Appendix 7

Framework for midwives' interviews

Thank you for agreeing to this interview which will be very helpful to inform a study we are carrying out for the NHS about the routine examination of the new-born. As part of this study we are interviewing SHOs, midwives, GPs as well as mothers and professional bodies, to get your views about the examination, how and when it is carried out and how it fits in with your other work. There are no right or wrong answers – it is your opinion and experience we are interested in.

Everything you say will be held in strictest confidence and will be available only to myself and other members of the research team. Information will anonymised.

We are in general tape recording the interviews. Is it OK with you if I tape record our interview?

1. Can you tell me a bit about your qualifications in midwifery?
   When qualified, type of qualification, direct entry or post nursing, further qualifications?

2. Can you tell me about your career in midwifery?
   Areas of practice, antenatal/labour/postnatal/community, extended role responsibilities?

3. Do you carry out the routine examination of the new-born?
   Regularly or occasionally?
   Where – hospital/home?
   Which babies – all/low risk?
   What do you include?
   Do you carry out elements of the examination in a specific order – systematic/opportunistic?
   What would you otherwise be doing?
   How did you learn to carry out the examination (training, by whom)?
   Do you think this was sufficient (if not, what would be required)?
   How confident do you feel about conducting the examination (probe areas of uncertainty)?
   Do you enjoy doing the examination?

4. What do you consider to be the purposes of the new-born examination?
   What do you consider its value or usefulness (for the baby, parents, doctor)?
   What do you consider its weaknesses?
   When and where do you think it should be carried out?
   Do you see it as an opportunity to discuss other issues (childcare, reassurance, mother's health)?
   Are there aspects that could be omitted?
   Are there aspects that could be strengthened?

5. Who do you think is appropriate to carry out the routine examination of the newborn?
   Explore experience/knowledge about midwives and paediatricians undertaking examination?
   What has informed experience and knowledge?
   How do you feel about midwives performing the examination – and paediatricians?
   How do you feel about midwives undertaking roles and responsibilities that were traditionally perceived as medical?
   What are the practical implications for midwives undertaking, and for paediatricians not undertaking examination?
   Benefits to midwives, midwifery, mothers and babies?
   Concerns about midwives extending role/educational implications/maintaining competence?

6. How do you feel about the government's recommendations for nurses and midwives to extend their role into areas of practice that were traditionally the domain of the medical profession?
   Undertaking responsibilities perceived as medical?
   Practical implications/concerns about midwives extending roles/implications for mothers?
   Benefits to midwives, midwifery, mothers and babies?
   Areas of responsibility that midwives could undertake (antenatal, intrapartum, postnatal)?

7. What factors might influence midwives to take on new roles?
   What factors would influence you to take on new roles?
   Financial, career move, professional self-interest, client interest, preparation for role/education?
   Meeting the needs of mothers and babies, pressure from employers, NHS changes?
   Ability to delegate aspects of current role – which aspects? Why?

Appendix 8

Framework for interviews with mothers

Thank you for agreeing to be interviewed. Explain confidentiality. Permission to tape record. Will be asking for views on the baby examination. Explain which baby examination, i.e. not straight after birth.

What is your understanding of the new-born examination?

Explain SHO/midwife – level of expertise

Do you know what the examination entails?
Probe – aims, content

Who conducted your babies' examination (first child, second child)

Were you present for the examination?

Where was it conducted?

How much of the examination do you remember?

How did you feel about the examination?
Probe – pleased, anxious, concerned

Did you feel the examination was conducted at the right time?
Too early, too late

Which parts of the examination were explained to you?

Were there things you didn't understand?

What sort of issues did you discuss with the examiner?

Did you feel you had enough time to discuss issues?

Were you encouraged to ask questions?

Was there anything you didn't like about the examination?

Do you have any opinions about who should conduct the examination?
Midwives/junior doctors/GP. Why?

What do you feel are the benefits for midwives/junior doctors examining?

How important is continuity of care – seeing the same midwife during and after pregnancy?

What do you feel are the disadvantages in midwives/junior doctors examining?

Do you think certain babies are more suitable for examination by midwife/junior doctor?
Pre-term, low birth weight, jaundice, etc.

Do you have any opinions about where the examination should be conducted?
Home, ward, privacy. Why?

Do you feel it should be just you and the examiner present or should there be anyone else?
Who? Partner/other professional. Why

What sort of issues would you like explained to you during the examination?

What questions or issues would you like to raise at the baby examination?

Do you think the baby examination is an opportunity to discuss other issues?
Such as

What do you feel is the value of the examination to you?

Are there any weaknesses in the examination?
What

How would you feel if the baby wasn't examined before you went home?

Can you think of any changes to improve the examination?
Person, content, timing

Health Technology Assessment Programme

Prioritisation Strategy Group

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Professor Bruce Campbell, Consultant Vascular & General Surgeon, Royal Devon & Exeter Hospital

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Dr John Reynolds, Clinical Director, Acute General Medicine SDU, Radcliffe Hospital, Oxford

Dr Ron Zimmern, Director, Public Health Genetics Unit, Strangeways Research Laboratories, Cambridge

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and
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Dr Andrew Farmer, Senior Lecturer in General Practice, Department of Primary Health Care, University of Oxford, Institute of Health Sciences, Headington, Oxford

Professor Fiona J Gilbert, Professor of Radiology, Department of Radiology, University of Aberdeen, Lilian Sutton Building, Foresterhill, Aberdeen

Professor Adrian Grant, Director, Health Services Research Unit, University of Aberdeen, Drew Kay Wing, Polwarth Building, Foresterhill, Aberdeen

Professor Alastair Gray, Director, Health Economics Research Centre, University of Oxford, Institute of Health Sciences, Headington, Oxford

Professor Mark Haggard, Director, MRC ESS Team, CBU Elsworth House, Addenbrooke's Hospital, Cambridge

Professor F D Richard Hobbs, Professor of Primary Care & General Practice, Department of Primary Care & General Practice, University of Birmingham, Primary Care and Clinical Sciences Building, Edgbaston, Birmingham

Professor Peter Jones, Head of Department, University Department of Psychiatry, University of Cambridge, Addenbrooke's Hospital, Cambridge

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Dr Donna Lamping, Senior Lecturer, Health Services Research Unit, Public Health and Policy, London School of Hygiene and Tropical Medicine, London

Professor David Neal, Professor of Surgical Oncology, Oncology Centre, Addenbrooke's Hospital, Cambridge

Professor Tim Peters, Professor of Primary Care Health Services Research, Division of Primary Health Care, University of Bristol, Cotham House, Cotham Hill, Bristol

Professor Ian Roberts, Professor of Epidemiology & Public Health, Intervention Research Unit, London School of Hygiene and Tropical Medicine, London

Professor Peter Sandercock, Professor of Medical Neurology, Department of Clinical Neurosciences, University of Edinburgh, Western General Hospital NHS Trust, Bramwell Dott Building, Edinburgh

Professor Martin Severs, Professor in Elderly Health Care, Portsmouth Institute of Medicine, Health & Social Care, St George's Building, Portsmouth

Dr Jonathan Shapiro, Senior Fellow, Health Services Management Centre, Park House, Birmingham

Current and past membership details of all HTA 'committees' are available from the HTA website (www.ncchta.org)

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Professor Jon Nicholl,
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Mrs Julietta Patnick,
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The HTA Programme and the authors would like to know your views about this report.

The Correspondence Page on the HTA website (http://www.ncchta.org) is a convenient way to publish your comments. If you prefer, you can send your comments to the address below, telling us whether you would like us to transfer them to the website.

We look forward to hearing from you.

The National Coordinating Centre for Health Technology Assessment,
Mailpoint 728, Boldrewood,
University of Southampton,
Southampton, SO16 7PX, UK.
Fax: +44 (0) 23 8059 5639 Email: hta@soton.ac.uk
http://www.ncchta.org

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