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# Maternity High Dependency Care (MHDC) in Obstetric Units remote from tertiary referral centres; findings of a modified Delphi study

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#### Abstract

**Background**. Increasing numbers of pregnant and postnatal women require higher levels of care, including maternity high dependency care (MHDC), due to comorbidities and/or obstetric complications. Up to 5% of women in the UK will receive MHDC, although there are varying opinions as to the defining features and definition of this care. Furthermore, some evidence suggests that the size and type of obstetric unit (OU) influences the way MHDC is provided.

**Objectives.** The aim of this modified Delphi study was to 'determine what constitutes high dependency care in OUs remote from tertiary referral centres'. The research objectives were to achieve a consensus on the definition and defining features of MHDC in OUs remote from a tertiary referral centre, examine whether the definition for defining features of MHDC were the same for OUs with differing annual birth rates and to investigate if the definition for, and defining features of MHDC were the same for MHDC were the same for the professional groups of doctors and midwives working in OUs with similar annual birth rates.

**Ethics.** Ethical approval was granted by the NHS research ethics committee and the relevant local NHS research and development departments.

**Method**. A three-round modified Delphi survey was conducted. The first-round questionnaires were sent to 193 obstetricians, anaesthetists, and midwives who worked across seven OUs (with annual birth rates ranging between 1500 and 4500), remote from tertiary referral centres, in southern England. Round one involved completion of a qualitative self-report questionnaire. Rounds two and three were predominantly quantitative and respondents were asked to rate their level of agreement or disagreement against five-point Tikért scale items for a series of statements derived from the first-round findings. The level of consensus for the combined percentage of strongly agree/agree statements was set at 80% for the second and third rounds. A detailed account of the research methods used are reported in the September 2017 issue of *Evidence Based Midwifery* (James et al, 2017).

**Findings.** Response rates for the first, second and third rounds were 44% (n=85/193), 87% (n=74/85) and 90.5% (n=67/74) respectively. The respondents achieved consensus regarding the defining features of MHDC with some exceptions including post-operative care and postnatal epidural anaesthesia. MHDC was defined as 'an interim level of care for women requiring interventions over and above the [specialised] "high-risk" obstetric care that will be carried out routinely on a consultant- led labour ward, but not requiring care on an intensive care unit. It will be implemented where a woman has deteriorated clinically but her care can be managed appropriately on the labour ward'. MHDC was likened with level 2 care (Intensive Care Society, 2009) although respondents from the three smallest OUs agreed it also comprised level 1 care. The smaller OUs were less likely to

provide MHDC and had a more liberal policy of transferring women to intensive care. Midwives in the smaller OUs were more likely to escalate care to the intensive care unit than their medical colleagues.

**Conclusion.** MHDC is complex and this Delphi survey corroborates previous evidence that local variations exist in MHDC provision. Varying opinions as to the level of care that equates with MHDC were apparent, but it is unknown how these variations influence women's care. Organisationally robust systems are required to promote safe, equitable MHDC including precise escalation of care guidelines incorporating standardised terminology.

**Key words:** Maternity/obstetric high dependency care, maternal critical care, levels of critical care for adults, invasive monitoring, obstetric intensive care, Delphi survey, evidence-based midwifery

#### Introduction

Increasing numbers of pregnant and postnatal women require higher levels of care, including maternity high dependency care (MHDC), due to comorbidities and/or obstetric complications. Up to 5% of women in the UK will receive MHDC (Saravanakumar et al, 2008), although there are varying opinions as to the defining features and definition of this care. Furthermore, some evidence suggests that the size and type of obstetric unit (OU) influences the way MHDC is provided (Zwart et al, 2010; Cordingley and Rubin, 1997). The overarching aim of this modified Delphi study was to 'determine what constitutes high dependency care in OUs remote from tertiary referral centres'. The research aim was addressed through the following objectives, which were to:

- Achieve a consensus on the definition for, and defining features of MHDC
- Examine whether the definition for, and defining features of MHDC are the same for OUs that have different annual birth rates and are remote from a tertiary referral centre
- Investigate if the definition for MHDC and its defining features are the same for the professional groups of doctors and midwives, who work in OUs with similar annual birth rates that are remote from a tertiary referral centre.

A detailed rationale for this Delphi survey examining MHDC, and the precise methods used, are reported in the September 2017 issue of *Evidence Based Midwifery* (James et al, 2017). This paper presents and discusses the research findings.

#### Findings

The response rates were 44% (n=85/193) for the first survey round, 87% (n=74/85) for the second round and 90.5% (n=67/74) for the third round. Despite non-responders, all professional titles comprising the expert panel were represented during the three survey rounds, which upheld panel stability. A mixture of midwives and doctors represented each OU, although the ratio of midwives to doctors was not equal across all the OUs. No respondents had been registered with their requisite professional bodies for less than five years. Overall, 76.5% of the respondents (n=65) stated they had undertaken training, courses or study days that were relevant to MHDC provision. By contrast, n=20 (23.5%) identified they had not undertaken any training relevant to MHDC provision, with the majority of these being midwives. Most of the midwives who returned the round one (R 1) questionnaire (n=41, 93.2%) identified they also held a nursing qualification

#### **Round one findings**

Findings are presented by round of the Delphi study. Four overarching themes emerged from the qualitative data. These were: conditions, vigilance, intervention, and service delivery. The theme of 'conditions' encompassed the categories of obstetric conditions, comorbidities, intrapartum care, complications, physiological instability and emotional and psychosocial complications. The 'vigilance' theme focused on the respondents' need to detect clinical changes in a woman's condition. Vigilance comprised not only basic non- invasive clinical monitoring such as pulse, blood pressure and respiratory rate recording but more complex invasive monitoring such as central venous pressure and arterial line recording. Vigilance also included the categories of staff to patient ratios, the need for medical reviews, clinical investigations, and the use of documentation, such as Early Warning Score systems to detect clinical changes.

The interventions theme included the categories of postoperative care, step-down care following an admission to intensive or coronary care, care planning and treatments related to MHDC. This theme also included 'intervention level', which included the sub-categories of 'subjective' definitions for MHDC and 'objective' definitions for MHDC using the Intensive Care Society (ICS) (2009) levels of care classification system. The service delivery theme encompassed the categories of multidisciplinary working, the environment in which care was delivered, funding/available resources, the need for appropriately trained professionals and the risk management systems in place to ensure safe and effective care provision.

#### **Round two findings**

There were 36 statements where consensus agreement was achieved by the respondents during round two (R2). Specific conditions, clinical circumstances and interventions were identified as defining features of MHDC and these are presented in Table 1 (overleaf).

Relating to the theme of 'conditions', the respondents' additional qualitative comments identified that the stability of the patient and severity of the condition would influence the decision to provide routine labour ward care, MHDC or transfer a woman to intensive care:

"All are mainly dependent on severity of the conditions and stability of patient as most - if stable, can be managed normally" (B/12).

In terms of the vigilance that characterises MHDC, there was strong consensus that non-invasive monitoring was vital to MHDC. However, some respondents commented that invasive monitoring was an indication for transfer to the intensive care unit (ICU):

"Women with arterial lines should not be cared for on a labour ward" (D/23). Some of the interventions identified as indications for MHDC were also highlighted as indications for ICU care:

"Any active respiratory or renal support is critical care level 3 and not high dependency care as I see it" (D/23).

The R2 statements that did not achieve 'strongly agree' or 'agree' consensus responses included 25 statements describing conditions (such as obstetric cholestasis, mental illness, gestational diabetes, fetal loss), 13 statements relating to vigilance (such as vital signs recorded <4 hourly but > or =hourly, increased use of imaging, informal medical reviews), and 25 statements describing interventions (such as routine post-operative care up to 24 hours after CS, prolonged post-operative care >24 hours, postnatal epidural, oxygen therapy <50% by face mask and oxygen therapy >50% by face mask).

Of the four R2 statements providing overarching descriptions for MHDC, only one of these - 'MHDC is an interim level of care between normal and intensive care' - achieved a consensus response (83.8% agreement). Only 33.8% (n=25) of the respondents were familiar with the ICS levels of critical care for adults (ICS, 2009). A total of 48 (64.9%) respondents were not familiar with the ICS levels of care and one respondent (1.3%) did not answer this question. Those who were familiar, equated MHDC with level 2 care (n=24/25, 96.0%), although level 1 care almost gained consensus (n=19/25, 76.0%). Twelve of the respondents (48%) also likened MHDC with level 3 care.

Please rate how strongly you agree or disagree that the conditions / pre-existing conditions / complications listed below are indications for maternity high dependency care (MHDC).		Median SA/A score (IQR) %		SD/D %	NAND %	Missing response %
itions	Hypertensive disorders (e.g. moderate to severe pre-eclampsia; HELLP syndrome)	5 (1)	98.6	0	1.4	0
	Obstetric haemorrhage	5 (0)	97.3	0	2.7	0
	Confirmed Amniotic Fluid Embolism (AFE)	5 (0)	97.3	2.8	0	0
	Signs / symptoms of shock	5 (0)	97.3	2.7	0	0
	Sepsis	4 (1)	95.9	1.4	0	2.7
	Disseminated Intravascular Coagulation (DIC)	5 (0)	95.9	1.4	0	2.7
	Organ failure	5 (0)	95.9	4.1	0	0
	Diabetes (e.g. unstable despite sliding scale)	4 (1)	94.6	1.4	4.1	0
	Physiological compromise	5 (1)	94.6	5.4	0	0
pu	Maternal collapse	5 (0)	94.6	4.1	1.4	0
S	Suspected AFE	5 (0)	93.2	0	6.8	0
	Woman who is critically ill	5 (0)	93.2	4.1	1.4	1.4
	Organ dysfunction	5 (1)	93.2	4.1	2.7	0
	Condition threatening maternal life	5 (1)	89.2	2.7	6.8	1.4
	Acute fatty liver of pregnancy	5 (1)	85.1	5.4	8.1	1.4
	Cardiac conditions (e.g. valvular heart disease)	4 (1)	83.8	2.7	10.8	2.7
	Confirmed Deep Vein Thrombosis / Pulmonary Embolism	4 (1)	83.8	4.1	12.2	0
In relation to the observation and monitoring of women, please rate how strongly you agree or disagree that the statements below represent features of MHDC.		Median score (IQR)	SA/A %	SD/D %	NAND %	Missing response %
	Recording of observations on HDU chart	5 (1)	91.9	0	5.4	2.7
	Continuous monitoring vital signs	5 (1)	90.5	1.4	8.1	0
	Vital signs < hourly	4.5 (1)	86.5	1.4	12.2	0
	Continuous electrocardiogram (ECG)	4 (1)	86.5	4.1	9.4	0
e	Neurological observations	4 (1)	86.5	5.4	5.4	2.7
an	Continuous ECG	4 (1)	86.5	4.1	9.4	0
igi	Neurological observations	4 (1)	86.5	5.4	5.4	2.7
>	Joint lead clinicians	4 (1)	85.1	2.7	10.8	1.4
	Regular and frequent investigations	4 (1)	85.1	2.7	9.4	2.7
	Invasive monitoring i.e. Central Venous Pressure (CVP line)	5 (1)	82.4	2.7	13.5	1.4
	Invasive monitoring arterial line	5 (1)	82.4	5.4	12.2	0
Please rate how strongly you agree or disagree that the interventions listed below are components of MHDC		Median score (IQR)	SA/A %	SD/D %	NAND %	Missing response %
rventions	Step down care post ICU	4 (1)	93.2	4.1	2.7	0
	Administration of intravenous (IV) anticonvulsants	5 (1)	93.2	0	6.8	0
	Involvement of critical care outreach team or ICU	4 (1)	90.5	4.1	5.4	0
	Transfer of patient e.g. to ICU or coronary care	5 (1)	90.5	1.4	5.4	2.7
	Administration of IV antihypertensive	4 (1)	89.2	2.7	8.1	0
Ite	Drugs / fluids via central line (CVP line)	5 (1)	87.8	2.7	6.8	2.7
드	Administration of inotropes / vasopressors	4 (1)	86.5	5.4	6.8	1.4
	Renal support	5 (1)	81.0	17.6	1.4	0

### Table 1. The R2 statements where consensus agreement was achieved

#### Round three results

The round three (R3) results are presented for the whole respondent group (n=67), but are also reported for respondents representing OU groups with similar birth rates (James et al, 2017) and by the professional groups of doctors and midwives representing OUs with similar birth rates, where findings of significance were noted. The first section of the R3 questionnaire asked the respondents whether intensive care was required for 15 statements identified during the second round. Of these 15 statements, n=8 achieved >80% 'yes' responses in favour of intensive care as opposed to providing MHDC (see Table 2, column 1)

MHDC (see Table 2, column 1).

Table 2	R3 results identifying the indications for intensive care, as reported by doctors and
midwive	s for all the OUs combined and those working in OUs with similar annual birth rates.

	Column 1	Column 1 Column 2		Column 3			Column 4			
Obstetric Unit (Annual birth rate)	All OUs Group one   xetric Unit A-G C and D   yual birth rate) (1500 – 4500) 4000/4500		e 0	Group two A and B 3300/3300			Group three E, F, and G 1700/2220/1500			
Professional group (DR= Doctor, MW = Midwife)	DR + MW	DR + MW	DR	MW	DR + MW	DR	MW	DR + MW	DR	MW
Number of respondents	67	25	13	12	21	9	12	21	10	11
Section 1. Patients with the following conditions or interventions should be cared for on an ICU:	Percentage of respondents in favour of ICU care									
Severe obstetric conditions (e.g. severe pre- eclampsia, HELLP, eclampsia, major haemorrhage, acute fatty liver disease)	61.2	56.0	69.2	41.7	42.9	44.4	41.7	85.7	80.0	90.9
Suspected amniotic fluid embolism	70.1	60.0	69.2	50.0	66.7	55.6	75.0	85.7	70.0	100
Confirmed amniotic fluid embolism	92.5	88.0	76.9	100	95.2	100	91.7	95.2	90.0	100
Disseminated intravascular coagulation	89.6	88.0	76.9	100	90.5	88.9	91.7	90.5	90.0	90.9
Physiological deterioration / compromise (unstable patient despite escalation of appropriate care)	98.5	96.0	100	91.7	100	100	100	100	100	100
Continuous ECG monitoring and / or neurological observations required	56.7	52.0	46.2	58.3	52.4	33.3	66.7	66.7	30.0	100
Invasive monitoring – arterial line	62.7	56.0	53.8	58.3	47.6	33.3	58.3	85.7	70.0	100
Invasive monitoring – pulmonary artery flotation catheter (Swan Ganz lines)	91.0	80.0	100	58.3	95.2	88.9	100	100	100	100
Administration of inotropes / vasopressors (e.g. dopamine)	86.6	80.0	100	58.3	85.7	88.9	83.3	95.2	100	90.9
Drugs and / or fluids administered via a central line	46.3	40.0	30.8	50.0	19.0	22.2	16.7	81.0	60.0	100
Continuous oxygen therapy (e.g. > 50% given by face mask)	55.2	44.0	38.5	50.0	52.4	33.3	66.7	71.4	60.0	81.8
Continuous oxygen therapy (e.g. < 50% given by face mask)	16.4	20.0	7.7	33.3	0	0	0	28.6	10.0	45.5
Noninvasive ventilation e.g. CPAP or BIPAP	86.6	72.0	76.9	66.7	100	100	100	90.5	80.0	100
Intubation and ventilation	98.5	96.0	100	91.7	100	100	100	100	100	100
Renal support	94.0	84.0	84.6	83.3	100	100	100	100	100	100

The respondent group as a whole did not achieve consensus agreement that intensive care was required for women with severe obstetric conditions, suspected amniotic fluid embolism (AFE), or those requiring continuous ECG or neurological observations, arterial line monitoring, drugs/ fluids administered via a central line, and continuous oxygen therapy (for example >50% given by face mask) (see Table 2, column 1). By contrast, the respondents representing OU group three, the OUs with the lowest annual birth rates (see Table 2, column 4), achieved consensus that women with severe obstetric conditions, suspected AFE, invasive monitoring by arterial line and the administration of drugs/ fluids via a central line required intensive care as opposed to MHDC. Overall, the respondents of OU group three recorded the most statements in favour of intensive care (n=12) when compared with the respondents representing the other two OU groups.

Further analyses by the professional groupings of doctors and midwives identified that n=14 of the 15 statements were identified as indications for intensive care by the midwives representing OU group three, compared with n=9 statements for the doctors (see Table 2, column 4). Suspected AFE, continuous ECG monitoring or neurological observations, invasive monitoring (by arterial line), drugs/fluids administered via a central line and continuous oxygen therapy (such as >50% given by face mask) were all identified as indications for admission to ICU by these midwives. The number of 'yes' responses (n=8) provided by the doctors and midwives working in OU group two were identical and applied to the same statements (see Table 2, column 3). In contrast, the number of 'yes' answers provided by the doctors and midwives representing OU group one were the same (n=5), but there was disparity in terms of the statements these related to (see Table 2, column 2).

The second section of the R3 questionnaire achieved consensus responses across the whole respondent group for all statements. A total of 10 third-round statements did not achieve consensus responses including:

· Five describing conditions (autoimmune disorders with clinical instability, severe pre-existing

condition with clinical stability, suspected pulmonary embolism (PE), morbid obesity, history of organ transplantation with clinical stability)

- Two relating to vigilance (referral to paramedical staff, such as a physiotherapist, operating department practitioner and monitoring of vital signs more frequently than four hourly but not more frequently than hourly)
- Three interventions (prolonged post-operative care because of unsatisfactory patient recovery, a woman needing epidural anaesthesia, excluding pain relief during labour, and immediate post-operative care (first hour post-CS)).

When comparing the responses provided by the doctors and midwives representing each OU group, there was comparatively close agreement as to the statements that did and did not gain consensus in favour of MHDC however, some variations were evident. Midwives representing OU groups one and three did not achieve consensus that IV antihypertensive administration is an indication for MHDC whilst the doctors did. The doctors across all three OU groups achieved consensus that immediate post-operative care does not constitute MHDC, while the midwives did not achieve consensus. Moreover, the midwives across all three OU groups achieved consensus agreement that prolonged post-operative care >24 hours was an indication for MHDC while the doctors did not. By the final round of the Delphi survey the respondent group agreed on a definition for MHDC:

"An interim level of care for women requiring interventions over and above the [specialised] 'high risk' obstetric care that will be carried out routinely on a consultant-led labour ward, but not requiring care on an intensive care unit. It will be implemented where a woman has deteriorated clinically but her care can be managed appropriately on the labour ward. It is more likely to be undertaken for maternal than fetal reasons."

#### Discussion

#### **Defining MHDC**

The consensus definition emerging from this Delphi study has similarities to that provided by Martin and Hutchon (2008: 954) who define high dependency care as 'a standard of care between the general ward and full intensive care'. It also equates with a definition for 'step-up care' where patients are transferred to a higher level of care from a ward area or emergency department due to 'acute clinical changes' not requiring intensive care (Prin and Wunsch, 2014: 1212). The MHDC definition is not absolute, as the phrase 'can be managed appropriately on the labour ward' reflects local variations.

Using the objective criteria of the ICS's (2009) 'levels of critical care for adult patients' classification system, the respondents equated MHDC with level 2 care. However, the number of professionals who were aware of this classification system was relatively low, and some equated it with level 1 and level 3 care. Education regarding the ICS levels of care for both medical and midwifery staff is needed to promote a shared understanding of what constitutes MHDC at the local level and standardise the terminology used to describe this cohort of women. MacLennan et al (2016) highlight that accurate data collection is particularly important as women receiving level 2 care forms part of the Critical Care Minimum Data Set that feeds into the service commissioning process. As the ICS levels of care were first introduced in 2002 (ICS, 2009), the term 'high dependency care' may no longer be useful.

#### **Defining features of MHDC**

The complexities of MHDC were reflected by the large amounts of data generated over the three rounds of the Delphi study and encompassed the conditions, vigilance, and interventions characterising this type of care. In terms of the conditions that typify MHDC, the familiarity and expertise that professionals acquire due to frequent or 'high volume' exposure to certain conditions or complications may explain why the respondent group agreed that women with severe obstetric conditions such as hypertensive disorders of pregnancy and obstetric haemorrhage were suitable candidates for MHDC (Sultan et al, 2013; Saravanakumar et al, 2008). Moreover, venous thromboembolism and sepsis are also 'high profile' complications that were likely to be familiar to the respondents (Society of Critical Care Medicine, 2015). AFE is rare (Knight et al, 2010) and women with confirmed AFE may go on to develop pulmonary hypertension, left ventricular failure and coagulopathy requiring advanced respiratory/organ support (level 3 care) and intensivist expertise (Foley et al, 2014; Winter et al, 2012), which may explain the consensus that these women require intensive care.

While the presence of clinical instability was agreed to be an indication for MHDC, ongoing physiological instability was viewed as an indication for intensive care, reflecting the assertion that care in the ICU is required for women 'whose conditions are life-threatening' (Martin and Hutchon, 2008: 954). Unresolved physiological instability is associated with increased severity of illness, and higher patient acuity necessitating complex haemodynamic monitoring and more active treatments outside the facilities within OUs (Maternal Critical Care Working Group, 2011). This also corroborates why the complex disorder of disseminated intravascular coagulation (DIC), often indicative of maternal physiological deterioration secondary to major obstetric haemorrhage and sepsis, achieved consensus in favour of intensive care (Belfort et al, 2010). Overall, the respondents focused heavily on the conditions that necessitate MHDC and a shift of focus towards the need for organ support in line with the ICS (2009) levels of care classification system is required.

#### Vigilance as a characteristic of MHDC

Level 2 patients require a minimum of hourly observations (ICS, 2009), and there was consensus that vital signs recorded less than hourly and/or continuously were a feature of MHDC. In line with other reports, ECG monitoring, neurological observations and invasive monitoring using central venous pressure and arterial lines were viewed as features of MHDC by many of the respondents (Whitworth et al, 2016; Saravanakumar et al, 2008). However, midwives representing the three OUs with the lowest annual birth rates agreed that intensive care was indicated. This finding may reinforce previous assertions that midwives in smaller OUs do not have the appropriate equipment or skills to care for women requiring these types of monitoring (Sultan et al, 2013; Cordingley and Rubin, 1997).

Swan Ganz monitoring was agreed to be an indication for ICU admission and reflects the respondents' recognition of the complexities and complications associated with this type of monitoring which is indicated for the sickest patients (Carlin and Alfirevic, 2008).

Most respondents viewed "one-to-one" care with a professional in constant attendance' as a characteristic of MHDC. This staff to woman ratio is advocated for women receiving MHDC when in individual rooms and is a normal clinical requirement within UK labour wards (Obstetric Anaesthetists' Association and the Association of Anaesthetists of Great Britain and Ireland (OAA/AAGBI), 2013). However, this ratio does not reflect the general literature suggesting lower staff to patient ratios may be acceptable for patients receiving high dependency care (Garfield et al, 2000). The respondents agreed that women needing MHDC should receive regular medical reviews, and care should be led jointly by a consultant obstetrician and a consultant anaesthetist. This joint

leadership approach utilises the different skills that obstetricians and anaesthetists bring to MHDC provision and reflects professional recommendations (Maternal Critical Care Working Group, 2011; Martin and Hutchon, 2008).

#### Interventions characterising MHDC

Step-down care, classed as level 2 care (ICS, 2009), is appropriate for patients no longer requiring intensive care, but still requiring a level of monitoring and/or intervention that cannot be provided in the general ward area (Vincent and Rubenfeld, 2015). Staff working on busy antenatal/ postnatal wards may not have the necessary equipment, skills, and/or capacity to provide safe level 2 care (Vincent and Rubenfeld, 2015). This may explain why most respondents achieved consensus that step-down care is an indication for MHDC on the delivery suite.

The importance of accessing specialist knowledge and expertise when caring for acutely ill women was recognised in this study, with most respondents agreeing that referral to specialist medical staff, the critical care outreach team (CCOT) and ICU were components of MHDC. The CCOT has previously been reported as a mechanism for supporting ward staff to care for acutely ill patients (Cheliei et al, et al, 2010) and the respondents' opinions reflected this.

Routine physical care (such as pressure area care) and psychological/family support were agreed components of MHDC, reflecting the respondents' holistic view of this type care (Billington and Stevenson, 2007). A balance between physical and psychological support is paramount for women receiving MHDC as a qualitative study reports women felt healthcare professionals prioritised physical care over emotional support during MHDC (Bassett et al, 2016).

## The impact of annual birth rate and professional role on the defining features of and definition for MHDC

Although there was parity across the three OU groups regarding many of the defining features of MHDC, the professionals working in the three OUs with the lowest annual birth rates were more likely to request women be transferred to ICU. This finding reflects dated evidence and expert opinion suggesting local variations exist in MHDC provision (Vercueil and Hopkins, 2015; Scrutton and Gardner, 2012; Cordingley and Rubin, 1997). Furthermore, midwives working in the three smaller OUs were more likely to request that women be transferred to ICU than their medical colleagues, suggesting they did not have the appropriate skills or they did not use them frequently enough to maintain competence to provide MHDC (Sultan et al, 2013; Bench and Fitzpatrick, 2007).

It is not known how midwives' and doctors' differing perceptions of MHDC manifest in the OU setting on a day-to-day basis, or whether these differing opinions are mediated by team interactions utilising a collaborative approach to decision-making (Hastie and Fahy, 2011). Patient safety is enhanced when members of a team possess a common understanding regarding a task, the objectives they wish to achieve and the processes that will be used to meet these objectives (The King's Fund, 2008). Varying definitions of MHDC may lead to inequitable care provision for acutely ill women (Williams et al, 2015) and the admission of relatively low acuity patients to ICU may have a deleterious impact on those with greater need for higher levels of care (Stelfox et al, 2012). Moreover, the detrimental effect of early escalation to the ICU on the mother-baby relationship cannot be discounted.

The draft recommendation that one midwife per shift has the skills to provide MHDC (Intercollegiate Maternal Critical Care Sub-Committee of the Obstetric Anaesthetist Association, 2015) is a pragmatic approach to ensure women can receive MHDC. However, the introduction of midwives with MHDC skills in smaller OUs is controversial, given the limited opportunities for maintaining their competencies and transfer of women to the ICU may be more feasible (Vercueil and Hopkins, 2015). In OUs where midwives with the skills to provide MHDC are unavailable, the mobilisation of external support mechanisms including the CCOT or recovery/anaesthetic nurses may facilitate short-term MHDC provision (Vercueil and Hopkins, 2015; RCOG, 2013).

#### **Strengths and limitations**

This is the first published Delphi survey involving obstetricians, anaesthetists and midwives that has examined the concept of MHDC. The findings offer a detailed, and holistic insight into MHDC. While this survey was completed approximately seven years ago, the issues and ambiguities regarding the terminology used to describe MHDC, and the variations surrounding local service provision appear to reflect previous dated research and contemporary discourse (Vercueil and Hopkins, 2015; Williams et al, 2015; Cordingley and Rubin, 1997).

#### Conclusion

Despite the complex nature of MHDC, the respondent group agreed on many of the features that comprise MHDC by the third round of the Delphi survey. A definition for MHDC was obtained, although leeway for local variation was intrinsic in the definition. Although the respondent group equated MHDC with level 2 care, some professionals were unaware of the ICS (2009) levels of care classification system, suggesting education is required. Raising awareness of this classification system may facilitate a shift of focus away from the conditions that characterise MHDC, to the need for organ support. Midwives working in the three OUs with the lowest annual birth rates had lower thresholds for requesting that women be transferred to ICU than their medical colleagues. Further research is required to assess the impact this may have on cohesive multidisciplinary team-working. Service providers in district general hospitals remote from tertiary referral centres are challenged with complex decisions when developing escalation of care guidelines, and must decide whether MHDC is provided equitably for all acutely ill women, or some/all are transferred to the ICU.

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