

**The value of a Modified Early Obstetric Warning System (MEOWS) in managing maternal complications in the peripartum period: an ethnographic study**

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## **Abstract**

### **Objective**

To explore implementation of the modified early obstetric warning system (MEOWS) in practice to further understanding about the influence of contextual factors

### **Design**

Ethnographic study using observations (>120 hours), semi-structured interviews (45) and documentary review over a 7 month period; data was analysed thematically

### **Setting**

Maternity services in two UK hospitals

### **Participants**

Doctors, midwives, and managers

### **Results**

For women admitted to hospital in the antenatal and postnatal period with established risk of morbidity, the MEOWS enabled communication about vital signs from junior to senior midwives and obstetricians. The trigger prompts helped shape shared understandings of maternal complications. However, midwifery and obstetric staff questioned the added value of an extra chart in the postnatal period given the low incidence of maternal complications, and the resulting increase in workload. In an effort to prioritise workload demands and respond to the immediate needs of both women *and* their babies, midwives exercised professional discretion regarding its use. However, discretionary use of MEOWS meant the loss of a potential universal safety net for detection of deterioration.

### **Conclusion**

Despite a decade of use in acute settings, research into the effectiveness of early warning systems still yields conflicting results. Widespread policy support for the MEOWS is based on its intuitive appeal and no validated system for use in the maternity population currently exists. Our findings suggest that while the MEOWS has value in structuring the surveillance of hospitalised women with

established risk of morbidity, the complexities of managing risk and safety within the maternity pathway, the MEOWS' associated opportunity costs, and variation in implementation currently call into question its role for routine use.

## INTRODUCTION

In the UK overall, there has been a small but welcome decline in maternal death rates, against a backdrop of increasing birth rates and an older and less healthy population of mothers.[1] However, for every death, nine women develop major obstetric complications,[2] including haemorrhage, infection, hypertensive disorders and thromboembolism.[1, 3] A recent confidential enquiry into maternal deaths in the UK [1] identified substandard care in a number of the cases. Many of the avoidable factors such as lack of routine observations and failure to recognise the significance of deteriorating vital signs remained the same as those identified in previous enquiries. To reduce delay, there have been calls for a modified early obstetric warning system (MEOWS) for routine use on all pregnant or postpartum women who have been admitted to hospital and require either obstetric or gynaecology services, in addition to those who have already been identified as critically ill.[1, 3] Use of the MEOWS is now included in the maternity risk management standards set by the NHS Litigation authority.[4]

Early warning systems (EWS) use a set of predetermined 'calling criteria' (based on periodic charting of vital signs) as indicators of the need to escalate monitoring or call for assistance.[5] In acute care, while EWS have been found to legitimise calling for help across hierarchical boundaries,[6, 7] the heterogeneity of tools has undermined staff confidence in their validity, and made it difficult to identify the optimal system.[8, 9] An EWS modified for the obstetric population needs to have predictive ability for conditions such as sepsis, haemorrhage and pre-eclampsia, and to reflect the physiological changes associated with pregnancy and the early postnatal period.[10] While several studies concluded that the MEOWS may be a useful tool for predicting obstetric morbidity,[11-13] there is a lack of robust evidence linking implementation of MEOWS with improved outcomes which raises questions about its effectiveness and generalisability.[14] While some obstetric anaesthetists have demonstrated support for a national MEOWS tool, poor compliance with guidelines has also

been documented,[15, 16] and concerns have been expressed about its relevance for the healthy pregnant population.[17]

This study contributes to the emerging field of research regarding the logic and perceived value of clinical decision support tools such as the MEOWS and its 'fit' with the complex practice of maternity care. The research aimed to explore the translation of the MEOWS from policy design to implementation on the front-line to further understanding about its effectiveness and interaction with contextual factors.

## **METHODS**

For an expanded version of the methods see online Appendix 1

### **Settings**

The study was carried out in two large inner city maternity service providers, purposively selected within the UK NHS, providing care to around 6,000 women a year each. Pseudonyms for the sites, Eastward and Westward, have been used to maintain anonymity. At the time of the study, Eastward provided an Obstetric Unit (OU), a mixed high and low risk care environment, while Westward provided an Alongside Midwifery Unit (AMU) providing care for women classed as low risk which was situated on the same floor as their OU (predominantly high risk environment). Both Eastward and Westward offered an integrated home birth service provided by midwives employed by the Trusts.

### **The MEOWS**

Details of service design and implementation of the MEOWS at the individual Trusts are provided in Appendix 2.

## **Data collection**

An ethnographic approach guided data collection and analysis as it provides an effective means of exploring interrelationships between frontline practices, the unwritten rules governing professional work and contextual factors.[18, 19] Ethnographic enquiry uses the researcher as the principal research tool.[20] Observations are supplemented by conversations, interviews and textual material.[19]

Data was collected by three researchers (NM, SR, KW) over a seven month period (February – August 2010). Fieldwork included observation of activity on the OUs and AMU as well as multidisciplinary team meetings including risk management (>120 hours in total). Ethical approval excluded access to women's labour and birth rooms so observations focused on those spaces utilised by the multidisciplinary team. Documentary evidence (guidelines and audit data) were also collected.

Further data collection included 45 semi-structured face-to-face individual audio taped interviews (see Appendix 3 for guide). Interviewees were purposively selected for theoretical representativeness [21] on account of their professional group, clinical role and place within the organisational hierarchies. This included junior and senior obstetricians (11), anaesthetists (3), neonatologists (2), midwifery staff (17) and managers (12). Women (17) and their partners (4) were also interviewed, and this data is reported elsewhere.[22] Interviews were recorded and transcribed verbatim.

## **Analysis**

Data were coded using NVivo v8, organised thematically and reviewed at regular team meetings. Analysis involved working in the first instance iteratively with the data, taking a 'bottom-up' approach. We also worked on a more strategic and policy focused coding framework, [23] adopting a deductive approach which focused on implementation, benefits and unintended consequences of the safety solutions, including the MEOWS.

In the second stage of analysis, we drew on the framework approach, [23, 24] which enabled linkage between both inductive and deductive coding frames, the clinical literature and sociological theoretical perspectives. This paper draws on five of the final themes: the legitimacy of charting systems, boundary distinctions, cultural norms, professional jurisdictions, and structural influences.

## **RESULTS**

For the purpose of this paper, these final themes have been grouped into three organising themes: (1) the value of MEOWS' in facilitating response to complications; (2) the design 'fit' of the MEOWS in maternity; and (3) contextual influencing factors.

### **The value of MEOWS in facilitating response to complications**

Guidelines within both Trusts recommended staff use the MEOWS chart to record vital signs in the antenatal and postnatal period. Prior to its introduction, these recordings were included by midwives within the narrative text of the handheld maternal records. Monitoring of vital signs was perceived as part of a holistic package of care and documented alongside other reflections of a woman's progress and her care rather than on a separate observation chart.

Following introduction of the MEOWS, senior midwifery and medical staff who managed activity on the OU noted the value of the coordinating function of the MEOWS chart. Vital signs previously

'hidden' within lengthy prose were made visible, providing benefit for senior staff such as this midwife who needed to come up to speed with trends developing over time.

*'Fancy me trying to look back and see when was the first temperature of 38, when did it come down? I'm having to leaf through 10, 15 pages of notes to look at the observations and to have a trend in my mind, to visualise it'* (Eastward, Senior Midwife OU, 15)

The chart was reported to increase team situation awareness and reduce delay in diagnosis and management. The fieldnote extract in Box 1 illustrates how the MEOWS provided a visual aid for detecting a woman's slow deterioration which might otherwise not have been picked up (potentially leading to an inappropriate discharge from the OU and delayed treatment).

**Box 1: Visualising trends in vital signs**

*The consultant obstetrician reviews a woman who is two weeks postnatal and on the OU after being readmitted for a wound infection. The obstetrician queries why the woman is still on the unit and suggests she moves to the postnatal ward. As the obstetrician looks through her notes she complains of difficulty establishing an overview of the woman's progress. The midwives have been writing the observations in the notes. She asks a house officer to plot the temperature on a MEOWS chart and sees there is a very slow upward trend. She decides this woman does need to stay on the unit* (Westward, OU Field notes)

The charts directed midwifery staff who recorded the abnormal vital signs to alert senior midwives and medical staff to the problem, facilitating shared understandings of deterioration and providing legitimacy for escalation of care.

*'I suspect that MEOWS really come into their own because people speak in terms of thresholds and everyone knows what's abnormal. You know, people used to say, 'Well, somebody's breathless,' but now the midwife will be able to say, 'She's breathless and her respiratory rate is 40,' which automatically rings bells'* (Westward, Consultant Obstetrician, 12)

*'If it's in the red [zone] you can't ignore that'* (Eastward, Midwife OU, 4)

Midwives and medical staff generally appeared to accept the setting of the 'trigger points'. These were set differently in the two sites (e.g. a respiration rate of 28 was categorised as 'abnormal' at Westward and 'mildly abnormal' at Eastward) prompting variance in escalation of care between the two providers. Directions for response on the MEOWS chart at Eastward were limited to 'call a doctor' rather than specifying who to call, the time frame and associated actions, which led to variability in subsequent monitoring, referral patterns and management.

### **The design 'fit' of the MEOWS**

The MEOWS did not appear to 'fit' or add value uniformly across the maternity care pathway. Three areas emerged as distinctive; during labour, high dependency care and the postnatal period.

#### **During labour**

Guidelines at both Trusts recommended that midwives on the AMU and OUs monitored women's vital signs during labour and birth with the partogram rather than the MEOWS. The partogram provided an alert and action line to enable monitoring of labour progress and prompt detection of complications. This included recordings of contractions, fetal observations, cervical dilatation and descent of the fetus.

In practice, variable use of the partogram and documentation of maternal observations was reported at both Trusts and confirmed by audit data at Westward (Westward, audit data of women in labour, unpublished data, 2009/ 10). Some midwives believed the alert line promoted unnecessary interventions rather than enabling use of their clinical judgement and professional skills to manage variations in women's labour patterns.

Box 2 provides examples of staff's mixed opinions regarding the value of the MEOWS for monitoring purposes during labour. A few obstetricians and some midwives from both Trusts considered that one to one care during labour enabled those midwives looking after a woman to spot changes in her condition without the need for a partogram or MEOWS chart. In contrast, a few queried why the MEOWS was not used during the intrapartum period. Junior midwives were observed to be confused at times about which chart to use.

**Box 2: Staff perceptions regarding the role of MEOWS in labour**

***No need for the MEOWS in labour because of one-to-one care***

*'One-to-one care in labour obviates the need for a MEOWS chart. Because if you're in the room it's very, very easy to tell that someone you saw an hour ago awake and chatty is now not looking so good' (Eastward, Consultant Obstetrician, 1)*

***The MEOWS should only be used in labour for women assessed as high risk***

*'We use the MEOWS chart for women who are very high risk [of developing complications] during labour, so if you've got somebody who's got pre-eclampsia [a complication that presents with high blood pressure and protein in the urine], then they would use it. But they don't use it on low risk women. I think the danger with MEOWS charts is that if you put them across the board, then you*

*reduce their value'* (Eastward, Consultant Obstetrician, 10)

***The MEOWS should be used for all women in labour***

*'I think it should be used across the board. I don't know why the decision has been made not to use it in labour. That doesn't make sense to me in all honesty but I wasn't involved in that decision making'*  
(Westward, Consultant Obstetrician, 2)

Some women assessed as high risk of complications during labour were monitored using the partogram and the MEOWS chart. Vital signs were recorded by midwives in four places; the notes, partogram, MEOWS chart and cardiocotograph (which monitored the baby's heart rate together with the mother's uterine contractions). Guidelines at the two Trusts did not require routine use of either the partogram or the MEOWS for women labouring at home, therefore when women transferred from home to hospital, handover of changes in a woman's condition was organised around verbal handover and narrative text recorded in the notes, rather than the partogram chart.

#### High dependency care

Both Trusts had designated high dependency beds on their OUs for women with established critical illness such as eclampsia and sickle cell disease where specially designed high dependency unit charts (HDU charts) were used rather than MEOWS charts to monitor women's vital signs. These HDU charts did not include trigger points or specify response actions. At Westward, a few staff noted tensions between physicians (such as respiratory specialists who were external to the maternity units) and obstetricians, in terms of their management decisions regarding the care of these women. When calling for help, midwives struggled at times to elicit a response from some of the medical physicians. Trust guidelines for escalation at Westward directed junior midwifery and medical staff to consult with the woman's obstetric consultant before calling for help from a physician. This

hierarchy of command created difficulties when consultants were occupied elsewhere and midwives were required to raise the alarm, as this midwife explains.

*'We have a lot of medical patients in HDU; when they're here it is like getting blood out of a stone to get physicians to come and review them. They don't listen to midwives. I've been told by an obstetric registrar, 'You need to get the medics over here,' but when you ring the medics they won't listen to you, because I'm a midwife. So what do you do when all our obstetricians are busy in theatre? You've got a sick woman that needs to be seen, but the medics won't see her, radiology won't do a portable chest X-ray because it's not the doctor that's speaking to them. I've held phones up to surgeons in theatre, when they're scrubbed, to give verbal orders over the phone' (Westward, Midwife OU, 9).*

Hierarchical boundaries resulted in avoidable delays in escalation of care.

#### The postnatal period

At Eastward, guidelines directed midwifery staff to use the MEOWS on all women in the postnatal period. Audit data showed that there was 22% usage of the MEOWS on the postnatal ward. Monitoring of respiratory rate, in particular, was poor. In the cases where a MEOWS chart was used, few had required referral or escalation of care. Most women whose case notes were reviewed were well, had their observations documented in the notes and were discharged within 24 hours (Eastward MEOWS audit, unpublished data, July 2010).

Decisions by Eastward's midwives *not* to use the chart were made on account that the majority of these postnatal women were not 'patients', but healthy women recovering from a natural event. The chart was perceived to inappropriately medicalise childbearing. Senior midwifery staff and

obstetricians saw a role for the chart to monitor women either post caesarean section or following establishment of complications in the antenatal or postnatal period. There was resistance to its routine use for all women in the postnatal period given the large numbers of healthy women within the system. The potential gain in detecting morbidity early was perceived to be small while the workload involved in follow-up vital sign recordings and false positive referrals was significantly greater.

At Westward, guidelines directed midwifery staff to use the MEOWS charts routinely on women staying *longer* than 12 hours as delayed discharge was assumed to be due to maternal or neonatal complications. Compliance to standards was also variable at this Trust, particularly with regards to documentation of a full set of observations and score. Midwifery staff from both organisations were observed to assess the need for an EW chart postnatally on an individual case by case basis. The midwives used their professional judgement to decide when vital sign monitoring for some women was lower priority than other postnatal activities (Box 3). In these instances, midwives chose to privilege women's breastfeeding or psychological needs, or at risk babies' monitoring needs, or system demands, ensuring women assessed as healthy moved quickly through the maternity system without delays imposed by the additional workload associated with the MEOWS (see Box 3).

**Box 3: The opportunity cost of the MEOWS chart in the postnatal period**

*'[It's hard] to persuade every midwife on the postnatal ward that measuring respiratory rate is important. On the whole midwives – and obstetricians – don't think that's important ... you have to do an awful lot of normal respiratory rates to come across the one woman who's actually sitting quietly getting sick in the corner' (Westward, Consultant Obstetrician, 2)*

*'If you know you've got your [maternal] observations to do and you've got to chart them on the early*

*warning chart. ... You think I'll do it later ...I need to feed this baby now'* (Eastward, Postnatal Ward Manager, 7)

*'Every 12 hours mothers and babies should have observations done, and I don't know that we always do them. [...] I'm weighing up all the time if a woman's well and there's been not a problem, I'm not going to wake her up at three in the morning because I forgot, or I didn't have time to do it at nine or ten in the evening. So you leave it and so that woman doesn't get that observation. And they're going home the next day anyway so, what would have happened if she'd been at home after the midwife had left her, she wouldn't necessarily have had observations done'* (Westward, Senior Midwife AMU, 4)

Observation of risk management meetings across both sites highlighted very few case reviews which concluded that there was a delay to the detection and management of women with postnatal complications because of a lack of observations or early warning score. Other cases were discussed which highlighted the limited use of the MEOWS in facilitating early detection of maternal collapse. These case reviews contributed to staff's mixed sense of the need for and effectiveness of the MEOWS chart.

However, anaesthetists from both organisations noted the limitation of the case by case approach as it was unlikely to increase detection of those women whose deterioration in condition might otherwise go unnoticed by midwives administering routine postnatal care. A midwife at Westward noted such a case where colleagues failed to recognise subtle signs of the complications a woman was developing. Routine use of the MEOWS chart including measurement of her respiratory rate in the postnatal period could have facilitated earlier intervention.

*'We had a woman that was showing signs that something was slightly out but it was a very grey thing. She was a bit out of breath. We thought, 'Oh well, she is a very large lady anyway, she's got crutches, she can't walk properly. That's why she's a bit puffed out'. But that's not what she was like all the time. She went into cardiac arrest' (Westward, Midwife OU, 7)*

This anaesthetist explained his argument for extending use of the chart to *all* women in order to 'catch' those one or two who otherwise would slip through the existing safety net because of its reliance on individual practitioner's professional judgement.

*'It's deciding where to draw that line, that's the million dollar question because you can't predict who's going to go off and who isn't [...] We have to throw the net a little bit wider than we are now, if we're going to pick up the ones [that are missed]' (Eastward, Anaesthetist, 8)*

### **Contextual influencing features**

Contextual features (leadership and governance, supervision and support, audit monitoring and feedback) also influenced staff's perceptions of the value of the MEOWS.

#### **Leadership and governance**

A centrally governed safety committee to improve the management of the acutely ill had been established at both Trusts. Both committees did not concern themselves with maternity, however. There was consensus from within and outside maternity that it was culturally distinct from acute care (Box 4).

#### **Box 4: Distinctions between maternity and acute care**

*'We are quite separate because we've got a different class of healthcare professionals with midwives who are different from nurses. And because we've got two patients and because our patients aren't patients, they're well and entirely normal and then they have life threatening problems which are unexpected disasters every time ... they think they're different in surgery, dermatology and radiology and so forth, but I'm not sure they are. Pregnant women physiologically are more different than men and women... so I think that we don't fit and we're always [considered] difficult'* (Westward, Consultant Obstetrician, 1)

*'A ward situation where you have a row of post-operative patients who all have the same basic demands, um, is different to a ... to a birth centre situation where the demands change from minute to minute, and the midwife has to flip between different clinical situations'* (Westward, Anaesthetist, 11).

A service manager from Eastward explained the implications of this.

*'the general EWS doesn't fit maternity or children's services, so those areas have developed their own [tools], but perhaps not with support from the rest of the organisation to make sure they're really robust, and that's the bit that I feel is a bit difficult [...] I think sometimes [...] we're just a little bit in that too difficult box. [Laughs] so you just do your own thing!'* (Eastward, Manager, 12)

Maternity based clinical governance services monitored use of the MEOWS in each organisation. Maternity was excluded from the support and oversight provided by each Trust's central safety committee. Similarly, although Westward's critical care outreach team was designed to facilitate

escalation of care processes across the Trust, in practice a clear boundary existed between its remit within acute care and maternity. Midwifery and obstetric staff were observed to be reluctant to ask for help from the outreach team even when midwives experienced difficulties getting physicians to listen or attend to calls for help.

At both Trusts, implementation of MEOWS had been driven largely by national pressure to meet NHS Litigation Authority risk management standards. Demonstration of compliance to these standards provided both Trusts with the opportunity to acquire financial benefits via the clinical negligence scheme for trusts (CNST). At Westward, this led to tensions between managers keen to secure these benefits and clinicians who lacked faith in the system.

At Westward strong clinical leadership, a learning culture, respectful interprofessional relations, and a formalised strategy for driving forward quality and safety improvements were observed to help facilitate implementation of the MEOWS. At Eastward, standardised processes (including the MEOWS and partogram) were perceived by the majority of midwives interviewed to challenge their professional autonomy and jurisdiction. Case by case use of the MEOWS was sanctioned by some senior managers, midwives and obstetricians (see Box 5).

**Box 5: Senior sanctioning of case by case use of MEOWS at Eastward**

*'I'm not convinced that MEOWS charts are important for highlighting problems. [...] Personally I don't think it needs to be that regimented, I don't know what the evidence is that these charts are helpful'*  
(Eastward, Consultant Obstetrician, 9)

*'If we were strict about the MEOWS I'm sure it would be done but maybe it's just the fact that we're not reinforcing it much'* (Eastward, Obstetric Registrar, 11)

*'If everything is normal like a midwifery case there's no need for a MEOWS chart, and I'm not bothered if you're not doing a partogram, there's no risk factors, if she's progressing normally I don't make a big fuss about that.... our policy says we should do it when they're in established labour, we're supposed to do it, but I won't go crazy if you didn't do it. (Eastward, Senior Midwife OU, 16)*

### Supervision and support

On both OUs there was strong obstetric consultant presence, providing supervision and support for junior medical and midwifery staff. However, medical and midwifery staff reported variability in performance of midwifery coordinators on the OUs with some concerns regarding their provision of support for junior midwifery staff. At Eastward, a 'coping culture' norm meant midwives felt pressured to demonstrate competence at managing the unit and at times delayed asking seniors for help, as this obstetrician illustrates.

*'There is still this old macho thing that you don't want to call in your consultant. It's there amongst the midwives as well, [...] There's this huge reluctance to ask for help, it's seen as a sign of weakness' (Eastward, Interview, 1, Consultant Obstetrician)*

This cultural norm also made it difficult for coordinators to speak up when they felt that workload levels on the unit were unsafe.

*'Through the years people ... have just managed ... and there's this bravado that, 'Yes I can do it, I can do it,' and I think actually we should just say every now and then, 'Actually we can't.' Because you're looking forward, you're looking backwards, you're looking at what's*

going on the ward, who's needing to be induced, it's too much' (Eastward, Interview, 17, senior midwife).

#### Audit monitoring and feedback

Audit data on the recording of observations and the use of MEOWS were collected by both sites. Adherence to standards was fed back regularly to the units and wards at Westward, prompting managerial scrutiny, the development of action plans and further monitoring. The auditing element was reported to help encourage staff to use the MEOWS over the research period. At Eastward there was less managerial focus on monitoring and feedback on chart utilisation.

#### **DISCUSSION**

This paper makes a contribution to the patient safety literature in its critical exploration of the consequences of knowledge production at the 'blunt end' (policy development) for action at the 'sharp end' (clinical practice). Certain economic, political or ideological factors may lead to new policy initiatives, without any evidence from research informing the process.[25] Healthcare organisations are no exception to the attraction of the quick fix safety solution.[26]

After a decade of its use within acute care, research into the effectiveness of EWS still yields conflicting results.[8] The MEOWS has been widely promoted in maternity since 2007 as an effective patient safety strategy by policy makers, safety and clinical leads,[1, 3,27, 28] despite little evidence of its predictive value or utility.[29] Indeed, the physiological changes of pregnancy and the early postnatal period may render existing MEOWS inappropriate.[30] Inclusion of the MEOWS as a CNST standard has further endorsed its use.[4] Differences observed between the MEOWS at the two Trusts reflect the wide variation in charts and implementation systems in use in maternity across the

UK.[17, 29] This variance mirrors the heterogeneity of EWS in use across acute care prior to the implementation of a national early warning system in 2012.[31]

This research highlights the front-line difficulties that result from roll-out of policy solutions that lack cultural and scientific legitimacy. The partogram has become an integral part of routine labour care despite uncertainty regarding its effectiveness.[32] While our study demonstrates the benefits of audit data monitoring and feedback,[33] leadership and multidisciplinary relations [34] for MEOWS implementation, staff at both sites used their professional judgement to set parameters around its application which in turn undermined its design brief to act as a *universal* safety net. Professionals exploit and use risk to override formal decision-making systems.[35] The privileging of routine surveillance of at risk babies in the postnatal period as opposed to healthy women occurred against a backdrop of a low incidence of maternal complications comparative to neonatal morbidity and mortality rates.

Our research develops and builds on others' work which demonstrates the expressive signature and values encoded within safety tools within specific clinical settings.[36, 37] Utilisation of the MEOWS embodied 'chart talk', which conforms to normative conceptions of clinical rationality and emphasises diagnosis and pathology.[38] Midwives chose to override locally set MEOWS standards on account of competing policy imperatives to promote normality in childbirth [39] and keep 'the production line' of maternity going.[40] Managerial controls were insufficient to ensure its standardisation.

The MEOWS chart was introduced alongside the case notes, partogram and HDU chart, making it hard at times for staff to identify its particular organisational niche. As Berg [41] observes, decision support systems redefine parameters and activation lines. Poor sensitivity and specificity of the EW

criteria reinforced staff's lack of belief in its added value. A sense of difference provided legitimacy for maternity to sit outside the governance framework provided by each Trust to enable learning from other services' experiences of EWS implementation.

Reliance on professional agency is unlikely to be the way forward as reports into failure to rescue within maternity care substantiate.[1, 3] While restriction of health care professionals' clinical discretion has improved safety,[42] systemic safety thinking and management *across* departments and boundaries remains a major challenge.[43] Importantly, this research sheds light on those factors that have remained under the policy radar but influence rescue processes across maternity care pathways. Our findings demonstrate the significance of cultures, boundaries and hierarchies within midwifery teams and between obstetricians and physicians, and midwives and physicians which delayed intervention. This reflects findings regarding the influence of structures and cultures in acute settings.[7, 9] Once validated for the maternity population, the MEOWS may help with recognition and response behaviour. However, it is unlikely to have an impact on outcomes until greater attention is focused on cultural and structural factors such as those outlined in this study which contribute to the root of the problem.[8]

### **Strengths and weaknesses of the study**

As a qualitative methodology ethnography offers important strengths, notably, 'a nuanced understanding of an organisation'.[44 p.1402] Observations were carried out purposively by three researchers with different disciplinary backgrounds which reduced the potential for observer bias. The research was part of a wider sociologically informed programme of work focusing on escalation of care across medical and maternity settings. Consequently, our interpretive lens was influenced by insights already gained from findings regarding use of the EWS in medicine. The existence of an audit trail, transcribed field notes of observations and regular team discussion of emergent findings

helped minimise bias. The research focus was the management of intra-partum complications and therefore whilst some data was collected regarding experiences of home birth, community services, antenatal and postnatal care, the main focus was on the OUs and AMU. Both Trusts had introduced the MEOWS in the 12 to 18 month period prior to data collection. There is growing evidence that it takes years for such systems to achieve cultural change.[45]

The findings come from two sites with different maternity service configurations and local cultures, increasing generalisability to other settings. The richness of the data may provide important insights for those clinicians and managers involved in implementation of MEOWS who recognise some of the same contextual characteristics within their own hospitals (see Appendix 4). These findings may not be applicable to maternity settings outside the UK NHS due to staffing and system level differences. However, we suggest that these two organisations act as ‘telling cases’,[46] enabling application of conceptual insights regarding the MEOWS beyond the study sites.

## **CONCLUSION**

This research joins others in highlighting the influence of context on utilisation of EWS. The findings suggest that while the MEOWS has value in structuring the surveillance of hospitalised women with established risk of morbidity, its lack of evidence base and the complexities of managing risk and safety within the maternity pathway call into question its widespread use. Given the MEOWS’ opportunity costs and potential for unintended consequences within women’s pathways of care, there is an urgent need for further research to validate such a system for use.

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**Competing Interest**

All authors have completed the Unified Competing Interest form (available on request from the corresponding author) and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years, no other relationships or activities that could appear to have influenced the submitted work

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