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Using social media for research

Key words: Social media, research, internet statistics, evidence-based midwifery

This editorial has one key message for readers – the global field of online data is ripe for harvesting and the harvesters need to be ready to take up their tools and do their job within the confines of their everyday ethical and professional code of conduct.

Social media platforms include Facebook, Twitter, Instagram, blogs, discussion forums, Wikipedia, and other sites that contain user-generated information. Online data generated by the user who tweets, blogs, shares videos and photographs has grown exponentially since the 1980s. If we review the latest statistics on internet use by the world (Greenwood et al, 2016), we find data demonstrating eight out of 10 online users in the US now use Facebook, 32% use Instagram, 31% Pinterest, 29% LinkedIn and 24% Twitter. Younger women (18-29) continue to be the lead users (88%) compared to 65% for those over 65. This is of immense importance to midwives, who will engage with younger women of childbearing age. PEW also reports that almost half of the Instagram users access the platform daily, as do 42% of Twitter's users. Of interest in this report is the data on social media matrix, where it is evident that more than half of online adults (56%) used more than one of the five social media platforms. PEW reported 95% of Instagram users, 93% of Twitter's and 92% of Pinterest users were also on Facebook. Furthermore, this most recent survey explored the use of apps for the first time, as almost 72% of US adults are now using mobile devices, and nearly 30% of smartphone users were using apps, such as WhatsApp, with a continuing trend demonstrating increased usage by the younger generation (18-29).

These recent statistics are clear indicators of the growth of user-generated content now available on the internet and this is of immense interest to all who are involved in health research. However, it is important to be aware of a key factor that will have implications for clinicians, researchers and educators in health and that is the shift from computer use to mobile use and the power of the handheld mobile device for instantaneous use. The speed of access, the globalisation and the instant sharing of data are growing rapidly. If you are planning to do online research, it is important to be familiar with a range of tools for data access, data management and data analysis and to be very conscientious in your ethical and professional stance.

Regardless of the reason for your research (for example, exploring attitudes, seeking data on behavioural trends, intervention design and testing), you need to obtain ethical approval from your local institution. However, there is much debate in the literature on what is public data and many question why they should not use data from a person who has already consented to being used for research purposes and agreed to their data being accessed by third parties. Few people read the small print and tick the box rapidly to access the platform. Remember – your personal data is held on

Twitter and it is a soapbox platform to share with the world. If you are doing online research using any of the social media platforms, it is essential for you to decide if the data is public or private and if you think the user-generator wants the world to see everything.

As professionals, we need to act respectfully, confidentially and sensitively. We must be wise to the potential for harm and the benefits of insightful knowledge and take action to protect the individual, the profession, the institution and ourselves. It is so easy to take a simple phrase for use in research from a blogger, search on Google and within seconds we can identify the precise source, thus risking exposure of the user-generator. Thankfully, we now have recently published guidance *Social media research: a guide to ethics* (Townsend and Wallace, 2017). This document provides a set of ethical guidelines for use by researchers, ethics committees and anyone using online research methodologies. They have produced a framework for ethical research and social media data that takes the researcher through a series of steps to consider legality, privacy and risk factors and publication issues. They provide an extremely helpful series of grounded research case studies using social media to facilitate understanding of the key issues for consideration in different types of research. Another factor is awareness of the rapidity of growth in this area and the need to act from best research ethics principles in any research study.

We must bear in mind the vast array of tools now available to assist us in data management, data analysis and data interpretation. Ahmed (2017) provides an excellent review of the most up-to-date tools, their application, cost and technical requirements. Tools such as Boston University Twitter Collection and Analysis Toolkit are particularly valuable to researchers undertaking Twitter research. Social media research is developing at a phenomenal rate and we need to have guidance on ethical as well as professional and moral issues, so that we can be well prepared to harvest this field of research.

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Professor Marlene Sinclair, editor

PhD, MEd, BSc, DASE, RNT, RM, RN.
Professor of midwifery research and head of the Centre for Maternal, Fetal and Infant Research at the University of Ulster, Northern Ireland

An analysis of motivational goals in breastfeeding instruction in a Thai cultural setting

Lesley Dornan¹ PhD, BSc, SCPHN, HV, RN. Marlene Sinclair² PhD, MEd, PGDip, BSc, RNT, RM, RN. W George Kernohan³ PhD, BSc. Pikul Suppasan⁴ RN. Siriphon Srisawat⁵ RN.

1. Health visitor and research associate, Institute of Nursing and Health Research, University of Ulster, Newtownabbey BT37 0QB Northern Ireland.

Email: dornan-L1@email.ulster.ac.uk

2. Professor of midwifery research, Institute of Nursing and Health Research, University of Ulster, Newtownabbey BT37 0QB Northern Ireland. Email: m.sinclair1@ulster.ac.uk

3. Professor of health research, Institute of Nursing and Health Research, University of Ulster, Newtownabbey BT37 0QB Northern Ireland. Email: wg.kernohan@ulster.ac.uk

4. Lactation nurse, Faculty of Nursing, Chiang Mai University, Chiang Mai 50200 Thailand. Email: psuppans@gmail.com

5. Head nurse, Faculty of Nursing, Chiang Mai University, Chiang Mai 50200 Thailand. Email: ssysawa@med.cmu.ac.th

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Abstract

Background. Motivation and goal setting can play a significant role in breastfeeding behaviour. Effective antenatal education has been recognised as a key component within breastfeeding decision-making. The inclusion of specific and relevant goals can increase self-efficacy and improve performance.

Aim. To observe motivational influences communicated by midwives in breastfeeding instruction in a Thai cultural setting.

Methods. A total of 75 hours of observation were completed in eight instructional environments. Field notes and a semi-structured observation schedule were implemented to identify cultural and motivational content of routine breastfeeding education. Goals were identified through a motivational framework.

Findings. Key breastfeeding themes identified in the instruction included 'Breast: the best option; Best for mum; Best for baby; and Best for Thais'. Further themes were 'Start off well; Building confidence; Managing tough times; and The Thai way'. There were a significant number of goals and indicators within the instruction to allow women to achieve and measure success.

Conclusion. Breastfeeding instruction offered within a supportive environment with clear goal structures and culturally relevant information appears to offer a motivationally positive environment for women to begin their breastfeeding journey.

Key words: Breastfeeding, instruction, motivation, context, culture, adaptation, evidence-based midwifery

Introduction

Breastfeeding support is a routine component of a midwife's role, but recent research has suggested that midwives face a tension between their desire to support women in the early days of breastfeeding initiation, and the perceived risk of failure if mothers decide not to persist (Gustafsson et al, 2017; Battersby, 2014). Key factors for successful breastfeeding include consistent advice, practical support, positive attitudes and trust (James and Sweet, 2016). While traditional methods of instruction focused on position and latch, more contemporary approaches included the importance of self-efficacy, a supportive environment and care centred on the breastfeeding dyad (Schafer and Genna, 2015). A lack of, or conflicting, information may have a significant influence on the duration of breastfeeding (Wandel et al, 2016).

However, culture plays a meaningful role in breastfeeding behaviour including local practices during early initiation and the influence of parents (Bazzano et al, 2015; Premji et al, 2014; Frota et al, 2009). A recent study completed in Ireland suggested that normalising breastfeeding at individual, community and societal levels was essential in the promotion of the behaviour (Leahy-Warren et al, 2016). A recent *Lancet* series recognised that breastfeeding is no longer the norm in many cultures, and supportive measures including policy directives, workplace support and healthcare services are all required (Rollins et al, 2016).

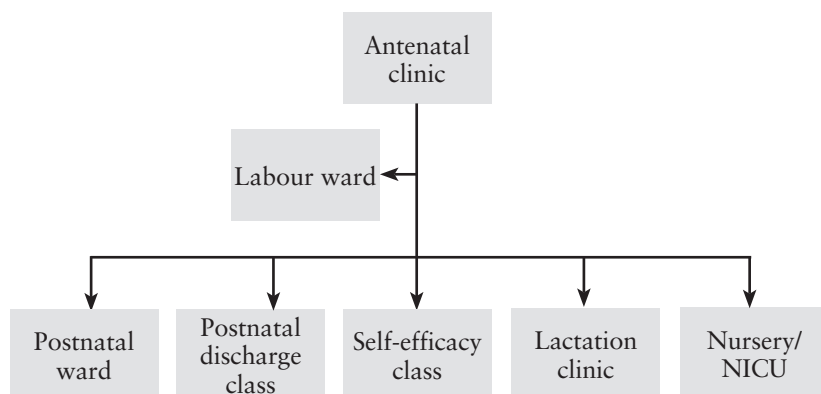
Antenatal education is recognised as an ideal opportunity for women to be able to communicate effectively with midwives, gather relevant information and make their own choices (Nolan, 2009). Understanding the goals and underlying motivation contained in breastfeeding instruction, should enable midwives to give clear and comprehensible guidance in a culturally appropriate way. Goals set by midwives during routine instruction may influence maternal motivation in a positive or negative manner depending on the clarity of the goal structure (Stockdale et al, 2008). Therefore understanding the goals which are set and the influence they may have within breastfeeding environments is critical, not only to breastfeeding promotion but building a successful programme to encourage sustaining of the behaviour. This paper explores the motivational influences communicated by midwives during antenatal and postnatal breastfeeding instruction.

Aim

To observe motivational influences communicated by midwives in breastfeeding instruction, in a Thai cultural setting. The objectives are to:

- Identify and analyse themes suggested within breastfeeding instruction
- Examine motivational content within the identified themes
- Identify cultural beliefs and practices suggested within the breastfeeding instruction

Figure 1. Breastfeeding instructional environments



Method

An analysis was completed of all antenatal and postnatal breastfeeding instruction in a university hospital in northern Thailand. The aim was to identify motivational influences as communicated by health professionals through breastfeeding instruction. Ethical approval was obtained from Ulster University ethical sub-committee, Northern Ireland; and Chiang Mai University ethical committee, Chiang Mai, Thailand. Recruitment for the study took place in the midwifery unit in Chiang Mai University Hospital, northern Thailand.

A convenience sampling approach was implemented to facilitate a breadth of observation with the minimum of disruption to women and midwives. Participants were identified and approached by staff in the unit and offered information packages prior to written consent being obtained. Alternative instruction was available for those who did not wish to participate in the study. Midwives who preferred to be excluded in the study were not included in the observation sessions. Following consultation with the Thai research team, eight potential environments were identified where breastfeeding instruction may be offered (see Figure 1).

A total of 75 hours of observation were completed (n=204 mothers) in 64 midwife-led environments by the researcher, and on occasions, an independent observer, both whom understood Thai. Field notes were completed during each session with a focus on breastfeeding goals, motivational and cultural content. All information was documented, transcribed and analysed immediately after each observation. Thematic and content analysis was completed through the implementation of Braun and Clarke's (2006) framework and Sansone and Harackiewicz's (2000) goal structure. Identified motivational goals were colour-coded and transferred to an observation schedule for analysis. Following the Braun and Clarke (2006) framework, data were checked and initial codes given. A search for themes was completed. Identified cultural and motivational themes were colour-coded and transferred to a thematic analysis table and reviewed prior to overarching and sub-themes being allocated. Data was verified by the research team and an independent motivational researcher. All data were kept in a secure location and transferred to an encrypted and

password-protected university computer, and backed up as per university guidelines.

Findings

The university hospital was not a recognised Baby Friendly hospital but implemented many of the recommended guidelines advised by the Baby Friendly Initiative (Dornan et al, 2015; WHO and Unicef, 2009). With new medical leadership in 2000, a high value for breastfeeding was promoted and changes implemented following consultation with staff encouraging multi-professional buy-in (Dornan et al, 2015). Routine breastfeeding instruction was offered on a daily basis in early morning classes within the antenatal

clinic, and women were encouraged to attend. Women of all gestational stages were included in the classes along with family members. Labour ward classes were held during a tour of the unit between weeks 34 and 38, and included a short information session including the value of skin to skin and early initiation of breastfeeding.

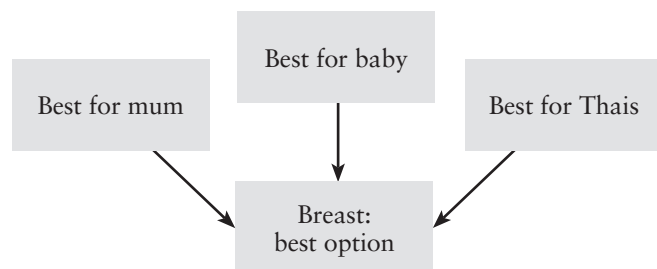
Postnatal breastfeeding instruction was observed in different settings throughout the maternity unit. This included individual instruction and support from midwives, and group instruction held twice a day on the postnatal ward. Additional support was available within the lactation clinic located on the postnatal ward for mothers with more complex breastfeeding needs, as well as those whose infants were in the NICU receiving specialised care. Classes were also held in the nursery unit for mothers initiating breastfeeding.

In each of these settings, routine instruction included breast massage, hand expression and support with pumping, if and when required. The self-efficacy class, facilitated by trained nurses from the lactation clinic, was initiated following an internal unpublished research project investigating self-efficacy in breastfeeding, and was held on the ward every two to three days for all women prior to discharge. This class had a specific focus on breastfeeding practices while the postnatal discharge class, also offered prior to discharge, included advice on nutrition, postnatal care and potential neonatal emergencies. Women who had uncomplicated births received hospital care

Table 1. Motivational goal structures as applied to breastfeeding (Stockdale et al, 2008)

Purpose goals	Suggested reasons or purposes for women to consider breastfeeding which become the underlying motivational influence behind goal setting
Target goals	Specific methods and skills women would be able to initiate to achieve breastfeeding goals
Performance feedback indicators	The provision of specific and relevant information which will allow women to know that they are achieving their selected goals

Figure 2. Overarching themes in goal structure in breastfeeding education



for three to five days, with more complex cases remaining longer as required.

Motivational goals

Sansone and Harackiewicz (2000) suggested that interest in a behaviour and commitment to achieve or change that behaviour come from two types of goals which are associated with the task or activity; they named these as purpose goals and target goals. However, to achieve success in a task, feedback is also required. Within this goal structure, these are called performance feedback indicators. This goal structure, first applied to breastfeeding behaviour by Stockdale et al (2008), recognised the influence of goal-orientated suggestions by midwives which may influence women’s motivation and behaviour.

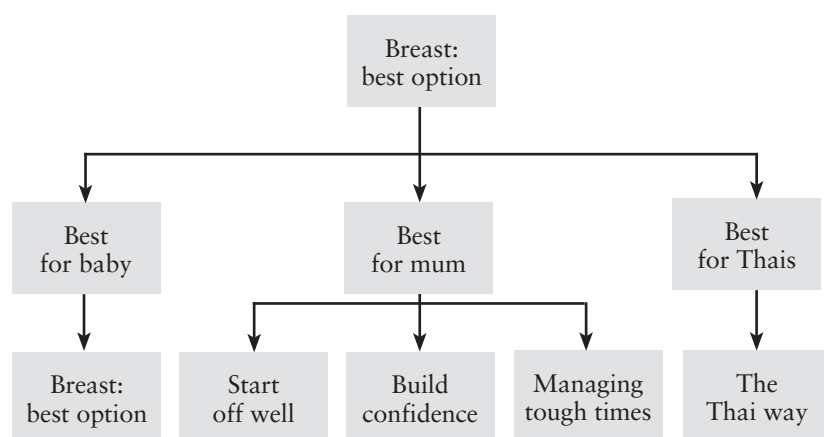
The three goal structures were identified in the breastfeeding instruction through the analysis and implementation of the Sansone and Harackiewicz (2000) goal framework. The overarching theme identified through the breastfeeding instruction in this setting was that breastfeeding was the best option. This included the concept that breastfeeding was preferable for mother, baby and for Thais (see Figure 2).

In addition, within these themes there were further identifiable sub-themes which were suggested by the midwives during the antenatal and postnatal breastfeeding instruction. These were:

Breast: best option

The theme Breast: best option was similar to the overarching

Figure 3. Identified sub-themes in breastfeeding instruction



theme seen within the breastfeeding instruction but contained specific midwife-led reasons or purpose goals to consider breastfeeding. The midwives regularly proposed goals which encouraged mothers to consider and value breastfeeding within the instruction. These included suggestions such as:

“Breastfeeding prevents breast cancer and ovarian cancer” (ANCV). And:

“Breastfeeding helps with postpartum bleeding” (ANCV). They also highlighted the concept that breastmilk offers protection and good health for infants:

“Breastfeeding helps to protect against allergies and disease” (ANCV). Or:

“Breastmilk has over 200 vitamins” (ANC3, MW3).

Attachment was also recommended, for example:

“Skin to skin has many benefits, keeping warm, the best warmth is mum” (LW2, MW2). Or:

“A baby receives a sense of security and wellbeing both emotionally and physically” (ANCV).

These reasons to consider breastfeeding (purpose goals) were primarily suggested during the antenatal instruction but were reinforced again during the postnatal phase, particularly in the breastfeeding self-efficacy class.

Start off well

The next theme which emerged from the analysis was the concept of ‘Starting off well’. This theme promoted the recommendation that establishing a good practice of breastfeeding in the early days was important in the sustainment of breastfeeding behaviour. The theme included target goals on achieving a good position and latch, planning ahead, and encouraging feeding and hand expression of breastmilk. Much of this advice was given both verbally and with a hands-on approach from midwives which was acceptable within the culture. Examples of this include:

“After birth, hormones will be produced in your body so it is good to have your baby start breastfeeding within an hour of being born” (ANC, MW1).

The midwives also acknowledged that women may have sore or cracked nipples and advised mothers that:

“You can use your hand to express if your nipples are sore or cracked” (ANC4, MW3).

Very practical instruction was offered to manage the position and latch during feeding. This included:

“Put your four fingers under the nipple and the thumb above the nipple. Bring the breast to your baby’s mouth gently” (ANCV).

The midwives would then demonstrate with the mother by helping to position the baby to learn how to achieve this.

Much of the instruction regarding this theme was given in the form of target goals or ways to achieve successful breastfeeding. Performance feedback indicators were offered to assist women in measuring if they were being successful or not. These were given in a positive form of

instruction, such as:

“Make sure that baby’s mouth is wide open and latches on well” (ANC3, MW3).

Or, included ways of recognising a poor latch, for example:

“If you don’t detach the baby properly, it will really hurt” (ANC1, MW1). And:

“If the baby is not latched well and is just sucking on the nipple, it will become very sore” (ANC3, MW3).

Other suggestions for starting breastfeeding well included building a routine by feeding every two to three hours, and recommendations to feed the baby frequently.

Within the postnatal instruction, there were a number of goals set around long-term plans related to returning to work and weaning. These included an emphasis on learning to express and pump maternal breastmilk in preparation for the mother returning to work. This had particular value in the Thai context as national legislation provides maternity leave for 14 weeks, with 45 days paid by the employer and 45 days covered by social security. Government employees are entitled to 90 days paid allowance and 150 days unpaid leave (Dornan et al, 2015).

Building confidence

Confidence is recognised as a critical component in breastfeeding behaviour. Within the observed instruction, this theme was emphasised in the antenatal and postnatal phases with specific goals suggested to mothers. Much of the instruction offered was designed to build maternal confidence and address potential challenges of insufficient milk supply, early initiation, and recognising successful breastfeeding. Examples of this included:

“You may not have much milk in the first few days... as baby feeds longer, your milk will increase” (ANC1, MW1). And:

“You can see the top of the areola but not the bottom” (ANC3, MW3).

In particular, this theme was evident during the observation in the lactation clinic and nursery instruction where midwives suggested practical ways for mothers to overcome challenges. Mothers were frequently encouraged to keep practising breastfeeding skills and were offered ways of measuring success, such as recording urine output and observing maternal milk supply. Videos shown during the self-efficacy class discussed challenges that experienced mothers had encountered, such as engorgement and breastfeeding following a CS.

The issue of insufficient milk supply was raised again during the postnatal self-efficacy class with a visual aid to demonstrate the early days of milk production.

Within these themes, there were also a number of target goals suggested to mothers to encourage them to look after their own health and adopt healthy behaviours while breastfeeding. These included suggestions related to healthy eating, accepting family support, and not skipping meals.

Managing tough times

The theme ‘Managing tough times’ was of considerable interest during the analysis, as it recognised and normalised

potential breastfeeding challenges. Topics such as engorgement and inverted or short nipples were identified, and recommendations to overcome them were offered by the midwives in both the antenatal and postnatal phases of the instruction. Stress was also highlighted but limited suggestions to manage stress were given, rather mothers were simply advised not to get stressed. Within this theme the topic of formula feeding was discussed, but often it was suggested through avoidance goals. For example, midwives were observed suggesting that formula milk may cause constipation or contain too much sugar and that breastfeeding was better.

The postnatal discharge class, offered between day three and five to all mothers on the ward, concentrated on potential health problems mothers may encounter with their infants in the early postnatal phase. This included subjects such as vomiting, jaundice, and constipation. Many of these topics had target goals and performance feedback indicators combined to enable mothers to establish what they needed to do and how to measure the action taken.

The Thai way

This theme contained a number of recommendations and activities related to cultural beliefs and practices. Common suggestions which incorporated Thai beliefs included staying inside for the first month, avoiding spicy food, advocating breastfeeding as a way of helping Thai society, and practical ways of increasing maternal milk supply through massage. The concept of encouraging mothers to care for their breasts was a recurrent theme within the instruction.

Within the maternity unit, there was a cultural practice of encouraging mothers to attend breastfeeding sessions on the ward. This included instruction and assistance by the midwives in applying warm cloths onto the breasts, and breast massage to increase milk supply. The midwives worked consistently to reinforce and correct cultural beliefs and practices, for example:

“The nurses try to encourage the mums both with bathing and breastfeeding to build their confidence so they can then feel confident to teach the grandparents and correct cultural practices” (N2, Obs1, NLN1).

Within the observed instruction cultural practices which enabled breastfeeding behaviour were encouraged while unhelpful practices were highlighted and addressed. In doing so, it may be argued that breastfeeding behaviour was normalised as advocated by recent research.

Discussion

Social support and maternal care is not guaranteed in every cultural context, although it can come from a range of sources, but the normalisation of breastfeeding behaviour and support given in the early days as suggested in a study in Ireland is recognised as key in breastfeeding behaviour (Leahy-Warren et al, 2016; Leahy-Warren, 2007).

It may be argued that traditional Thai culture is supportive of breastfeeding, but an increased media promotion of formula milk and reduced maternity leave may account for an exclusive breastfeeding rate of 12% at six months

(Dornan et al, 2015; Unicef, 2014).

In this observation, the normalisation and promotion of breastfeeding as the best option for mothers from the very first antenatal instruction, built a strong foundation of value within the unit. Throughout the observation, breastfeeding goals were introduced routinely as ways to motivate women to breastfeed. Many of the goals reflected this value and placed a focus on learning to breastfeed successfully.

For women who encountered challenges, particularly in the early days, support was available through the midwives on the postnatal ward – they were observed spending time with mothers, particularly in the first two to three days. The lactation nurses were accessed through a referral system from midwives, the nursery staff or medical staff, but they also routinely saw mothers when teaching the self-efficacy class. As the lactation class and clinic were positioned on the postnatal ward, mothers appeared to be aware of and have access to the service as required.

Midwife-led maternal goals were suggested throughout the antenatal and postnatal breastfeeding instruction. While there did not appear to be any co-ordination between the settings, self-efficacy and the development of maternal breastfeeding skills were highlighted by all staff in the unit as critical to overcoming breastfeeding challenges. These were communicated clearly as reasons to consider breastfeeding, ways to achieve it, and signs by which mothers could measure success. Stockdale et al (2011) suggested that when all three of these goal structures are in place, women are able to develop a long-term strategy for breastfeeding which allows them to sustain the behaviour.

A common theme within breastfeeding literature is the belief in maternal milk insufficiency (Lundberg and Thu, 2012; Osman et al, 2009; Tarrant et al, 2004). Indeed, a recent study noted that maternal breastfeeding self-efficacy may impact perceived milk insufficiency, and argued that breastfeeding interventions should be directed to increase maternal confidences (Galipeau et al, 2017). This belief was evident during the observation and addressed during the instruction within the themes. The identification and recognition of early challenges of potential milk insufficiency, combined with strategies to overcome the challenges, therefore should provide both the goal and motivation to continue and build confidence. Within the self-efficacy class, lactation clinic, and nursery instruction, there were very clear guidelines set by the midwives regarding milk supply. This was in part due to the measurement required for specialised care of the infants, but it was presented as a measurement of success, with goals set to achieve the volumes required as well. In addition, there was a considerable amount of support provided to increase maternal milk supply.

There were some indications of maternal expectations being set within the goals, particularly within the theme Breast: best option. Emotions of warmth, happiness and bonding associated with breastfeeding were expressed and advocated regularly by the midwives; however this may create motivational barriers if, for example, the mother did not bond naturally with her infant due to surgery or complications. Equally there was limited information

observed during the instruction on the different temperaments of infants which may cause difficulties if the mother has an unsettled baby. Two of the identified themes in the analysis were ‘Start off well’ and ‘Managing tough times’, which suggested that time and practice may be required to be able to establish breastfeeding. This may help to balance women’s expectations of breastfeeding and maintain motivation.

As noted in the findings, there was some evidence of avoidance goals. As the name suggests, these are goals which are proposed to avoid a situation or outcome. Examples of these included the avoidance of stress or pain, particularly related to latching the infant to the breast. While instruction was given on recognising an inferior latch, limited information was given on how to avoid or relieve stress. However, in Thai culture, health professionals are highly regarded and respected, so it is possible that the advice to not feel stressed is enough of a motivating factor to enable mothers to try and avoid stressful situations.

Unicef and the Baby Friendly Initiative promote breastfeeding as the best form of infant feeding, with international guidelines to support the initiative (Unicef, 2017). This view was promoted as the best option for the mother, baby and Thais and formed the policy basis within the unit.

There was limited information offered in relation to formula feeding and on occasions information related to formula was given that may have been perceived as a negative choice. While this reinforced the high value of breastfeeding within the unit, it may have presented mothers with motivational barriers, in particular if experiencing difficulties. Mothers who experience breastfeeding challenges and introduce formula may have lower self-efficacy and a sense of regret (Shepherd et al, 2017). Equally it has been argued that midwives may feel a sense of failure in their role if women are unable to achieve their breastfeeding goals (Gustafsson et al, 2017). However, it was observed that on occasions within the unit, mothers were offered formula milk when it was medically required, while supporting mothers in increasing their milk supply.

There was no evidence of a policy or practice of donated breastmilk observed during the research.

Implications

In spite of some motivational issues, such as the lack of information of the different temperaments of babies, suggested avoidance goals related to stress, and formula milk within the instruction, the breastfeeding programme in this Thai unit appeared to offer a comprehensive and motivationally positive approach to breastfeeding education.

Positive elements included the acknowledgement of breastfeeding challenges in the early days and strategies to overcome them, the value of starting the maternal breastfeeding journey well, the recognition of the importance of building maternal self-efficacy, and the inclusion of cultural beliefs and practices. In particular, the introduction of the self-efficacy class following an internal research study appeared to be key in reinforcing breastfeeding practices and

correcting potential misunderstandings or misinformation from one-to-one midwife instruction.

Cultural influences, which may have caused maternal barriers, were included in the instruction, and ways to overcome cultural barriers, such as influences from an extended family, were addressed.

The observation of breastfeeding instruction in this Thai setting offered valuable insights. There were a significant number of goals which were introduced during the antenatal sessions, and then revisited and reinforced during the postnatal instruction.

The majority of the goals were congruent, with combinations of purpose goals, target goals and performance feedback indicators – all of this allowed the women to decide the reasons they would consider breastfeeding, ways to manage their goals, and measurements to allow them to achieve success.

While there was some evidence of goal incongruence, the overall attitude of the staff across the unit was that breastfeeding was the best option for mother, baby and Thai people.

Conclusion

The breastfeeding instruction observed in this Thai unit appeared to offer a supportive environment with clear goal structures and culturally relevant information, creating a motivationally positive environment for women to begin their breastfeeding journey.

Potential challenges included within the instruction allowed women to identify and employ strategies to overcome difficulties while measuring their success.

From a theoretical motivational perspective, this should allow women to move from a successful initiation to sustaining breastfeeding behaviour.

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Diet and eating habits of expectant parents and families in Ras Al Khaimah, Emirates: an exploratory study

Mary Steen¹ PhD, MCGI, PG Dip HE, Dip ClinHypn, RM BHSc, RGN, UniSA. Richard Mottershead² MSc, RMN, BN, BSc, PG Cert, RNT. Johaina Idriss³ MSc, RD. Natalie Parletta⁴ PhD, BPsych, MDiet, RNutr. Basma Aftab⁵ PhD, MSc, BSc. Vijaya Kumardhas⁶ PhD, MSc, MA, BA.

1. Professor of midwifery, School of Nursing and Midwifery, University of South Australia, Adelaide SA 5000 Australia. Email: mary.steen@unisa.edu.au
2. Senior lecturer, Higher Colleges of Technology, Ras Al Khaimah, PO Box 4793, United Arab Emirates. Email: rmottershead@hct.ac.ae
3. Registered dietician, Faculty at Nutrition and Health, United Arab Emirates University, PO Box 15551, United Arab Emirates. Email: jidriiss@uaeu.ac.ae
4. Senior research fellow: nutrition and dietetics, Centre for Population Health Research, Sansom Institute, University of South Australia, GPO Box 2471, Adelaide SA 5001 Australia. Email: natalie.parletta@unisa.edu.au
5. Registered nutritionist, Faculty of Health and Social Care, University of Chester, Parkgate Road, Chester CH1 4BJ England. Email: m.sinclair1@ulster.ac.uk
6. Dean, College of Nursing, RAK Medical and Health Sciences University, Ras Al Khaimah, PO Box 11172, United Arab Emirates. Email: vijaya@rakmhsu.ac.ae

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Abstract

Background. Obesity is a problem that has reached epidemic proportions around the globe, attaining an alarming level in Arab Gulf countries. Poor diets and a lack of essential nutrients being consumed by pregnant women has been acknowledged, and it is recognised that parental eating habits and preferences can contribute to the development of unhealthy diets in children. However, there have been no studies exploring diet and eating habits that have targeted expectant parents and their families in the United Arab Emirates (UAE).

Aim. To explore the diet and eating habits of expectant parents and their families during pregnancy and test the feasibility of introducing an EatWell Assist workshop and diary, to increase awareness of healthy eating to improve family diet and nutritional status.

Method. Participants were recruited from three study sites in Ras Al Khaimah, UAE. Initially, a purposive sample of 20 expectant mothers and 10 expectant fathers were interviewed. Phase 2 of the study recruited 15 expectant mothers and five female family members or close friends to attend one of three EatWell Assist workshops and complete a diary for four weeks. Thematic analysis of interview transcripts and simple analysis of the structured questionnaire was undertaken.

Results. The thematic analysis identified seven main themes for expectant mothers' current diets and eating habits. These were: knowledge and understanding, eating patterns, fast foods, using supplements, likes and dislikes, body image, influences. Five similar main themes emerged for expectant fathers but the theme, 'no supplements', was in contrast to expectant mothers' 'using supplements', and 'body image' did not emerge. Overall, the findings demonstrated the workshop evaluations were positive and participants gained knowledge and valued the opportunity to attend. Completing an EatWell food diary enabled expectant mothers to improve their diets and eating habits.

Conclusions. Expectant parents' current diet and eating habits were significantly influenced by the availability of a Western diet as well as traditional foods and cultural eating preferences. There was some improvement in healthy eating behaviours after attending a healthy eating workshop and keeping a daily food diary. Expectant fathers' work commitments and women's preferences inhibited opportunities for them to receive healthy eating education. Strategies to engage with expectant fathers need to be implemented and online education options may be worth considering.

Key words: Diet, eating habits, pregnancy, exploratory study, healthy eating, cultural eating preferences, body image, evidence-based midwifery

Introduction

Eating an unhealthy diet and not consuming sufficient nutrients during pregnancy is associated with increased risks for complications and poor outcomes (Marchi et al, 2015; Muktabhant et al, 2015). It is well recognised that being overweight or underweight during pregnancy increases risks of poor maternal and infant outcomes (Dennedy and Dunne, 2010). There is evidence that overweight and obese women who become pregnant are at increased risk of pre-eclampsia, hypertensive and thromboembolic disorders, and gestational diabetes, which can lead to having a miscarriage, a stillbirth, or a large or low birthweight baby (Ramachenderan et al, 2008). A study undertaken in the US demonstrated that excessive weight gain and a poor diet consumed by Hispanic women who were classified as obese during their pregnancy, was a risk factor for gestational diabetes

(Tovar et al, 2009). Gestational diabetes is also becoming an increasing problem for pregnant women and urgently needs to be addressed; it presents an increased burden on the health system with longer hospital stays, increased risk of maternal haemorrhage, and surgical interventions. While gestational diabetes is beyond the scope of this paper, it is a pregnancy health-related topic that needs further research.

It is now recognised that intergenerational effects of poor diet on children's health are perpetuated directly by obesity and diabetes in pregnant women (Hillier and Olander, 2017). In addition, parental eating habits and preferences can contribute to the development of unhealthy diets and eating habits in children (Savage et al, 2007). However, there are no studies focusing on expectant parents and their families in United Arab Emirates (UAE).

Previous studies have targeted school children and the

general population. Al-Haddad et al (2005) reported that the frequency of obesity among children residing in the UAE is two to three times greater when compared to the international average. UAE's obesity rates now rank among the highest in the world and an unhealthy diet and lack of exercise are primarily the reasons for this problem (Dobbs et al, 2014). In this region, the prevalence of being overweight and obesity is estimated to be between 3% and 9% in preschool children, 12% and 15% in school children, 15% and 45% in adolescents, 35% and 75% in women and 30% and 60% in men (Musaiger, 2004). Eating poor diets and a lack of essential nutrients being consumed by pregnant women has been acknowledged in other Arab Gulf countries (Almurshed et al, 2007).

Nevertheless, pregnant women are very willing to make important adjustments to their diet and eating habits as they want to provide the best start in life for their developing baby (Wilkinson and Tolcher, 2010; Szwajcer et al, 2005). However, health professionals, including midwives, do not seem to capitalise on targeting expectant mothers to promote healthy eating and modifying eating habits (Begley, 2002). Health professionals may lack the knowledge, confidence and skills to inform and support pregnant women and their family about healthy eating (Arrish et al, 2014). Research has shown that pregnant women only receive very basic information during pregnancy and an opportunity to support women to eat healthily and modify poor eating habits is lost (Arrish et al, 2014; Begley, 2002).

It is now well known that diet and adopting healthy eating habits are primarily modifiable lifestyle risk factors for cardiovascular diseases, stroke, and diabetes, which increase the risks of disability and mortality globally (WHO, 2009). These chronic conditions create challenges for health budgets, productivity and quality of life. Conversely, consumption of nutritious, minimally processed foods is associated with decreasing the risk of these chronic health conditions (Sofi et al, 2008) and also better psychological wellbeing (Oyebode et al, 2014; Parletta et al, 2013). Therefore, eating healthily and adopting good eating habits is vitally important, particularly during pregnancy when diet not only affects the expectant mother, but also her developing baby.

Background

Planning and during a pregnancy are both good times for women to reflect on their dietary intake, habits and lifestyle, for example, exercise, sleep, relaxation, smoking, alcohol consumption (if culturally accepted). It is also a good opportunity to engage with expectant fathers and families and get them to reflect upon their diets and eating habits. Opportunities to educate about eating a well-balanced diet and the importance of drinking plenty of water to keep hydrated should be emphasised.

The chronic health problems associated with obesity necessitates the need to reverse the increasing rates of obesity in the local population. This therefore justified the need to undertake exploratory research in Ras Al Khaimah (RAK), UAE to identify current habits and assess potential strategies for change.

Aim

The aim of this study to explore the diet and eating habits of expectant parents and their families during pregnancy, and test the feasibility of introducing an EatWell Assist workshop and diary to increase awareness of healthy eating to improve family diet and nutritional status.

Method

Sample and setting

The study population was expectant mothers, and fathers or family members who met the inclusion criteria. A purposive sample was used to recruit 20 expectant mothers and 10 fathers in Phase 1 of the study, and 15 expectant mothers and five family members or close friends, in Phase 2.

The study was undertaken within a 12-month period between November 2015 and November 2016. Fieldwork in RAK, UAE was undertaken in February and May 2016. Local coordinators recruited participants from three study sites in RAK, UAE (RAK Hospital, Saqr Hospital, Sham Hospital) representing both urban and rural populations.

Inclusion criteria

Those included in the study were:

- Expectant mothers who were booked to receive maternity care at one of the three study sites
- >12 weeks pregnant
- Low risk of pregnancy complications
- Planning to give birth in one of the three RAK study sites
- In addition, either their husband or another family member were included to represent the target population.

Exclusion criteria

Those excluded were:

- Expectant mothers not booked for maternity care at one of the three study sites
- <12 weeks pregnant
- Had a medical disorder or gestational diabetes
- >BMI 40, or an eating disorder
- Receiving specialist dietary consultations and support.

Study design

An exploratory study that involved two phases:

- Phase 1: Face-to-face interviews with expectant mothers and fathers to explore their current diet and eating habits.
- Phase 2: Expectant mothers, fathers and family members were invited to attend an EatWell Assist workshop and then complete a food diary for four weeks.

Data collection

An interview schedule guided the interviews which took approximately 45 to 60 minutes. The interviews were undertaken in a quiet room or area in the antenatal clinic at one of the three study sites or in a designated room at the local RAK Medical and Sciences University (RAKMSU). The interviews were undertaken by members of the research team, in both English and Arabic, to capture and represent the responses of the local population of expectant parents residing in RAK. The interviews were not audio-taped as it

was culturally more acceptable to use an interview guide and write participants' responses and quotes in a notebook. Data were written in either English or Arabic; the Arabic was then transcribed into English when interpreting the findings by one of the researchers who is fluent in both languages.

The workshops were held at one of the study sites and the local university (RAKMSU). The content of the workshop was delivered in English and then Arabic, as the study was being undertaken in an Arabic-speaking country. A total of 90 minutes was allocated for the facilitation of the workshop, which included time for discussion, evaluation and guidance on how to complete the EatWell food diary.

Data analysis

Phase 1: A thematic analysis was undertaken to interpret interview data using the Braun and Clarke (2006) six-stage framework to gain insights into expectant mothers' and fathers' current diets and eating habits.

Phase 2: A semi-structured questionnaire was designed and reviewed for content validity and clarity by an English- and Arabic-speaking expectant mother, before the implementation of it being used as a data collection tool. Participants completed this questionnaire at the end of the EatWell workshop and also a food diary for four weeks following the workshop. The questionnaire consisted of 14 structured questions using 1-5 ordinal Likert scale, representing a range of 'strongly agree' to 'strongly disagree' responses, and an opportunity to feed back any other comments or suggestions.

Descriptive data analysis was undertaken to measure participants' responses. Frequencies and percentages were calculated. Open-question responses were recorded as either positive or negative, and this data assisted to triangulate interview data.

Ethical approval was obtained from the RAK research ethics committee and the University of South Australia human ethics committee. The Sheikh Saud Bin Saqr Al Qasimi Foundation for Policy Research funded this research and permission to undertake the study was granted from the Ministry of Health, RAK and the three local study sites.

Findings

The demographics details for participants in Phase 1:

Expectant mothers

Age range: 19 to 40 years. Educational level: four attended secondary education, seven college, seven higher education, and two university. Employment: two were employed, five were students, and 13 were not employed. Ethnicity: seven were Emirati Arabs, one Egyptian Arab, one Lebanese Arab, two Syrian Arab, five Indian South Asians, three Far East Asians (Malaysian, Singaporean, Philippine), one white (UK). Gestational age was between 12 and 39 weeks. Parity: 12 were having their first baby, three had one child, two had two, one had three, one had four, and one had five.

Expectant fathers

Age range: 21 to 53 years. Educational level: one attended primary education, three college, four higher education, two

university. Employment: one chef, three in construction, two in ICT, one in real estate, one teacher, two doctors. Ethnicity: four were Emirati Arabs, one Lebanese Arab, one Syrian Arab, one Egyptian Arab, two Indian South Asians, one Pakistani South Asian. Number of children: six were having their first child, four had other children.

Themes from transcripts

When exploring the expectant mothers' current diets and eating habits, seven main themes were identified from 21 sub-themes. The main themes were: Knowledge and understanding, eating patterns, fast foods, using supplements, likes and dislikes, body image, influences.

Five similar main themes emerged from the 22 sub-themes identified from the fathers' diets and eating habits: knowledge and understanding, eating patterns, fast foods, likes and dislikes, influences. However, the theme 'no supplements' contrasted to the expectant mothers' 'using supplements' theme, and 'body image' did not emerge. Breastfeeding and being a good role model was discussed and relates to some of the main themes discussed below.

Knowledge and understanding

The interview data demonstrated that expectant mothers and fathers generally had a good understanding of what a healthy diet is. But they lacked knowledge about portion sizes, and had a tendency to consume high amounts of carbohydrates, and not enough fruit and vegetables.

Expectant mothers were more likely to drink insufficient amounts of water, while in contrast, expectant fathers drank plenty of water. Expectant fathers' water consumption was linked to being in a hot climate and working hard, often outside, therefore increasing the need to replenish their fluids. The majority of participants, 27 (90%), discussed the importance of drinking sufficient amounts of water daily. However, it was concerning that the majority of the expectant mothers, 16 (80%) of the 20 interviewed, reported they did not drink enough fluids and were susceptible to urinary infections:

"I know I need to drink more water as I get infections, but when I do, I feel too full and bloated, so it is hard for me to do this" (M3).

"I must drink more, especially when I am hot and feel thirsty. I forget to do this and then I get an infection. This is not good for me, or my baby. It stings when I go to the toilet. I have had antibiotics but I need to drink more" (M11).

"I drink but then need to go to the toilet more, especially during the night, so it is a problem for me. Then I get an infection and the doctor treats me with antibiotics. I will be happy when I am not pregnant anymore because of this" (M17).

All expectant mothers and most of the expectant fathers recognised the importance of breastfeeding and benefits for their baby and discussed how they had been advised and given information about breastfeeding. All expectant mothers intended to breastfeed, but a few discussed how they would have to stop early to continue with their studies at university, or if they found it too hard with having other children, they

may stop and formula feed their baby. However, it emerged that there was a lack of knowledge about the benefits of breastfeeding for maternal health and many participants did not know about the benefits for the mother:

"I am not sure what the benefits of breastfeeding are for me. I think it will help me to bond with my baby, but I think it will also make me very tired, so basically, I'm not sure" (M2).

Eating patterns

Participants' eating patterns varied and while most attempted to eat breakfast, lunch, and an evening meal most days, this pattern was often disrupted by work and other social and family commitments:

"My husband works long hours and I am alone often and so do not eat an evening meal... I will have a bowl of soup, some nuts, biscuits to keep me going" (M3).

"I try to eat breakfast, but I start work very early and sometimes I am in a rush and do not have time to eat, so I will take some fruit with me as I dash out." (F3).

Interestingly, it emerged from the data how the importance of being a good role model would have an influence on both expectant mothers' and fathers' current diet and eating habits. This goal would be a motivator to adopt better eating habits, have regular meals and eat more home cooking:

"I want to be a good role model for my baby... I will teach him good eating habits... I will breastfeed, but this might have to be restricted when I go back to work, but I will express and freeze my milk. I will then introduce diet around six months. I will give baby rice, then, blend our food, until my baby can eat solids" (M14).

"I want our baby to have the best start in life, so it is important to be good role models... we will eat as a family and adopt good eating habits. It will be challenging during the week with working, but will have our evening meal together..." (F2).

Fast foods

Eating 'fast foods' for convenience was associated with expectant fathers' work shifts and poor eating habits. Expectant mothers also consumed convenient fast food, such as burgers, fried chicken and fries, as they liked to do so and their children had a preference for this type of food as well. It was highlighted that expectant mothers with other children had to make compromises and allow their young children to eat fast food so they would eat home-made food:

"Honestly, I know fast food is not good but I cannot stop eating because I like it. And my other children like fast food too. They do not like home-made food, they prefer to have fast food. Otherwise they will not eat if I do not provide fast food. I am trying to change our children's eating habits but it is a compromise" (M1).

Use of supplements

Overall, expectant mothers were more likely to report that they took daily vitamins, minerals and probiotic supplements, while expectant fathers were more likely to discuss how they viewed the human body to be like a machine that needed fuel. For example, one participant stated:

"You do not need supplements, perhaps iron, my wife takes them and also those probiotics, but your body knows what it needs, it is like a machine, even in pregnancy... my body lets me know when I need food and fluid, it is like needing fuel to keep a machine running" (F3).

An expectant mother discussing her use of supplements noted how:

"I take a multi-vitamin every day. I did before I was pregnant and will do so after this pregnancy. I take iron tablets and calcium, as my doctor has prescribed these for me. I drink one of those probiotic drinks every morning and it is very helpful with my digestion and I do not feel as sick afterwards" (M6).

Body image

The data clearly showed that expectant mothers were very concerned about their body image and gaining too much weight during pregnancy:

"I am concerned about putting weight on. I do not want to get too big and have trouble getting back to my previous weight. My sister is still trying to lose her baby weight, so I am being careful as to what I eat" (M4).

"I'm very concerned about putting on too much weight. I have put on 10kg since being pregnant. I am now 33 weeks pregnant. I am very concerned about my body weight and how I look. I lost 4kg at the beginning of pregnancy due to sickness. I monitor my weight very closely and I do not want my baby to be large" (M10).

Body image did not emerge as an issue for expectant fathers but a few recognised health problems linked to excessive weight and requested help to lose some weight:

"I am overweight and I have a knee injury and struggle to walk, so I need advice and help as to how I can lose weight. It is difficult for me as I am a chef and I am tempted to eat many times, too many times" (F1).

Likes and dislikes

Interestingly, expectant fathers were more likely to express how they enjoyed food and eating together as a family. Some fathers discussed how they liked cooking when they had time but work commitments limited opportunities and influenced what they consumed. Most expectant mothers consumed Western style food as they liked convenient fast foods, but there was a difference between those residing in the urban city and those in a rural area. Expectant mothers who lived in the mountains were more likely to discuss how they ate locally caught fish and grown vegetables and home cooking, only very occasionally eating out in the city as this was viewed as a special treat:

"I like my food and I enjoy cooking when I am not working. My wife likes my cooking and I encourage her to eat well. I think dinner together as a family is very important, we all catch up with our day. I know I should eat better when at work but it is hard. I sometimes take my own lunch but fast food is too tempting and easy, so I am often weak and buy this type of food but drink lots of water and limit sweet drinks" (F3).

"I like and eat locally caught fish and locally grown foods."

My mother and sister do most of the cooking and we eat as a family... very occasionally I will go into the city with my husband and eat out in one of the shopping malls” (M14).

Influences

Interestingly, during the interviews with expectant mothers there were several myths discussed concerning consuming some types of foods that could have an influence on their pregnancy. For example, myths relating to consuming hot and cold food types are strong beliefs in some cultures:

“Cinnamon is hot and can bring on contractions, so you should avoid consuming cinnamon tea in pregnancy. Also, dates, pineapples, and papaya are encouraged near when your baby is due as it is believed to help bring on contractions. You should restrict these foods in the first three months of pregnancy, as it is believed that this may lead to a miscarriage. Walnuts are good to eat but hot so restrict intake generally, but once again, especially in the first three months of pregnancy” (M9).

“Do not eat camel meat during pregnancy, as it is believed that as a camel’s pregnancy is 10 months, you will be late and go over your expected date, I am not sure about this so I will not eat this meat to be safe” (M5).

In addition, several participants mentioned how the teachings in Islam influenced mothers to breastfeed; it is highly recommended to breastfeed for two years if able. In addition, breastfeeding was viewed as natural and best for

babies and it was questioned why you would not breastfeed as mothers have been breastfeeding for generations:

“I am going to breastfeed for as long as possible. My husband and family will help and support me. My sister breastfed for just over two years as it is recommend in Islam, so I will do the same as I know it is good and natural for my baby” (M15).

“My mother and her mother breastfed, why would my wife not breastfeed our baby? It is natural and best for our baby, I will support my wife, I will cook her good food and remind her to drink plenty. It is recommended in Islam to do this for two years if possible, so this is what we will do” (F3).

Family influences were identified as a possible issue, and several participants discussed how they would have to deal with this sensitively as family members’ intentions are good but the advice may not be the best for eating healthily:

“In India giving honey is a very common practice as it is believed it will settle a baby, so I have to teach my mother and sister this is not good for my baby in the first six months. This will be difficult to do especially if my baby is unsettled or if I am unwell and my mother will be caring for me during the first 40 days” (M20).

Phase 2:

EatWell Assist workshop and evaluation

Following phase 1, the content of the EatWell Assist workshop was modified to include issues that had been highlighted by participants who were interviewed (see Table 1).

Workshop attendance and evaluation

Three EatWell Assist workshops were facilitated, two during February 2016 and a further workshop in May 2016. The total number of participants was 15 expectant mothers and five female family members or close friends. No fathers attended the workshops. Expectant mothers were between 16 and 34 weeks pregnant. A total of 17 of the participants rated their overall satisfaction with the workshop to be very good or excellent, two rated the workshop 2 and one did not provide an answer. For further evaluation information, see Table 2. All the comments were positive and demonstrated that learning had taken place and that it was important to provide the workshop in English and Arabic:

“A great opportunity to learn about pregnancy nutrition and the teacher was fantastic and engaging” (WM4).

“The information provided by the speaker helps me to understand better what I should be eating during pregnancy” (WM6).

“I am very pleased the information was delivered in Arabic as well as English, I understand both but my Arabic is obviously better” (WM14).

Expectant mothers’ and fathers’ willingness to undertake an EatWell Assist programme that would also include a practical cooking session and a follow-up session, if this were made available, was explored. All participants liked this suggestion and felt that it should be offered in a community setting in a health clinic and not at a hospital. The use of digital technology to provide healthy eating education, such as an EatWell Assist workshop was a common suggestion.

Table 1. EatWell Assist workshop

Content of workshop (facilitated in English and Arabic)
Over-reliance on convenience foods
Time to reflect on your dietary intake and lifestyle
Eating healthy – a well-balanced diet
Enough protein, carbohydrate, fats and fibre
Rich in fruit and vegetables
Vegetarian and vegan diets
Importance of minerals and vitamins
To drink plenty of water to keep you hydrated
Adjust and correct portion sizes
Myths need to be dispelled!
Caffeine intake – monitor and cut down
Foods to avoid – increase awareness
Top tips for food hygiene
Read labels
Eat well for life
Complete an EatWell food diary (in English or Arabic).

EatWell food diary feedback

A total of 12 completed diaries from expectant mothers who attended one of the EatWell Assist workshops were returned to a local coordinator; eight diaries were not returned. From the recordings in the diaries, the researchers were provided with valuable insights into the benefits this resource had on modifying diets and eating habits, and how this visual aid may benefit other pregnant women in UAE in the future. Expectant mothers who returned the diaries evaluated using them very positively; they found it simple and easy to use on a daily basis and to record the different food groups, and reported that the clear and concise instructions and examples given – use of hands and fingers to assist them to consume recommended portion sizes – were very helpful.

Discussion

NICE has published guidelines for health professionals (including midwives) to provide nutritional support and advice to women planning a pregnancy or already pregnant (NICE, 2008). However, it seems that there is limited education, resources and time spent on informing such women what exactly comprises a healthy diet and the importance of adopting healthy eating habits.

Pregnant women receive very general and sometimes vague information about healthy diets, supported by written literature, such as leaflets to read about diet; this seems to be the current approach used to inform and educate pregnant women (Garnweidner et al, 2013). Interestingly, there is a lack of information for vegetarian and vegan pregnant women (Arrish et al, 2014).

Expectant mothers in this study reported that they had been given leaflets on healthy eating and briefly told what foods to avoid, such as spicy foods, and the importance of food safety to reduce risk of gastro-intestinal infections such as listeria. But that no-one had explained in great detail what a healthy diet was or asked about their current diets. It has been reported that pregnant women have a tendency to not read leaflets given to them and there is research evidence that having a friendly discussion about healthy eating in pregnancy with a health professional, supported by written material, is preferred (Edvardsson et al, 2011). However, health professionals have requested more education to help them gain in-depth knowledge and understanding about healthy eating during the childbirth continuum (Arrish et al, 2014). Arrish et al (2014) published a literature review that identified a lack of knowledge and confidence

in midwives who have to advise and support expectant mothers who are vegetarian or from different religious and ethnic backgrounds. During the undertaking of this exploratory study, the researchers found some guidance concerning vegetarian and vegan diets, provided by NHS Choices (2015) *Vegetarian and vegan mums-to-be*, but there appears to be a need to raise awareness of this useful resource.

The findings from this exploratory study shows there is a need to target expectant mothers, fathers and their families with more in-depth healthy eating education; this can be informed by the NICE guidelines (2008) and adapted for an UAE culture. The Al Qasmi Foundation, who funded this research, produces policy guidelines for public and community health in RAK, and therefore an opportunity exists for a specific policy to be written for the promotion of eating healthily during pregnancy and after giving birth. Implementing EatWell Assist workshops and food diaries may be a helpful method to provide healthy eating education to expectant mothers, as this exploratory study found positive benefits and assisted in changing eating behaviours. Expectant mothers reported that they liked the simple ways to explain what portion sizes they should be consuming. Using hands and fingers

Table 2. Summary of evaluation scores for EatWell Assist workshops

	Neutral	Agree	Strongly agree	No answer
Information was presented clearly and easy to understand		14	6	
My knowledge of nutrition and healthy eating has improved		12	8	
I am inspired to eat and cook food from the food hampers	5	9	6	
I am inspired to improve my health through better diet		15	5	
I will increase the amount of vegetables I eat each day	5	9	6	
I will consume less sugary food and drinks	3	12	5	
I plan to breastfeed my baby exclusively for six months		8	12	
I plan to continue breastfeeding for 12 months or more	4	6	8	2
I plan to introduce healthy solids to my baby around six months	2	9	7	2
I will follow the 'parent provide, child decide' model of feeding	6	9	4	1
It was helpful to have my baby's father here (if applicable)				20
It was helpful to have my family member there (if applicable)	2	6	2	10
The workshop was fun and engaging		10	10	
I would take part in a three session programme if it was offered	2	9	7	2

to help guide them on portion sizes was evaluated highly. Unfortunately, expectant fathers were unable to attend the EatWell Assist workshops or complete a daily food diary in this study due to work commitments, which limited their availability; also, expectant mothers preferred to attend women-only workshops. Expectant mothers' preferences were taken into consideration and only women attended the EatWell Assist workshops and completed a food diary during the second phase of this study. Interestingly, a few other females accompanied some expectant mothers and consented to participate in this phase. This highlights that further exploratory research and healthy eating education could be undertaken on a larger scale, directed at families and communities in the UAE. However, providing information and education in Arabic and English needs to be taken into consideration when targeting the community at large.

Ways of accessing expectant fathers also needs to be specifically considered in the UAE. Alternative approaches to access, engage and educate expectant fathers, such as providing online options, may be a way to provide healthy-eating education. This is particularly important given the well-recognised health and wellbeing benefits, and the national concerns in UAE about obesity and its long-term consequences.

Overall, the workshop evaluations were very positive; all participants gained some knowledge about healthy eating and reported that they valued the opportunity to attend.

An interesting suggestion by several of the participants in this study was to adapt the workshop content and food diary and develop these resources into an 'EatWell Assist' mobile application (app) which could be used as a follow-up measure for pregnant women and an alternative for expectant fathers who had limited time availability to attend a workshop. It was also highlighted that digital health education was evolving and this increasingly popular approach would meet a need for childbearing women and their families.

The findings from the EatWell food diary suggest a change in eating habits and behaviours during the one month of diary recordings. It is interesting to note that expectant mothers increased their fluid intake while completing the diary, an issue identified in Phase 1 of this study. In addition, expectant mothers adjusted the portion size of carbohydrates, for example, one rather than two hand-fulls of rice, and recorded a significant increase in vegetables and salads. It was highlighted in this study that many of the expectant mothers were eating far too much rice and not enough fruit and vegetables, but by using the visual hands as a measuring guide in the food diary to assess how much you should eat at each meal, portion sizes were adjusted.

The ever-increasing problem of obesity within the Emirates and globally, is a serious cause for concern; however, modifying diet and eating habits can halt and lessen this world health issue. Targeting expectant parents and their families to eat healthily is an opportunity not to be missed. This exploratory study has shown that exploring current

diets of expectant parents and their families, and providing healthy eating education, can have a positive impact upon food consumption and eating habits.

Targeting expectant parents to eat healthily would fit in with early-in-life recommended preventative work in the UAE Vision 2021, national objectives (UAE Vision 2021, 2012). An indicator identified in a national policy paper is to reduce the high prevalence of obesity among children in the Emirates (Mooresar, 2015). Introducing healthy lifestyle programmes in the UAE has been guided by the WHO (2009). The findings from this exploratory research can support this ongoing preventative work.

Limitations and strengths

This study was exploratory and therefore has limitations, and the findings may not be generalisable; nevertheless, it has provided valuable insights into expectant parents' current diets and eating habits in UAE which can inform further research. The workshops were piloted and only included small numbers; further workshops and evaluations would build upon this initial research.

An identified challenge when undertaking this research was the potential language barrier that might inhibit both expectant mothers and fathers from fully participating in an interview. It was, therefore, essential to involve local coordinators to recruit participants from the three study sites. Although the majority of participants had a good understanding of the English language, the researchers had support of an interpreter if there were any misunderstandings or some confusion with any questions that were being asked. In addition, one of the researchers spoke fluent English and Arabic. The EatWell Assist workshops were facilitated by a senior nutritionist in English and then Arabic. This facilitator is fluent in English and Arabic and has worked as an educator in both English-speaking and Arab-speaking countries.

Conclusion

Knowing more about current diets and eating habits and the benefits of providing healthy eating education, in the form of workshops and keeping a food diary, has given valuable insights into ways to address important healthy eating issues for expectant parents in the UAE.

This study highlights the need to provide healthy eating education for expectant mothers and to also consider expectant fathers, families and the community at large. Targeting expectant parents as an early preventative measure to reduce both short- and long-term effects of unhealthy diets would be beneficial.

Recommendations

When addressing the ongoing obesity problem, expectant parents are an ideal group to work with, although to date little attention has been given, there is an urgent need to address this deficit.

There is a need for implementing healthy eating education workshops for expectant mothers as a component of antenatal education. It is also worth considering using

a father- and family-inclusive approach, and targeting the whole family to receive healthy eating and behaviour education as a preventative strategy to tackle the increasing problem of obesity.

Raising awareness of the importance of drinking sufficient water and other fluids needs to be taken into consideration as this study highlighted this as a problem which then predisposed some expectant mothers to a urinary tract infection. Follow-up care is recommended and completing a food diary such as the EatWell Assist diary can help

expectant mothers and fathers to monitor and modify their daily consumption of food and fluids.

A further recommendation would be for research to be undertaken to explore children's diets and eating habits in schools, introducing EatWell Assist sessions with child-friendly diaries, and then undertake an impact evaluation.

As we now live in a digital world and much learning is taking place via the internet, a digital format of the EatWell Assist workshop and diaries in English and Arabic is recommended as a resource and a further area for research.

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Capture my mood: a feasibility study to develop a visual scale for women to self-monitor their mental wellbeing following birth

Lois McKellar¹ PhD, Nurs, BMid, RM, RN. Mary Steen² PhD, MCGI, PG Dip HE, Dip ClinHypn, RM BHSc, RGN, UniSA. Nirmal Lorensuhewa³ PhD, B Biotech.

1. Midwifery programme director, University of South Australia, City East Campus, Frome Road, Adelaide SA 5000 Australia. Email: lois.mckellar@unisa.edu.au

2. Professor of midwifery, School of Nursing and Midwifery, University of South Australia, Adelaide SA 5000 Australia. Email: mary.steen@unisa.edu.au

3. Principle scientist, Paranta Biosciences, Suite 549/1 Queens Road, Melbourne, VIC 3004 Australia. Email: nirmal.lorensuheva@gmail.com

Abstract

Background. A variety of practices have been developed to screen mothers for anxiety and depression during the antenatal and postnatal periods. However, there is ongoing debate about the appropriateness, timing and effectiveness of screening all women, with a limited number of rigorous evaluations. It is timely to re-think current maternal mental health surveillance and to develop and evaluate innovative approaches to monitoring wellbeing.

Aim. To ascertain a correlation between a newly developed Capture My Mood (CMM) tool and the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) and assess the acceptability of the tool during the early postnatal period.

Method. A mixed-methods approach was used to pilot the CMM tool alongside WEMWBS. Participants were recruited from a midwifery group practice and provided with a guide which explained the study and how to use the CMM tool. Participants were asked to complete the CMM tool in the early postnatal period. At completion of week two, participants completed the final CMM tool as well as the WEMWBS. Pearson's Correlation was used to calculate the r^2 and p values to assess the correlation between the CMM and WEMWBS scores. Participants were asked to complete a short questionnaire to record their views. Ethical approval was gained from South Australia Health human research ethics committee and the UniSA ethics committee.

Findings. A total of 20 women was the estimated sample to ascertain a high correlation between the CMM tool and the WEMWBS. To allow for attrition rates, 30 women were invited to participate in this study. Some 12 women returned the completed CMM, WEMWBS and questionnaire within the time period of eight weeks. Findings indicate an acceptable correlation between the CMM tool and WEMWBS ($r=0.57$, $p=0.05$). Women found the tool easy to use and understood the five 'C' descriptors.

Conclusion and implications. This study has shown that the CMM tool correlates with the WEMWBS. Women found the simplicity of tool to be user-friendly and helpful in self-monitoring their mental wellbeing during the early postnatal period.

Key words: Mothers, mental health, wellbeing, anxiety, depression visual scale, postnatal care, self-monitoring, evidence-based midwifery

Introduction

Mental health is an integral component of health; it is a state of well-being that is achieved when an individual realises their own abilities, can cope with the normal stresses of life, can work productively and is able to contribute to his or her community (WHO, 2016). A combination of social, psychological, and biological factors determine the level of mental health of an individual at any time. Interruptions to mental health and wellbeing may have significant consequences, such as depression in which an ongoing state of low mood and aversion to activity affects a person's thoughts, feelings, sense of wellbeing and behaviour (Herrman et al, 2004). On this basis, the promotion of mental health should be a priority for individuals, communities and societies throughout the world and mental health has been outlined as a priority for governments both in Australia and the UK (Department of Health, 2011; Beyond blue, 2008).

Pregnant women and new mothers may be more susceptible to changes in mental health with anxiety and stress being common during pregnancy and following birth, which can stand alone or be present with other mental

health problems (Steen and Steen, 2014). In Australia, up to 15% of mothers experience depression during the perinatal period (Puckering et al, 2010; Buist et al, 2008). A recent study reported that one in three women indicated a decline in mental wellbeing and depressive symptoms on at least one occasion from early pregnancy to four years postpartum (Woolhouse et al, 2014). Additionally, it has been reported that as many as 16% of women may require some degree of intervention for mental health concerns during the antenatal and postnatal period (NICE, 2014). When undiagnosed and in the absence of appropriate care, depression can pose serious health consequences to both mother and child (Steen et al, 2015; Glover, 2014; Raposa et al, 2014; Darcy et al, 2011).

Research indicates that women with depression after birth have significantly lower personal, household and social function (Glover, 2014; Steen et al, 2013). Additionally, postnatal depression (PND) impacts on attachment and adversely affects the cognitive and emotional development of the infant as the quality of the mother-infant interaction is diminished (Steen et al, 2013; Buist et al, 2008; Milgrom et al, 2006).

A variety of practices have been developed to screen mothers for anxiety and depression symptoms during both the antenatal and postnatal periods (Yelland et al, 2009; Buist et al, 2008; Edwards et al, 2008). For instance, the National Perinatal Depression Initiative aimed to improve the early detection of depression in Australia through routine and universal screening of all women during pregnancy and the postnatal period (Beyond blue, 2008). In this initiative, the Edinburgh Postnatal Depression Scale (EPDS) was used as a screening tool for PND (Buist et al, 2008; Edwards et al, 2008). Nevertheless, there is ongoing debate about the appropriateness, timing and effectiveness of screening all women, with limited number of rigorous evaluations (Austin et al, 2011).

Some studies report that antenatal screening has a reasonably high number of false positives with a significant economic impact, as well as false negatives, where women go on to develop depression (Paulden et al, 2009). There is also a lack of consensus regarding the cut-off score, with some researchers advocating a lower cut-off score in an attempt to capture a more accurate assessment of risk (Dunkel Schetter and Tanner, 2012; Yelland et al, 2009). Additionally, screening tools are typically used at a single point in time and only provide a snapshot of the woman's emotional wellbeing. Moreover, women who have been assessed during the immediate postnatal period as not being at risk have subsequently developed depression.

There has also been concern that screening women adds to the medicalisation of childbirth and motherhood, though women themselves have not reported screening negatively (Brealey et al, 2010; Yelland et al, 2009). It would appear that there is a consensus that it is important to identify women at risk of mental illness, with guidelines advocating screening for depression during the perinatal period (O'Connor et al, 2016; NICE, 2014; Beyond blue, 2008). Nevertheless, there is also a need to provide strategies that optimise psychological wellbeing and focus on prevention of mental disorders of mothers (WHO, 2017; NICE, 2014).

It is, therefore, timely to re-think current maternal mental health surveillance and to develop and evaluate innovative approaches to contribute to monitoring perinatal mental wellbeing. Considering recent changes to postnatal care in Australia, in which women may return home from hospital six hours following the birth of their baby with limited follow-up care and support (Forster et al, 2016), it would be valuable to equip women with a means of self-monitoring. This would also be one way of safeguarding further medicalisation of motherhood by empowering women to determine their own state of psychological wellbeing, guided by a self-assessment tool.

The Warwick-Edinburgh Mental Well-being

Scale (WEMWBS) has been used as a tool by pregnant women and new mothers in a recent Mind 'Building resilience for better mental health' study (Steen et al, 2015). WEMWBS was developed in 2006 through collaboration between Warwick and Edinburgh University as a means to determine mental wellbeing (NHS Health Scotland, 2011; Tennant et al, 2007).

The tool is built around five core concepts including: satisfying interpersonal relationships; positive functioning; positive affect; hedonic perspective and eudemonic perspective. It consists of a 14-item scale with five response categories, which is added together to provide a single score ranging from 14 to 70. The items are all worded positively and cover both feeling and functioning aspects of mental wellbeing. The WEMWBS tool has been validated as a reliable tool to ascertain population mental wellbeing (Stewart-Brown et al, 2009). Since the development of the WEMWBS, further research has been undertaken to examine the appropriateness of this tool for ascertaining group or individual wellbeing, concluding that it was appropriate for measuring individual wellbeing (Maheswaran et al, 2012).

This project seeks to contribute to better maternal mental health by developing and piloting a visual scale that provides women with a means to monitor their mental wellbeing and alert them to changes in mental state.

The tool, Capture My Mood (CMM) consists of a visual scale that uses five 'C' descriptors which align with the five core concepts of the WEMWBS (see Figure 1):

- Connected (satisfying interpersonal relationships)
- Confident (positive functioning)

Figure 1. CMM visual tool (visual design adapted from Thomson and Chatterjee, 2014)

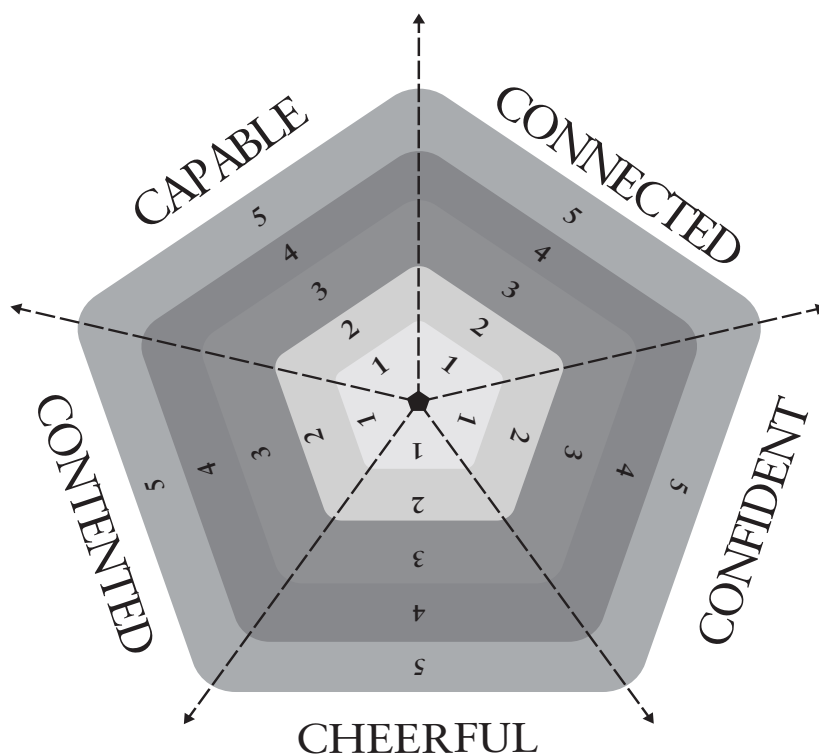


Figure 2. CMM statements and scale

In the last few days I have felt ‘Cheerful’

None of the time 1	Not very often 2	Some of the time 3	Very often 4	All of the time 5
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In the last few days I have felt ‘Contented’

None of the time 1	Not very often 2	Some of the time 3	Very often 4	All of the time 5
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In the last few days I have felt ‘Capable’

None of the time 1	Not very often 2	Some of the time 3	Very often 4	All of the time 5
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In the last few days I have felt ‘Connected’

None of the time 1	Not very often 2	Some of the time 3	Very often 4	All of the time 5
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In the last few days I have felt ‘Confident’

None of the time 1	Not very often 2	Some of the time 3	Very often 4	All of the time 5
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- Cheerful (positive affect)
- Contented (hedonic perspective).
- Capable (eudemonic perspective)

The tool is presented in a visual format adapted from a tool developed by Thomson and Chatterjee (2014) and shows five ‘C’ descriptive words around the edge of a hexagon. Each word has 1 to 5 written in the space under it and requires the woman to rate each word by asking themselves the question: ‘In the last few days I have felt (insert the descriptive word)’ then circle a number from 1 to 5, where 1 = none of the time and 5 = all of the time. For example, if the word ‘capable’ is used in the sentence, ‘in the last few days I felt capable’ and the woman felt capable some of the time then she would circle 3 (see Figure 2) (Thomson and Chatterjee, 2014).

Methods

This feasibility study employed a mixed-methods approach in which the newly developed CMM tool was piloted alongside the WEMWBS and a purpose-designed questionnaire implemented. Specifically, the aim of this pilot study was to ascertain a correlation between the CMM tool and the WEMWBS, as well as assess the utility and acceptability of the tool for women during the perinatal period. It addressed two central research questions:

- Did the CMM correlate with the WEMWBS in determining mental wellbeing?

- Was the CMM easy to use and acceptable for women during the perinatal period?

Permission was granted to recruit women from a local hospital during the antenatal period.

The inclusion criteria were:

- Had given birth to a live baby at gestation of or greater than 37 weeks
- Were able to understand and communicate in English
- Over 18 years of age
- Gave informed consent.

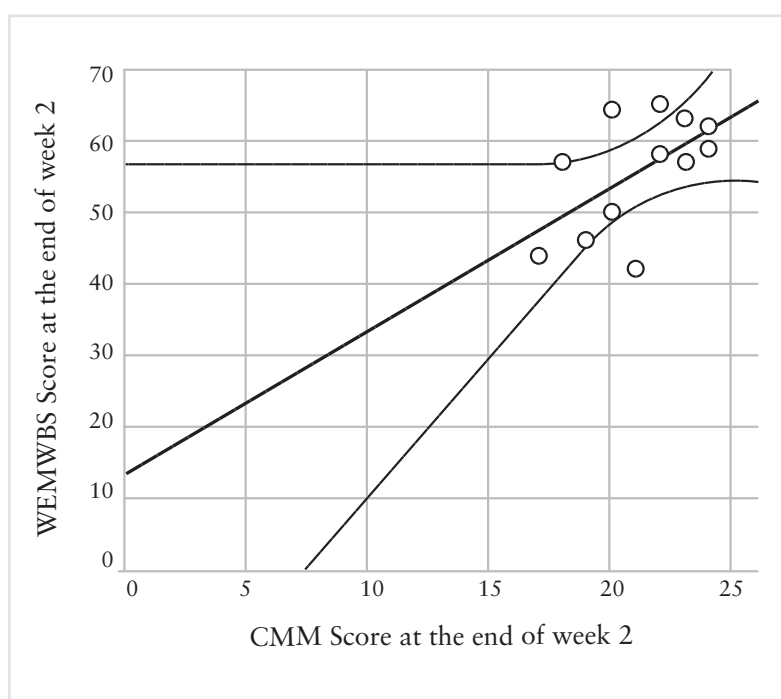
The exclusion criteria were:

- Mothers whose baby required level 2 or 3 nursery care (special care/intensive care).
- Mothers who had been diagnosed with a perinatal mental illness.

Interested participants were provided with an information sheet and an opportunity to ask questions. If they indicated an interest, they were asked to sign a consent form by a midwifery group practice midwife (who had attended a preparatory session for the study). Women were then provided with a pack which explained how to use the CMM tool in more detail. Participants were asked to complete the CMM tool three times during the week, for two weeks.

At completion of week two, participants completed the final CMM tool as well as the WEMWBS. Participants were also asked to complete an anonymous purpose-designed questionnaire regarding their impression of the CMM scale, ease of use, appropriateness and satisfaction with the process. This questionnaire also collected simple demographic data. Included in the pack

Figure 3. Scatter plot showing each participant’s CMM score at end of week two versus their WEMWBS score (n=12)



was a guide to understand the WEMWBS score once they had completed this scale. If the score indicated that their wellbeing was below 40, the participants were advised to discuss this with their midwife, GP or the local hospital perinatal health service. Additionally, links to online and community services and a guide to improving their mental wellbeing based on the Five Steps to Wellbeing was provided to all participants as part of this pack (NHS Choices, 2015). A stamped return address envelope was included in the pack.

The questionnaire responses relating to mothers' views and experiences of using the CMM scale were analysed using simple descriptive statistics. IBM SPSS v21 statistical package was used to analyse quantitative data. Pearson's Correlation was used to calculate the r^2 and P values to assess the correlation between the WEMWBS and CMM scores. Ethical approval was gained from South Australia Health, human research ethics committee and the UniSA ethics committee.

Findings

The estimated sample to ascertain a high correlation between the CMM tool and the WEMWBS was 20. Therefore, to allow for attrition rates, 30 women were invited to participate in this study. Then 30 packs were distributed and 12 women returned the completed CMM, WEMWBS and questionnaire within the time period of eight weeks. An additional woman returned the questionnaire, but the CMM and WEMWBS were incomplete. The CMM score of the 12 women who responded demonstrates an acceptable correlation with WEMWBS score.

Figure 3 illustrates the scatter plot showing each participant's (n=12) CMM score at end of week two versus the WEMWBS score. Each bubble represents a participant.

The dark linear line represents the best fit Pearson's Correlation. Curved grey lines show the 95% confidence interval. Findings indicate an acceptable correlation between the CMM and WEMWBS.

An anonymous purpose-designed questionnaire regarding their impression of the CMM scale, ease of use, helpfulness and satisfaction was completed by 13 women, 11 women were born in Australia, with one woman born in South Korea and another in the Philippines.

Women were asked to provide a rating for a variety of statements (see Table 1).

It is evident that all of the women found the tool easy to use and that they understood the descriptors. Most women indicated that the tool was helpful and that they would use it again. The woman who indicated that she did not find the tool helpful provided a comment to explain her response:

"While it was interesting to record my feelings and see them on paper. I didn't necessarily find it helpful. In the same token it was not unhelpful" (W13).

Interestingly, women were more likely to use the tool again if it was presented in a digital form. This was evident in the additional comments that women provided which will inform the next phase of the development of this tool:

"Being on paper it is very easy to misplace the paper and forget... an app would be very good with reminders that would pop up" (W10).

"For the app – include a graph of overall moods" (W2).

"More visually appealing, interactive, delivers instantaneous feedback (for example if it were an app) would be more user friendly" (W13).

There were other comments which suggested that there could be more clarity in explanations and that there was a need to provide an understanding of the results. In this study, only an explanation of the results of the

Table 1. Women's responses to CMM

	n=13					
	Strongly agree	Agree	Unsure	Disagree	Strongly disagree	Missing
I thought the CMM tool was easy to use	7 (53.8%)	6 (46.2%)	0	0	0	0
I understood the meaning of the descriptor words used in the tool	8 (61.5%)	5 (38.5%)	0	0	0	0
I felt comfortable using the CMM tool	8 (61.5%)	4 (30.8%)	0	0	0	1 (7.7%)
I found the CMM tool helpful	1 (7.7%)	9 (69.2%)	1 (7.7%)	1 (7.7%)	0	1 (7.7%)
I would use the CMM tool again	2 (15.4%)	7 (53.8%)	2 (15.4%)	1 (7.7%)	0	1 (7.7%)
I would use a digital form of the CMM tool	5 (38.5%)	6 (46.2%)	0	1 (7.7%)	0	1 (7.7%)

WEMWBS were provided:

“Once I understood what 1-5 stood for it allowed me to circle my response without too much thought” (W6).

“Maybe a little more info or examples of how each title could be interpreted, for example connected with baby? Or connected with others or self” (W4).

“Would be good to know what the results mean” (W6).

Discussion

There is ongoing debate around the most effective means to assess deterioration in mental health for pregnant women and new mothers (Howard et al, 2014a; 2014b). Acknowledging there is potential stigma attached to screening for postnatal depression that may impact on the way the tool is completed, researchers advocate for a more holistic approach to assessment, ensuring that midwives and health professionals embed questioning as part of their care (NICE, 2014; Brealey et al, 2010). Additionally, a systematic review undertaken to combine and compare findings from published systematic reviews that evaluated the evidence of interventions for improvement in maternal mental health and wellbeing identified a need to focus on wellbeing (Alderdice et al, 2013). Therefore, there is a justified need to develop and evaluate an innovative approach to contribute to monitoring maternal mental wellbeing and encourage pregnant women and newly birthed mothers to participate. It would be beneficial to equip women with a user-friendly self-monitoring tool such as the CMM tool.

The findings from this feasibility study suggests that the 12 women’s responses for the CMM tool show an acceptable correlation with the WEMWBS and that women find the CMM a simple visual scale, easy to use and potentially helpful in self-monitoring their mental wellbeing during the perinatal period. As the sample size was small, there is a need for further research using a population approach to determine validity and reliability, particularly to ascertain a correlation between scores which indicate below average mental wellbeing. This may be helpful in early detection of women at risk of depression.

A study undertaken to ascertain the correlation between the WEMWBS and the EPDS found a large negative correlation, that is, high WEMWBS correlated to low scores on the EPDS, and suggested that it would be a possible tool to determine mothers at risk of perinatal depression (Ragonesi and Gremigni, 2012). Interestingly, the NHS in Scotland developed a handout for individuals to use the WEMWBS to assess their mental wellbeing based on population results, for example a score of 40 to 59 suggested that the individual had average mental wellbeing, a score of 32 to 40 suggested

that the individual’s score was below average and it was recommended that they take action to improve their mental wellbeing. Recommended actions included connecting with others and getting active with links to supportive sites (NHS Choices, 2015).

The project team aim is to develop a smartphone-based application (app) of the CMM tool. As a platform to deliver effective healthcare solutions, smartphone-based apps have a number of advantages, such as greater accessibility, user friendliness and privacy. In addition, smartphone apps have the capability to record and analyse data, as well as have built-in triggers to provide access to appropriate education and support. Potentially, the app could be developed to enable selected connectivity to other key users, such as family and friends and healthcare professionals, as it was evident in this study that women were very receptive to a digital form of the tool.

Conclusions

During pregnancy and the first year following childbirth, anxiety and stress are common and these mental health problems can stand alone or present as co-morbidities with other disorders, such as antenatal and postnatal depression. There is cumulative evidence demonstrating that poor maternal mental health and wellbeing is associated with bonding and attachment issues. If poor maternal mental health is not recognised then long-term adverse effects can occur for both mother and baby. Therefore, enabling pregnant women and new mothers to self-monitor their wellbeing is an important women’s health issue.

This study has shown that the CMM tool correlates with the WEMWBS and that women found the simplicity of the CMM tool to be user-friendly and helpful in self-monitoring their mental wellbeing during the early postnatal period. Therefore, this early preventative approach may help some women to recognise early signs and symptoms of mental health deterioration, seek help and support. It is recognised that there are limitations to this feasibility study including the smaller-than-estimated sample size to measure a correlation between the two wellbeing tools.

However, the lower response rate than expected did demonstrate an acceptable correlation rather than a high correlation. Lack of validity of the evaluation questionnaire used to gain general feedback about the CMM tool from the women who participated is also a limitation. Therefore, further research is required to investigate the effectiveness and explore the acceptability of the CMM tool, with a multi-centred, randomised controlled trial currently being designed.

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Bladder scanning in maternity care: a scoping review

*Belinda Lovell*¹ BNg, MMid, RM, IBLCE. *Mary Steen*² PhD, MCGI, PGDipHE, PGCRM, BHSc, Dip Clin hyp, RM, RGN. *Adrian Esterman*³ PhD, MSc, BSc, FACS DLSHTM.

1. Research midwife, School of Nursing and Midwifery, University of South Australia, Adelaide, SA 5000 Australia. Email: belinda.lovell@unisa.edu.au

2. Professor of midwifery, School of Nursing and Midwifery, University of South Australia, Adelaide, SA 5000 Australia. Email: mary.steen@unisa.edu.au

3. Professor of biostatistics, School of Nursing and Midwifery, University of South Australia, GPO Box 2471, Adelaide SA 5001 Australia. Email: adrian.esterman@unisa.edu.au

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Abstract

Background. The accuracy of bladder scanning appears to be inconclusive, particularly during the childbirth continuum (pregnancy, labour and post birth). Some authors recommend using the bladder scanner in maternity care while others do not. Being catheterised increases the risk of urethral trauma, discomfort, urinary tract infection and negative psychological effects related to this invasive procedure. Some women may be catheterised unnecessarily and adopting the use of bladder scanners may reduce these risks and enable the midwife to use a less invasive measure to facilitate clinical decisions. The aim of this scoping review is to identify research studies previously conducted to investigate the accuracy of bladder scanning during the childbirth continuum and to report the findings.

Method. The scoping review was guided by the framework of Arksey and O'Malley (2005). Electronic databases and reference lists were searched to identify published articles. The information was collated into a table to summarise the findings.

Results. A total of 10 research articles and one poster presentation were found which incorporated testing the accuracy of bladder scanning on women during labour or post birth. Three studies were unable to demonstrate accurate measurements using a bladder scanner and eight studies concluded that bladder scanners are accurate post birth and one in labour (if the membranes are not intact). The Bladderscan® BVI 3000 was used in 10 of the studies and the Bladderscan® BVI 6100 in one study. There were no studies that involved non-labouring pregnant women.

Conclusion. Eight out of 11 studies concluded that bladder scanners are accurate when used in maternity care. Despite these conclusions, there are many factors that can contribute to the inaccuracy of the device, especially during pregnancy and post birth. Further research is required to test current bladder scanners for use in maternity care.

Key words: Bladder, urinary retention, women, childbirth, postnatal urinary retention, catheterisation, bladder scanner, evidence-based midwifery

Introduction

This scoping review was conducted as part of a bladder care project to determine the available evidence on the accuracy of bladder scanning in maternity care. If bladder scanning is shown to be an accurate and reliable tool for midwives to use in maternity care, it may have the potential to reduce the number of catheters inserted and the risks associated with catheterisation. Scanning a woman's bladder may detect urinary retention and prevent bladder trauma (Lovell and Steen, 2017). Bladder scanners are used to detect the volume of urine in the bladder of a person unable to void, showing signs of voiding dysfunction, urinary retention or postnatal urinary retention (PUR). However, the accuracy and reliability of bladder scanning appears to be inconclusive, particularly for maternity care.

Catheterisation has remained a standard treatment for voiding dysfunction in pregnancy, labour and for newly birthed mothers with urinary retention. There are several risk factors associated with catheterisation such as: urethral trauma, discomfort and urinary tract infection; these can lead to negative psychological effects, increased use of antibiotics, longer hospital stays and family separation. In some cases, women may be catheterised unnecessarily. The use of bladder scanners in clinical practice may have the potential to reduce the physical and psychological associated risks described above. However, the literature demonstrates a dearth of evidence. One report has summarised evidence

on the use of a portable bladder scanner in the general population and included a brief summary of the findings of three observational studies relating to postpartum women (NHS Quality Improvement Scotland, 2010). Nevertheless, no published scoping or systematic reviews could be identified that investigated the accuracy of bladder scanning during maternity care. This article describes and discusses the results of a scoping review that has recently been undertaken to report the findings of research studies and factors found to have an impact on the accuracy of bladder scanning devices used in maternity care.

Background

Yip et al (2005) suggested the two most important clinical strategies for prevention and management of PUR included appropriate bladder care in labour and early detection of urinary retention post birth. These researchers advocated ultrasound assessment or catheterisation to identify women who required closer observation (Yip et al, 2005). The WHO (2010) and NICE (2006) guidelines recommend that measures to assist women to void are undertaken (such as a warm bath or shower) and that fluid balance is assessed. If a woman is unable to void six hours post birth, the bladder volume should be assessed and catheterisation considered (WHO, 2010; NICE, 2006).

Women returning home from a birth suite should empty their bladder before they leave (WHO, 2010). It is also

suggested in the NICE guidelines that post-void residual bladder volumes (PVRBV) can be measured by bladder scan or catheterisation in women with symptoms of voiding dysfunction. These guidelines promote the use of a bladder scanner due to its acceptability and lower incidence of adverse risk (NICE, 2013). However, this latter advice is not specific to maternity care. Despite the recommendations outlined by NICE and the WHO, a study by Zaki et al (2004) found that of 156 maternity units in England and Wales, only 36 (23%) complied with these and the RCOG guidelines (catheterisation within six hours of birth if unable to void). The RCOG refers to the NICE guidelines for this recommendation.

It was found that 24 of units (15%) allowed eight hours and 41 (26%) allowed 12 hours before women unable to void were catheterised (post vaginal birth or removal of a catheter). It was also found that 21 units (13%) had no specified guidelines to follow. PVRBV was measured in 53 maternity units (34%), and 11 units (7%) used ultrasound to estimate bladder volume before catheterisation. It was also found that eight units (5%) checked the residual volume after the first void, but it was not specified how. The researchers suggest that further work is necessary to produce evidence-based guidelines, and that clinicians should be timing and measuring urine volume and if possible checking residual volumes to detect urinary retention (Zaki et al, 2004).

Bladder scanners and ultrasound in maternity

Bladder scanners are an adaptation of ultrasound. The proposed advantages of bladder scanners are: they are portable, easy to use, limited training is required, can be operated by midwives and obstetricians, measurements are relatively quick and they are well received by women. The use of a bladder scanner or diagnostic ultrasound has the potential to assist with the early detection of urinary retention and reduce the amount of unnecessary urinary catheters inserted. Therefore this in turn can reduce the risk of urinary tract infection, uncomfortable sensations, urethral trauma and negative psychological effects of urinary catheterisation which can contribute to the increased use of prophylactic and treatment antibiotics, longer hospital stays, family separation and costs to healthcare.

The disadvantage of the bladder scanner is that the device will detect any fluid filled structure and therefore the gravid or involuting uterus, fibroids, cysts and scar tissue can lead to inaccuracies. Some bladder scanners cannot view the bladder, thereby increasing the risk of detecting another fluid-filled structure, leading to inaccuracies. Real-time ultrasound has been shown to be accurate in women during labour and post birth (Donnez et al, 2017; Gyampoh et al, 2004; Yip et al, 1998; Chien et al, 1996), but has the disadvantage of being less portable, more expensive, and requiring more training and expertise to operate – multiple measurements and calculations are required to estimate the bladder volume – making it less desirable for use in maternity care. However, Gyampoh et al (2004) state that measuring the dimensions of the bladder with ultrasound is a straightforward procedure, requiring minimal training.

These authors suggest that this ultrasound procedure could be performed by midwives. To date, ultrasound is reported to be safe, reassuring, non-invasive, painless and can be performed multiple times during labour (Gyampoh et al, 2004).

Method

Arksey and O'Malley (2005) outline a framework, which was used for this scoping review, to provide a systematic approach to the literature search and a comprehensive foundation to guide the review (Arksey and O'Malley, 2005). The authors of this study aimed to identify research previously conducted to assess the accuracy of bladder scanning as part of maternity care which included pregnancy, labour and newly birthed mothers.

A scoping review is often undertaken to determine the extent, range and nature of literature and research activity and can also guide researchers as to whether or not there is any value to embark upon a systematic review. Therefore, this scoping review will summarise and disseminate relevant literature, research findings, and identified gaps in the research. Arksey and O'Malley suggest a six-stage process for undertaking a scoping review. However, the sixth stage is considered optional and was not undertaken in this review, as the authors did not feel it would add anything to the review outcomes.

Stage one: identify the research question

The mnemonic PCC (population, concept and context) was used to derive the research questions. The population included pregnant, labouring and newly birthed women. The concept involved the assessment of the accuracy of bladder scanners. The context included bladder and bladder volume.

The research questions

Is there evidence to support that bladder scanning is accurate when used on pregnant, labouring or newly birthed women to

Table 1. Search terms

Population	Concept	Context
Postnatal care/ or postpartum period or postnatal or postnatal or postpartum or peripartum or puerperium Pregnancy/ Pregnan* or antenatal or anteartum or gestation or antenatal or prenatal or labour or labor or intrapartum	Postnatal care/ or postpartum period or postnatal or postnatal or postpartum or peripartum or puerperium Pregnancy/ Pregnan* or antenatal or anteartum or gestation or antenatal or prenatal or labour or labor or intrapartum	Urinary bladder/ or urine/or bladder or voiding or postvoid or retention or urinary or urine or void or residual

estimate bladder volume? What factors contribute to the accuracy or inaccuracy of the device?

Stage two: identify relevant studies

Databases searched were MEDLINE Embase, CINAHL, Cochrane, Scopus, Google Scholar and Google (see table, below). These terms were changed slightly to suit the relevant database. Reference lists were also searched to find any research that may have been missed during the electronic database search. Alerts were set on each database to keep the research ongoing and current.

Stage three: study selection

The inclusion criteria were: English language; pregnant women, labouring or newly birthed mothers; performance of a bladder scanner used to estimate bladder volume; scanned estimates compared to another measure, for example ultrasound, measured void or catheterisation to determine the accuracy of the device; no date restrictions specified.

The exclusion criteria were: the general population; studies that included the use of a bladder scanner without testing the accuracy and reliability.

The search strategy identified 9763 articles. These studies were saved to a specifically created Endnote database (referencing management system) and initially reviewed by title. Articles were selected if the title incorporated the childbirth continuum (such as pregnancy, labour, post birth) scanning and the bladder. The studies excluded by title were considered unrelated to the topic. These included studies focusing on the fetus, neonate, pelvic floor and the general population. A total of 20 articles were reviewed by abstract; 14 were reviewed by full text. A total of 10 studies and one poster presentation met the inclusion criteria for the scoping review (see Figure 1 for the PRISMA chart).

Stage four: charting the data

A table was created to summarise relevant information from each research study. The table included: author, year, country, population, sample size, aim, study type, methodology, findings, conclusions, strengths and limitations (see appendix).

Stage five: collating, summarising and reporting

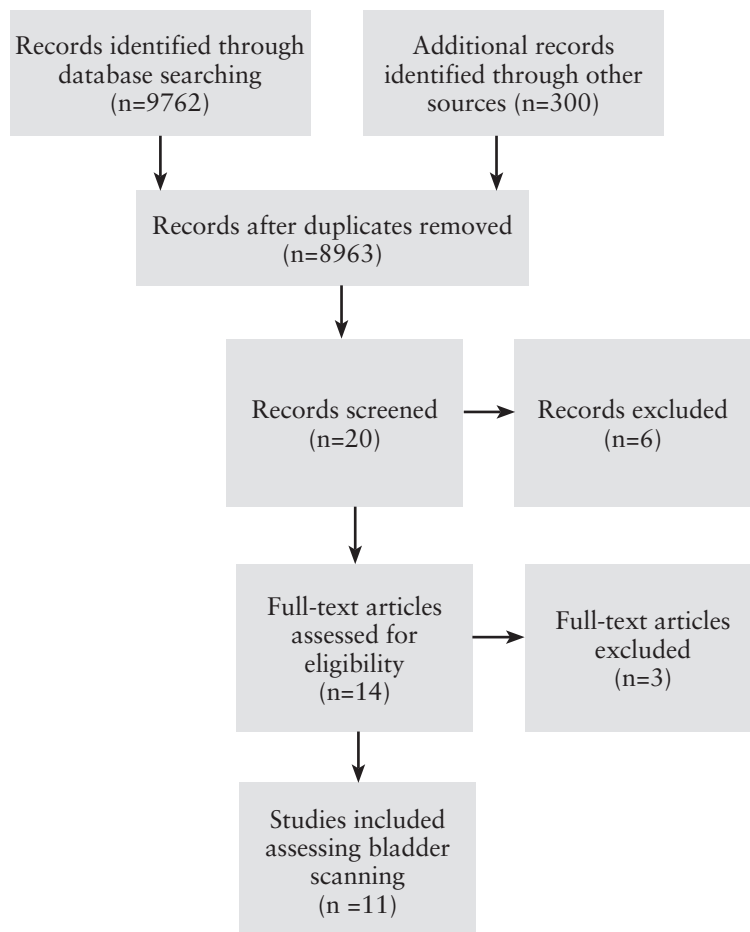
The final stage involved the collating, summarising and reporting of specific information from the articles included in the review.

Findings

Overall summary of studies found

Ten studies and one poster presentation assessed the Bladderscan® BVI bladder scanner for accuracy post birth and during labour. There were two different bladder scanner models studied, BVI 3000 and BVI 6100. Although there

Figure 1. PRISMA flow chart studies assessing the accuracy of bladder scanning during the childbirth continuum



are other types of bladder scanner available, no published literature was found assessing them. The Bladderscan® BVI 3000 was assessed in 10 of the studies and the Bladderscan® BVI 6100 in one study (Lukasse et al, 2007). Only one study recruited women in labour (Barrington et al, 2003) and all the other studies evaluated newly birthed mothers.

Studies concluding bladder scanning is accurate CS

Barrington et al (2001), assessed the Bladderscan® BVI 3000 on women post CS and concluded it was ‘accurate enough’ to assess these women’s urine volumes, although there were isolated cases where large discrepancies were reported and it was suspected that fluid in the uterus was measured by the bladder scanner. Ibrahim et al (2011) and Nusee et al (2014) also tested the Bladderscan® BVI 3000 post CS and concluded that bladder scanner measurements were comparable to catheter drainage volumes. The researchers also commented that accuracy was affected by the lochia in the uterus, overweight women (possibly due to abdominal wall thickness) and large bladder volumes (Nusee et al, 2014).

Studies concluding bladder scanning is accurate post vaginal birth

Demaria et al (2004) found the BVI 3000 underestimated urine volume by a mean of 42ml and that imprecision was

found in volumes over 400ml, but concluded overall that a 6.8% relative mean error was low and the scanner showed good measurement reproducibility and acceptable validity on women post vaginal birth. Lukasse et al (2007) assessed the Bladderscan® BVI 6100, a later model of bladder scanner, in women post vaginal birth.

The BVI 6100 was assessed to be accurate on women with symptoms of PUR. It was concluded that women could still be catheterised unnecessarily if the bladder scanner was used with a 300ml threshold for catheterisation, but the amount of unnecessary catheters would still be halved compared to the previous protocol where women were catheterised if they had urinary symptoms three hours post vaginal birth. Van Os and van Der Linden (2006) also concluded that the BVI 3000 is reliable for women post vaginal birth, if used by trained nurses and that it is well accepted by women.

They also reported a few cases of large overestimation and concluded that inaccuracy may be caused by uterine contents interfering with the total volume of fluid measured. In an experimental study, Blomstrand et al (2015) assessed the Bladderscan® BVI 3000 on women after all modes of birth; they also concluded that it was reliable and non-invasive when compared to catheterisation, although the scanner overestimated bladder volume when compared to catheterisation. Authors concluded that the bladder scanner detected 2.7 times more women with PUR than when using signs and symptoms. Overall one woman in each group ended up with an indwelling catheter.

Assessment of labouring women

Barrington et al (2003) assessed the BVI 3000 on labouring women and found the device to be accurate if the membranes were not intact, recommending that the device could be used clinically in this situation. The accuracy was seen to be poor when the membranes were intact because the bladder scanner detected the amniotic fluid, interfering with the accuracy of measurements. Therefore, the use of the bladder scanner was not recommended when the membranes are intact (Barrington et al, 2003).

Studies concluding bladder scanning is not accurate post vaginal birth

A study conducted in Australia found the BVI 3000 to be inaccurate on women one day post vaginal birth. There were large and variable overestimations of bladder volume using the BVI 3000 as well as a number of underestimations. Therefore the authors were unable to recommend its use in clinical practice. It was reported that possible factors influencing the accuracy of the bladder scanner results were the 8ml balloon of the Foley catheter, fluid in the post-birth uterus and urine remaining in the bladder after catheter drainage (Pallis and Wilson, 2003).

Two other studies also assessed the accuracy of the BVI 3000 in women post birth and were unable to recommend its use in the clinical setting (Lee et al, 2008; Mathew et al, 2007). One study recruited women within 24 hours of birth (all modes of birth) and found that accuracy was affected

by both small and large bladder volumes – it was the only study to measure the uterine volume using ultrasound and found that increasing uterine volume also negatively affected the accuracy of the bladder volume estimation by the bladder scanner (Lee et al, 2008).

Mode of birth

Five studies were conducted with women post vaginal birth (Lukasse et al, 2007; Mathew et al, 2007; van Os and van Der Linden, 2006; Demaria et al, 2004; Pallis and Wilson, 2003) three post CS (Nusee et al, 2014; Ibrahim et al, 2011; Barrington et al, 2001); two after all modes of birth (Blomstrand, 2015; Lee et al, 2008) and one during labour (Barrington et al, 2003).

Number of operators

There were a varying number of clinicians involved in scanning women. In five studies, there was one operator (Nusee et al, 2014; Lee et al, 2008; Mathew et al, 2007; Demaria et al, 2004; Pallis and Wilson, 2003). The remaining studies reported multiple operators including: two (van Os and van Der Linden, 2006), 21 (Barrington et al, 2003), 60 (Blomstrand et al, 2015) and 70 operators (Lukasse et al, 2007). Two studies did not state how many clinicians were used (Ibrahim et al, 2011; Barrington et al, 2001).

Timing of intervention

The timing of the intervention varied within the studies and included: one study within two hours of birth (Demaria et al, 2004), two within three hours (Blomstrand et al, 2015; Lukasse et al, 2007) one within six hours (van Os and van Der Linden, 2006), four studies on day one post birth (Nusee et al, 2014; Ibrahim et al, 2011; Pallis and Wilson, 2003; Barrington et al, 2001), one within 24 hours (Lee et al, 2008), and one with an average of 33 hours post birth (Mathew et al, 2007). Barrington et al (2003) recruited women requiring a catheter during labour.

Comparator

Various methods were used to measure the urine volume compared to the estimated bladder scan volume. Three studies used a foley catheter (12 gauge) (Ibrahim et al, 2011; Pallis and Wilson, 2003; Barrington et al, 2001), one used a 14Fr catheter (Demaria et al, 2004), one study measured the volume voided in a pan (Mathew et al, 2007), one in/out catheterisation (Lukasse et al, 2007), two used an in/out and indwelling catheter (Blomstrand et al, 2015; van Os and van Der Linden, 2006), two studies used a foley catheter and aspirated urine on catheter removal (Nusee et al, 2014; Lee et al, 2008) and one study did not state the catheter type used (Barrington et al, 2003).

Residual measurement

More than half of the studies re-measured the urine volume after the bladder was drained (Nusee et al, 2014; Ibrahim et al, 2011; Lee et al, 2008; Mathew et al, 2007; van Os and van Der Linden, 2006; Barrington et al, 2001), and the remainder did not follow up with this measurement (Blomstrand et al,

2015; Lukasse et al, 2007; Demaria et al, 2004; Barrington et al, 2003; Pallis and Wilson, 2003).

Procedure for scanning

The number of times the bladder was scanned to determine a reading was once in two studies (Barrington et al, 2003; Pallis and Wilson, 2003), three times in two studies (Lukasse et al, 2007; Nusee et al, 2014), five times in one study (Demaria et al, 2004), six times in two studies (Lee et al, 2008; Barrington et al, 2001), two to 12 times in one study (Blomstrand et al, 2015) and was not stated in two studies (Mathew et al, 2007; van Os and van Der Linden, 2006).

Post-void residual limit

Various post-void residual limits were used as a guide for catheterisation. The studies reviewed used 100ml (Mathew et al, 2007), 300ml (van Os and van Der Linden, 2006), and 400ml (Blomstrand et al, 2015; Lukasse et al, 2007). In the remaining studies, it was not necessary to define this limit for the particular methodology of the study.

Time delay

Five studies did not record the time delay between the scan and catheterisation (Blomstrand et al, 2015; van Os and van Der Linden, 2006; Demaria et al, 2004; Barrington et al, 2003), one study recorded on average a three-minute delay (Ibrahim et al, 2011), one study recorded a 10-minute maximum delay (Lukasse et al, 2007), and in four studies the catheter was already in situ, therefore reducing time delays (Nusee et al, 2014; Lee et al, 2008; Pallis and Wilson, 2003; Barrington et al, 2001).

Inter-rater reliability

This was conducted in four of the studies (Blomstrand et al, 2015; Lukasse et al, 2007; van Os and van Der Linden, 2006; Pallis and Wilson, 2003).

Pregnancy

There were no studies found which reviewed the accuracy of bladder scanners for non-labouring pregnant women. A case study published in 2003 detailed two women who presented to a hospital with symptoms of urinary retention and were scanned using the Bladderscan® BVI 3000 (Nastos et al, 2016). The bladder volume results for these women were 239ml and 115ml, but after catheterisation no significant amount of urine was collected. It was later discovered that these women were pregnant and the bladder scanner was measuring the amniotic fluid within the uterus.

Discussion

The results of the studies reviewed can only be applied to the particular type of bladder scanner studied (Bladderscan® BVI) and the circumstances in which they were used. However some of the findings, methodology and limitations can apply to future research. For example, inter-rater reliability was only assessed in four of the 11 studies. This however is an important component of research which tests the reliability of the device between operators, especially considering there

were multiple operators used in many of the studies.

It is vital that the bladder volume assessed by the bladder scanner is compared to the 'true' urine volume. This is most accurately measured by catheterisation. The time between the bladder scan and the urine being drained and measured also impacts on the accuracy of the comparison, as urine is constantly being produced. The manufacturer's guidelines for performing scans and the number of scans should also be adhered to. These elements of the methodology contribute to the rigour of the study being conducted.

Various methods of measuring urine were used in the studies and included catheterisation (different types and sizes), ultrasound and measuring a void into a pan. There are quite a number of barriers to measuring the exact amount of urine in the bladder or the 'true' urine measurement. Ultrasound has been shown to be accurate in a number of studies (Donnez et al, 2017; Gyampoh et al, 2004; Yip et al, 1998; Chien et al, 1996). There have been studies showing differing amounts of urine left in the bladder after catheter insertion and residual volume after voiding, adding to the importance of the post-drainage bladder scan or ultrasound (Avulova et al, 2015; Garcia et al, 2007; Haylen et al, 1989).

Other considerations impact the accuracy. The time taken to insert and drain the catheter after the first scan contributing to the ongoing diuresis, making the drained volume potentially higher than the volume estimated by the bladder scanner. There were different methods used to reduce the time lapse. Following up with a bladder scan post emptying of the bladder was performed in over half the studies to determine if the bladder was fully drained by catheterisation or urination, increasing the accuracy of comparisons in these studies. There was also a large variation in the number of scans performed on each woman (one to 12) to obtain a bladder volume result.

The more scans conducted, the more time lapses, adding to ongoing diuresis before the drained urine is measured. Performing multiple scans with time pressure in the clinical setting may also be an unrealistic recommendation, making the inter-rater reliability an important component of the research. The manufacturer of Bladderscan® BVI 3000 suggests the operator takes several measurements (non-specific regarding the number of measurements) to gain maximum accuracy and at least three times for the BVI 6100 (Verathon, 2004); however, there were only two studies that followed this recommendation (Nusee et al, 2013; Lukasse et al, 2007).

A number of studies clamped or spigoted the catheter before measuring the bladder volume. Consideration to over-distention of the bladder would need to be made with this study design. Aspiration of the urine was used in some studies to ensure quicker and more accurate drainage of urine. In an earlier study, this technique had been shown to cause discomfort to all patients and bleeding in 29% with no advantage (Haylen, 1989).

It has been found that increased pressure to the transducer when scanning women in labour using ultrasound affected the accuracy of the urine measurement. Scar tissue and fibroids can affect the shape of the bladder leading to

inaccuracies (Gyampoh et al, 2004). It has been reported that in postpartum women, the bladder scanner measured the contents of the uterus, and the uterus can also distort the shape of the bladder which interferes with the automatic reading of the bladder scanning device (Lukasse et al, 2007; van Os and van Der Linden, 2006; Pallis and Wilson, 2003). Fibroids, ovarian cysts, retroperitoneal haematoma and bladder oedema have also been shown to lead to inaccuracies in bladder volume measurements, causing difficulties with accuracy during the childbirth continuum (Lee et al, 2008). Despite some of these issues and studies reporting large over- and underestimations of urine volume, many studies still concluded that the scanners could be used clinically.

The study by Blomstrand et al (2015) had some limitations: not all women were catheterised, and clinical decisions were based on the results of the bladder scanner. There were 19 women catheterised unnecessarily in the experimental group and only two women were catheterised when clinical signs were detected by the midwife, and in each group one woman required an indwelling catheter. Despite the findings, it was recommended that the bladder scanner was 2.7 times more likely to detect PUR than using clinical signs alone.

Consideration when conducting a bladder scan over a new CS incision would need to be given, in relation to pain and infection. These potential issues were not discussed in the literature reviewed. Interestingly, the manufacturer's guidelines for the BVI 3000 and 6100 state that the scanner should not be used on open skin wounds in the suprapubic area, recommending that care should be taken post surgery; scar tissue in the suprapubic area, staples and stitches can interfere with transmission and reflection of the ultrasound waves (Verathon, 2004).

The training of staff prior to using the bladder scanner was not detailed in most studies. One did conclude that accuracy may have been improved by increasing the amount of staff training (Blomstrand et al, 2015). Mathew et al (2007) highlighted the benefits of the bladder scanner, stating that it is easy to use, requires minimal training, can be carried out at the bedside and reduces pressures on the ultrasound department. Other benefits include that it's fast and does not require mathematical calculation (Nusee et al, 2014).

One of the disadvantages of the BVI 3000 and 6100 is that the bladder cannot be viewed by the operator while scanning, so it is possible that the operator is measuring another fluid-filled structure in the pelvic area and is why the gravid or involuting uterus can lead to inaccuracies (Mathew et al, 2007).

Interestingly, there are studies where bladder scanners have been used and assumed to be accurate including: BVI 3000, BVI 9400, Bardscan bladder scanner BTI 3000, Mediwatch Portascan bladder scanner, and one unnamed scanner. The focus of these studies was analgesia and PUR; PUR after CS; incidence and treatment of PUR; and risk factors (Mulder et al, 2016; Buchanan and Beckmann, 2014; Liang et al, 2010; Demaria et al, 2008; Ismail and Emery, 2008; Liang et al, 2007; Glavind and Bjørk, 2003).

It is stated in the warning section of the Bladderscan® BVI 6100 user manual that the bladder scanner is not

intended for use on pregnant women (Verathon, 2006). This is because the amniotic fluid in the uterus and the changing anatomy of the bladder shape can influence the accuracy of the bladder scanner. So it was not surprising that there were no studies found assessing non-labouring pregnant women.

Bladder scanners have many reported benefits, including: easy to use; minimal training required; quick to obtain results; non-invasive; well-accepted by women; reduces the need for women to move from the ward environment; reduces the strain on radiology departments; assists in the reduction of unnecessary catheterisations; reduces the risk of urinary tract infection, the negative psychological impact of catheterisation, discomfort and urethral trauma. If bladder scanners were shown to be accurate they could have a very positive effect on bladder care in the maternity setting.

Conclusions

Research assessing the accuracy of bladder scanning for maternity care is currently limited. The studies concluding the device is accurate have also reported cases of large overestimation, underestimation, and that the device can be affected by the fluid-filled uterus, overweight women (increased abdominal wall thickness) and large bladder volumes. Therefore the accuracy of bladder scanning women in the maternity setting still requires further assessment.

The measurement of residual urine or bladder volume using the BVI 3000 or 6100 bladder scanner on labouring or newly birthed women has its challenges. It is not possible to view the bladder on a screen, making it hard for the clinician to be confident in its accuracy; it is known the device detects other fluid-filled structures within the pelvic area, such as fibroids, cysts, amniotic fluid, lochia and water in the catheter balloon.

Current evidence is very limited. Testing the latest technology of bladder scanners to determine the accuracy of bladder scanning during the childbirth continuum is necessary. If shown to be clinically accurate, it will have the potential to reduce the number of urinary catheters inserted and reduce the negative associations of this intervention.

Implications

To increase the rigour of future research investigating the accuracy and reliability of bladder scanners, the authors suggest the following considerations: staff should be trained in the use of the bladder scanner in a consistent manner; inter-rater reliability should be assessed; the time lapse between scan, catheterisation and drainage of urine should be kept to a minimum by recruiting women with a catheter already in situ or maintaining time restrictions; the catheter needs to be drained in less than five minutes; the measurement of urine needs to be precise by weighing or measuring the output with a syringe.

Scanning the bladder post drainage also accounts for the urine left in the bladder and for ongoing diuresis. The manufacturer's recommendations should be followed to guide the researcher in the optimal way of using the bladder scanner which should involve the technique, the number of

times the woman needs to be scanned for the most accurate result and the woman's position during the scan.

Further research is required to test new technology in bladder scanners as there have been recent developments. It is of utmost importance to test the reliability and accuracy of bladder scanners before clinical use in maternity care as the clinician needs to be reassured that their decisions are based on results accurate enough to make a clinical assessment.

It is essential for the bladder scanner to be accurate with large bladder volumes that have the potential to cause over-distention of the bladder, and small bladder volumes in order to reduce the amount of unnecessary catheterisations.

Further research is needed to clarify this important part of women's health and how bladder scanners can be best utilised for pregnant, labouring and newly birthed mothers to optimise the bladder care that women receive.

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Appendix. Summary of studies measuring the incidence of postpartum urinary retention

Author, year, country, sample size	Aim	Type of study and method	Findings and conclusions	Strengths and limitations
Barrington et al, 2001 UK 50 women post CS	No aim documented	Observational study. Foley catheter clamped morning after CS, until desire to void. Six measurements undertaken using Bladderscan® BVI 3000, over CS incision. The largest volume recorded. The clamp removed and urine volume measured. Catheter removed and bladder rescanned. Mann-Whitney for analysis.	Results showed a correlation between scan and measured bladder volume (r=0.807 and p=0.610). Authors reported bladder scanner is accurate in women post CS. Concluding bladder scanner could be used to detect distended bladders post CS. The uterine contents can distort the complex algorithms of the scanner. The bladder also changes shape and if time is not taken to locate the bladder, it can cause inaccuracies. The bladder scanner introduced to the unit for women post CS as a result of study. Catheters can be traumatic, uncomfortable and often unnecessary.	Smaller volumes of urine not assessed in study which could be useful in assessing what is normal postpartum. Time taken for catheter drainage not reported. Study was not blinded. Six scans performed on each woman with no rationale provided. Inter-rater reliability was not reported. Who carried out scans not reported or if there were multiple operators. Catheter already in situ reducing time delay.
Barrington et al, 2003 UK 50 women in labour, unable to void	To determine whether the bladder scanner is accurate measuring bladder volume of women in labour.	Prospective observational study. 18 midwives and three doctors involved in scanning. Women were in labour and recruited if catheter required (no voiding >4 hours or unable to void). Bladderscan® BVI 3000 used by midwife/doctor to record bladder volume. Bladder emptied immediately via catheterisation and volume recorded. Medical and midwifery staff were instructed in the use of the equipment to standardise the results.	Women with ruptured membranes correlation was good r=0.851 if membranes were intact was poor r=0.128. Overall correlation 0.593. Bladder scanner unable to differentiate between bladder volume and amniotic fluid. Accuracy was independent of the experience of user. Increased body mass index did not impact the results. Concluding that bladder scanning is safe with no fetal compromise and that it could be used clinically if membranes have ruptured. Also that it is small, portable and fast to obtain results.	Type of urinary catheter used not stated and study not blinded. 21 clinicians (18 midwives, three medical staff) scanned. No inter-rater reliability carried out. One scan performed on each woman. Length of time urine drained not reported or time taken to catheterise. Women not rescanned after catheterisation for residual volume. Concluded that bladder scanner is safe to use with no fetal compromise. There was no documented evidence of how fetal wellbeing was measured.

Appendix continued. Summary of studies measuring the incidence of postpartum urinary retention

Author, year, country, sample size	Aim	Type of study and method	Findings and conclusions	Strengths and limitations
Pallis and Wilson, 2003 Australia 27 women day one post vaginal birth recruited over three-month period	This study was designed to assess the validity of the bladder scanner (Bladderscan® BVI 3000) in women post vaginal birth.	A prospective blinded comparison. Foley 12G catheter was spigoted between 0700 and 0815 and between 0830 and 0900 bladder scanned by trained urology nurse. Catheter drained immediately into bag with woman standing for five minutes. 50ml syringe used to measure urine volume (by the midwife).	The ICC was 0.23 with 95% CI of 0-0.59. Therefore a poor correlation shown between scan and catheter measurements. Large and variable over-and underestimations. Bladder scanner overestimated bladder volume in this study.	8ml catheter balloon may have disrupted results. Fluid in uterus and bladder distortion could also cause large discrepancies. Author stated the foley catheter has been shown to leave residual urine (77ml) and female short catheter more accurate leaving less than 1ml residual urine. Bladder not rescanned post catheter drainage. Blinded study with one operator scanning each woman once.
Demaria et al, 2004 France 100 women two hours post vaginal birth recruited over a two-month period	To determine the reproducibility and validity of urine retention volumes measured by 3D ultrasound (bladder scanner) in women two hours post birth.	Longitudinal prospective study. Bladder volume measured five times by same operator, using Bladderscan® BVI 3000 and immediately catheterised (14Fr catheterisation). Last four measures analysed using interclass correlation coefficient and results four and five with Bland Altman, to determine reproducibility. Validity was determined by the mean of four scans and true volume (catheter drainage).	Results highly reproducible with ICC 0.974 (95% CI). Bland Altman plot confirmed this. Mean of four scans and measured urine had ICC of 0.924 (95% CI). Bland Altman showing wider variation with validity. Bladder scanner underestimated urine volume by mean 42ml. Imprecision shown in volumes >400ml. Pearson's Correlation between two techniques was 0.94 (p<0.0001). Low relative mean error of 6.8% reported as a good result. Bladder scanner more likely to underestimate urine volume by mean of 42ml. Good validity shown with mean of four scans, ICC 0.924. Concluding good measurement reproducibility and acceptable validity in measuring small and large volumes of urine <1litre.	One operator performed scans. Time interval between scan and catheterisation not estimated. Bladder scanning performed two hours post birth and 92% of women had epidural anaesthesia. Rationale for measuring bladder five times not described. Bladder not scanned post catheterisation. Intra-observer agreement assessed by using ICC with same operator doing measurements. Low relative mean error of 6.8% reported as good result although results of some scans from catheterised values were substantially different.
van Os and van Der Linden, 2006 Netherlands 85 women six hours post vaginal birth between January and March 2004	The reliability of an automatic ultrasound system to measure bladder volume in the postpartum period (Bladderscan® BVI 3000).	Prospective observational study. All women post vaginal birth over three month period eligible for study. Women scanned by trained nurses (BVI 3000) within six hours of birth. 41 women scanned by two nurses, with an interval of <5minutes. Scan done before voiding and post void. If residual >300ml woman catheterised (Lofric catheter, Ch 12). Volumes <300ml were excluded from follow up. If volume scanned was 300ml to 500ml, Lofric catheter was inserted. >500ml indwelling catheter (IDC) inserted 24 to 48 hours. Women followed up until residual was <300ml. Nurses trained in the use of bladder scanner by Department of Obstetrics and Gynaecology. Women post CS or with catheter for difficulties with spontaneous voiding excluded from study.	A total of 24 measurements up to 18 hours postpartum used to compare catheterisation and scan results using Bland Altman with no significant difference shown. Inter-observer variability analysed by Bland Altman. No significant differences in the two nurses' results, two unnecessary catheterisations done in order to detect eight residual volumes >300ml. From the 27 catheterisations, 17 women would have been catheterised due to signs and symptoms following the usual clinical protocol. 10 women were catheterised due to bladder scan results, one had catheter drainage of 50ml and one 230ml and the rest were >300ml which included five who had volumes of >500ml (500ml to 1200ml). Concluding scanner is reliable when used by trained nurses and well-accepted by women due to its non-invasive nature. Further RCT is needed to evaluate clinical relevance of early detection of PUR. Bladder can be very full without exhibiting signs and symptoms detectable to the midwife.	Two cases of large overestimation reported where uterine contents may have caused inaccuracy. Catheter drainage time not stated. A total of 300ml of urine used in this study as the intervention point. Unknown how many women in study were not investigated further due to bladder scan result <300ml as they were eliminated from the study but could potentially have larger bladder volumes. All women in study followed up for six weeks postpartum.

Appendix continued. Summary of studies measuring the incidence of postpartum urinary retention

Author, year, country, sample size	Aim	Type of study and method	Findings and conclusions	Strengths and limitations
Lukasse et al, 2007 Norway 100 women at risk of PUR after vaginal birth	To test the reliability of the bladder scan in assessing the bladder volume, specifically post-void residual (PVR) >400ml.	Prospective study. A group of nine project members trained in the use of bladder scanners by a urology nurse and taught other staff members (70). At risk of PUR was defined as: unable to void within three hours of birth, clinical signs (abnormal fundal height, palpable bladder, little or less urine passed than expected). Women scanned by two operators within five minutes, three times each and highest of three results recorded. An in/out short female catheter used to drain urine (Lofric ch12, Astra Tech, Molndal Sweenden) within 10 minutes of last scan.	Mean difference between bladder scanner and catheter results 26ml. Inter-agreement between two scans and measured volume showed 95% CI for mean difference of two scans. Second scan result used due to it being closer to time of urine emptying. Sensitivity 0.76 and specificity 0.96 for scanner using 400ml threshold, 0.9 and 0.75 for 350ml and 1.0 and 0.65 for 300ml. Concluding bladder scanner is reliable screening tool for women at risk of PUR after vaginal birth. If bladder volume intervention point set at 400ml, 39% of women needing catheters would be missed. 300ml threshold could reduce catheter insertions by half compared to a policy where no scanner used.	70 staff members performed scans (student nurses/ midwives, midwives, nurses and care assistants). Three scans performed in study. Catheter measures reported higher which could be due to time delay and ongoing diuresis. Women with PUR recruited, reflecting how scanner could be used in clinical setting. No scan performed post catheterisation. Short female catheter used in study as very minimal post catheter residual (1ml), demonstrated by Haylen et al (1989).
Mathew et al, 2007 Scotland 101 women post vaginal birth, with or without signs of bladder dysfunction. Recruited March – July 2004	Compare the accuracy of a bladder scanner and real-time ultrasound in measuring urine volume after vaginal birth.	Observational study. All scans performed by one clinician. Bladder volume measured using real-time ultrasound (Toshiba Diagnostic Ultrasound System, Model SSA-240A) followed by a bladder scanner (Bladderscan® BVI 3000) on average 33 hours post birth. Women voided into pan and volume measured. Both systems were used to measure PVRBV of urine.	Voided urine volume was generally more (mean of 41ml) than volumes estimated by real-time ultrasound and bladder scanner (mean of 33ml higher). Portable scanner was on average 9ml higher than real-time ultrasound. It was concluded that these ultrasound techniques are not accurate in the puerperium and catheterisation is still the gold standard. Authors also report that no women with high residual volumes (>100ml threshold) or bladder dysfunction were missed in study.	One clinician performed all scans. Concluded that both techniques cannot be relied upon and results suggest bias in the measurements. No cases of high PVRBVs missed. Study not validated against catheterisation, rationale explained as residual urine remaining after catheter drainage and the increased risk of urinary tract infection.
Lee et al, 2008 UK 52 women with catheter inserted (12 F foley) (30 women post emergency CS, 12 elective CS, six ventouse, two forceps and two vaginal birth)	To compare the accuracy of 2D ultrasound and Doppler planimetry (Bladderscan®BVI 3000) with catheterisation of postnatal women.	Prospective study. The bladder was aspirated and emptied using a 50ml syringe and then spigoted for one to two hours. Women hydrated normally. 2D ultrasound (Urosonic Scanner, real-time scanner with 3.5MHz transducer) performed with woman supine and uterine volume calculated. Bladder volume then estimated by 2D ultrasound and Doppler Planimetry (BVI 3000). Six recordings done using bladder scanner. Bladder was emptied by aspiration using 50ml syringe. 12 F foley catheter removed and aspirated on way out. Ultrasound evaluation showed bladder to be empty post removal of catheter. Elapsed time was recorded and enabled individual production of urine volume to be calculated and taken into consideration.	Ultrasound ($r=0.796$ and $r=0.790$) was better correlated to catheter measured volume than Doppler planimetry (DP) ($r = 0.477$ and 0.375). Ultrasound and Doppler planimetry overestimated bladder volume, especially with small volumes and underestimated large volumes. Six readings on each woman (single-rater reliability). DP showed a wide range from 15ml to 535ml. The ICC was 0.81 with 95% CI of 0.74 to 0.87. Conventional ultrasound shown to have higher sensitivity (0.59 vs 0.46) than bladder scanner but a lower specificity (0.69 versus 0.89). Accuracy affected by extreme bladder volumes (large and small) and increased uterine volumes. Concluded that conventional ultrasound requires more expertise and therefore is not as clinically adaptable. DP was shown to be suboptimal for assessing postpartum PVRBV.	Catheter balloon could have interfered with results. One operator performed scans. Study not blinded but strict adherence to study protocol maintained. Various modes of birth included. Urine aspirated from bladder to reduce inaccuracies caused by residual volume post catheter drainage. Only study to measure uterine volume.
Ibrahim et al, 2011 Malaysia 193 women	To determine the validity of BVI3000 bladder scan in the detection of bladder volume of postpartum women.	Prospective observational study. Women day one post CS were scanned with BVI 3000 and immediately catheterised within eight minutes. 2D ultrasound used to ensure bladder empty.	The relationship between bladder scan estimate and catheterised measure $r=0.82$. Bladder scanner is comparable to urethral catheterisation.	Poster presentation. Not detailed information about the study.

Appendix continued. Summary of studies measuring the incidence of postpartum urinary retention

Author, year, country, sample size	Aim	Type of study and method	Findings and conclusions	Strengths and limitations
Nusee et al, 2014 Malaysia 190 women day one post CS with a 16 F foley catheter in situ. Recruited from Sept to Nov 2010	To determine the accuracy of bladder volume compared to catheterisation as well as the factors that influence the bladder scanner measurement.	Cross-sectional study. The catheter bag removed and the catheter clamped between 30 and 260 minutes. Catheter balloon deflated and scan (Bladderscan® BVI 3000) performed with woman supine, two finger breadths above symphysis pubis bone. Three readings recorded for each woman by one operator. Catheter emptied using a 50ml syringe to aspirate urine and catheter removed and aspirated further on way out. Residual urine checked with 2D scanner.	Mean difference between aspirated volume and scanned volume 15.7ml. Bladder scanner volumes were highly correlated with aspirated volumes ($r=0.819$ and $p<0.001$). When true bladder volume less than 50ml, lochia in uterus did interfere with results overestimating urine volume (between 2ml and 270ml). Study concluded that bladder scanner and catheterisation results are comparable but accuracy of measurement can be affected by increasing body weight (increased abdominal wall thickness) and larger bladder volumes.	Study not blinded. One operator performed scans and in/out catheter. Results can be generalised to women post CS.
Blomstrand et al, 2015 Sweden 252 women post birth (all modes of birth) over a two-month period	To determine if the systematic use of a bladder scanner can accurately identify more women with postnatal urinary retention than clinical signs detected by the midwife.	Experimental study. Women divided into experimental group (126) and control group (126). All women asked to void within three hours of birth. 60 midwives and auxiliary trained in use of bladder scanner. Experimental group received systematic bladder scanning post void or post attempt to void (Bladderscan® BVI 3000). Intermittent catheterisation used (Coloplast A/s Speedicath nr.12 and 4mm) if residual volume >400ml or unable to void and >400ml. Women scanned twice and highest measurement recorded. Urine measurement >1lt an IDC inserted. If <1lt bladder scan within four hours of next voiding (all women catheterised if >400ml). Bladder scanning ceased when PVRBV <200ml. Control group catheterised if symptomatic of urinary retention (abdominal pain, abnormal bleeding, abnormal fundal height or a palpable bladder) or unable to void within three hours of birth. Inter-rater reliability tested by two nurses scanning 20 women (blinded).	Inter-rater reliability closely correlated. 40 women in experimental group and 11 women in control group catheterised due to suspected PUR. 21 women in experimental group and 9 in control group identified as having PUR after catheterisation. 14 women with PUR in experimental group had PVRBV <200ml within six hours of birth and 20 had PVRBV <200ml within 12 hours of birth. One woman in each group catheterised at discharge. PVRBV higher via bladder scan than measured urine volume from catheterisation, especially with volumes <500ml. Concluding bladder scanner increased the chances of identifying PUR 2.7 times compared to clinical signs. One woman in experimental group with risk indicators received unnecessary catheter due to overestimation by bladder scanner. None of the women post CS diagnosed with PUR. Concluding BVI 3000 is accurate and non-invasive measuring technique and necessary in women post vaginal birth with risk factors but further study required. Authors reported systematic approach was criticised by women and midwives saying that too much emphasis placed on bladder care.	Women were required to void within three hours of birth. 400ml chosen as PVRBV for catheterisation. Unknown if any women with PUR were missed in experimental group – not all catheterised and is unknown if women in control group without signs and symptoms of PUR were missed. Bladder scanner overestimated bladder volumes leading to unnecessary catheterisation rather than missing over distended bladder. Two women in control group and 19 women in experimental group were catheterised unnecessarily. One woman from each group was discharged with IDC. Clinical decisions made based on scan results even though accuracy was being tested. Bladder was not rescanned post catheterisation. Authors stated that the shape and size of uterus can affect bladder scanner results. Two to 12 scans performed on each woman. Author reports larger discrepancies between scan and catheter volumes than some other studies stating that training may have been too short.

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 Ratnaik, 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

RCM conference speakers to be announced

The RCM has received the most entries ever for abstracts to be presented at this year's RCM annual conference. The abstracts are being reviewed and details of the full programme and list of speakers are due to be announced shortly on the event website. The concurrent sessions will be announced in due course too. The conference has already reached capacity, but those wishing to attend can still enter their details on the online waiting list. The two-day event is free to attend and is being held in Manchester on 31 October and 1 November. For more information, visit rcmconference.org.uk

Florence Nightingale Foundation travel scholarship applications open

Applications for the Florence Nightingale Foundation travel scholarships are open. The scholarships offer up to £5000 of funding for the scholar to study an aspect of practice or education in the UK or overseas. They are awarded for projects connected with the applicant's field of work that will benefit their patients or service users and the profession more widely. General and specialist scholarships are available. General scholarships are open to all midwives who wish to study practice or education in any area of clinical care. Information about the specialist scholarship opportunities is available on the foundation's website. Applications close on 21 July. For more information, visit florence-nightingale-foundation.org.uk

Thousands attend ICM Triennial Congress

An estimated 4000 midwives from around the world attended the 31st International Confederation of Midwives Triennial Congress, which was held in Toronto, Canada. In total there were 130 midwives associations, representing 114 countries from every continent. The theme for the congress was 'Midwives – making a difference in the world'. There was live streaming and a live webchat so that midwives around the world could access all sessions. The congress took place on 18 to 22 June and concluded with a look at the next congress, which will be held in Bali in 2020. For more information, visit midwives2017.org

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