# EVIDENCE BASED MIDWIFERY

ROYAL
COLLEGE
OF MIDWIVES

# EVIDENCE BASED MIDWIFERY

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# Looking through the research lens at the challenges facing midwives delivering evidence-informed antenatal education

*Key words:* Antenatal education, technological lens, woman focused lens, technology, midwife education, evidence-based midwifery

The 'Z' generation of new mothers and fathers are hungry for instant access to data that can be linked and mapped in seconds and arrive on their mobiles, with multi-media resources including video, blogs, YouTube links, Google alerts and online publications. The appetite for traditional, face-to-face antenatal education classes may be lost if we do not take action now and begin to prepare our student midwives and our midwife educators for this rapidly changing technological field.

Technology-based learning may have many advantages over a traditional educational setting, however, development of face-to-face education has a unique role to play. An expert teacher does not rely on transferring information to novice pupils, instead, as a highly skilled communicator, they have the ability to facilitate the learners in using the information to generate their own knowledge.

A teacher who can achieve this face-to-face has the power to emulate the educational experience that occurs online where the student is in control of their learning. This teacher will always teach with impact and will undoubtedly remain in post; he or she may become exceptional and may even be highly desirable and sought after.

I say this because I wholeheartedly believe we will always value the human touch, the personal contact and the interaction that guides us towards understanding knowledge for ourselves. For example, we all remember excellent teachers who brought joy to the antenatal classes and kept us totally enthralled as we absorbed their every word and thought about how we could apply their ideas.

Women and their partners today want that same expert teaching in their antenatal education sessions and not just online; a midwife educator who, as an expert, facilitates their personal learning and helps them discover what their options are and what is likely to work for them. I can still remember the breastfeeding antenatal class I attended in 1981 where the midwife advised us to toughen up our nipples in preparation for breastfeeding by wearing rough or coarse fabrics without a bra. You have to ask yourself where did this type of information come from and where was the evidence to support it? Of course there was no randomised controlled trial (RCT) or feasibility or cohort study to support the advice. The midwife was sharing her lived experience with us and we all believed what she had to say was valuable and highly relevant to our planning and preparation for our breastfeeding experience. There were no online tutorials on YouTube to show you how to breastfeed, or apps to help remind you which side you fed on last time. However, this teacher's approach was successful for many of us and you have to ask yourself why? Was it the skill of the educator and her ability to prepare us for a realistic breastfeeding experience or was it that she cared for us and invested in our success? Maybe it was both.

It is important for our new midwives to value both evidence from the RCTs and what technology has to offer in the application of that evidence. However, midwives, as experts, must remember that true learning is what happens when we support women in their discovery of their different options, and facilitate them in exploring how those options might work for them. It is only when midwives as educators achieve this that real evidence-based practice can exist. Our thinking must remain free and we need to view all evidence-based education with the women we care for in mind. If we don't, we will stifle creativity, innovation and women will not find what works for them and in what circumstances.

This is where the internet has one up on face-to-face education; the internet does not see you or I in a particular social class, or with a particular skill set, or as a somebody or nobody. We are all simply 'users' of a service available and we all can generate our own knowledge from the different choices we are presented with. The internet is an amazing resource that connects, collects and stores our top tips and remains in the control of women, not midwives or researchers, who look with the research lens and dismiss that which is not supported by best evidence.

The challenge for midwives in the future, however, is to learn how to harness the power of the internet by being 'digitally ready' and 'face-to-face ready' in equal parts. Women need midwives who have achieved in both skill sets – who have equally developed their ability to teach and communicate through both human and technological interfaces. The midwife in the antenatal setting can be either virtual or real and the choice should be the woman's as to which midwife she interacts with and at what point in time. In fact, midwifery education ought to prepare midwives to be the conduit between the woman and the technology, so that the information exchange, information analysis and synthesis are, literally speaking, a natural streaming of information in human or electronic format.

I believe the norm for antenatal education of mothers and fathers in the future will be online and face-to-face, with mothers making the choice of connecting to education forums, drawing data from repositories, becoming members of communities of practice, using avatars and attending 'good old-fashioned face-to-face classes'.

The choice does not have to be technological or face-to-face, nor should it be. Choice should be blended to meet women's needs – needs that are met through an evidence-based, technological and midwife to women-centred lens.

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# A realist evaluation of a normal birth programme

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## Abstract

*Background.* Complex programmes are characterised by multiple components, acting independently and interdependently, at multiple levels, within diverse and dynamic systems. High-quality evaluation of such programmes is imperative for optimising their development, implementation and effectiveness, but is often challenging. There is debate about whether the traditional outcome-focused approaches are feasible or appropriate for evaluations of large-scale, complex programmes as they often fall short of explaining how and why they do or do not work. Theory-driven approaches offer a more appropriate alternative as they attempt to uncover the black-box between the programme's inputs and the resulting complex pattern of outcomes.

*Aim.* This paper illustrates drawing upon a realist evaluation to assess a complex programme to support normal birth.

*Method.* Firstly, the programme theories – the ideas about how the programme would bring about change – were elicited from programme developers and key stakeholders. Secondly, these initial hypotheses were tested out by collecting data on how the programme worked in different contexts, using a multiple case study design. Thirdly, the data were analysed and interpreted to refine the programme theories in light of evidence on how the programme unfolded in practice.

*Findings.* Described in detail are the process of conducting a realist evaluation, methods used, steps in data analyses, challenges encountered and the approach adopted to overcome them. The usefulness of this approach and some limitations are discussed.

*Key words:* Realist evaluation, normal birth, complex interventions, programme evaluation, evidence-based midwifery

## Introduction

Those involved in the planning and delivery of health care are increasingly aware of the importance of demonstrating that service innovation and change 'works'. However, in the context of the fast pace of change in a real world, health service researchers may be challenged to conduct rigorous research and provide timely and robust information to support the delivery of high-quality health care. If the concepts of rigorous and timely are not to be incompatible, a number of factors need to be considered at the early stage of study design.

Traditionally, the focus of evaluative inquiry has been dominated by summative or outcome-focused approaches, which aim to assess the impact and effectiveness of interventions in achieving intended outcomes (Greenhalgh et al, 2004; Pawson and Tilley, 1997). Within this tradition, randomised controlled trials and other experimental designs have been regarded as the gold standard for assessing the worth of single or multi-component healthcare interventions (MRC, 2000). This approach is also advocated in evaluations of complex programmes, which are often characterised by multi-level components acting independently as well as interdependently (Craig et al, 2008; Campbell et al, 2000). However, whether this approach is feasible or appropriate for evaluations of complex programmes is highly contested, with some emphasising the assessment of 'impact' and others focusing on the 'process'. In recent years, it has been increasingly acknowledged that, in many situations, it is not possible to directly answer or appropriate to ask the question,

'does this programme work?' (Mackenzie et al, 2010). Two considerations are important in deciding the right questions to ask. One is concerned with the nature of complex programmes and the other the contexts in which they are implemented.

Firstly, complex healthcare programmes often comprise multiple components operating at multiple levels into systems that are themselves complex, dynamic and diverse. Programmes may comprise one or more interventions that have been tested for efficacy in a trial and now require to be implemented in real world settings. Several such components/ complex interventions may be combined and implemented across diverse contexts in anticipation that these combined efforts will result in a greater impact than those achieved by individual interventions. In many cases, programmes may already be in place before evaluation is considered, or they may be required to be rolled out across all areas simultaneously, giving little opportunity for a control group. In addition, the programme components are likely to interact with each other in unexpected ways to produce a range of unanticipated and unintended outcomes. Evaluations in such circumstances need to focus not on whether programmes work, but on how well they are implemented, how different components interact, and what makes them work or not. Secondly, complex programmes are implemented into pre-existing social systems that are themselves complex, dynamic and ever-changing. Health services are delivered in organisations that are subject to frequent change at every level of service delivery and are affected by factors such as service reorganisation, changes

in health policy direction and clinical guidance, as well as financial constraints, changing demographics, health needs and demands. Interventions interact with local contexts in complex, dynamic and unpredictable ways, leading to a complex and often mixed pattern of outcomes. In such circumstances, there is often little evidence to identify linear, causal relationships between the programme inputs and observed changes in practice or clinical outcomes, as is required by outcome-focused approaches (Greenhalgh, 2009). In evaluating complex programmes, it is more pertinent to ask how the components interact with the context, why they work well in some contexts more than others and how contextual factors relate to impact and implementation (Pawson and Tilley, 1997). Outcome-focused approaches are inherently inadequate for this task as they are not geared up to explaining the 'black box' of how and why programmes work, and fail to acknowledge the active role played by the social systems into which programmes are implemented (Ling, 2012).

Evaluation research, drawn from applied social sciences, offers systematic procedures for undertaking rigorous systematic evaluation to address questions that cannot be addressed by the outcome-focused approaches (Rossi et al, 2004). Two alternatives to the traditional approach are formative and process evaluation (Robson, 2011). Process evaluation is concerned with understanding what actually occurs in the programme and explaining how and why the outcomes are brought about or not. Formative evaluation intends to inform and improve the quality of the development of a programme through a constant feedback of process and outcomes to developers and implementers (Scriven, 1991). In the context of health service evaluation, a similar framework by Donabedian (1980) argues that information about quality of care can be drawn from the 'structure', 'process' and 'outcomes' of care.

The science of evaluation has developed rapidly and several different approaches are now commonly used in healthcare evaluation, including logic models, theory of change and realist evaluation (Blamey and Mackenzie, 2007). Although there are slight differences among these, they all offer a theory-driven framework for evaluation, based on a model or theory about how the programme works and seeks to get inside the 'black-box' of a programme to explain the complex and mixed pattern of outcomes (Pawson and Tilley, 2004; Weiss, 1997).

### Realist evaluation

Realist evaluation adopts a distinctive view on the nature of programmes, how they work and what is involved in understanding and explaining them. According to the realists, programmes are social systems where there is a constant interplay between human agency (people's capacity to act freely and shape their lives) and social structures (the environment or circumstances they work in) such that any change is a result of an interaction between individuals and the systems they work in. The social structures provide individuals with resources that enable them to act, as well as placing limits on their behaviour. However, the behaviour of human agents is not exclusively governed by social structures; individuals are also able to transform social structures by responding creatively

to the circumstances they find themselves in (Pawson and Tilley, 2004; McEvoy and Richards, 2003). Programmes therefore represent ideas or theories, often stemming from the minds of those who develop and implement them, about the way in which wrongs may be put to right. The task of realist evaluation is to identify the core theories about how the programme is supposed to work and test them out to see if they are plausible, practical and valid.

Realist evaluation contends that it is not programmes that work, it is the people involved in the programme who make them work. It suggests that programmes introduce resources and opportunities for change, but the actual mechanisms that bring about change are located in the reasoning and capacity of those touched by the intervention and contingent on the social context in which they work. Realist evaluation seeks to explain the complex relationship between the mechanisms activated by the programme, the context that influences their workings and the outcomes they produce. Mechanisms refer to the process of how people interpret and act upon the resources offered by the programme and their capacity to put their choices into practice. Context refers to those features of the conditions in which programmes are introduced that enable or disable the operation of the programme mechanisms. Finally, outcomes refer to the intended and unintended consequences of interventions, resulting from the activation of different mechanisms in different contexts. The explanatory proposition of realist evaluation is that interventions work (have successful outcomes – O) only in so far as they introduce appropriate ideas and opportunities (mechanisms – M) to groups in the appropriate social and cultural conditions (contexts – C) (Pawson, 2013; Pawson, 2002; Pawson and Tilley, 1997).

There are three broad phases to realist evaluation (Pawson and Tilley, 2004). The first phase seeks to identify and formalise the programme theory by gathering data from developers and key stakeholders of the programme on how the programme is expected to work. These data are used to build hypotheses about how the programme is expected to work, for who, in what circumstances and to produce what outcomes. These hypotheses are in the form of context (C), mechanism (M), and outcome (O) configurations. In the second phase, data are gathered on the contexts, mechanisms and outcomes in sites where the programme is implemented to interrogate each of these hypotheses. In the third and final phase, the set of context-mechanism-outcome hypotheses are put to test, using the data gathered at phase two. These analyses are aimed at testing if the proposed theory (CMO configurations) explains the complex pattern of observed outcomes. The original programme theories are then refined in the light of data generated in the testing phase, which gives way to middle-range theories, indicating how programmes activate mechanisms among whom and in what conditions to bring about different outcomes.

This paper describes how the realist evaluation approach was used in the evaluation of a Scotland-wide programme of change in maternity care: the *Keeping childbirth natural and dynamic* programme. The evaluation is reported in full elsewhere (Cheyne et al, 2013). This is a discussion of the methods used, the opportunities and challenges encountered.

*Keeping childbirth natural and dynamic – a national programme*
The concept of normal birth as a 'good thing' has gained widespread acceptance in the UK and many developed countries. A growing body of research has indicated practices likely to be effective in supporting normal birth and these practices have been endorsed in government health policies and healthcare guidelines. Despite this, most women experience some form of medical intervention in labour and the caesarean section rate continues to rise. In 2007, the Scottish government introduced *Keeping childbirth natural and dynamic* (KCND), a programme of change in maternity care, with the aim to maximise opportunities for women to have as natural a birth experience as possible, reduce unnecessary interventions in low-risk pregnancy and childbirth and to provide women-centred care.

It was a three-year programme funded and led by the chief nursing officer's directorate (within the Scottish Government Health Directorates). A multidisciplinary national steering group was established to oversee programme development and monitor progress toward targets. The group was chaired by the chief nurse for Scotland and comprised representatives of the main stakeholder groups relevant to maternity care, including the health board executive nurse directors, midwifery service leads, consumer organisations and professional bodies (the Royal Colleges of Midwives, Obstetricians, GPs, Paediatricians and Anaesthetists). The agencies involved in quality and monitoring of health care and education in Scotland were also represented (Health Scotland, NHS Education Scotland, Quality Improvement Scotland). A consultant midwife was seconded to be the national programme director and, in each health board, a senior manager was identified as programme lead with responsibility for reporting back to the national steering group. Central funding was provided for the appointment of a consultant midwife in each health board to facilitate and support the programme. The main objectives were to:

• Ensure evidence-based care, reduce unnecessary intervention, and support informed choice
• Introduce multiprofessional care pathways based on a traffic light risk assessment system; green: midwife-led care, amber: further assessment required, red: maternity team care with flow between levels of care pathways as risk altered
• Initiate the lead maternity care professional designated by risk; the midwife would be the lead for healthy women, those with more complex needs would have maternity team care, led by an obstetrician while the woman's GP had ongoing responsibility for medical care
• Establish the midwife as the first point of professional contact for women in pregnancy. The midwife would undertake early risk assessment and streaming of women to the appropriate care pathway.

*Keeping childbirth natural and dynamic – the evaluation*
The Nursing, Midwifery and Allied Health Professions Research Unit was commissioned to undertake the evaluation of the KCND programme from 2008 to 2011. This provided the opportunity to observe the unfolding programme as it was developed and implemented into maternity care practice.

The aims and design of the evaluation were shaped by the following considerations. Firstly, KCND was implemented on a national (Scotland-wide) basis and the evaluation took place alongside the implementation. The 'real-time' nature of the evaluation meant that the researchers participated as active observers, influencing the unfolding development of the programme as well as evaluating it. In this situation it is not possible to pre-identify the programme's active ingredients, or ring-fence intervention and control groups in ways necessary to conduct a randomised controlled trial even of complex interventions. This meant that an experimental design was not feasible. Secondly, KCND was a complex healthcare programme having multiple objectives and numerous work streams operating across different levels of the maternity care system, it brought together several interventions or practices for which there was existing trial evidence of effectiveness, but implementation in practice was variable. A method was required that would be sensitive to the contextual factors and provide explanations of why maternity services in some areas had more fully adopted pro-normal practices, while others appeared to be resistant to change from longstanding medical models of care. A realist evaluation was chosen due to its acknowledgement of the importance of context in understanding the way in which programmes work in real-life situations.

The valuation therefore aimed to understand how the KCND programme was implemented, how the different components worked, and how the local contexts shaped the programme's impact on clinical practice and outcomes. A secondary aim was to draw transferable lessons for future national implementation of healthcare strategies.

Realist evaluation provided an overall framework for the evaluation and informed decisions about design and method (Pawson and Tilley, 1997). Accordingly, there were three stages to the project, as described above.

*Stage one – identifying programme theory*
The objective at the first stage was to understand the purpose of the programme, what it was anticipated to achieve and how this informed decisions about its development and implementation. Semi-structured interviews and focus groups were used to gather data from those involved in developing the programme and other key stakeholders; these data were used to develop the programme theory.

All members of the national steering group were invited to participate in individual interviews. The 14 consultant midwives employed as part of the KCND programme were invited to attend one of two focus groups. Data were collected using a topic guide focusing on the contexts, mechanisms and potential outcomes of KCND. Interviews and focus groups explored the stakeholders' account of the purpose of the KCND programme, the key aspects of the programme, how it would be implemented, how it was expected to work, likely facilitators and barriers to the programme and likely impact on practice. Consultant midwives were additionally asked to discuss their experience of participating in KCND and the strategies they employed to implement and support the programme. Ultimately, 12 stakeholders took part in individual interviews and a total of 13 midwives took part

in two focus groups. The interviews and focus groups were audio recorded, transcribed verbatim and managed using the software package QSR NVivo 8.

## Analysis

The framework approach (Ritchie and Spencer, 1994) was adopted to analyse the data generated from interviews and focus groups. An initial coding frame was developed using data from three transcripts and the key concepts of the realist evaluation framework – contexts, mechanisms and outcomes. These transcripts were selected to ensure that the main stakeholder groups – such as midwifery, obstetrics and management – were represented. The transcripts were read and re-read independently by two researchers in order to become thoroughly familiar with the data. Data from each of the transcripts were divided into 'units of analysis' – data segments containing discrete bits of information to be assigned to categories in subsequent analytical steps. Each unit was then assigned a meaning, known as a code. At this initial stage, the codes were largely descriptive and merely reflected what the unit suggested with respect to the main topics covered in the interviews, such as programme aims, activities, process, change mechanisms, barriers and facilitators. The codes, first assigned independently by two researchers, subsequently underwent several iterations and discussions until they were refined to accurately describe the meaning contained.

Codes from the three transcripts were then considered together to look for similar codes, which were sorted and grouped under higher order categories. At this stage, the codes were also classified according to the realist concepts of contexts, mechanisms and outcomes. All codes that suggested a change in people's minds and actions (reasoning, feeling, behaviour, attitudes, and beliefs at individual, interpersonal, social and organisational levels) in response to the changes introduced by the programme were classed as mechanisms. For instance, codes suggesting that the programme would work by providing 'local champions of normality', 'maximise midwives' role and accountability' or 'increase midwives' confidence', were grouped together as programme mechanisms. Codes describing the pre-existing enabling or disabling conditions, as well as measures introduced by the programme to support implementation, were categorised as contexts. Codes that described the intended and unintended consequences of the programme, whether behavioural, attitudinal or clinical, were classified as outcomes.

After several iterations and revisions, a preliminary coding framework was developed which was then systematically applied to the remaining transcripts. New categories were added as they emerged from subsequent data. Once all the data had been coded, the coding framework was revisited to search for similarities and differences among categories and identifying higher order themes. The resulting refined framework was used to generate initial hypotheses about what mechanisms would be triggered by the programme, in what contexts to achieve what outcomes. These formed the initial CMO configurations. Below is a discussion of some of the challenges encountered during the process of generating initial CMO hypotheses and the approach adopted to overcome them.

### Identifying programme components

The first challenge was in identifying the resources and opportunities offered by the programme to make change happen, which is a crucial first step in identifying the mechanisms triggered by them, for example: identifying how they are interpreted and acted upon by those who are involved in or affected by the programme. In interventions involving single or multiple (albeit inter-related) components that lead to a coherent set of predictable mechanisms and outcomes in fairly well known contexts, this is relatively straightforward. However, with a large and complex programme like KCND, which involved a number of strands and components, it was difficult to identify those that were likely to activate mechanisms leading to change outcomes. For instance, the various strands in the programme involved: the development of care pathways, an information campaign aimed at pregnant women, a leadership programme for consultant midwives along with a number of normality-related changes such as continuous risk assessment, midwife-led care for healthy pregnancies and discontinuation of CTGs on admission in labour. The authors worked to distinguish between those that represented the measures introduced to enable change and those that were activities designed to support the implementation of those measures. The former were referred to as programme components, each one of which will work through their own underlying mechanisms. The latter were classified as contexts as they were expected to facilitate the operation of the components. Accordingly, three programme components were identified: the appointment of consultant midwives in each health board, national pathways for maternity care and midwife as the first point of contact and lead care provider for healthy pregnant women.

### Building the CMO hypotheses

The second challenge was in generating hypotheses about specific CMO configurations. Although the data were coded using the concept of contexts, mechanism and outcomes, the relationship among them was not self-evident. The task of breaking down the programme into its components helped the process of CMO generation, as an explanation could be built around each component in terms of how it would be expected to work, in what conditions and to what effects. For each component, data were drawn on that suggested the ways in which people were expected to respond to and act upon the changes brought on by the component (M1, M2, M3...), the factors anticipated to enable or constrain those mechanisms (C1, C2, C3...), and the consequences those mechanisms were expected to lead to (O1, O2, O3...). Using these data, a coherent CMO hypothesis was put together for each component. For example, the CMO in relation to the appointment of consultant midwives was as follows: the consultant midwives were expected to facilitate practice change through negotiation with all stakeholders, gaining multiprofessional engagement, acting as champions of normality, providing training and problem-solving. It was anticipated that the consultant midwives' experience, special interest in normal birth, and additional leadership training would increase their credibility and effectiveness

as programme leads. However, hurdles were envisaged in engaging the multidisciplinary team and in potential role conflicts with senior midwife managers.

*Stage two – testing the programme theory*
The objective in stage two was to test the hypotheses that was developed in the first stage by collecting data in a range of different contexts, to explore the way in which the programme's anticipated mechanisms unfolded across different practice contexts.

*Design*
A multiple case study design was used as it enables in-depth study of a contemporary phenomenon within its real-life context (Yin, 2009) and complements the realist approach to evaluation. The size of the 'case unit' was determined by the need to capture the variation in process, context and outcomes of implementation at organisational and practice levels. Within each health board, maternity service provision comprises one or more maternity units varying in size, location, and model of care. To encompass the contextual conditions at a range of levels, a 'case' was defined as 'the maternity service in a particular health board area'.

*Selection of cases*
Three health board areas were purposively selected to maximise the opportunity for accessing a diverse range of contexts. To aid the selection, a sampling frame was first constructed using information from a health board level survey of maternity care practice prior to programme implementation. The parameters included in the sampling frame were demographics of the health board area (configuration of maternity services, annual births, demographic characteristics of the population and rurality) and the adoption of aspects of practice relevant to midwife-led care and normal birth (discontinuation of routine electronic monitoring on admission in labour and the midwife as the first point of professional contact in pregnancy). Information on the status of the health boards on these parameters was compiled in the form of a matrix. Boards with different combinations of parameters were selected to ensure diversity in case study profiles.

*Data collection*
Both qualitative and quantitative data were collected, using semi-structured interviews and focus groups with staff, and case record audit of all births in Scotland during one week, in two consecutive years before and after implementation of the programme (Cheyne et al, 2013). Within each case study site, the authors sought to interview personnel selected on the basis of their role in maternity services across levels: practice (frontline care staff) and organisational (staff from senior clinical and health board management). A purposive approach to sampling was used with the aim of selecting informants with a diverse range of views and experiences of KCND. At practice level, the authors planned to recruit clinical staff involved in maternity care within each case – at least two obstetricians, two GPs and two groups of midwives, hospital and community based, with five to seven per group.

The sample included clinical leads relevant to maternity care and the health board management, specifically: head of midwifery, clinical director, director of nursing, KCND consultant midwife, and supervisor of midwives.

The interviews and focus groups centred on staff's views and experiences of being involved in the KCND implementation. The topic guides were informed by the realist framework to elicit information on three key elements:
- Context: views about the KCND initiative, the way programme components were implemented, the way change was facilitated, current practice and culture in the unit, the local context of maternity provision, and enabling and constraining factors
- Mechanisms: views of how the programme components worked, how the changes were interpreted and acted upon, and experiences of implementing the changes
- Outcomes: perceived changes in practice and service performance, impact on roles, workload and relationships.
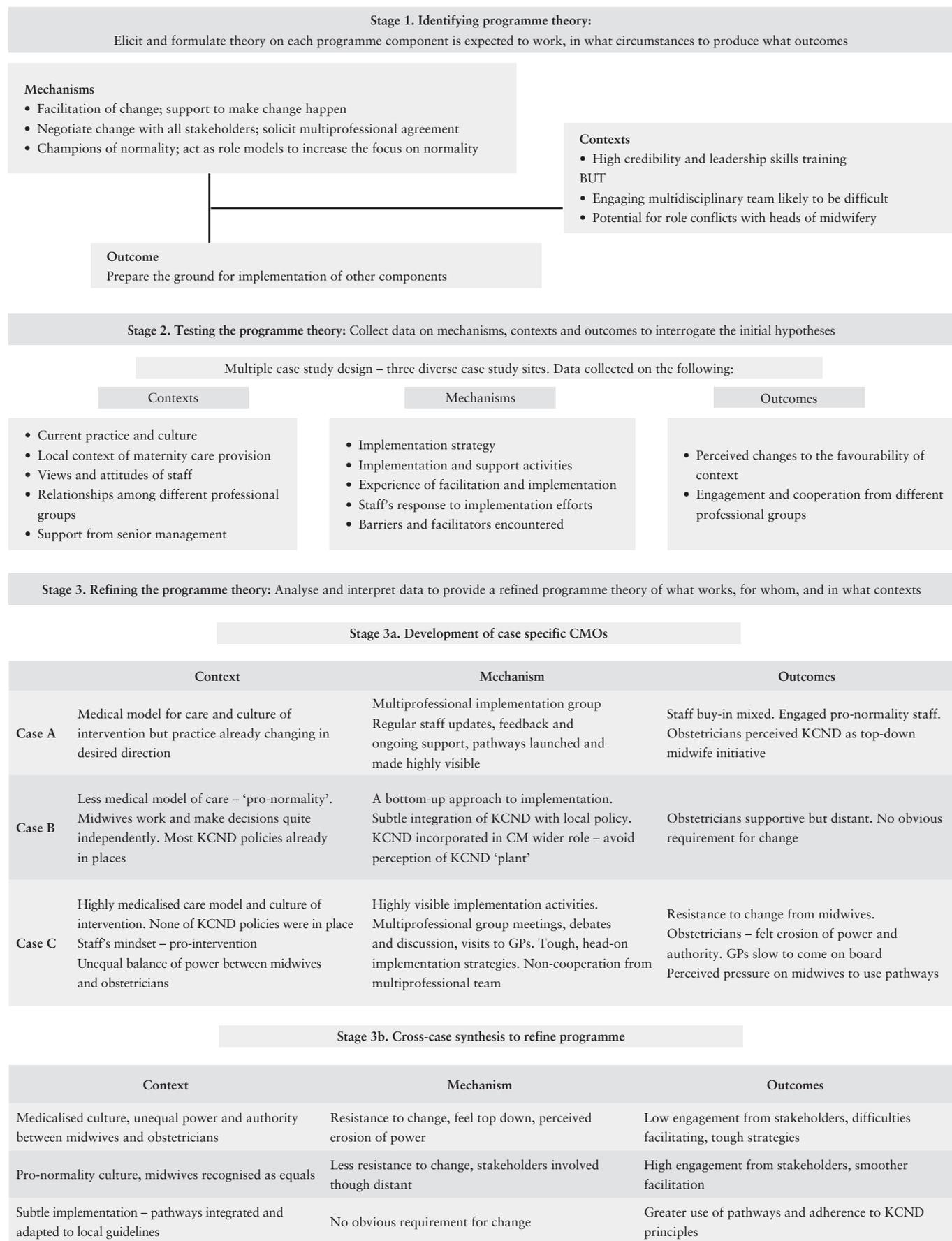
*Analysis and interpretation to develop middle-range theories*
This phase aimed to analyse and interpret the data gathered in phase two, in order to understand the ways in which the proposed mechanisms unfolded in practice and identify alternative mechanisms and explanations. Data gathered during phase two was subjected to analysis using a process similar to that of phase one. Three transcripts of interviews – with a consultant midwife, a consultant obstetrician, a head of midwifery and one transcript of a focus group with clinical midwives – were selected to develop the initial coding framework. The transcripts were selected to ensure a fair representation of views across various organisational levels, as well as case study sites. Briefly, the analytical steps involved familiarisation with data, descriptive coding, grouping of codes using realist concepts, identifying a coding frame, applying the coding frame to all transcripts and adapting and refining the coding frame to allow new themes as they emerge. The final coding framework clearly reflected the categorisation of the data into contexts, mechanisms and outcomes for each of the three components. Once all the data had been coded, the following steps were taken to move from the themes and categories to refining the CMO models.

*Developing case-specific CMOs*
Firstly, a detailed narrative was developed for each case study site. Each site was described in-depth, in terms of the local context that characterised it. This involved not only the demographics of the population and the maternity service, but also the existing practice models, culture within the service, relationship between various professional groups and staff attitudes. Within each case, the authors then sought to test out the proposed CMO configurations in relation to each component using the data obtained during stage two. Specifically, the authors actively looked for evidence threads that suggested the different ways in which the proposed mechanisms of each component unfolded on the ground, the associated contexts and ensuing outcomes. For example, the initial CMO for the appointment of consultant midwives hypothesised that this would trigger a range of

# Figure 1. Worked example of the appointment of consultant midwives

**Stage 1. Identifying programme theory:**
Elicit and formulate theory on each programme component is expected to work, in what circumstances to produce what outcomes

**Mechanisms**
- Facilitation of change; support to make change happen
- Negotiate change with all stakeholders; solicit multiprofessional agreement
- Champions of normality; act as role models to increase the focus on normality

**Contexts**
- High credibility and leadership skills training
BUT
- Engaging multidisciplinary team likely to be difficult
- Potential for role conflicts with heads of midwifery

**Outcome**
Prepare the ground for implementation of other components

**Stage 2. Testing the programme theory:** Collect data on mechanisms, contexts and outcomes to interrogate the initial hypotheses

Multiple case study design – three diverse case study sites. Data collected on the following:

| Contexts | Mechanisms | Outcomes |
|---|---|---|
| - Current practice and culture<br>- Local context of maternity care provision<br>- Views and attitudes of staff<br>- Relationships among different professional groups<br>- Support from senior management | - Implementation strategy<br>- Implementation and support activities<br>- Experience of facilitation and implementation<br>- Staff's response to implementation efforts<br>- Barriers and facilitators encountered | - Perceived changes to the favourability of context<br>- Engagement and cooperation from different professional groups |

**Stage 3. Refining the programme theory:** Analyse and interpret data to provide a refined programme theory of what works, for whom, and in what contexts

**Stage 3a. Development of case specific CMOs**

| | Context | Mechanism | Outcomes |
|---|---|---|---|
| **Case A** | Medical model for care and culture of intervention but practice already changing in desired direction | Multiprofessional implementation group Regular staff updates, feedback and ongoing support, pathways launched and made highly visible | Staff buy-in mixed. Engaged pro-normality staff. Obstetricians perceived KCND as top-down midwife initiative |
| **Case B** | Less medical model of care – 'pro-normality'. Midwives work and make decisions quite independently. Most KCND policies already in places | A bottom-up approach to implementation. Subtle integration of KCND with local policy. KCND incorporated in CM wider role – avoid perception of KCND 'plant' | Obstetricians supportive but distant. No obvious requirement for change |
| **Case C** | Highly medicalised care model and culture of intervention. None of KCND policies were in place Staff's mindset – pro-intervention Unequal balance of power between midwives and obstetricians | Highly visible implementation activities. Multiprofessional group meetings, debates and discussion, visits to GPs. Tough, head-on implementation strategies. Non-cooperation from multiprofessional team | Resistance to change from midwives. Obstetricians – felt erosion of power and authority. GPs slow to come on board Perceived pressure on midwives to use pathways |

**Stage 3b. Cross-case synthesis to refine programme**

| Context | Mechanism | Outcomes |
|---|---|---|
| Medicalised culture, unequal power and authority between midwives and obstetricians | Resistance to change, feel top down, perceived erosion of power | Low engagement from stakeholders, difficulties facilitating, tough strategies |
| Pro-normality culture, midwives recognised as equals | Less resistance to change, stakeholders involved though distant | High engagement from stakeholders, smoother facilitation |
| Subtle implementation – pathways integrated and adapted to local guidelines | No obvious requirement for change | Greater use of pathways and adherence to KCND principles |

implementation and support activities initiated and led by the consultant midwife to facilitate practice change within their local area. When analysing the data from case studies, the authors sought to identify what specific activities and efforts were undertaken, the way in which they were received and responded to by practice staff and what happened as a result. This was followed by a process of identifying and understanding the interactions between specific mechanisms, the contexts in which they were triggered and the associated outcomes. This enabled us to build an explanation for the fate of each component within each case study site. For instance, in site C, the consultant midwife planned and embarked upon a range of highly visible implementation activities, which soon had to be adapted to the needs of a highly medically-dominated culture (C1).

This context triggered her to adopt a series of tough, head-on implementation strategies, for example: frequent audits and monitoring (M1) and debates with medical professionals (M2), which resulted in feelings of undue pressure among midwives (O1) and perceived erosion of authority by the medical staff (O2), however, ultimately appeared effective in achieving important changes in certain practices, such as discontinuation of admission CTGs.

*Actively looking for new, unanticipated mechanisms*
The process of testing and refining the initial CMOs in each case study site also led to the identification of new, unanticipated mechanisms. Below one unanticipated mechanism that was triggered by the appointment of consultant midwives is illustrated. Midwifery leadership, in the form of consultant midwives at health board level, had been under discussion for some time and there was a growing inclination for their appointment in some health boards (cases B and C). The KCND programme provided a timely opportunity for materialising their existing plans and facilitated the process of appointing the consultant midwives. The health boards were given the freedom to decide whether and how these posts would be sustained beyond the duration of the programme. In all three case study sites, there was a strong buy-in to the programme from the board level, which was manifested through the keen interest in appointing the clinical leads in full-time, substantive posts. This formed a favourable context (C), triggering a new mechanism – termed a commitment mechanism (M) – which signalled to all the stakeholders that the health board was committed to driving the KCND initiative forward. The commitment mechanism provided a significant backing to the activities and strategies implemented by the consultant midwife (O).

*Examining the interaction between components*
Following the development of case-specific CMO models in relation to all the components, the ways in which the components interacted with each other, as well as with local contexts, were investigated. The authors actively looked for instances where the activation of mechanisms for one component depended on the outcomes from the implementation of another component. For instance, it became apparent that the successful engagement and

buy-in from frontline staff (an anticipated outcome of the consultant midwives' activities) subsequently became the context for the implementation of care pathways and midwife as the lead professional components. In case B, the greater support and buy-in from all stakeholders paved the way for smoother implementation of the care pathways and resulted in greater adherence to the KCND principles. In case C, the resistance to change from the obstetricians affected the ability of midwives to adhere to the intrapartum care guidelines set out in the pathways, as obstetricians continued to dominate the intrapartum setting and intervene in low-risk pregnancies.

*Developing refined CMOs*
The process of building explanations in the form of CMOs specific to each case was followed by cross-case comparisons and synthesis. Each component compared and contrasted the CMO models emerging from the three sites. At the case-level analysis, the 'context' within the CMO models was closely tied to the individual case study site so that the case study site served as a proxy to all aspects of the context. However, at the stage of cross-case synthesis, the analysis was carried out at a higher level of abstraction and transcended the individual cases. The CMO models were refined by identifying the 'contextual factors' that were common across the cases and re-examining the associated mechanisms and outcomes. This meant that a particular CMO was now able to explain the workings of a component in more than one case site where the specific contextual factors were present. For example, a refined CMO stated that the appointment of consultant midwives worked by triggering a range of facilitation and support mechanisms, however, these mechanisms were only successful in eliciting engagement and buy-in from staff where the culture was more pro-normality, obstetricians were supportive and midwives were recognised as equals. This theory was borne out in all aspects of maternity service in site B, but was also supported in the antenatal care service in site A, which was characterised by this favourable context.

## Discussion
The Scottish government KCND programme was a large scale complex programme of service change, implemented simultaneously in all health boards across NHS Scotland. The task of evaluating the programme posed a considerable challenge to the research team. This paper has described the way in which this challenge was addressed, the key methodological issues encountered, and, in particular, the theory-driven evaluation approach that allowed the authors to answer to some extent the question – was the KCND programme successful and, if so, how and why did it work?

The KCND programme was rolled out nationally across NHS Scotland and, therefore, an experimental research design was not feasible. The realist evaluation approach offered the opportunity to generate a theory for why, how and where an intervention or programme will work and to test this theory in a range of real-life contexts to examine why some elements worked well and how context appeared to shape the outcomes.

The method also enabled the authors to develop middle-

range theories that helped in drawing some transferrable lessons about how and why programmes work. In line with realist thinking, the authors demonstrated that it is the programme mechanisms that are key to transferrable learning. While KCND programme components are likely to be maternity care specific, the mechanisms activated by the components in specific contexts may be transferrable to wider healthcare settings. For example, the appointment of consultant midwives was a component specific to the KCND programme and unlikely to be readily transferred to other kinds of healthcare or social programmes. However, the success of the commitment mechanism triggered by this component – signalling that the programme was supported and upheld at the top-level management – offers transferrable learning. Future programmes may build in strategies that could trigger such a commitment mechanism, which would in turn enhance the likelihood that changes are implemented. These mechanisms can be further tested in other programme evaluations, as well as used formatively when developing new programmes using CMO hypothesis to anticipate barriers and target resources, thereby avoiding the 'one size fits all' approach to programme development and implementation.

There were a number of limitations. At stage one, initial CMO configurations were developed and these were tested in stage two; however, the outcomes obtained were largely subjective. For example; there was a perceived erosion of authority among the obstetricians, and perceived increases in activities to support normal birth. Furthermore, the changes instigated by the KCND programme were directed at the level of service organisation and clinical practice, yet many of the anticipated outcomes would impact at the level of women receiving maternity care. It was not possible to undertake data collection from service users and this was a significant limitation. Finally, while the realist design allowed identification of what aspects of a programme worked, for whom and in what circumstances, it also gave rise to some uncertainties. For example, the authors were able to suggest the way in which a subtle implementation strategy worked in a context favourable to programme implementation (case B), but were not able to test how this strategy would have worked in a different context. This would have required a more experimental approach testing this implementation strategy in a different set of contexts. Hence the nature of the findings remains somewhat tentative, and this is characteristic of many realist evaluations.

## Conclusion

Using realist evaluation enabled a theoretically informed and robust evaluation of a national programme of change in maternity care and the provision of information to policy-makers and key stakeholders at clinical practice level on the ways in which it may have worked to achieve its aims and areas that require further input. Transferrable lessons for development and implementation of other large scale programmes of change in the NHS and beyond were also drawn.

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# Motivating pregnant women to eat healthily and engage in physical activity for weight management: an exploration of routine midwife instruction

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## Abstract

*Background*. The importance of antenatal education for supporting and advising women about diet and physical activity for weight management has been highlighted in recent guidelines. However, little is known about how midwives (through routine instruction) aim to influence maternal motivation for healthy behaviours.

*Aim*. To explore the motivational content of routine antenatal instruction provided by midwives relating to diet, physical activity and weight management as a means of identifying any strengths, weaknesses and deficits.

*Method*. A non-participant, semi-structured observation approach was undertaken. All written and verbal instruction relating to diet, physical activity and weight management was collected through a semi-structured observation schedule. Barron and Harackiewicz (2000) conceptualisation of goals was chosen as a framework for analysis. Content and thematic analysis was undertaken to identify key patterns or themes that emerged from the data.

*Findings*. The type and frequency of the goals communicated to women about diet and physical activity during pregnancy varied considerably, depending on the individual midwife, with no apparent standardised procedure being followed. There was evidence of midwives strongly communicating the value of these behaviours. However, three motivational deficits were identified: lack of purpose goals within verbal instruction; lack of performance feedback indicators; and target goals often lacked specificity and relevance.

*Conclusions*. Findings suggest that the motivational potential of routine antenatal instruction is yet to be fulfilled. Although a purpose goal and target goal structure was evident, several motivational problems have been identified. Lack of purpose goals in verbal instruction and almost non-existent feedback prevent antenatal education from fulfilling its potential to motivate women.

*Implications*. Now that these critical gaps have been identified, they can be addressed in order to create an optimally motivated environment that supports women in making healthy lifestyle choices. Midwives and other healthcare professionals would benefit from training and sufficient resources in order to empower them with the knowledge and skills that they need to effectively communicate and support women in their care.

*Key words:* Antenatal education, goals, motivation, diet, exercise, obesity, weight management, evidence-based midwifery

## Introduction

Recent national guidelines highlight the important role of the instructional environment and, more specifically, antenatal education for supporting and advising women about diet and physical activity for weight management (NICE, 2010). Evidence suggests a link between antenatal education classes and an improvement in healthy lifestyle behaviours such as diet and physical activity (Koehn, 2002; Sims-Jones et al, 1998; Jackson, 1995). An exploratory study by Vonderheid et al (2007) reported that healthier behaviours were associated with women's reports of discussing more health promotion topics. They suggest that an increase in antenatal health promotion content during routine visits might improve the effectiveness of care. Although this evidence is limited, it does suggest that midwife support and antenatal instruction has the potential to motivate women to begin and maintain healthy behaviours.

Sansone and Harackiewicz (2000: 1) define motivation as that which *'energises and guides behaviour towards reaching a particular goal'*. This definition suggests that when individuals have a goal that they want to achieve, they will pursue that goal as long as the goal remains valuable to them; they understand what they have to do to be successful and believe they have the resources available to ensure their success. From a goal setting perspective, it would seem that all health educators have to do to increase maternal motivation for a healthy diet and physical activity during pregnancy is to provide women with a number of key goals, such as: 'avoid an excess of high fat foods'. However, multiple theorists have demonstrated that to influence the amount of motivation a person experiences, the designer of the educational programme must understand the dynamics and complexity

of motivation and know how to apply these principles to the overall educational instruction (Keller, 2010).

In the literature, goal intention and goal setting have been successful in improving dietary and physical activity behaviour change among non-pregnant adults and have provided favourable effects when integrated into behaviour change interventions (Pearson, 2011; Shilts et al, 2004: Cullen et al, 2001). Therefore, the type and frequency of goals provided to women through routine antenatal instruction are very important (Brown et al, 2012). Key aspects of goal setting – purpose goals, target goals and performance feedback indicators – are of great importance in relation to data collection and analysis while assessing the motivational strengths and weaknesses within routine antenatal instruction. By examining the goals suggested by health professionals, we can gain a comprehensive understanding of how they, through routine instruction, aim to influence maternal motivation.

## Aim and objectives

The aim of this study was to explore and describe the motivational content of current midwife instruction and also to identify strengths, weaknesses and deficits. The objectives included:

• Identifying what goals (purpose and target) midwives routinely communicate to women through both verbal and written instruction
• Identify if and what type of performance feedback indicators are offered routinely to women
• Determine whether women express a need for target goals or performance feedback.

## Method

*Mapping of key instructional environments*
For this study, a non-participant, semi-structured observation approach was undertaken. A mapping process was used to identify key time points during pregnancy (from initial booking appointment, to the final review appointment) when women are given information about diet, physical activity and/or weight management. Key routine antenatal appointments included booking appointments (eight to 14 weeks' gestation), 20-week parent education talks, and parentcraft classes offered to all first-time mothers (32+ weeks' gestation). Details of data collection time points are shown below in Table 1.

In addition to attending key antenatal appointments, the researcher also attended several review appointments to ensure any important instruction was not missed. Where possible, the researcher was positioned behind the participant and midwife and out of eye view to ensure discreteness. The researcher spent 21 hours in observations until data saturation had been reached.

*Sample*
Prior to carrying out the study, ethical approval was obtained (ref no: 11/NI/0106). The trust area where recruitment took place caters for almost 5000 births per year and covers both rural and urban populations. At the beginning of each antenatal appointment or class, the researcher was required to explain the purpose of the study and provide participants and midwives with an information sheet.

Women and midwives were given time to read the information and ask any questions about the study before providing written informed consent to be involved. Due to practical and logistical implications, potential participants were not given a substantial amount of time to consider refusal. Therefore, on the occasions where one or more women did not provide written informed consent, it was decided that the researcher would simply not observe that particular appointment. Inclusion criteria included only first-time mothers who were receiving routine antenatal care within the chosen research site.

**Table 1. Overview of data collection time points for information analysis**

| Key antenatal appointment | Average length of appointment | Overall purpose of appointment | Number of sessions attended |
|---|---|---|---|
| Booking appointment | 45 mins to one hour | Scan to confirm pregnancy and view the fetal heartbeat. Take a blood sample and review medical history through routine questions | 8 |
| 20-week talk | 10 to 15 mins | To review pregnancy and ensure baby is growing and developing properly and check mothers' bloods | 8 |
| Parent education class one | Two hours | To prepare women for labour and birth and equip them with the knowledge and skill to stay comfortable up until labour begins | 3 |
| Parent education class two | Two hours | To prepare women for what happens after delivery | 3 |

*Motivational units of observation*

An in-depth exploration of the goals communicated to women through routine instruction allows us to identify how goals can affect motivation positively or negatively. Barron and Harackiewicz (2000) conceptualisation of goals was chosen as a framework for analysis. Instruction material was collected and analysed based on three key components of goal setting:

- Purpose goals: defined as the overall reason given to individuals for engaging in healthy eating and/or physical activity during pregnancy
- Target goals: defined as task-specific guidance given to the individual that has the ability to enable them to achieve the overall purpose goal
- Performance feedback indicators: defined as the provision of specific or personalised information that enables the individual to assess their progress towards goal attainment, such as regular weight monitoring.

*Development of a semi-structured observation schedule*

At each key instructional time point, any information relating to diet, physical activity or weight management was recorded on a structured observation schedule. A structured observation schedule for recording observation data was developed, aimed at increasing the reliability of findings, while reducing the risk of bias (Seale, 2012). In addition to the collection of verbal instruction, the researcher also collected all written instruction given to first-time mothers.

The observation schedule was developed based on the motivational units of observation described above and guidance from Keller (2010), who recommends recording background information about the audience and the setting, as this will assist in understanding their motivational characteristics and identifying motivational problems. These descriptions included the format and structure of the appointment, method of delivery, any materials given out in the session, type of instructor, length of session and any other important information.

For the purpose of this study, instruction relating to food hygiene and food safety, such as foods to avoid, was excluded. The purpose of this study was to assess instructional goals aiming to help motivate women to eat healthily. Therefore, the focus was primarily on instruction relating to achieving a healthy diet, such as consuming healthy foods and avoiding those that are unhealthy.

*Content analysis*

All written and verbal instruction regarding diet, physical activity and weight management were entered into the program NVivo10 for data management. Thematic and content analysis was performed to explore and identify patterns within routine instruction in relation to the goal setting framework described above.

Guidelines on thematic analysis by Braun and Clarke (2006) were used to analyse observational data. Firstly, data collected through observation schedules and written materials were read several times to ensure familiarity

with it. Statements within instruction that were classified as a purpose goal (why eat healthily, remain physically active or manage your weight); target goal (how to achieve a healthy diet, be physically active or gain optimal weight); or performance feedback indicator (indication of progress towards the overall goal) were highlighted and categorised into the corresponding node. A second rater was introduced to increase reliability. To assess inter-rater reliability, the second rater was given unmarked transcripts alongside conceptual nodes and independently coded statements into key goal setting components. A third rater was introduced to aid in resolving any disagreements.

## Results

Motivational analysis assessed both strengths and weaknesses, however, due to the restrictions associated with publishing, the results section reports the motivational weaknesses only. All women and midwives approached consented for the researcher to observe the specific appointment or class they were attending. Figures 1 and 2 show the frequency of each observational unit in relation to diet, physical activity and weight management for written and verbal antenatal instruction. A narrative summary of all written and verbal instruction relating to diet, physical activity and weight management is presented below. Each topic is discussed in relation to purpose goals, target goals and performance feedback indicators for both verbal and written instruction.

*Diet*

**Verbal instruction**

Purpose goals: There was a clear lack of purpose goals for eating healthily during pregnancy. Only four purpose goals describing reasons why to eat healthily were recorded, relating to benefits such as calcium-rich foods for healthy bones and growth, oily fish for brain development, fibre to prevent constipation and helping women to return to their pre-pregnancy weight.

Target goals: A total of 15 statements relating to how women could achieve a healthy diet were reported. The majority of statements were very general such as "*eat a healthy, balanced diet*" and "*eat lots of green leafy vegetables and fibre*". There were other more specific statements, such as:

"*Take six to eight glasses of fluid a day, including tea, water, or milk*" (OM01).

Target goals also included how to overcome certain motivational barriers. For example: "*Eat fibre for constipation, take a glass of prune juice in the morning and at night to regulate yourself*" (OM02).

Also: "*For nausea, eat dried foods, little and often and eat small meals often to avoid heartburn*" (OM03).

Performance feedback indicators: No verbal feedback, enabling women to assess whether their diet was sufficient was reported.

One woman expressed a need for more target goals regarding dairy allergies that were present in her family. The midwife offered her a '*Food in Pregnancy*' leaflet.

## Written instruction

Purpose goals: There were considerably more purpose goals reported within written instruction compared to verbal instruction. In total, 20 statements conveying reasons for eating healthily during pregnancy were reported. These focused mainly on the benefits of a healthy diet for the wellbeing of the baby (growth and development) and for maternal health (wellness and weight management).

Purpose goals also focused on the usefulness of specific foods and food groups. Foods to avoid were also mentioned. The importance of specific nutrients such as folic acid, vitamin D, calcium and iron were mentioned. For example:

*"Folic acid is important... as it can reduce the risk of neural tube defects such as spina bifida"* (WI).

Target goals: In total, 30 statements relating to target goals were reported within written instruction. Similar to those reported within verbal instruction, some were more specific than others. For example:

*"Aim for five portions daily (fruit and vegetables), at least one of these should be a source of vitamin C, for example, one orange, half a grapefruit, two kiwis, glass of pure orange juice"* (WI).

This is much more specific than, the following:

*"Try to eat red meat regularly as it contains iron"* (WI).

Only one statement reported how to help women overcome motivational barriers. That was:

*"You will probably find that you are more hungry than normal, but you don't need to 'eat for two'(...) eat breakfast everyday – this will help you to avoid snacking on foods that are high in fat and sugar"* (WI).

Performance feedback indicators: Written information allowing women to assess whether their diet was healthy enough was not reported. One statement emphasised the usefulness of supplements for achieving healthy iron levels:

*"If the iron level in your blood becomes low, your GP or midwife will advise iron supplements"* (WI).

**Figure 1. Frequency of purpose goals, target goals and performance feedback indicators within verbal instruction in relation to diet, exercise and weight management**
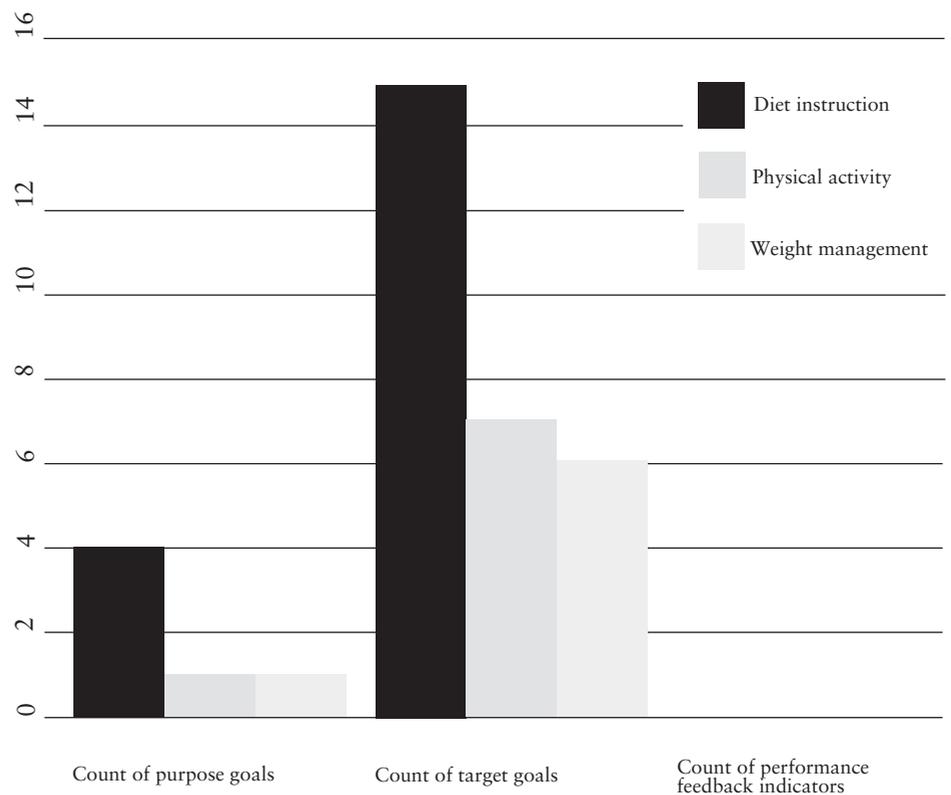


**Figure 2. Frequency of purpose goals, target goals, and performance feedback indicators in relation to diet, exercise and weight management within written instruction**
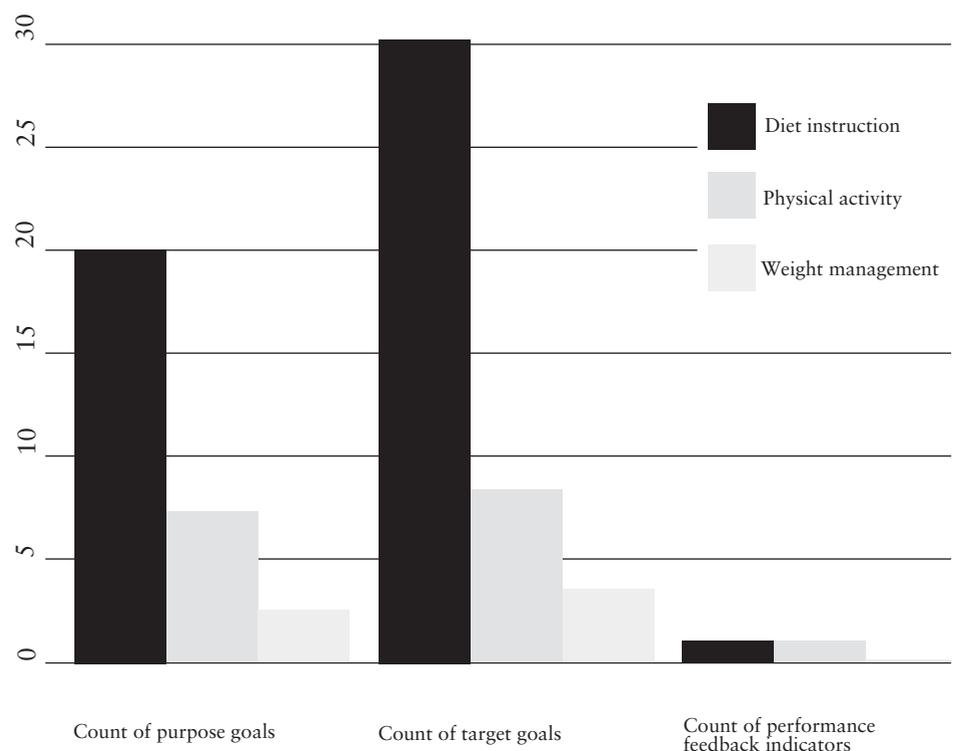
*Diet-related themes*

The goals communicated through both written and verbal instruction in relation to diet were then re-examined and interpreted in relation to suggested themes. Dietary instruction appeared to fall into three main themes: 'What's good to eat and what's not good to eat' with statements such as:

*"Fruit and vegetables provide fibre which helps digestion and prevents constipation"* (WI).

Another main theme was: 'It's a matter of just doing it', which included statements such as:

*"Eat a healthy, balanced diet"* (OM04).

The third main theme was 'a successful diet includes a variety of foods'. One respondent said:

*"Aim for a wide variety [of fruit and vegetables] and at least five servings every day. Fresh, frozen, canned, dried and juice all count"* (WI).

These three emerging themes demonstrate the generalist approach to antenatal education and the gap in provision of individualised education and instruction.

*Physical activity*

**Verbal instruction**

Purpose goals: Similar to dietary instruction, there was a lack of purpose goals provided to women by the midwife regarding physical activity. Only one purpose goal was reported:

*"Keep walking, it keeps the weight off"* (OM06).

Target goals: A total of seven statements relating to how women could be physically active were recorded. Target goals focused on encouraging women to take part in, 'light, gentle' physical activity in pregnancy. There was an emphasis on continuing with 'normal' physical activity. One midwife's advice to women was:

*"Continue as normal, nothing too strenuous or high impact"* and *"normal physical activity in pregnancy is fine... as long as you don't overdo it"* (OM07).

Another midwife suggested:

*"Exercising in pregnancy is fine, only if you're used to it"* (OM08).

Recommended activities included: walking, swimming, yoga and pregnancy aerobics. One midwife recommended that women avoid taking the stairs to prevent back pain. Midwives did not give women any advice about recommended physical activity frequency and duration.

Performance feedback indicators: no feedback performance indicators were recorded for verbal instruction.

**Written instruction**

Purpose goals: Considerably more purpose goals were reported in written materials compared to verbal instruction. Seven statements describing the benefits of physical activity in pregnancy were reported. These often focused on helping women to cope with weight gain during pregnancy and getting back into shape after birth. Physical activity as a preparation for labour, easing backache and overall wellbeing were all mentioned. More specifically, instruction described the importance of physical activity for improved circulation, and pelvic floor exercises for preventing stress incontinence.

Target goals: In total, nine statements relating to target

goals were identified within written material. Two of these target goals were specific with regard to frequency, duration and intensity of physical activity. For example:

*"If you were inactive before you were pregnant, don't suddenly take up strenuous physical activity... begin with no more than 15 minutes' continuous [aerobic] physical activity, three times per week. Increase this gradually to a maximum of 30-minute sessions four times a week"* (WI).

*"Try to keep active on a daily basis. Half an hour of walking each day can be enough... any amount is better than nothing"* (WI).

The majority of information focused on physical activity to avoid such as: 'lying on your back', 'contact sports', 'horse riding', and 'downhill skiing'.

Performance feedback indicators: One statement relating to performance feedback was reported:

*"You should be able to hold a conversation as you exercise. If you become breathless as you talk, then you are probably exercising too strenuously"* (WI).

One woman asked if she could still run during pregnancy, indicating the need for more relevant target goals.

**Physical activity related themes**

The goals communicated through both written and verbal instruction in relation to physical activity were then re-examined and interpreted in relation to suggested themes. Physical activity instruction appeared to fall into three main themes. The first, 'physical activity can help you cope with the effects of pregnancy', including instructional statements such as:

*"The more active and fit you are during pregnancy, the easier it will be for you to adapt to your changing shape and weight gain"* (WI).

The second, 'continue as normal', resulted in statements such as:

*"Keep up your normal daily physical activity or exercise for as long as you feel comfortable"* (WI).

The third theme was 'don't overdo it' and a typical statement was the following:

*"Do light, gentle exercises like pregnancy yoga, swimming and walking. Nothing too strenuous"* (OM09).

*Weight management*

**Verbal instruction**

Purpose goals: Reasons given to women for managing their weight during pregnancy were not discussed in any routine antenatal appointments. During a parentcraft class, one midwife stated the following:

*"If you are obese in pregnancy, you are at an increased risk of pre-eclampsia"* (OM010).

Target goals: In total, seven target goals for weight management were recorded. There were two occasions where women with high BMIs (≥35) were advised regarding weight management:

*"Don't change what you eat. People used to say 'eat for two', but that's not true. You would expect to gain about a stone and a half but it's different for everyone; avoid high fat foods and stick to a balanced diet"* (OM011).

*"You should gain around two to two and a half stone in pregnancy. When you're hungry make sure you eat, but choose nutritious foods, avoid cakes and biscuits. If you eat fruit, combine it with yoghurt as the protein in the yoghurt will help balance out your blood sugar levels"* (OM012).

Women in a parentcraft class were told about the average weight gain in pregnancy:

*"One and a half stone, now, this is not meant to put you under pressure"* (OM013).

Performance feedback indicators: No feedback performance indicators were provided by midwives. However, women and their partners showed some evidence of requiring relevant target goals and feedback as one women expressed concern as to how she could lower her BMI to be within the range suitable for delivering in the low-risk, 'home-from-home' suite. The woman's partner questioned the midwife about weight loss in pregnancy. Another woman with a high BMI asked at the booking appointment how much weight she should expect to gain.

### Written instruction

Purpose goals: Three statements describing reasons for managing weight gain were reported within written instruction. Two reported statements advised women that gaining too much weight could affect their health and increase blood pressure. One statement reported the following:

*"You are more likely to get stretch marks if your weight gain is more than average"* (WI).

Target goals: Four statements relating to target goals for weight management were recorded. Two of these focused on the amount of weight gain:

*"Most women put on between 10 and 12.5kg (22 to 28lbs) in pregnancy, most of it after the 20th week"* (WI).

*"The average weight gain is around 10 to 12.5kg (approximately one a half to two stone)"* (WI).

Another source focused on diet and physical activity as a means to achieving adequate weight gain, and said:

*"Eating sensibly and taking regular physical activity can help"* (WI).

One statement recommended that women did not eat for two even though they might find that they were hungrier.

Performance feedback indicators: No formal feedback, such as weight monitoring was offered to women.

### *Weight management related themes*

The goals communicated through both written and verbal instruction in relation to weight management were then re-examined and interpreted in relation to suggested themes. Only one theme emerged in relation to weight management instruction: 'All women should expect to gain "x" amount of weight' and included instructional statements such as the following:

*"Average weight gain is around 10 to 12.5kg (approximately one a half to two stone)"* (WI).

*"You should only put on two to two and a half stones in pregnancy"* (OM014).

*"Average weight gain in pregnancy is 1.5 stone, now, this is not meant to put you under pressure"* (OM015).

### *Other observations*

It was clear from field notes that the majority of diet and physical activity instruction was communicated through written materials. In particular, large amounts of written material were given to women at the booking appointment. These materials covered a wide range of topics relating to pregnancy. However, in relation to diet, physical activity and weight management instruction, women were given *The Pregnancy Book* and a Bounty pack, both of which included sections dedicated to these topics.

The booking appointment was particularly long, lasting on average 45 minutes to one hour. Women routinely see the midwife alone at this stage as routine enquiry requires midwives to ask about domestic abuse. Verbal instruction usually took place in a small clinical room through one-to-one discussions with the midwife. At this stage, first-time mothers were often nervous as the first scan was often only done after routine enquiry with the midwife.

The 20-week appointment usually lasted around 15 minutes, in addition to a scan to check for congenital abnormalities. Again this appointment involved one-to-one discussions with the midwife in a small room and partners were often present. Diet, physical activity and weight management were not routinely discussed at this stage. However, blood results were, and so, if iron levels were lower than normal, women were often given dietary and supplement advice.

Parentcraft classes were offered to women at 32+ weeks but were not compulsory. A typical class lasted two hours (7pm to 9pm) taking place in groups and involving partners. This was typically a more interactive session and a physiotherapist usually attended alongside the midwife. The first parentcraft class focused on labour and the second on what happens after the baby is born. Diet and physical activity were rarely mentioned in these classes.

### Discussion

Three key motivational deficits were identified after inspection of both verbal and written instruction routinely delivered to first-time mothers during the antenatal period:
- Lack of purpose goals within verbal instruction
- Lack of performance feedback indicators
- Target goals often lacked specificity and relevance.

These suggest that the potential of antenatal instruction for motivating individuals is yet to be fulfilled.

### *Lack of purpose goals*

The apparent lack of purpose goals within verbal instruction is likely to be a serious motivational deficit. These findings suggest that pregnant women are not always fully informed or aware of the risks of excess gestational weight gain (GWG) or the benefits and importance of diet and physical activity in the antenatal period.

In this study, only two reasons for managing weight in pregnancy were included in written antenatal instruction: to avoid stretch marks and high blood pressure. Evidence suggests that there are considerably more reasons why excess GWG and maternal overweight and obesity are serious problems: increased risk of miscarriage, gestational diabetes,

pre-eclampsia, induced delivery, macrosomia, caesarean delivery, postpartum weight retention and childhood obesity and stillbirth (Fraser et al, 2011; Halloran et al, 2011; Olson et al, 2009; Young and Woodmansee, 2002).

In this case, routine antenatal instruction failed to provide all the information available on the benefits of optimal GWG. This is consistent with other research which suggests that pregnant women are not aware of the need for behaviour change and are not aware of the adverse effects of excess GWG (Gardner et al, 2011; Keenan and Stapleton, 2010). Midwives were observed providing women with many target goals (positively influencing confidence), but fewer purpose goals (positively influencing value for healthy eating). Without purpose goals, target goals offer limited motivation for effort in performing behaviour. However, when analysing written information, significantly more purpose goals were provided alongside many target goals.

Therefore, written instruction may have a higher likelihood of positively influencing women's value for the behaviour together with their expectancy for success which is likely to result in greater motivation (Cramp and Bray, 2009). However, this is assuming that pregnant women will read all of the written material provided. Illiterate women are an important subgroup that may be deprived of sufficient information and support relating to a healthy lifestyle and weight management.

*Target goals lack specificity and relevance*
Target goals provided often lacked specificity and relevance. They were often communicated under the assumption that women were able to eat all the varieties of food recommended. Pregnant women frequently experience nausea and sickness and perceive that they cannot eat specific foods or the amounts recommended for a healthy diet. In addition, some women do not have access to the wide variety of foods recommended due to the cost or the skills needed to make healthy meals (Fowles et al, 2011; Fowles and Fowles, 2008; Tuffery and Scriven, 2005). Target goals provided were sometimes contradictory, for example, recommended weight gain in pregnancy varied depending on individual midwives. This may be due to the lack of evidence-based guidelines developed for the UK. All of these issues contribute to a lower expectancy for success in pregnant women. These findings are consistent with other evidence suggesting that information for pregnant women regarding GWG is limited (Olander et al, 2010).

*Lack of performance feedback*
Performance feedback is an important element for enhancing and sustaining motivation and was almost non-existent within antenatal instruction. As women are no longer routinely weighed throughout pregnancy, they have no means of assessing their progress with regard to weight management. In relation to diet and physical activity, women were never assessed or given feedback on current behaviour during these observations.

However, target goals offer some performance feedback in themselves as they allow women to assess whether they have been successful in achieving those goals or not, such as consuming five portions of fruit and vegetables per day. Performance feedback is important to reinforce positive feelings and accomplishments based on personal effort. Without this, women will not be motivated to sustain effort in performing healthy behaviours. Although women did not express an explicit desire for feedback, there was evidence to suggest that women required more specific and relevant target goals. At several time points during routine antenatal care, some women communicated their need for more information regarding diet, physical activity and weight management corresponding to their individual situation. For example, a woman who ran regularly prior to pregnancy, a woman with a family history of food allergies and a woman with a high BMI. This indicates the need for individualised instruction in relation to individual experiences.

Another issue was the clear lack of detailed instruction regarding physical activity, especially within verbal instruction. The frequency and number of purpose goals and target goals communicated relating to physical activity was considerably lower than those provided for diet-related instruction. Lack of emphasis on physical activity within instruction can have detrimental effects on the relevance aspect of motivation.

*Limitations*
In light of the findings of this observation study it is important to acknowledge some limitations:
• The instruction observed was limited to one hospital site and, therefore, should not be presumed to be representative of all antenatal instruction relating to diet, physical activity and weight management in the UK or Ireland.
• During the recruitment process, the researcher was required to obtain written informed consent from pregnant women and midwives attending the appointments or class. It is possible that the presence of the researcher in the natural setting could result in the Hawthorn effect (Wickstom and Bendix, 2000), which implies that individuals change their usual behaviour when they are aware that they are in a research study. However, this effect is thought to be short-lived and subjects tend to go back to their usual behaviour eventually (Wickström and Bendix, 2000). In addition, ethical approval was subject to the researcher explaining the purpose of the study to all participants, which could have influenced the instruction routinely given by midwives
• Due to time and resource restrictions, a second observer could not be present during the observation process; therefore inter-rater reliability could not be fully established.

## Conclusion
The aim of this study was to diagnose the motivational content of routine antenatal instruction in relation to diet, physical activity and weight management to identify strengths, weaknesses and motivational deficits. Findings suggest that the motivational potential of routine instruction is yet to be fulfilled. Although a purpose goal and target goal structure was evident, several motivational problems have

been identified. Lack of purpose goals in verbal instruction, irrelevant target goals and almost non-existent feedback prevent antenatal education from fulfilling its potential to motivate women.

## Implications for midwifery practice

Although previous evidence has highlighted the insufficiency of current antenatal education and support (CMACE, 2010; Keenan and Stapleton, 2010; Heslehurst et al, 2007), this study has identified unique motivational deficits. Now that these critical gaps have been identified, they can be addressed in order to create an optimally-motivated environment that supports women in making healthy lifestyle choices. Midwives and other healthcare professionals would benefit from training and sufficient resources in order to empower them with the knowledge and skills that they need to effectively communicate and support women in their care within the limited time and resources they have. Midwives need to be educated on how to deliver motivationally-designed, theoretically-informed instruction.

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# A preliminary survey of the use of complementary and alternative medicines in childbearing women

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## Abstract

*Objective.* This paper is a report of the findings from a research project designed to explore complementary and alternative medicines (CAM) activity among a group of childbearing women in the north of England.

*Method.* A descriptive questionnaire survey was designed to explore CAM activity with a sample (distributed to 85 women, of which 40 responded). Ethical approval was obtained from the NHS trust and the University of Hull.

*Findings.* Questionnaire data revealed that 17 out of 40 women (42.5%) engaged with CAM. A total of 11 (27.5%) had been offered CAM as part of their routine NHS care. Seven women (17.5%) used CAM after suggestion from a midwife, five (12.5%) used CAM by personal choice, and three (7.5%) had been encouraged by a friend or relative or 'another source' to use a form of CAM. In 11 (27.5%) cases, a midwife was aware of the use of CAM. However, four women (10%) stated they did not inform their midwife that they were using CAM.

*Conclusions.* A number of women are engaging with different forms of CAM. NHS provision appears to be fairly accurate in meeting the needs of this group of women. A small proportion of women using CAM are seeking advice from their midwife, and this is concerning. The findings from this preliminary survey present some evidence of a consumer interest in these medicines. The findings reflect the suggestion made by Jones (2012), that midwives in their attempts to promote models of care that seek to focus on a woman-centred and a midwifery-led approach, appear to be 'pseudo consumers' of CAM.

*Implications.* Researchers and practitioners should gain more insight into how women engage with, and want to engage with CAM. Midwifery research needs to effectively engage with the issue of consumer demand, and distinguish this from consumer interest. Further research is required in relation to midwives and their 'pseudo consumer' role of CAM use. There are growing opportunities to design and deliver relatively simple CAM treatments that meet women's needs. Midwives could use the booking interview and antenatal consultations to encourage women who are engaging with such medicines to seek advice from the appropriate CAM practitioner in relation to safety and efficacy.

*Key words:* Childbearing, complementary and alternative medicines, therapies, healing systems, evidence-based midwifery

## Introduction

Complementary and alternative medicines (CAM) are increasingly becoming integrated into mainstream midwifery practice (Evans, 2009; Wiebelitz et al, 2009; Tiran, 2003; Tiran, 1996). There is widespread acknowledgement that their popularity is consumer driven. However there is very little research exploring consumer demand. There remains limited access to good information about the individual therapies women are engaging with, or the reasons for the demand for it. It is helpful to gain a clearer understanding of the current patterns of CAM activity, including demand for, and use. There are difficulties in formulating an exact definition of CAM, as the field is broad and constantly changing. The University of Maryland Medical Centre (UMMC, 2011) recently defined such medicines as 'a wide range of healing systems that are not considered part of mainstream or conventional Western medicine', and this seems to appropriately capture and represent the variety of definitions that currently exist. For this paper, the acronym CAM is used to describe a range of healing systems that are not considered part of conventional Western medicine.

## Review of the relevant literature

A review of the literature on CAM healing systems in midwifery in the UK was undertaken between March and July 2012, and

updated in July 2013. The aim of the review was to explore CAM use across the literature with a specific focus on the concept of consumer demand, how demand was represented, and the different types of CAM requested and used by childbearing women. Four electronic databases (CINAHL Plus, Medline, PsycINFO and Scopus) were searched for literature addressing consumer demand for, and uptake of, CAM. Advanced searches with no date restrictions were conducted using the key words: 'complementary therap*', 'alternative therap*', 'integrative therap*', 'holistic therap*', 'complementary medicin', 'alternative medicin*', 'integrative medicin*', 'holistic medicin*', 'antenatal', 'intranatal', 'postnatal', 'antepartum', 'intrapartum', 'postpartum', 'ante natal', 'intra natal', 'post natal', 'ante partum', 'intra partum', 'post partum', 'preg*', 'childb*'.

The search was repeated in July 2013 and, with the exception of the findings from the initial review, published by the author of this current paper (Jones, 2012), no new papers were found.

There has been a reported steady growth of interest in CAM over the last two decades, alongside evidence of a growing consumer 'movement'. The main driving force behind this appears to be women's increasing need to achieve a less medicalised birth experience (Evans, 2009; Mitchell et al, 2006; Mitchell and Williams, 2006; Tiran, 2006a; 2006b; 2003; 1996). In relation to research on patterns of CAM, there are small

pockets of activity being reported. Consumer demand is not well evidenced across the literature; however, all papers promote the concept of childbearing women as CAM 'consumers' and 'consumer demand' is a term that is widely used. Demand is illustrated across the literature using a combination of anecdotal statements (Cant et al, 2011; Mousley, 2010; Evans, 2009; Jones, 2009; Kenyan, 2009; Tiran, 2008; Mitchell and Williams, 2007; Mitchell et al, 2006; Tiran, 2006a; Mousley, 2005; Tiran and Chummun, 2004; Tiran, 1996; 2003) and secondary sources of literature (Mitchell and Williams, 2006; Tiran, 2006b; 2006c).

An aromatherapy and aroma-massage service has been introduced by Mousley (2005) in response to women's requests for more choice and individualised care. Data suggests that women in this study also expressed an interest in yoga, reflexology and infant massage. A national survey by Mitchell et al (2006) on the extent of CAM use, and provision in maternity services in England identified the four therapies most widely available: massage, aromatherapy, reflexology and acupuncture (Mitchell et al, 2006).

In a discussion paper by Mitchell and Williams (2006), challenging midwives to improve integration of CAM into maternity services in response to growing demand, data from Featherstone et al (2003) is used to demonstrate the popularity of CAM; however, the Featherstone et al (2003) study provides insight into CAM use across the general population and is not aimed specifically at childbearing women. Similarly, Tiran (2006a) presents an illuminating discussion about its role in induction of labour, using supporting evidence (secondary data) from Pinn and Pallett (2002) to highlight the growing use of specific forms within the childbearing population. Vitamin supplements were identified as the most commonly used product in this study sample (24%), herbal therapies such as raspberry leaf tea, ginger and evening primrose were second most popular (Pinn and Pallett, 2002). Tiran (2006b) presents further secondary data by Gibson et al (2001) and Ranzini et al (2001), in a study exploring the accountability and responsibilities of midwives incorporating CAM into their practice. The secondary data presented in the Tiran (2006b) study relates to CAM use in women from the US, indicating that approximately one in three people have used CAM, two thirds of them women (Gibson et al, 2001; Ranzini et al, 2001; cited in Tiran, 2006b). While this study concluded that herbal medicines are 'popular' among pregnant women, the survey data indicated that less than one quarter of the sample engaged with CAM (Gibson et al, 2001).

This body of literature highlights that empirical research into the demand for, and use of, CAM from childbearing women in the UK is limited, and many claims of consumer demands are not fully substantiated with empirical evidence directly from childbearing women. Certainly, consumer demand, and interest from the women's perspective is poorly illustrated, and more research is required into the patterns of interest, demand, and uptake from the perspective of pregnant and postnatal women.

### The study

The overall aim of the project was to explore CAM activity within a local childbearing community in the north of England. NHS trust and university ethical approval processes were followed, and full approval was obtained.

### Validity and reliability of the tool

In the absence of an existing validated instrument, the researchers designed a descriptive questionnaire survey, to give an account of the patterns of CAM activity (including demand and usage) of a group of childbearing women. In order for the survey to be both reliable and valid, it was important that the questions were constructed properly. Questions were clear and easy to comprehend. As the questionnaire was a survey instrument, using descriptive statistics only, face validity of the survey items, as opposed to statistical analysis, was considered the most appropriate determinant of validity and reliability. The survey was therefore piloted with four participants to confirm face validity. This allowed for the checking of clarity, comprehension and completion time (Fraczyk and Godfrey, 2010). Two additional questions were added as a result of the pilot.

The design and construction of the questionnaire was guided by the work of Oppenheim (1966), Burns and Grove (2001), LoBiondo-Wood and Haber (2001), Bowling (2002) and Jackson (2009). A combination of open-ended and closed-ended items were used in the survey, as while there were a fixed number of responses for many of the questions, the research team also wanted the subjects to respond in their own words and did not know all of the possible alternative responses in relation to CAM products being used (LoBiondo-Wood and Haber, 2001). In many cases, the nature of what the researchers were attempting to describe (patterns of CAM activity) determined questions.

The closed-ended items from the predetermined list of CAM therapies were derived from a combination of evidence from Mitchell et al (2006), which stated that 'the four therapies offered most widely in maternity units in the UK were massage, aromatherapy, reflexology and acupuncture' (Mitchell et al, 2006) and the CAM products known to be available to women in the local trust. The NHS-provided CAM products were an essential oil blend applied to a perineal pad (for use postnatally), or an essential oil blend dissolved in the bath (for use in early labour). There were 16 questions in total.

Burns and Grove (2001) identify that content validity is the extent to which the method of measurement includes all the major elements relevant to the construct being measured. In this case, it was confirmed by a process of capturing relevant data in relation to CAM activity. Open and closed questions relating to therapies used, when and why, and which therapies women were interested in using, provided adequate data to assess CAM activity appropriately in order to address the research aims and objectives.

### Sampling and recruitment

Women who experienced a live birth across a period of three months were approached and provided with an information leaflet detailing the purpose of the study and inviting their participation. Information leaflets were distributed antenatally, from 36 weeks' gestation, or in the immediate postnatal period.

Women were eligible if they were aged at least 16 years old, with a live infant, who was not critically ill in the neonatal unit. Women also needed to be fluent in English. Recruitment took place over 16 weekday (Monday to Friday) evenings, over a six-week period, on the postnatal ward of a consultant-led maternity unit in the north of England with a mixed demographic; this

region has areas with high levels of deprivation, and dispersed rural communities. A total of 85 were questionnaires distributed, 40 were completed and returned, giving a response rate of 47%. Most women completing the questionnaires had given birth at the consultant-led unit (n=39), one had a home birth.

Consent was obtained by midwives, student midwives, or clinical support workers on the postnatal ward, following a verbal explanation of the study. Women who agreed to participate in the study completed and signed a consent form and were provided with the questionnaire and a freepost envelope. Collection boxes were left on the postnatal ward for completed questionnaires. All eligible women who were approached consented to participate in the study.

## Findings

Women were asked if they had used a form of CAM in their current pregnancy and childbearing episode. Questionnaire data revealed that 17 out of 40 women (42.5%) had engaged with CAM. The times women used CAM across the period of childbearing were varied. The total number of women who used CAM in pregnancy was eight (20%), in labour and birth nine (22.5%), and postnatally was seven (17.5%). Women used CAM at every stage of their pregnancy.

Women were asked if they had been introduced to CAM as part of their maternity care, and if they had disclosed the use of it to a health professional. A total of 11 (27.5%) women had been offered CAM as part of their routine NHS care; this was in relation to the NHS-provided product (essential oil blend either applied to perineal pad or dissolved in the bath). While four women (10%) had sought and paid privately for a form of CAM. In terms of disclosure, in 11 cases (27.5%), a midwife was aware of the use of CAM; the data highlighted that this was specific to the NHS-provided product. In total four women stated that they had not disclosed their engagement with CAM to a health professional. When asked for the reasons for non-disclosure, the following responses were received: *'It never came up in conversation'* – this was in relation to hypnobirthing. In the case of a woman who used aromatherapy, reflexology, essential oils in the bath, and on the perineum, her reason for non-disclosure was given as: *'I saw it as my decision during pregnancy, however, I did check that essential oils were safe to use during pregnancy.'*

Women were asked to provide some details about CAM treatments and therapies they would like to see made available on the NHS. The majority requested the use of essential oils in the bath 9 out of 40 (47.5%) and massage 18 out of 40 (45%), aromatherapy 12 out of 40 (30%) and essential oils on a perineal pad applied to the perineum 9 out of 40 (22.5%). While two requested acupuncture and two requested hypnotherapy.

## Discussion and conclusion

The findings highlight that a number of women are engaging with different forms of CAM across the spectrum of childbirth. Some women appear to engage with CAM more readily if this is available as part of their NHS care; a limited number of women in this particular group four out of 40 (10%) actively sought and self-funded their CAM. Whether this translates over into 'consumer demand' remains questionable. Women appear to be more likely to use CAM during labour and birth and the postnatal period,

again, reflective of the CAM products that are readily available on the NHS during labour and the postnatal period in this particular trust. This finding is not a negative one, as what is important is that NHS provision appears to be fairly accurate in meeting the needs of this group of women. The findings in relation to disclosure and non-disclosure are reassuring for midwives, as there appear to be limited numbers of women engaging with CAM without the knowledge of a health professional (n=4). However, the fact that four women did identify non-disclosed use, illustrates the potential of non-disclosure of CAM may be something midwives should be aware of, so that they might incorporate strategies for exploring potentially harmful CAM use with women during the antenatal period.

It would appear that midwives were the main source of initiation of CAM use. Data highlighted that seven women used this range of healing systems because the midwife suggested it, five used it as a result of their own requests to do so, and three had been encouraged by a friend or relative or 'another source' to use a form of it. The significance of this is that midwives were leading the consumption trend for the use of CAM in this specific group of women, and this is worthy of further investigation. When exploring the popularity of CAM with qualitative data from Australian midwives, Adams (2006) concluded that the integration of CAM not only provides an additional range of treatment options to hospital midwives, but also equips them with further resource for challenging the dominance of obstetrics in the healthcare setting. It is without doubt that CAM and its associated therapies are considered firmly situated within midwifery care provision, as many of the healing systems are based on concepts of promoting empowerment and normal birth (Mitchell and Williams, 2007; Mitchell et al, 2006; Mousley, 2005). Midwifery aided by CAM is reportedly considered a means of enhancing professional jurisdiction and regaining midwifery autonomy (Cant et al, 2011; Adams, 2006), which might explain the considerable support by midwives for the use of CAM by expectant women (Hall et al, 2012). However, despite enthusiasm, currently there are few educational opportunities and only limited research evidence regarding CAM use in midwifery practice. The findings from this preliminary survey present some evidence of a reasonably limited consumer interest in CAM. Perhaps more interesting, is how the findings reflect the suggestion made by Jones (2012), who stated that midwives in their attempts to promote models of care that seek to focus on a woman-centred and a midwifery-led approach, appear to be 'pseudo consumers' of CAM, hence highlighting the importance of capturing and reflecting consumer demand for CAM appropriately, gaining perspectives from both midwives and childbearing women.

While the research did not set out to establish whether or not the midwives providing advice to women on the use of CAM had undertaken any level of training, it is worthwhile highlighting at this stage that the NMC information for midwives practising CAM is clear and concise. Midwives practising CAM are accountable through *The code: standards of conduct, performance and ethics for nurses and midwives* (NMC, 2008), the *Midwives rules and standards* (NMC, 2012), and the *Standards for medicines management* (NMC, 2010). The NMC (2008) urges practitioners to: 'Ensure that the use of CAM is

safe and in the best interests of those in your care' (NMC, 2008).

Standard 23 in the *Standards for medicines management* states that: 'Registrants must have successfully undertaken training and be competent to practise the administration of complementary and alternative therapies' (NMC, 2010).

For those midwives who are and are not practising CAM, the advice in the *Midwives rules and standards* (NMC, 2012) state that: 'You must only supply and administer those medicines for which you have received training as to use, dosage and methods of administration' (NMC, 2012).

## Limitations

The small sample size and the fact the findings are localised were limitations. However, this data may be useful to providers in relation to the commissioning and introduction of CAM services.

## Implications for research and practice

- Researchers and practitioners should gain more insight into how women engage with, and want to engage with CAM
- Midwifery research needs to effectively engage with the issue of consumer demand, and distinguish this from consumer interest
- Further research is required in relation to midwives and their pseudo consumer role of CAM use
- There are growing opportunities to design and deliver relatively simple CAM treatments that integrate around women's needs
- Midwives could use the booking interview and antenatal consultations to encourage women who are engaging with CAM to seek advice from the appropriate CAM practitioner in relation to safety and efficacy.

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# Obesity, pregnancy outcomes and caesarean section: a structured review of the combined literature

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Tables to accompany this paper are available online and can be accessed at: rcm.org.uk/ebm

## Abstract

*Objective*. This literature review set out to explore the impact of obesity on pregnancy outcomes in relation to an increased rate of caesarean section (CS).

*Methods*. A systematic search strategy, utilising the Patient/Problem, Intervention, Comparison and Outcome (PICO) methodology was used. Two electronic databases, CINAHL and Medline, were searched to source relevant papers published between the years 2000 and 2011. The search identified 170 papers from CINAHL and 137 papers from Medline using the following inclusion criteria: 'written in English' and 'published between 2000 and 2011'. This led to the identification of four papers that met inclusion criteria and were the most relevant to the research question.

*Findings*. There is evidence of an association between elevated body mass index (BMI) levels and the subsequent risk of CS. As the BMI of the woman increases from obese to morbidly obese, the likelihood of CS as an emergency procedure becomes greater. This finding was recorded in all four of the studies reviewed where higher rates of CS were found in overweight women. A 27.8% CS rate was found among obese women, compared to 10.8% among non-obese women (OR = 3.2; [95% CI 2.9, 3.5]; P<0.001).

*Implications*. The appropriate management of the reduction in obesity levels among pregnant women is an important factor that can contribute to reduced CS.

*Key words:* Pregnancy, caesarean section, obesity, evidence-based midwifery

## Search strategy

Obesity is a growing concern to maternity services, with Soltani (2009) suggesting that 20% of all pregnant women in the UK are now obese. In 2010, the Centre for Maternal and Child Enquiries (CMACE, 2010) estimated that 38,478 women with a body mass index (BMI) >35 (class 11 and 111 obesity) give birth in the UK every year. The UK-wide obstetric surveillance system (UKOSS) in a recent study identified that one in 1000 pregnant women in the UK had a BMI of at least 50 (National Obesity Observatory, 2012). Obesity in pregnancy poses significant risks for both maternal and fetal wellbeing, affecting aspects of antenatal, intranatal and postnatal care (CMACE, 2010). Such risks include: miscarriage, gestational diabetes and hypertensive disorders, such as pre-eclampsia and venous thromboembolism (VTE). The fetus is also at increased risk of congenital malformations, macrosomia and stillbirth (Richens and Lavender, 2010).

The latest figures from Birthchoice UK (2011) state that 24.8% of all births in 2009/2010 resulted in caesarean section (CS). The CMACE report (2010) suggests that maternal obesity increases the likelihood of caesarean delivery by one and a half times that observed in the overall maternal population. Poobalan (2009) goes further, suggesting that CS rates rise in line with elevated BMI levels and that the rate of caesarean delivery in the western world has mirrored the increase in obesity trends. Obesity leads to a higher incidence of CS (Perlow et al, 1992), and repeat CS in highly obese multiparous women (Chauhan et al, 2001). Natural vaginal births are preferred to caesarean, as they lower the risk of: bowel dysfunction, infection, excessive blood loss, longer recovery time and extended hospital stay (Villar et al, 2006).

Trends among pregnant women in relation to obesity reflect the rising obesity in the general population. The latest figures reported from the *Health survey for England* (Department of Health, 2011) estimate that nearly one in four adults, and over one in 10 children aged two to 10 years of age are considered to be obese (Department of Health, 2011). Obesity is defined as, 'abnormal or excessive fat accumulation that may impair health' (WHO, 2011). Obesity has a significant impact upon health, being associated with illnesses such as cancer, coronary heart disease, diabetes and strokes (Husbands, 2007).

## Background

A systematic and comprehensive search strategy was developed, utilising the Patient/Problem, Intervention, Comparison and Outcome (PICO) methodology (Scullion and Guest, 2007).

Scullion and Guest (2007) suggest that using such a model enables the search to be focused, through the selection of key words, in this instance: 'obesity in pregnancy', 'pregnancy outcome' and 'caesarean section'. Aveyard (2007) suggests that the use of inclusion and exclusion criteria allows the researcher to further focus upon the collation of material that is relevant to the question. The inclusion and exclusion criteria limited the search for articles to: those dealing with maternal obesity and birth outcomes; written in the English language and published from 2000 onwards.

Two major electronic databases were selected. The first, CINAHL, is a comprehensive database focusing upon

midwifery, nursing and obstetric practice. It uses major headings as its primary search tool. The second, Medline, is more generic and retrieves both medical and social care literature. (This database utilises medical subject headings – MeSH). The two databases were selected as they contain by far the most comprehensive collection of high-quality, peer-reviewed health research written in the English language. They index virtually all English language nursing and medical journals and further searching of additional databases was thus redundant.

The use of Boolean search operators; AND, OR and NOT allows for the expansion, narrowing or combining of key words, to further refine the search and ensure only the most relevant articles are identified for subsequent review (Scullion and Guest, 2007). The search identified a detailed selection of material associated with obesity in pregnancy and increased rates of CS, from peer-reviewed research journals. The majority of these studies were undertaken in the US. However, in order to provide a more global perspective, articles were also located from a hand search of the reference lists of these papers. Two papers from outside the US (not in English and, therefore, missed during our electronic search) were located in this way.

A total of 11 articles were retrieved from the CINAHL search and 12 from the search of Medline. Eleven articles were common to both searches, leaving 12 articles in total (plus two further identified from reference lists, totalling 14). Seven of these articles were rejected (due to small sample size), and of the remaining seven, three were rejected as they principally covered issues not relevant to this review (such as weight loss, diabetes or rates of induction of labour).

The 23 papers identified in the first box in the prisma diagram (see Figure 1) were retrieved thus: 11 of these papers were retrieved from CINAHL and 12 from Medline (which equals 23).

The 11 papers from CINAHL were obtained as follows: a search on the key phrase 'obesity in pregnancy' returned 170 hits; a further search on the key phrase 'CS', 3368 hits and 'pregnancy outcomes', 3324 hits. When 'obesity in pregnancy' was combined with 'caesarean section' this produced two hits. When 'obesity in pregnancy' was combined with 'pregnancy outcomes' (and exclusion criteria applied), this produced 11 hits. These

11 papers contained the two studies from the search on 'obesity in pregnancy' and 'caesarean section', leaving 11 papers retrieved in total.

The 12 papers obtained from Medline were retrieved in the following way. A search on the key phrase 'obesity in pregnancy' returned 137 hits; a further search on the key phrase 'CS', 16,575 hits and 'pregnancy outcomes', 12,115 hits. When 'obesity in pregnancy' was combined with 'caesarean section', this produced one hit. When 'obesity in pregnancy' was combined with 'pregnancy outcomes' (and exclusion criteria applied), this produced 12 hits. These 12 papers contained the one paper from the search on 'obesity in pregnancy' and 'caesarean section' leaving 12 papers retrieved in total.

Therefore 12 papers were retrieved from Medline and 11 from CINAHL, making a total of 23.

## Analysis

The first study appraised in this review was published by Sheiner et al (2004). Undertaken over a 14-year period from 1988 to 2002, this Israeli study of maternal obesity and CS, focuses particularly upon the reported increased incidence of caesarean births (Cnattingius et al, 1998). The study has a number of strengths. Rigorous methodology was employed, which was quantitative in approach,

**Figure 1. Prisma diagram**
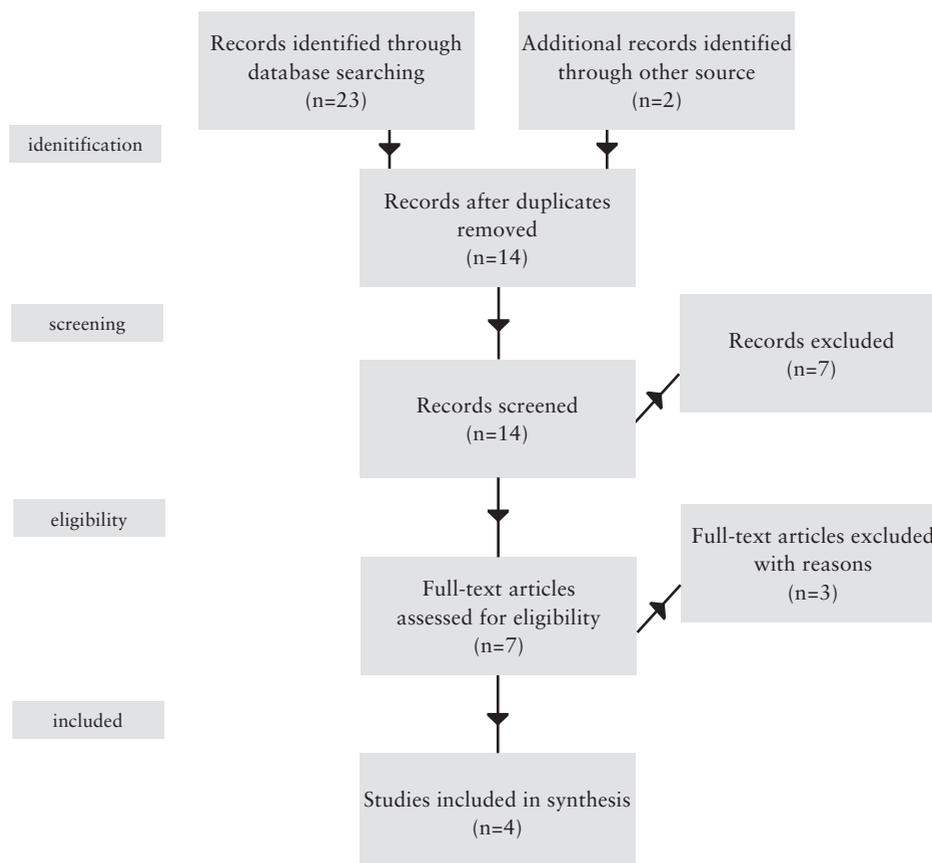


Adapted from: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group. (2009) Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med* 6(7): e1000097.

utilising a non-experimental research method in the form of a population-based, longitudinal cohort study. Clear inclusion and exclusion criteria were also identified, requiring the participants to be pregnant with either a BMI categorised as non-obese (30kg/m² or below) or as obese (30kg/m²or more). Women who were suffering from hypertensive and diabetic disorders of pregnancy and those lacking in antenatal care were excluded.

A further strength was the size of the sample used. The study had an overall sample size of 126,080 of which 1769 were considered obese. This sample size was large, providing greater reliability for the application of findings to the obstetric population at large. Also, delivery outcomes were entered into a database by skilled medical secretaries, who cross-referenced information with patient medical records to enhance the subsequent validity and reliability of the results.

In order to take account of influencing factors and variables, some of which are known to cause an increase in caesarean birth, the researchers identified four separate areas for observation. These were clinical characteristics (such as age and ethnicity), obstetric risk factors (such as previous caesarean birth and pregnancy), labour complications (such as induction of labour) and perinatal/maternal outcomes. Each was evaluated separately to enable the researchers to look specifically at obesity as an independent risk factor.

The results were presented concisely through the use of tables, which clearly distinguished between obese and non-obese participants. The study found obesity to be associated with several conditions: delay in progress of labour, malpresentation, and fetal macrosomia. However, the main findings showed that there was a higher rate of caesarean delivery (27.8%) among obese participants, compared to 10.8% in non-obese participants (OR = 3.2; [95% CI 2.9, 3.5]; P<0.001). There was also a link between caesareans prior to the participant's current pregnancy and obesity (with 17.4% of obese patients experiencing prior caesarean compared to 10% of non-obese patients: OR = 1.9; [95% CI 1.7, 2.1]; P<0.001). Sheiner et al therefore state that *'maternal obesity was found in our study to be an independent risk factor for CS. The percentage of obesity-attributed deliveries by CS has more than tripled over the last 20 years'* (2004: 200).

Aside from the strengths of the study, some limitations were also present. Time duration is the main disadvantage of a cohort study (although, in terms of the validity of the statistical findings, cohort studies are rated third within the hierarchy of evidence, (Steen and Roberts, 2011; Gerrish and Lacey, 2010)). Medical practice may have evolved during the time the study was conducted, (although the researchers attempted to address this by looking at specific cohorts for years of delivery). A further limitation of Sheiner et al's project was a lack of focus on the experiences of highly overweight women. Future research should identify a category of participants with a BMI in excess of 40kg/m². Also, such research should widen the ethnicity base, which in Sheiner et al's study was particularly narrow. However, notwithstanding its limitations, this investigation clearly

makes a valuable contribution to current understating of obesity as a risk factor for CS.

The second study appraised in this review was conducted by Sebire et al (2001). This examined the impact of maternal obesity in relation to pregnancy outcome between 1989 and 1997. The study (which was UK-based), clearly documented the significance of obesity, highlighting the risk of adverse pregnancy outcomes. The researchers suggest that some previous studies had lacked accurate quantification of each associated risk, which this study sought to address. The investigation was quantitative in nature, adopting the methodology of a retrospective analysis. These types of study are similar to that of a cohort study, which observes events that have already taken place (Gerrish and Lacey, 2010).

The investigation had several key strengths. Data were collected from a validated database of NHS maternity hospitals that held data on more than 80% of all deliveries within the north-west Thames region. With a population of more than 3.5 million, which included a diverse range of ethnic communities, this produced an excellent sample size of 287,213. Each of the participants were assigned to groups, according to their BMI measurement: those with a BMI below 25 (61.6%, n=176,923); those between 25 and 30 (27.5%, n=79,014); and those with a BMI over 30 (10.9%, n=31,276). The number of participants within each group was clearly documented, making subsequent analysis robust. A clear inclusion criterion was identified of singleton pregnancy at term (over 37 weeks' gestational age). Similarly, those women with a BMI of below 20 were excluded. In order to collate the results, the researchers utilised a range of variable characteristics: demographics (such as age and ethnicity); antenatal complications (such as hypertension and diabetes); maternal and fetal complications. They also identified both elective and emergency caesarean procedures separately, for each BMI group.

The results of the study were displayed in the form of both frequency tables and charts, which clearly demonstrated the effects a raised BMI has on both pregnancy and fetal outcome. The study found that gestational diabetes, pre-eclampsia, induction of labour and fetal macrosomia were more prevalent in obese pregnant women. Specifically in relation to caesarean births, the study identified that women with a BMI over 30 were almost twice as likely – '20% compared with nearer 10%' (2001: 1179) – to require CS as those with a normal BMI (20 to 24.9). It was also more likely that these would be emergency procedures (13.4% emergency and 8.48% elective procedures).

As well as the strengths identified above, some limitations were also apparent. When reviewing this study, account must be taken of its reliance on the recording of the participants' BMI at the booking stage. Some women may have presented late in the pregnancy and this may have influenced the increase in the numbers in the raised BMI groups, thereby affecting the reliability of the data.

Also, as the study itself identifies, no reference to social class was made, even though socio-economic status and obesity are closely related (Health and Social Care

Information Centre, 2011). However, regardless of these limitations, the study provides an indication of the risks of obesity for CS among a large multi-ethnic sample from a significant population centre.

The third study evaluated in this review was by Dempsey et al (2004). These scholars undertook a study of maternal obesity as a risk factor for CS in the US over a four-year period, between 1996 and 2000. Dempsey et al (2004) also make reference to maternal stature in relation to an increased BMI and the impact this may have on CS. To examine these issues, the study adopted a quantitative approach, utilising a non-experimental design in the form of a hospital-based cohort study. The participants were derived from the *Prospective study of gestational diabetes mellitus risk in relation to maternal recreational physical activity before and during pregnancy* (Dempsey et al, 2005). Women who accessed antenatal care before 16 weeks' gestational age were initially included in the study, while those who were below 18 years of age, did not speak or read English, or did not plan to deliver at the research hospitals were excluded. This generated a sample size of 1219 eligible women, of which 1000 agreed to participate. The researchers then applied further exclusion criteria to those with pre-existing conditions, such as: diabetes; pregnancies that had resulted in spontaneous or induced abortion; those with missing or incomplete data; and multiparous women. This left an overall sample size of 738 women.

The study had several strengths, including the collection of a comprehensive set of data. Through the use of structured questionnaires, the researchers recorded pre-pregnancy weight, height, obstetric history and other socio-demographic data. To ensure reliability, the participants' records were reviewed and cross-referenced, along with the subsequent labour and delivery outcomes. The participants were placed into four groups, according to their recorded BMI: below 20 (n=158); 20 to 24.9, (n=424); 25 to 29.9 (n=103); and 30+ (n=53). Maternal height was divided into those below 1.55m and those above.

A further analysis of the group was undertaken to exclude those who had developed pre-eclampsia or gestational diabetes during the pregnancy (n=34). Overall, 26% of the births resulted in caesarean delivery. Those with a BMI of 25 to 29.9 were twice as likely to deliver by caesarean (RR=2.09; 95% CI 1.27-3.42), while a three-fold increase was observed in women with a BMI of 30+ (RR=3.05; 95% CI 1.80-5.18).

The findings also reflected the significance of stature in association with a raised BMI. Those women below 1.63m (median height), with a BMI of 25+ were found to be three times more likely to have a CS than taller women with a BMI below 25 (RR=2.79; 95% CI 1.72-4.52). Dempsey et al also re-examined '*the association between maternal pre-pregnancy BMI and caesarean delivery. When compared with lean women, the risk ratios for these overweight and obese women were 1.95 (95% CI 1.16-3.28) and 2.69 (95% CI 1.48-4.92), respectively*' (2004: 182).

The study clearly substantiated its hypothesis that obesity increases the risk of CS and recommends that there should

be more emphasis on providing pre-pregnancy advice regarding weight gain. However, there were limitations to the study. The participants were predominately nulliparous, white and well-educated. Therefore, the generalisability of the results can be questioned. Maternal weight and height were also self-reported and this may have lead to discrepancies within the data. The researchers also suggest that a limitation of their research was that they were unable to adequately assess the impact of maternal weight gain during pregnancy on later CS. Kaiser and Kirby (2001) suggest that such weight gain increases the incidence of caesarean delivery.

The final study in this literature review was published by Callaway et al (2006). This Australian-based study, conducted over a four-year period between 1998 and 2002, examines the prevalence and impact of overweight and obesity in pregnancy. The authors highlighted the incidence of obesity within the population and the implications this has within the obstetric care setting for maternal disorders, such as hypertension and gestational diabetes. The authors describe the increased incidence of caesarean delivery and the risks associated with neonatal outcomes (such as macrosomia, birth defects, prematurity and stillbirth) were referred to (Ehrenberg et al, 2004).

The rationale for this study was to examine the prevalence of overweight and obesity using BMI as a measurement tool, to assess the impact upon both maternal and neonatal outcomes. The study used a population-based cohort design and was approved by the hospital's Human Research Ethics Committee (Proctor and Renfrew, 2000).

The investigation had a number of strengths. For example, data for the study was derived from a hospital database system, which identified a large sample of 18,401 women. Clear inclusion and exclusion criteria were then applied, requiring the participants to have a recorded BMI at booking and a singleton pregnancy. Those with a BMI below $20kg/m^2$, emergency and late bookings were excluded. This left a sample size of 11,252 which were grouped according to four categories of BMI: normal ($20.01-25kg/m^2$) (n=6443 participants); overweight ($25.01-30kg/m^2$) (n=2882 participants); obese ($30.01-40kg/m^2$) (n=1679 participants); and morbidly obese (BMI $>40kg/m^2$) (n=248 participants). The researchers also identified three groups of characteristics and their associated outcomes; maternal, labour and neonatal, which were applied to each BMI category.

The results were presented in the form of tables, which clearly demonstrated the outcomes for each group. The study found that there was an increased risk of adverse outcomes for those women with a larger BMI, such as: hypertension, gestational diabetes and a longer hospital stay. The study also found that increasing BMI was associated with both maternal age and parity. In relation to labour outcomes, the study identified a correlation between BMI and increased rates of CS, (22.3% of those within the normal weight range, while those overweight saw this increase to 29.5%). In those considered obese this increased further to 35.3% (and in the morbidly obese

rose to 42.7%). This figure represented an adjusted odds ratio [AOR] [95% CI] for CS of: overweight 1.50 [1.36-1.66], obese 2.02 [1.79-2.29], morbidly obese 2.54 [1.94-3.32]). These results were statistically significant for all groups studied.

The study identified the extent of adverse pregnancy outcomes in those considered to be obese or (unlike the previous studies), morbidly obese. However, the validity of the data could be further improved by replicating the study at other hospitals. A limitation of the study was that greater emphasis should have been placed on identifying CSs that are undertaken as a result of an elective or an emergency procedure. Nevertheless, Dempsey et al's paper makes a valuable contribution to our understanding of obesity and risk of CS.

## Discussion

This literature review has clearly established that BMI levels considered overweight, obese or morbidly obese, increase the likelihood of CS. This is demonstrated in Sheiner et al's (2004) paper, where the main findings show that there was a higher rate of caesarean delivery among obese women (27.8%), in comparison to women who were non-obese (10.8%) (OR = 3.2; [95% CI 2.9, 3.5]; P<0.001). The second paper examined in this review (Sebire et al, 2001) also explains that compared to women with normal BMI, delivery by emergency CS was significantly more common in obese pregnant women (odds ratio (99% confidence interval) for BMI 25 to 30 and BMI>30: 1.30 (1.25-1.34), 1.83 (1.74-1.93)). In such cases, there was an increased incidence of emergency CS, as opposed to elective procedures.

This trend (of increased weight leading to CS) was also observed by Dempsey et al (2004). In this study, 26% of births were by caesarean delivery. Women with a BMI of 25 to 29.9 were twice as likely to deliver by caesarean (RR=2.09; 95% CI 1.27-3.42), while those with a BMI of 30+ (RR=3.05; 95% CI 1.80-5.18) were three times more likely. Pre-pregnancy BMI also appeared to be related to CS. Women who were overweight or obese prior to becoming pregnant experienced an odds ratio for caesarean of 1.95 (95% CI 1.16-3.28) when overweight and 2.69 (95% CI 1.48-4.92) when obese (Dempsey et al, 2004).

Callaway et al (2006) further established that the risk of CS rose in proportion to the increasing BMI of the participant. In Callaway et al's study, 22% of normal weight participants went on to have caesareans but for overweight women the figure was 29.5%. For obese participants, the rate was higher still at 35.3% (and in the morbidly obese was 42.7%). The adjusted odds ratio [AOR] [95% CI] for CS was therefore: overweight 1.50 [1.36-1.66], obese 2.02 [1.79-2.29], morbidly obese 2.54 [1.94-3.32]. Such results were statistically significant for the overweight, obese and morbidly obese groups, and clearly demonstrate the correlation between increased BMI and CS.

All the studies reviewed therefore replicated the increased incidence of CS in association with elevated BMI. They also suggest that this likelihood is further increased by a range of ancillary risk factors, such as gestational diabetes,

hypertension and induction of labour, posing increasing maternal and neonatal complications. As well as this, Dempsey et al (2004) explain that short maternal stature and increasing BMI levels, further increase the risk of CS, although Sheiner et al (2004) reported that independently, obesity in itself is a risk factor.

Weight gain during pregnancy may be an area for further research, with current guidelines (NICE, 2010) recommending that those women with a BMI of 30+ must be monitored at monthly intervals, to ensure effective and appropriate management of care. Obstetricians should nevertheless be encouraged to allow obese women not suffering from adverse pregnancy complications, to have an adequate trial of labour and thus avoid the known risks with caesarean birth (Richens and Lavender, 2010). It is therefore also advisable that those involved with the care of obese pregnant women, particularly midwives, in their role as advocate, have both an understanding of the risk factors and awareness of the complex needs of obese women.

A more comprehensive understanding of obesity as a condition itself, as well as the links to pregnancy outcomes, is necessary. Practices should focus upon the importance of adhering to a normal weight range before conception, through pre-pregnancy consultation and ongoing advice. This is reflected in the current guidelines on obesity in pregnancy (NICE, 2010).

As obesity levels continue to increase globally, it is recognised that this poses a significant public health risk. Being overweight and obesity are common in the obstetric population (Callaway et al, 2006) with increasing BMI levels being associated with maternal age and parity. A CS procedure costs in the region of £2369, compared to that of a normal birth, £1665 (Gallagher, 2011). This has significant financial implications for both the cost of obstetric healthcare delivery and the overall NHS budget, particularly in the context of the proposed efficiency savings required by the coalition government.

There is growing evidence that preventative strategies could and should be better utilised. Irwin (2010) suggests that midwives are in a position to empower women, through information giving and education, although dietary advice, weight management and activity levels would be more appropriately discussed prior to pregnancy (NICE, 2010). For those pregnant women that are classified as obese, it is essential that effective strategies are put in place to manage the risk and ensure the wellbeing of both mother and baby.

## Conclusion

This review has sought to establish the extent to which obesity contributes to an increased rate of CS. It has found that there is evidence of an association between elevated BMI levels and the subsequent risk of caesarean. Furthermore, it was clearly demonstrated that as the BMI of the woman increases from obese to morbidly obese, the likelihood of CS as an emergency procedure also becomes greater (Callaway et al, 2006).

The findings from this review have clear implications for

midwives, especially with regard to the support offered to clients who may be overweight or obese. It may even be possible for obstetricians to more frequently offer such women an adequate trial of labour to avoid the risks associated with CS (Villar et al, 2006). Midwives could advocate for these women by developing a thorough knowledge of obese women's complex needs and the risk factors they face.

Obesity as a condition in itself should be more fully understood. Advice and support with the aim of achieving a normal weight range prior to conception should also be provided. This may be a productive focus for further study given that current NICE guidelines (2010) recommend women with a BMI of 30+ be monitored at monthly intervals, to ensure effective management of care.

However, while midwives can provide information, advice and support to women, they cannot do this in isolation. The successful reduction of obesity levels requires the adoption of a multidisciplinary approach. Only through coordinating the work of a range of public health practitioners can obesity levels be reduced and as a consequence, a reduction in the overall rate of CS can be achieved.

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# Australian maternity health professionals' experience of an e-learning fetal surveillance package

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## Abstract

*Background*. The provision of e-learning packages for health professionals is gaining acceptance. Introduction of a computer-assisted fetal surveillance package (K2MS) was new to Western Australian public maternity health care and its user-acceptability and efficacy required evaluation.

*Aim*. To determine knowledge improvement and retention, as well as user experience with K2MS.

*Method*. A cross-sectional design was undertaken to collect user experience feedback from a convenience sample of clinicians. A pre/post-test design was also employed with a sample subset to evaluate knowledge improvement and retention at <1 month, six to eight months and nine to 11 months. Descriptive statistics were used for demographic and user experience data. Wilcoxon-related tests determined whether median test scores changed significantly from pre-test across three follow-up periods. The Women and Newborn Health Service granted ethical approval.

*Results*. A total of 82 clinicians consented and provided demographic data, with 56 offering user experience feedback. The number that consented to the pre/post-test knowledge evaluation was 47, with 42 completing the pre-test and providing data across three follow-up periods. Comparison of follow-up scores with pre-test scores confirmed that knowledge was significantly improved and retained for a period of nine to 11 months. Compared to pre-test baseline scores (54.0), median scores increased to 64.5 at <1 month and were retained at 61.5 at six to eight months and nine to 11 months (p<0.05). User experience results indicated clinicians enjoyed using K2MS, felt topics were relevant, met their learning needs and was more convenient than face-to-face workshops. Challenges to completion were attributed to work/life commitments and information technology issues.

*Implications*. K2MS provided an effective, relevant and sustained means to educate clinicians. However, strategies are needed to ensure that those in rural and remote areas can successfully access K2MS with protected time to complete the package.

*Key words:* E-learning, maternity health professionals, fetal monitoring, knowledge retention, evidence-based midwifery

## Literature review

Health professionals responsible for providing intrapartum care need to perform, interpret and act appropriately using knowledge of fetal surveillance measures, such as cardiotocograms (CTGs) and fetal blood sampling within standard clinical care. Consistent with international and Australian regional initiatives (Miller and Miller, 2013; RCOG, 2011; Cooke et al, 2010), the Perinatal and Infant Mortality Committee of Western Australia recommends obstetric and midwifery staff have appropriate knowledge of fetal surveillance measures, particularly, the use and interpretation of CTGs (Western Australian Department of Health, 2007). In low-risk birth settings and services that cater for relatively low numbers, maintenance of fetal monitoring knowledge and skills can be challenging.

Since its introduction into maternity care in the 1960s, the intrapartum use of continuous electronic fetal monitoring has increased steadily in well-resourced countries (Talaulikar and Arulkumaran, 2011), and Western Australia (WA) is no exception; a 10% rise over

the last five years suggests that fetal surveillance is now a feature of 54% of WA births (Joyce and Hutchinson, 2012). Assurance of health professionals' readiness to competently and confidently undertake CTG monitoring in all settings is therefore imperative.

WA is Australia's largest state, with a total land area of 2.5 million km$^2$ (976,790 square miles) and a population of 2.4 million residing largely in the Perth metropolitan and wider south-west area of the state. The most recent 2010 statistics confirmed an annual birth rate of 31,000, almost all of which occurred in the 35 hospital maternity units located throughout the state – only 1% of babies born in WA are born at home (Joyce and Hutchinson, 2012).

Until recently, CTG monitoring education in WA has been delivered in a classroom setting. For health professionals in or near the Perth metropolitan area, sessions have been provided at the state's tertiary hospital, while education for those in rural WA has been via a visiting peripatetic teaching team. The Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG, 2011) also

provides fetal surveillance education for members.

In an effort to standardise and improve access to CTG training in a cost-efficient manner, the WA Department of Health introduced the K2MS computer-assisted fetal surveillance learning package. Originally developed and commercialised as a decision support system by a UK perinatal research group in the late 1990s, the computer-assisted package was evaluated in a randomised controlled trial and found to be effective in improving clinicians' intrapartum fetal monitoring knowledge for up to seven months (Beckley et al, 2000).

The electronic provision of mandatory core competence education for health professionals is new to WA public maternity health care and, as such, its user-acceptability and efficacy required evaluation. To inform decisions for recommendations with professional development requirements around fetal surveillance, it was important to ascertain retention of knowledge following completion of the K2MS package.

Furthermore, given the wide variation in clinicians' exposure to intrapartum fetal monitoring practice opportunities, assessment of knowledge improvement and retention plus user experience across a range of WA maternity care settings was necessary. Therefore, the aim of this study was to determine knowledge improvement and retention and user experience with WA health professionals engaged with the computer-assisted fetal surveillance package K2MS.

## Method

A cross-sectional survey design was utilised to determine user experience of a convenience sample of WA health-employed maternity health professionals during their engagement with K2MS. In addition, a pre/post-test design was also employed to evaluate knowledge improvement and retention of a subset of health professionals (n=42) following completion of the K2MS and across three follow-up time periods (<1 month, six to eight months, nine to 11 months). Early follow up (<1 month) was chosen to determine change in knowledge, and the remaining follow-up time periods focused upon retention of knowledge. The purpose of the final follow-up period was to determine whether any loss of knowledge occurred between the time knowledge was found to be retained in Beckley et al's (2000) study (seven months) and up to nine to 11 months.

### Recruitment of participants

Convenience sampling was utilised to recruit midwives and doctors working in the WA public health service (in metropolitan, rural and remote settings) into the study. Those identified as registered with the K2MS database but yet to start completing the online learning package, were contacted via email and invited to participate. Registration onto the K2MS database and access to the package was through local (health service-based) administrators. Once registered, interested staff members were able to confirm their consent to participate in the study, following review of an electronic information sheet. Participants were recruited

over a three-month period via email, a second email was sent two weeks later if there was no response. Clinical managers, regional learning and development managers and site K2MS administrators assisted with recruitment. Hard copy information packs were also sent to each health service with a request to each K2MS administrator to seek consent to participate in the study from eligible individuals at the time of organising their K2MS access. At the time of consent, participants agreed to complete K2MS within three months. The K2MS database was monitored by the researchers to determine progress through the package.

### Data collection

Electronic versions of a demographic questionnaire plus the multiple choice questionnaire and 'user experience' questionnaire, developed and evaluated by the UK Perinatal Research Group, were provided to participants via an email link (Beckley et al, 2000). Demographic data included participants' age group, role, workplace locality and educational level. Knowledge was determined by 16 questions; 12 on acid-base balance and four on CTGs. Each question consisted of a short stem phrase followed by five items to complete the statement. For each question, participants were asked to read the stem phrase and mark each item as true (T), false (F) or don't know (D). The K2MS questionnaire was developed in the original study (Beckley et al, 2000) and incorporated a negative scoring system (-1 marks for an incorrect response and 0 marks for a 'don't know' response).

Purchasing of the K2MS package included permission to use the questionnaire. Details regarding validity and reliability of the questionnaire were not available from K2MS. The scoring system for our study differed by using a positive scoring system (1 mark for a correct response, 0 marks for an incorrect response or 'don't know'). A positive scoring system was chosen as participants were not informed of the negative scoring system, which may have influenced their response. In other words, if a participant was unsure of an answer, they could have chosen 'don't know' rather than make an educated guess and be penalised for an incorrect response. Participants did not receive feedback regarding their scores to prevent bias with follow-up scores.

User experience data collected following completion of K2MS included responses from all participants engaged with the package over a 12-month period. Statements used were from the original work by Beckley et al (2000) under headings of overall impression, usefulness, ease of use and presentation of learning materials. Participants were asked to confirm agreement with a statement by 'true', 'false' or 'don't know'. Examples of statements were: *'I enjoyed the package'*; *'I will use the information in this course to further my practice'*; *'I could find my way around the package without getting lost'*; and *'the diagrams helped to explain the text'*.

### Data analysis

Descriptive statistics such as mean, median and standard deviation were employed for continuous data. Categorical

data were expressed as percentages. Wilcoxon-related tests determined whether median test scores differed significantly between test times. Mann-Whitney U independent samples tests were used to look for significant differences between median scores. Significance was set at 0.05.

*Ethical considerations*
Approval for this study was granted by the Women and Newborn Health Service (WNHS) ethics committee, in accordance with the National Statement 2007, Audit No: 118QK and the QI Obstetrics WNHS committee, No: 1995. No ethical issues arose during the study.

## Results
A total of 82 health professionals consented to participate, provided demographic data and were encouraged to offer feedback on the user experience for K2MS. Demographic data were also collected about participants' current experience and practice, including CTG monitoring in clinical practice, fetal surveillance education attendance, use of computer-assisted learning programmes, and perception of computer skills. At the time of collecting demographic data, 24.7% (n=19) respondents were conducting CTG monitoring (ranging from one to four hours weekly). When asked if they had attended any fetal surveillance workshops or activities in the six months prior to completing this survey, 82.7% (n=62) had not attended a programme. A majority of 70.3% (n=52) confirmed they had previously utilised a computer-assisted learning programme with 96% (n=71) rating their computer skills as average or excellent.

Of those who provided user experience feedback (n=56), the majority, 63.7% (n=35) were over 41 years of age and 54.5% (n=30) held a postgraduate qualification. In relation to their employment position, a total of 90.0% (n=54) were midwives or student midwives and 45.0% (n=27) worked in rural hospitals.

A total of 47 health professionals consented to participate in the pre/post-test evaluation, with 42 completing the pre-test and follow-up over three time periods. The subset demographics were similar to the total sample of health professionals engaged in K2MS who provided user feedback. The majority, or 61.0% (n=25), were over 41 years of age, 46.3% (n=19) had postgraduate qualifications and 83.3% (n=35) were midwives or student midwives. Of these 42 participants, 25.5% (n=12) completed K2MS within the recommended three months with the remaining 12 health professionals requiring up to nine months to achieve the final n=24 or 51% completing K2MS. The mean time required to complete K2MS was 16 weeks (median 15, mode 20, range 1 to 36).

*Pre/post-test knowledge improvement and retention with K2MS*
A total of 42 health professionals completed the pre-test with a significant loss to follow-up at <1 month. Some 26 participants completed the first follow-up questionnaires, 28 completed the six to eight month questionnaires and 18 completed the nine to 11 month questionnaires. The 26

participants who completed the questionnaires at the first follow-up time points also completed the subsequent two follow-up questionnaires. The additional two participants who completed the six to eight month questionnaire also completed the final ones.

In relation to knowledge around intrapartum fetal monitoring, respondents were asked 16 questions; 12 on acid-base balance and four on CTGs. Follow-up scores were compared with each pre-test scores. There were significant increases in scores between the pre-test (median 54.0, mean 54.2, range 33 to 75, SD 12.3) and <1 month test (median 64.5, mean 63.2, range 33 to 74, SD 8.7; median score increased by 10.5, p<0.05); the pre-test and six to eight month test (median 61.5, mean 62.5, range 46 to 75, SD 7.4; median score increased by 7.5, p<0.05); and the pre-test and nine to 11 month test (median 61.5, mean 61.8, range 39 to 76, SD 8.9; median score increased by 7.5; p<.05) suggesting that knowledge increase from pre-test to follow-up periods was retained.

*User experience with K2MS*
Of the 82 health professionals engaged with K2MS over the 12-month period, 56 (68.3%) completed the user experience survey. Those respondents unable to complete K2MS (25.5% or n=24) within the allocated timeframe were contacted via email to determine the barriers or difficulties they encountered, with 37.5% (n=9) responding. The largest number of respondents (41.1%, n=23) completed K2MS at both home and work, with 18 (32.1%) working from home only and 15 (26.8%) completing the package at work. Some clinicians took an average of 16 weeks to complete the package, which was recommended to take 8.5 hours (Beckley et al, 2000).

Most users (28%, n=16) felt the CTG module was most relevant to their current practice with 25% (n=14) indicating they felt all modules were relevant to their clinical practice, even though most WA facilities do not routinely analyse cord gas samples. The majority of respondents found K2MS useful and felt they learnt as much using this format as they would attending a face-to-face workshop and suggested that this learning format is more convenient than attending workshops. Content analysis was also conducted for the 17 responses collected under 'any further comments', which revealed five common issues: the time consuming nature of the package; competing commitments for clinicians; issues in relation to IT (access and navigability); and the capacity to complete K2MS during work time due to limited clinical access.

## Discussion
The authors' results suggest that WA maternity health professionals found the K2MS learning package valuable and convenient to use. Following completion of the package, intrapartum fetal monitoring knowledge was significantly improved and retained for a period of nine to 11 months; this confirms and extends the results reported by the original K2MS study authors, who demonstrated knowledge retention for seven months post-learning

(Beckley et al, 2000); this is particularly useful to know given that many WA Health maternity services only recommend that maternity clinicians revisit the K2MS learning package annually. Recruitment of participants via email was difficult and yielded a relatively small sample size. This could in part be related to the transient workforce nature of WA public maternity health professionals, infrequent or no access to WA Health email, incorrect contact details in the K2MS database, or professionals leaving the maternity care setting although still registered to access K2MS. For these reasons, electronic recruitment may not have been the most effective approach compared to face-to-face contact. However, face-to-face recruitment would have required additional administrator training and, due to the geographical expanse of WA, was not feasible. In addition, doctors were not proportionally represented in the sample and some participants did not complete all the required timeframe questionnaires. This missing data prevents deeper statistical and comparative analysis between clinicians and professional groups. Despite this limitation, however, the authors' aims to determine maternity health professionals' user experience, improvement in knowledge and knowledge retention up to 11 months post-learning were achieved.

Research has demonstrated significant improvements in knowledge through e-learning programmes. O'Leary and Janson, using a prospective before/after observational study to assess knowledge improvement and competence in the Basic Life Support (BLS) of Australian medical students, found a 57.7% improvement in post-test scores (O'Leary and Janson, 2010). O'Leary (2011) repeated this original research in Australia, with a larger sample size using doctors and nurses resulting in the e-learning improving participants' ability to perform BLS by 51%. However, it must be noted that O'Leary (2011) examined practical skills knowledge improvement using an observational scoring system and timeframes between initial testing and re-testing were variable.

Eaton-Spiva and Day (2011) evaluated the effectiveness of a computerised education module on North American nurses' knowledge and confidence related to diabetes using a descriptive, quasi-experimental, pre/post-test design. Although no statistically significant differences in improvement of knowledge and confidence were found, there were similar issues concerning poor response to online surveys and competing work commitments further highlight the need for support and commitment when developing and distributing e-learning programmes.

Comparisons between e-learning programmes and face-to-face programmes in terms of knowledge improvement are evident in the literature. Canadian investigators Alfieri et al (2012) developed a web-based interactive radiation oncology module and tested its effectiveness using a multi-centre randomised controlled, pre/post-test design. The intervention group completed the web-based module and the control group completed traditional face-to-face modules; results demonstrated a significant improvement in scores for the intervention group.

Limited research exists that examines the long-term retention of knowledge following completion of e-learning packages. Beckley et al (2000) found knowledge retention to seven months following the completion of K2MS, whereas this study demonstrated retention of knowledge for up to 11 months. Earlier research by Naidr et al (2004) demonstrated retention of knowledge by up to 67% 12 months following an electronic medical informatics course in the Czech Republic. Although sample size was small, the findings from this European study in 2004, when computer-assisted learning and advanced web technologies were beginning to flourish, highlighted the promising future for e-learning. A recent study conducted in the US by Subramanian et al (2012) compared medical students' knowledge improvement and retention following completion of a web-based interactive module or a traditional face-to-face lecture format demonstrating significant improvement and retention in the web-based group. Subramanian et al's study examined retention up to 22 days, compared to this 11-month follow-up period.

The results for user experience are compatible with Beckley et al's (2000) original UK study, where participants confirmed that although K2MS was received favourably, clinicians felt the package was tiring and concentration was difficult to maintain. Concerns around external factors, such as fatigue and large volumes of information and relevance of acid base physiology, may offer some explanation for the significant drop in numbers from pre-testing, completion of K2MS and follow up to 11 months (Beckley et al, 2000). Additional concerns identified in the user experience feedback highlighted issues with work/life commitments and information technology challenges.

Although research suggests that participation in e-learning improves the computer skills of participants cross-culturally (Grant and Brettle, 2006; Yu and Yang, 2006; Billings et al, 2001; Lewis et al, 2001), it remains necessary to evaluate the computer skills and software/hardware availability of the intended audience to reduce frustration and improve motivation (Lu et al, 2009; McVeigh, 2009; Wilkinson et al, 2004; Atack and Rankin, 2002). These issues become even more apparent when dealing with large geographical areas and internet connection issues, as identified in this study. It could be speculated that roll out of the anticipated Australian Government's National Broadband Initiative (National Broadband Network, 2013) may alleviate some of these issues.

More recent studies concerning e-learning suggest motivation is related to lifestyle and work/family commitments. Yu et al (2007) conducted a feasibility study to investigate the reasons why Taiwanese public health nurses adopt or reject continuing education activities. They found that access is impeded by heavy workloads, job stress, family duties and an individual's self-control ability. These findings are further supported by this study's results, which identified work/life commitments, time and access issues as major barriers to successfully completing K2MS.

McVeigh (2009) examined the factors influencing the utilisation of e-learning in 88 UK nursing students using questionnaires and interviews. Findings related to student

functional abilities (computer skills) and perceived abilities based on experiences and expectations. Flexibility of e-learning was the highest rated positive factor, but appeared limited by perceptions of being time consuming, particularly problems with the operation and navigation of the learning tools for those having average or self-taught computer skills. Work/time relationships were seen as a significant focus of participants, issues concerning availability of work computers to complete e-learning and the pressure of clinical workloads made access to e-learning in work time difficult. The authors' results confirm that, with the expansion of available e-learning resources, continuing advances in technology, and positive experiences with accessing e-learning, it is of utmost importance that the intended audience is adequately supported to complete e-learning activities.

## Conclusion

All maternity health professionals have a professional responsibility to ensure their knowledge regarding fetal surveillance is acceptable. K2MS is broadly effective when users can complete it in a timely fashion and integrate what they have learned into clinical practice.

K2MS has been demonstrated to improve and maintain participants' knowledge of CTG monitoring and acid base balance. The authors therefore recommend that WA Health continue to fund and provide access to K2MS, or a similar e-learning package on CTG interpretation and management.

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# Information for authors

*Evidence Based Midwifery* is published quarterly and aims to promote the dissemination, implementation and evaluation of midwifery evidence at local, national and international levels. Papers on qualitative research, quantitative research, philosophical research, action research, systematic reviews and meta-analyses of qualitative or quantitative data are welcome. Papers of no longer than 5000 words in length, including references, should be sent to: rob@midwives.co.uk in MS Word, and receipt will be acknowledged. Suitable papers are subject to double-blinded peer review of academic rigour, quality and relevance. Subject area and/or methodology experts provide structured critical reviews that are forwarded to authors with editorial comments. Expert opinion on matters such as statistical accuracy, professional relevance or legal ramifications may also be sought. Major changes are agreed with authors, but editors reserve the right to make modifications in accordance with house style and demands for space and layout. Authors should refer to further guidance (RCM, 2007; Sinclair and Ratnaike, 2007). Authorship must be attributed fully and fairly, along with funding sources, commercial affiliations and due acknowledgements. Papers that are not original or that have been submitted elsewhere cannot be considered. Authors transfer copyright of their paper to the RCM, effective on acceptance for publication and covering exclusive and unlimited rights to reproduce and distribute it in any form. Papers should be preceded by a structured abstract and key words. Figures and tables must be cited in the text, and authors must obtain approval for and credit reproduction or modification of others' material. Artwork on paper is submitted at the owner's risk and the publisher accepts no liability for loss or damage while in possession of the material. All work referred to in the manuscript should be fully cited using the Harvard system of referencing. All sources must be published or publicly accessible.

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# News and resources

**Florence Nightingale Foundation research scholarships**
Applications for the Florence Nightingale Foundation research scholarships open in February 2014. They are available to midwives registered with the NMC, who work and are resident in the UK. Up to £5000 is available to undertake a course in research methods, research modules or a dissertation/thesis. All applications must involve clinically-focused research. For more information, visit: florence-nightingale-foundation.org.uk

**Jean Davies Award (Iolanthe Trust)**
This new award will be available for midwives working to address the impact of social inequalities on wellbeing. The award is worth up to £5000 per year. Midwives, student midwives or interprofessional teams led by a midwife can apply. The lead midwife or student midwife must be an RCM member. Applications open in November and the closing date is 31 January 2014. For more information, visit: iolanthe.org/jean_davis.cfm

**ICM congress 2014**
Early bird ticket registration for the 30th ICM congress, which will be held in Prague on 1 to 5 June, closes on 21 February. A record number of delegates have already registered to attend the congress, the theme for which is 'Midwives: Improving women's health globally'. Midwives hoping to be at both the opening ceremony and the scientific congress are reminded that separate tickets are required. There are special rates for students and newly qualified midwives. For more information, visit: midwives2014.org

**RCM awards: shortlist announced**
The shortlisted nominees have been announced for the 2014 RCM Annual Midwifery Awards. The awards celebrate achievement in UK midwifery and booking for the prize giving ceremony, which will be held in London on 22 January, is now open. There are special rates available for RCM members and group discounts for those who book a full table of 10. For more information, visit: rcmawards.com/shortlist

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