Royal College of Anaesthetists

Royal College of Obstetricians & Gynaecologists

THE ROYAL COLLEGE OF MIDWIVES

intensive care society

The Faculty of Intensive Care Medicine

Care of the critically ill woman in childbirth; enhanced maternal care

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Contents

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Key messages

Working in teams

Women who become acutely unwell during pregnancy, labour and the postnatal period should have immediate access to critical care, of the same standard as other sick patients, irrespective of location. There are different models to deliver this care. These depend upon adequate numbers of staff being available with the knowledge and skills to detect deterioration, escalate care, and deliver appropriate care to a woman who becomes critically ill in any setting. We have attempted to define this knowledge and skill set as enhanced maternal care (EMC).

Our aim is to promote the development of these competencies and encourage closer working between maternity and critical care teams to optimise care for critically ill women, irrespective of where it is delivered.

Enhanced maternal care

EMC is driven by a set of competencies required to care for women with medical, surgical or obstetric problems during pregnancy – peri- and post-partum – but without the severity of illness that requires admission to a critical care unit. This care can be provided by any practitioner with the necessary skills.

Education and training

Education and training in the care of women who are acutely deteriorating/critically ill is essential for all teams involved in maternity care. This includes obstetricians, midwives, obstetric anaesthetists, physicians, intensivists, and critical care nurses. This can be achieved using existing teaching, training and organisational resources, as well as appropriate changes to the existing curricula. It will require collaboration between critical care and maternity services within local settings, as well as regional networks.

An early warning system modified for obstetrics

An early warning system modified for obstetrics is fundamental and should be used for all women presenting to acute care services who are pregnant, or who are within 42 days of delivery. We recommend key components for an obstetric early warning system, with the aim of developing a national obstetric early warning system.

Where care is delivered

It is anticipated that the large majority of acutely unwell maternity patients can have care safely provided by appropriately trained staff on the maternity unit. Transfer to a critical care unit may be required occasionally if the patient's condition warrants that level of care. This model will generally allow the woman and her baby to be together if care is required in the postpartum period, and will facilitate step-down care when, as is often the case, the woman's condition improves. In some cases, the skill mix on the maternity unit can be enhanced, if needed, by the critical care outreach team.

Care of the acutely ill woman in the general critical care unit

Critical care units should have a named lead for maternal critical care to act as the liaison between critical care and obstetric services. Shared care principles (ie effective, consultant-led teamwork) are essential to deliver appropriate obstetric and critical care. The obstetric team (usually consisting of a consultant obstetrician, consultant obstetric anaesthetist and a midwife) should review any obstetric patients admitted to the general critical care unit at least once every 24 hours. All units should have established follow-up/rehabilitation services as recommended by the National Institute for Health and Care Excellence (NICE) and in the Guidelines for the provision of intensive care services, 2015. Midwives should be involved in follow-up where there are ongoing issues due to the birth.

Introduction

The majority of women remain healthy during pregnancy and childbirth. The UK has one of the lowest maternal mortality rates in the world.[1] Nevertheless, there has been an increase in the number of women who become unwell around the time of childbirth, due to factors including increasing maternal age, increasing rates and levels of obesity and other comorbidities. Women who become acutely unwell during pregnancy, labour or the postnatal period should have immediate access to critical care, of the same standard as other sick patients, delivered by teams skilled in providing critical care to the acutely deteriorating obstetric patient. With this aim, in 2011, a multidisciplinary group from several royal colleges, including obstetricians, anaesthetists, intensivists, midwives and critical care nurses, published a document: *Providing equity of critical and maternity care for the critically-ill pregnant or recently pregnant woman*.[2] The current document is an update of the 2011 version and is the outcome of interdisciplinary discussions over the past six years. The aim of this document is to make recommendations regarding collaborative working between maternity units and critical care units alongside other specialist support (eg psychologists, paediatrics in case of teenage pregnancy), so that critically ill women are provided with the appropriate level of care in a timely manner.

How many women get sick?

The UK Intensive Care National Audit and Research Centre (ICNARC)[3] has been collecting data on admissions of pregnant women to critical care units since 2006. In 2013, 83 per cent of such admissions were described as 'recently pregnant' (up to 42 days post-delivery). Only 17 per cent were 'currently pregnant'. In the 'recently pregnant' group, the main reason for admission was massive obstetric haemorrhage, whereas respiratory failure was the major reason in the 'currently pregnant' group. Overall, there were 2.4 critical care admissions per 1,000 maternities. However, these figures significantly underestimate the actual numbers of sick women, as many critically ill women are not admitted to designated critical care units, but are instead managed on maternity units. The Scottish confidential audit on severe maternal morbidity (SCASMM)[4] reported serious morbidity in 7.3 per 1,000 births. The existing evidence suggests that 5 per cent of births require extra nursing care in maternity units.[5]

What care do we provide and what are the current national recommendations?

Providing the continuity of care required for a critically ill peri-partum woman can be challenging.[6] A survey of consultant-led UK maternity units in 2014 found that only 6 per cent of UK maternity units were staffed and funded to provide critical care.[7] The maternal critical care chapter in a recent report on maternal mortality in the UK highlights the need for teamwork and multi-disciplinary training in the early recognition of critical illness.[1] The 2017 Scottish national maternity review[8] suggests various models of care for critically unwell women, recommends protected time for education and highlights the need for critical care skills for midwives and midwifery skills for critical care nurses.

As far back as 2007, the report on maternal mortality in the UK recommended that maternity units should incorporate a modified obstetric early warning system (MOEWS) chart into clinical practice.[9] Early warning systems are now used throughout the world. In 2013, the Royal College of Physicians produced the national early warning score (NEWS) to be used in all UK acute hospital settings.[10] There is a need to develop a similar national standardised tool for obstetrics.

Teamwork and training in the recognition and management of critical illness

Section 1 describes a standard of care for sick women, using a set of competencies, which we have termed 'enhanced maternal care'.[11] They include skills familiar to many midwives already. The aim is to address national variation in pre- and post-registration midwifery education, without describing a designated level of critical care nursing.

Adequate numbers of staff to provide safe care should be available at all times with the knowledge and skills to detect deterioration, escalate intensity of monitoring, and deliver appropriate care to a critically ill peri-partum woman in any setting, whether it be in a low risk unit or a tertiary referral critical care unit. This will require maternity and critical care networks throughout the country to work together to implement models of care and training programmes that work for their local patient population and configuration of services. A multidisciplinary team, with wide group membership, extensive consultation and feedback are key to implementation.

A unified approach

The management of sepsis provides a template for how joined-up multidisciplinary care can be delivered. Obstetric patients should be included in initiatives around critically ill patients, such as critical care sepsis action groups, hospital critical care delivery groups, hospital acutely ill patient groups, and regional critical care networks. A national obstetric early warning score, electronic data collection and a rapid response system should be linked to critical care and outreach teams for obstetric patients. Future developments in this area should have a robust evidence base.

The success of guidelines for managing the critically ill peri-partum woman will ultimately depend on wide cooperation and the participation of multiple clinical specialties, other healthcare providers and policymakers. We must ensure that we avoid working in 'silos' in our busy maternity units; if obstetric patients are not included in generic policies in acute units, there should be a robust and transparent explanation for this.

As an example, many critical care units assess the need for and provide support for the physical, psychological and cognitive problems that may occur during recovery and rehabilitation. The obstetric population is not immune from such problems. The psychological effects or physical complaints, such as muscle wasting, may make attending to the neonate extremely challenging.[12,13]

In order to improve and develop critical care for the obstetric population we must listen to women. For this reason, the reflections of two patients who became critically ill peri-partum are included in this report. Patient-centred care, as highlighted in the recent UK National Maternity Review,[14] is vital and should be provided by staff working across professional boundaries. The final step in this process is to ensure that guidelines and recommendations are implemented through audit and peer review. We are aware that many of the 2011 recommendations have not yet been implemented.[7] We owe it to our patients that, following the recommendations in this document, the relevant organisations involved in the production of this document support implementation nationwide.

Patients' reflections highlighting some challenges we face managing the critically ill peri-partum woman: two women's' experiences of critical illness in pregnancy

Experience 1 A `unique case'

"I became critically ill after a caesarean section when my baby was 11 days old. I dissected three of my coronary arteries and had to have six bypass grafts.

I feel really grateful to the sister on intensive care who recognised that I needed to see my son and arranged regular visits for us to spend time together. My husband was given accommodation in the hospital so that he could be with me, and my family flew in from all around the world.

We didn't know how long my recovery was going to take as nobody at the hospital had experience of coronary artery dissections in a woman who had just given birth. They didn't really know what to expect and told me that the medical journals said my condition was usually diagnosed at a post-mortem.

Whilst in ICU, I developed a fever, they took tests but couldn't find the cause of infection. I was breastfeeding my son prior to my surgery and had to stop abruptly when I became sick. My breasts became very engorged. The ICU wasn't used to dealing with women in my circumstances and they didn't recognise the symptoms of mastitis. It was my sister who suggested that there might be a problem with my breasts. They didn't have access to a breast pump and I was too weak to relieve the pain and discomfort myself.

When I was discharged to the ward I had a side room so I could have my son with me. Somebody wrote in my notes that he could visit me at any time to help me recover and to keep us bonded together.

When the time came for me to be discharged, there were a lot of problems arranging the support I needed. My other children needed to be properly looked after and even simple tasks, like arranging vaccinations for my new baby, proved difficult when I couldn't take my son to the clinic in person.

The term 'unique case' was used a lot by the professionals that I met. My case was different to what they were used to dealing with, but sometimes it felt as though no one wanted to take ownership and make things work for me and my family. It has been a struggle every step of the way."

Experience 2
`The most challenging experience we have ever encountered'

"For me, the birth of my first child turned from what should have been a wonderful time for all my family to the most challenging experience we have ever encountered. Anyone giving birth hopes that everything will go well. Being admitted to intensive care is really frightening and the elation after a birth quickly turns to worry.

The rest of the family is thrown into caring for a newborn baby whilst visiting the baby's mum who is in a critical situation with an uncertain prognosis. Most people have never seen an intensive care unit except in television programmes. The reality is very different. ICUs can be very noisy, equipment alarms sound frequently, and the bright lights can be overwhelming.

From my experience, the most important thing is to maintain some contact between a new mother and her baby and to try to keep some normal experiences going after birth, even if the circumstances aren't what you had hoped for. Expressing milk to keep the option of breastfeeding open and taking photos of what is going on with your baby can be really helpful in dealing with the psychological impact of time in intensive care.

The family will also require support and they need to be aware of the complications the mother may encounter in order to help everyone cope better with some of these feelings."

These patients' stories are not isolated or uncommon accounts. Similar ones can be heard in critical care follow-up clinics and in qualitative studies of women's experiences. There is increasing recognition of the impact that critical illness in a woman has on her family.

There is a wide range of physical and psychological consequences after any critical illness. New mothers have to deal with these whist coping with their newborn and frequently caring for other children. It is difficult to overestimate the impact on a woman of unexpectedly waking up in the intensive care unit, being separated from her baby, and possibly being told that she is now unable to have any more children. Efforts to maximise interaction and bonding, including facilitating breastfeeding, may help to ease psychological trauma.

Support and further information for patients can be found at:

ICUsteps – The intensive care patient support charity

Healthtalk – Intensive care: Patients' experiences

1 Delivering care to the critically ill peri-partum woman and working in teams

Enhanced maternal care – recognising a standard of care for sick women

A small number of women become so acutely unwell during pregnancy or childbirth that they require critical care support.[15] In a small number of labour wards, the maternity team staff have the necessary Level 2 critical care competencies to care for these women, however for many units this remains aspirational. Such patients require timely access to critical care services. Depending on available resources, the patient may require transfer to a critical care unit. If this is not possible, then the critical care support should come to the patient, irrespective of location. An overriding principle is that when caring for sick postpartum women, the aim should be to keep the woman and her baby together if at all possible.

A much larger number of women, however, have an episode of illness that requires a short period of enhanced care. In most cases this can be provided by midwifery staff trained in a set of competencies brought together here as enhanced maternal care.[11] EMC competencies overlap with those required for what is termed Level 2 care.[2,15] Many women will require close support and monitoring but will not require admission to a critical care unit. Decisions about where, how, and by whom the sick woman will be managed will depend on local facilities and competencies whilst upholding the principles of providing the right care for the right patient at the right time.

EMC will commonly be delivered by midwives; however, in large centres, there may be scope for critical care nurses to provide EMC competencies in tandem with midwives. Consultant obstetrician-led maternity units should be able to provide EMC 24 hours per day, although currently only a small number of maternity units can offer Level 2 critical care. It is anticipated that, especially during the early period of implementation of this guidance, not all units will be able to deliver all the competencies required for full EMC. Such individual units should identify which aspects of EMC they can deliver, depending on local resources, what gaps they have in providing EMC, and how these gaps can be managed in collaboration with the local critical care units.

1.1 All obstetric units should have a lead clinician for the care of critically ill women.

1.2 Maternity service providers should establish training resources to enable staff to achieve and maintain skills in EMC.

1.3 Pregnant or recently pregnant women should have access at all times to a healthcare professional who has EMC competencies.

1.4 The individual competence of support and care required for each woman should be recorded by the maternity team and reported in ward rounds and handovers.

1.5 The lead clinician for the care of critically ill women should participate in the hospital's critical care delivery group or its equivalent.

1.6 The route of escalation to critical care services should be clearly defined, and include multidisciplinary discussion.

1.7 Critical care outreach or an equivalent service should be available to ill women, and provide support and education to healthcare professionals delivering EMC.

1.8 Obstetric units should consider membership of a regional maternal critical care network and the local critical care operational delivery network.

2 An early warning system modified for obstetrics

Failure to identify early signs of illness in obstetric patients has been a recurrent feature of cases of maternal death and serious morbidity. In 2007, the report on the confidential enquiry into maternal mortality included the development of a national obstetric early warning score as one of its top ten key recommendations.[9] Ten years on, UK maternity units are using a variety of early warning systems.[16] To date, there has been no progress towards developing a single national early warning score for obstetric patients.

Early warning systems are well established in acute care settings. They are designed to aid recognition of the deteriorating patient, and to link the recording of abnormal physiological parameters with an appropriate clinical response. Women who become unwell during pregnancy and birth often deteriorate abruptly after a period of physiological compensation. This narrows the window for early detection of developing illness. A three-stage graded response, recommended for general patients, may not be appropriate for the obstetric population. Instead, we recommend only one intermediate step before review by an experienced senior clinician.

An increasing number of hospitals in the UK have introduced electronic early warning systems and it is time to extend these systems to the obstetric population. We recommend the urgent development of electronic rather than paper-based systems.

The recommendations that follow can be applied to both electronic and paper systems. They aim to establish common ground between current obstetric early warning systems and facilitate the development of a single national early warning system modified for obstetrics.

2.1 An early warning system modified for obstetrics should be used in the care of all women presenting to acute care services who are pregnant or within 42 days of having given birth.[9,16]

2.2 The early warning systems modified for maternity patients should include:

- respiratory rate
- oxygen saturation
- heart rate
- systolic blood pressure
- diastolic blood pressure
- temperature
- urine output.

2.3 Additional supplementary observations (such as lochia) should be recorded separately from the early warning observations.

2.4 Clinical concern about a woman's condition should remain an important criterion for summoning help, independent of the early warning score.

2.5 Reduced/altered level of consciousness should be treated as a marker of established critical illness requiring urgent senior clinical attention.[17]

2.6 Where an aggregate score is calculated, the value assigned to abnormal observations should be adjusted to align with the numerical values used by the Royal College of Physicians of London's national early warning chart (ie a score of 5 to 6 = medium risk; a score of 7 or more = high risk), to reduce the risk of error by staff who work with both systems.

2.7 There should be clear instructions about the frequency of observations. This should include a specific schedule of observations for women after caesarean section. For all other pregnant or recently pregnant women, the minimum frequency of observation should be once every 24 hours. Women assessed to be at high risk of deterioration should have at least four-hourly observations, with more frequent observations as clinically necessary.

2.8 The response to abnormal scores could be clearly described in a simple flowchart. It should only contain one intermediate step before the involvement of senior clinical staff (usually a consultant).

2.9 The use of the Situation-Background-Assessment-Recommendation (SBAR) communication tool[18] should be considered for use to effect escalation in cases of concern identified by the early warning system.

3 The acutely ill pregnant woman in the general ICU

Because only a very few pregnancies are complicated by illness severe enough to warrant admission to a critical care unit, such admissions are currently spread thinly across a large number of units, and so the ability to develop and maintain expertise in care of the critically ill peri-partum woman is limited. This lack of expertise may become a greater issue as an increasing number of ICU clinicians do not have an anaesthetic background and may therefore not have encountered maternity patients since medical school. The most common reason for a critically ill peri-partum woman to be admitted to intensive care is massive haemorrhage.[3] All critical care units that provide support to labour wards should be able to provide high quality post-partum care to women who have suffered major blood loss.

As any woman can become critically ill when pregnant, intensive care doctors, as well as obstetric anaesthetists, should be skilled in the resuscitation and stabilisation of sick pregnant women. There is good evidence across a wide range of rare conditions and specialist services that outcomes can be improved by centralisation.[19] It is time to rethink where we provide some elements of obstetric critical care to ensure that critically ill women receive the best possible care.

After childbirth, admission to a critical care unit should not automatically mean the separation of a mother from her baby. If the baby is well, then critical care units should do all they can to facilitate contact between the mother and her baby.

3.1 Any critical care unit that admits women over 20 weeks of gestation should have rapid access to obstetric and neonatal/paediatric services able to attend in an emergency.

3.2 There should be a clear plan and equipment available for performing a peri-mortem caesarean section in the event of maternal cardiac arrest (in accordance with Resuscitation guidelines from the Resuscitation Council UK).[20]

3.3 Appropriate specialist equipment (eg for neonatal resuscitation) should be present in the critical unit for the duration of the critically ill peri-partum woman's admission.

3.4 An obstetric team (which will usually consist of a consultant obstetrician, consultant obstetric anaesthetist and a midwife) should review all women admitted to critical care at least once in every 24-hour period.

3.5 Critical care units that accept antenatal admissions should have a healthcare professional trained in neonatal resuscitation available within ten minutes, due to the risk of premature labour and unplanned birth. A senior neonatologist or paediatrician should be able to attend within 30 minutes when required.

3.6 Critical care operational delivery networks could consider nominating specific units as the nominated regional or supra-regional unit for maternal critical care.

3.7 Any woman requiring Level 3 care for more than 48 hours should be considered for transfer to a nominated regional or supra-regional critical care unit with appropriate facilities, support and experience.

3.8 All critical care units that admit pregnant or recently pregnant women should have a named lead ICM consultant for maternal critical care. The main function of this role is to be the point of liaison between critical care and obstetric services (including obstetric anaesthesia).

3.9 Contact between a mother and her baby and the routine aspects of neonatal care, eg breastfeeding, should be supported within the ICU.

3.10 All women admitted to critical care units should be offered a postnatal review that includes input from a clinician with experience in critical care follow-up, supported by midwives and other specialities, such as a clinical psychologist, as determined by the needs of the patient.

4 The transfer to a general ICU and clinical responsibility of the acutely ill pregnant woman outside of the maternity areas

The sick pregnant or recently pregnant woman can present to health professionals in any location where healthcare is provided: emergency departments, ambulatory medical units, medical or surgical wards or in the community and general practice. Reports on maternal mortality have repeatedly highlighted the need for a multidisciplinary team with early involvement of senior staff.[17] This section should be read in conjunction with Section 2: An early warning system modified for obstetrics.

The timely recognition and management of the deterioration is essential. In some hospitals, the critical care outreach teams may respond to the acutely ill pregnant or recently pregnant women as part of an early warning system escalation.

4.1 Critically ill pregnant or recently pregnant patients who undergo intra- or inter-facility transfer should be transferred in accordance with standards equivalent to the Intensive Care Society's *Guidelines for the transport of the critically ill adult*.[21]

4.2 A senior clinician* should be directly involved in escalation decisions within one hour of any deterioration.

4.3 Critical care outreach teams should work collaboratively with the critical care unit and maternity unit to ensure seamless transition of care between units.

4.4 If there are delays in transfer, ongoing critical care should be provided regardless of the setting.

*Consultant and the senior midwife responsible for the high dependency maternity unit.

5 Education

Early recognition of critical illnesses is a challenge for all maternity healthcare professionals as training in acute general medicine and critical care has decreased over recent years, due to increasing specialisation. There is now a pressing need for dedicated educational leads in each profession and subspecialty involvement in the care of maternity patients to collaborate in the delivery of training in critical care. In 2015, the General Medical Council (GMC) recommended broad-based training,[22] and this approach is of particular relevance to the multispecialty area of obstetrics. The *National Maternity Review*, also published in 2015,[14] and a recent report on maternal mortality,[1] recommended that those who work together should learn together in multiprofessional training.

The Royal College of Midwives has recently published *Enhanced Maternal Care: a competency framework for midwives caring for ill and acutely ill women*, and we fully support the rollout of this framework to ensure that more midwives have the appropriate skills to care for sick women. In conjunction with the evolution of these guidelines, UK Critical Care Nursing Alliance UK and the National Outreach Forum incorporated maternal critical care sections and recommendations into their standards/competencies in 2016.[23] We welcome this as an important step to improving care for sick pregnant or recently pregnant women.

For doctors, postgraduate training programmes should be reviewed for their content relating to maternal critical care. These sections may need to be developed in light of this guidance.

We believe that cross-specialty training in a variety of healthcare environments is an effective, practical, and economical way to improve standards in maternal critical care. For example, midwives might acquire and maintain enhanced maternal care skills from short attachments to theatre recovery and critical care units. By spending time on labour wards, critical care outreach nurses could become familiar with routine maternity care and the different physiology and response to illness in the maternity population. This peer-to-peer, cross-specialty training also helps to generate mutual understanding and personal connections, which are often identified as key factors when things go well in caring for critically ill women.

At a local level, an important educational tool is multidisciplinary skills training in the workplace, often in the form of simulated scenarios. Through feedback/debriefing, lessons learnt can be rapidly adopted into clinical practice.

5.1 Multidisciplinary teams that work together should train together.[1] Teams should undergo regular, multidisciplinary training that promotes teamwork, with a focus on human factors, effective communication and openness.

5.2 Simulation-based learning techniques should be considered to assist healthcare professionals to develop the necessary technical and non-technical skills for enhanced maternal care.

5.3 Joint multidisciplinary education relating to recognition of acute illness should be considered to encourage sharing of knowledge and skills.

6 Quality improvement

Quality indicators are a measure of a structure, process or outcome that can be used by local teams to improve care in line with national data. Only data collected in a reliable and robust way should be used to drive improvement.

Quality indicators should be developed that are specific for EMC and maternal critical care. Data about women who are admitted to critical care units providing Level 2 and/or Level 3 care will be captured by the critical care minimum dataset, and currently reported through the ICNARC case mix programme in England and Wales[24] and through the Scottish intensive care society audit group (SICSAG) in Scotland.[25] There are ill-defined boundaries between designated critical care and EMC, and classification will depend on location, availability of trained staff, severity of illness, and ultimately funding streams.

6.1 We suggest that a dataset of care given to critically ill women in the obstetric unit should be collected to support quality improvement. The following is a suggested dataset. Much of the data will already be collected through systems that are currently in place. Some data will be collected for each critically ill peri-partum woman and other data can be collected annually.*

Structure

Evidence of unit participation in audit of practice.*
Evidence of daily review and documented plan.*
Record of appropriate staffing levels and skills training.*
Evidence of access to support services (pharmacists, physiotherapist, dietician, microbiologist).*

Process

Care bundles in place for central venous catheter, arterial and peripheral venous catheter insertion and maintenance.*
Record of assessment for post discharge review and follow-up.*

Outcome

Record of critically ill peri-partum woman and baby contact.
Record improvement, deterioration, transfer, death.
Record outcomes of significant events (morbidity and mortality) discussed at regular multidisciplinary meetings.*
Record of regular critically ill peri-partum woman and family experience surveys.*

A paper or electronic dataset may include the following for collection on each critically ill peri-partum woman cared for:

- identifiers and demographics (hospital number or unique identifier, age, postcode, body mass index, ethnicity and relevant social factors, pregnancy status; including parity, gestation, multiple pregnancy)
- time and date of admission
- diagnosis on admission
- surgical status (non-surgical, elective, non-elective)
- mode of delivery
- highest level of care during admission**[26]
- time and date ready for discharge or transfer

- time and date discharged or transferred
- discharge or transfer destination
- length of stay (hours or days and fractions of days)
- admission of neonate to NICU or special care unit
- neonate contact with critically ill peri-partum woman.

*Can be collected annually.

**This is calculated daily by recording levels of organ support (basic or enhanced respiratory support, basic or enhanced CVS support, neurological, hepatic or other system) as defined by the critical care minimum dataset.

6.2 Data must be collected by appropriately trained staff, quality assured and stored securely in accordance with local guidelines on safe data storage.[27]

Further sources of quality improvement information include:

Guidelines for the Provision of Intensive Care Services (GPICS) (FICM)

Guidelines for the Provision of Anaesthetic Services (GPAS) (RCoA)

Raising the Standard: a compendium of audit recipes 2012 (3rd Edition) (RCoA)

Critical Care Minimum Dataset (CCMDS)

Good practice No.7: Maternity Dashboard (RCOG)

Good practice No.12: Improving Patient Handover (RCOG)

Glossary

Critical care outreach team	Critical care outreach teams are critical care-trained nurses who support ward nurses and doctors who are caring for acutely ill in-patients by: ■ assessing acutely ill/deteriorating patients on wards, and advising the patient's team on monitoring, investigations, and management plans ■ ensuring timely referral and admission to a critical care unit if required ■ following up patients who have been transferred from critical care to ward areas ■ sharing knowledge and skills with ward staff, both at the bedside and through formal education programmes. These teams may be referred to by different names in different hospitals and the critical care outreach capacity will vary between hospitals.
Enhanced maternal care	EMC is driven by a set of competencies required to care for women with medical, surgical or obstetric problems during pregnancy, peri- and post-partum, but without the severity of illness that requires admission to a critical care unit. This care can be provided by any practitioner with the necessary skills.
Levels of critical care	Level 2 and Level 3 critical care are defined in the Intensive Care Society's Levels of critical care for adult patients.[15] At the time of publication, the levels of critical care for adults are due for review.

References

1 Knight M et al. (Eds.) on behalf of MBRRACE- UK. Saving Lives, Improving Mothers' Care – Lessons learnt to inform future maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009–2012. *National Perinatal Epidemiology Unit, University of Oxford* 2014.

2 Providing equity of critical and maternity care for the critically ill pregnant or recently pregnant woman. *RCoA*, 2011 (bit.ly/2rtEyY6).

3 Female admissions (aged 16–50 years) to adult, general critical care units in England, Wales and Northern Ireland. ICNARC CMP Obstetrics. *ICNARC*, 2009 (bit.ly/2ru0fXM).

4 Scottish Audit of Severe Maternal Morbidity. *HIS*, 2014 (bit.ly/2ru2aLY).

5 Wheatley S. Maternal Critical Care. What's in a name? *Int J Obs Anesth* 2010;**19(4)**:353–355.

6 Verceuil A, Hopkins P. Maternal Critical Care. A time to embrace continuity. *Int J Obs Anesth* 2015;**24(3)**:203–206.

7 Williams VL et al. Are we providing equity of critical care in UK obstetric units? (bit.ly/2KLnSUI).

8 The Best Start: A Five-Year Forward Plan for Maternity and Neonatal Care in Scotland. *Scottish Government*, 2017 (bit.ly/2KHCEMa).

9 Lewis G. (Ed.). The Confidential Enquiry into Maternal and Child Health (CEMACH). Saving Mothers' Lives: Reviewing Maternal Deaths to make Motherhood Safer. 2003–2005. The Seventh Report on Confidential Enquiries into Maternal Deaths in the United Kingdom. *CEEMCH*, 2007.

10 National early warning score (NEWS): standardising the assessment of acute-illness severity in the NHS; report of a working party. *RCP*, 2012 (bit.ly/2I1h7QI).

11 IN PRINT. Enhanced Maternal Care Framework. *RCM*, 2018.

12 Acosta C et al. Severe Maternal Sepsis in the UK, 2011–2012: A National Case-Control Study PLOS medicine 8 July 2014. DOI: 1371/journal.pmed.1001672 (bit.ly/2KLoGJe).

13 Rehabilitation after critical illness in adults (CG83). *NICE*, 2009 (bit.ly/2HYdgUF).

14 National Maternity Review. *NHSE*, 2015 (bit.ly/2KLpptW).

15 ICS Levels of Care. *ICS* (bit.ly/2KM7pj1).

16 Isaacs RA et al. A national survey of obstetric early warning systems in the United Kingdom: five years on. *Anaesth* 2014;**69**:687–692 (bit.ly/2KIUzSR).

17 Saving lives, Improving mothers' care surveillance of maternal deaths in the UK 2012–2014 and lessons learned to inform maternity care from the UK and Ireland. Confidential Enquiries into Maternal Deaths and Morbidity 2009–2014. *National Perinatal Epidemiology Unit, University of Oxford*, 2016.

18 SBAR Implementation and Training Guide. *NHS Institute for Innovation and Improvement* 2017 (bit.ly/2JkqWKq).

19 Metcalfe D et al. Effect of regional trauma centralization on volume, injury severity and outcomes of injured patients admitted to trauma centres. *BJS* 2014;**101**:959–959 (bit.ly/2KL7SCj).

20 Resuscitation Guidelines. *RC(UK)*, 2015 (bit.ly/2FKlLkt).

21 Guidelines for the transport of the critically ill adult (3rd Edition). *ICS*, 2011 (bit.ly/2KHq3Zg).

22 Shape of training. *GMC* 2018 (www.shapeoftraining.co.uk).

23 National Standards For adult critical care nurse education. *Critical Care Networks National Nurse Leads*, 2016 (bit.ly/2ru4dQa)

24 Case Mix Programme: Obstetrics. *ICNARC* (bit.ly/2ru0fXM).

25 Minimum Standards and Quality Indicators. *SICSQIG*, 2015 (bit.ly/2rvbOxQ).

26 Guidelines for the Provision of Intensive Care Services. *FICM* and *ICS*, 2015 (bit.ly/2fDljDV).

27 Data Protection Act 1998. *HMSO* (bit.ly/2rrKb9d).

Recommendations grading

The grading system is outlined in the 'About these guidelines' section of this document. The grades for each of the recommendations in this document are detailed in the table below:

Recommendation	Level of evidence	Strength of recommendation
1.1	GPP	Strong
1.2	GPP	Strong
1.3	GPP	Strong
1.4	GPP	Strong
1.5	GPP	Strong
1.6	GPP	Strong
1.7	GPP	Strong
1.8	GPP	Weak
2.1	C	Strong
2.2	GPP	Strong
2.3	GPP	Strong
2.4	GPP	Strong
2.5	GPP	Strong
2.6	GPP	Strong
2.7	GPP	Strong
2.8	GPP	Aspirational
2.9	C	Weak
3.1	GPP	Strong
3.2	GPP	Strong
3.3	GPP	Strong
3.4	GPP	Strong
3.5	GPP	Strong
3.6	GPP	Aspirational
3.7	GPP	Strong
3.8	GPP	Strong
3.9	GPP	Strong
3.10	GPP	Strong
4.1	C	Strong
4.2	GPP	Strong
4.3	GPP	Strong
4.4	GPP	Strong
5.1	C	Strong
5.2	GPP	Weak
5.3	GPP	Weak
6.1	GPP	Strong
6.2	M	Mandatory

About these guidelines

This document revises the former Joint Standing Committee 2011 standards document: *Providing equity of critical and maternity care for the critically-ill pregnant or recently pregnant woman*.

This revision has been led by the Obstetric Anaesthetists' Association (OAA). It is published jointly by the Royal College of Anaesthetists (RCoA), Royal College of Obstetricians and Gynaecologists (RCOG), Royal College of Midwives (RCM), Intensive Care Society (ICS), Faculty of Intensive Care Medicine (FICM) and OAA.

A multidisciplinary working group was formed to review current practice relating to specialist and critical care in pregnancy. In this task, the remit was to adapt existing recommendations and to introduce new ones into clear sections with auditable outcomes.

Membership of the working group includes the RCoA, RCOG, Royal College of Physicians, RCM, ICS, FICM, OAA, UK Critical Care Nursing Alliance (UKCCNA), National Outreach Forum (NORF), Critical Care Leadership Forum (CCLF), Adult Critical Care Clinical Reference Group, and the Association of Anaesthetists of Great Britain and Ireland (AAGBI) and educationalists.

This document summarises recommendations relevant to the care of pregnant or recently pregnant, acutely or chronically unwell women, who require acute hospital maternity and critical care specialist services. Some recommendations extend beyond the acute hospital setting, and in such cases, skills are required for early recognition and management of a deteriorating woman, and for decisions regarding transfer to the most appropriate setting.

Literature search

The literature search was performed in January 2017.

Searches were performed on Embase (1980 to 2015), Ovid MEDLINE (1946 to present), CINAHL and Cochrane Library. A hand search of the literature was also conducted by the authors using the reference lists of relevant original articles and review articles. The authors and researcher independently reviewed the titles of the studies found in the initial search and the full text versions were accessed where deemed relevant. The final list of publications used can be found in the references.

Recommendations grading scheme

The evidence that is included in this chapter has been graded according to the RCoA's *Guidelines for the provision of anaesthesia services* grading system, which was adapted from NICE and is outlined below:

Level	Type of evidence	Grade	Evidence
Ia	Evidence obtained from a single large/ multicentre randomised controlled trial, a meta-analysis of randomised controlled trials or a systematic review with a low risk of bias	**A**	At least one randomised controlled trial as part of a body of literature of overall good quality and consistency addressing the specific recommendation (evidence level I) without extrapolation
Ib	Evidence obtained from meta-analyses, systematic reviews of RCTs or RCTs with a high risk of bias	**B**	Well-conducted clinical studies but no high-quality randomised clinical trials on the topic of recommendation (evidence levels Ib, II or III); or extrapolated from level Ia evidence
IIa	Evidence obtained from at least one well-designed controlled study without randomisation		
IIb	Evidence obtained from at least one well-designed quasi-experimental study		
IIc	Evidence obtained from case control or cohort studies with a high risk of confounding bias		
III	Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case studies		
IV	Evidence obtained from expert committee reports or opinions and/ or clinical experiences of respected authorities	**C**	Expert committee reports or opinions and/or clinical experiences of respected authorities (evidence level IV) or extrapolated from level I or II evidence. This grading indicates that directly applicable clinical studies of good quality are absent or not readily available.
UG	Legislative or statutory requirements	**M**	This grading indicates that implementation of this recommendation is a statutory requirement, or is required by a regulatory body (eg CQC, GMC)
		GPP	Recommended good practice based on the clinical experience of the multidisciplinary working group

Adapted from Eccles M, Mason J (2001) How to develop cost-conscious guidelines. Health Technology Assessment 5:16 and Mann T (1996) Clinical Guidelines: Using Clinical Guidelines to Improve Patient Care Within the NHS. London: Department of Health.

Strengths and limitations of body of evidence

The limitations of the evidence are:

- few RCTs; evidence was mainly based on opinion (eg editorials)
- the 'unmeasurables' (attitudes, behaviour, motivation, leadership, teamwork)
- papers often examine a single intervention within a complex system or bundle
- papers are often examining small numbers and/or patients from a single centre
- poor use of outcome measures, frequently concentrating on easily measured short-term outcomes which are not patient-centred
- generally a paucity of long-term follow-up.

Methods used to arrive at recommendations

Recommendations were initially drafted based on the evidence by the authors of the chapter. These were discussed with the multidisciplinary working group, and comments were received both on the content and the practicality of the recommendations. The level of evidence that was the basis for each recommendation was graded, and the recommendation was then graded taking into account the strength of the evidence and the clinical importance according to the RCoA's *Guidelines for the Provision of Anaesthesia Services* grading system. Recommendations were worded using the RCoA's *Guidelines for the Provision of Anaesthesia Services* system of categorisation, which is outlined below.

Strength	Type of evidence	Wording
Mandatory	The evidence supporting the recommendation includes at least one with an 'M' grading	Wording should reflect the mandatory nature of the recommendation, ie 'must'
Strong	Confidence that for the vast majority of people, the action will do more good than harm (or more harm than good)	Wording should be clearly directive 'should' or 'should not'
Weak	The action will do more good than harm for most patients, but may include caveats on the quality or size of evidence base or patient preferences	Wording should include 'should be considered'
Aspirational	While there is some evidence that implementation of the recommendation could improve patient care, either the evidence or the improvement is not proven or substantial	Wording should include 'could'
Equipoise	There is no current evidence on this recommendation's effect on patient care	Wording should include 'there is no evidence of this recommendation's effect on patient care'

Consultation

A draft of these guidelines was submitted for public consultation in 2016.

The feedback from the first consultation process was considered by the multidisciplinary group and the sponsoring organisations of these guidelines. Revisions were made to the guidelines. A further consultation process was held in January 2018 and the guidelines were submitted to the following groups:

- Association of Anaesthetists of Great Britain and Ireland
- Faculty of Intensive Care Medicine
- Intensive Care Society
- National Outreach Forum
- Obstetric Anaesthetists' Association
- Royal College of Midwives
- Royal College of Anaesthetists
- Royal College of Obstetricians and Gynaecologists
- Royal College of Physicians
- Society of Acute Medicine
- UK Critical Care Nurse Alliance.

Updating these guidelines

These guidelines will be submitted for a full review every five years.

Appendix

Enhanced Maternal Care: a competency framework for midwives caring for ill and acutely ill women

The Royal College of Midwives in association with the Obstetric Anaesthetists Association

July 2018

Introduction

This competency framework has been developed by a multidisciplinary working group in association with the Obstetric Anaesthetists Association.

The purpose of this document is to identify the competencies required by a midwife on entry to the Nursing and Midwifery Council (NMC) register, and for midwives who care for women who are ill, and are at risk of deterioration in their condition but do not need a critical care midwife or nurse, and can be looked after in a labour ward/recovery area.

This competency framework is to be used in conjunction with the NMC Standards for competence for registered midwives (2009),* the NMC Code of professional standards of practice and behaviour for nurses and midwives (2015), as well as local continuing professional development and preceptorship arrangements. These skills are to be undertaken with reference to appropriate underpinning theory and with evidenced-based decision making. All competencies marked 'R' are required at the point of entry to the midwives' part of the NMC register.

Please note that this framework identifies the competencies but not the accompanying underpinning theory that is additionally required.

Enhanced maternal care

Enhanced maternal care is driven by a set of competencies required to care for women with medical, surgical or obstetric problems during pregnancy, peri- and post-partum but without the severity of illness that requires admission to a critical care unit. This care can be provided by any practitioner with the necessary skills.†

*These standards are currently under review and new proficiencies will be published by the NMC in 2020.

†Care of the critically ill woman in childbirth; enhanced maternal care. *RCoA*, 2018.

There are three levels of competency required by midwives:

> Level 1 **Registration (R)** = competencies required at the point of entry to the midwifery part of the Nursing and Midwifery Council's register.
>
> Level 2 **Core (C)** = competencies required for core midwifery staff employed on a labour ward on a continuous basis.
>
> Level 3 **Enhanced Maternal Care (EMC)** = enhanced specialist skills required by healthcare professionals in an area designated to provide enhanced maternal care.

Midwives must be able to undertake the following competencies in a safe and professional manner within the NMC Code of professional standards of practice and behaviour for nurses and midwives (2015).

Respiratory system

The following competency statements relate to caring for women who require respiratory support, including monitoring, observation, and respiratory care.

Accurately perform and correctly document a thorough respiratory assessment.

Assess and monitor women requiring respiratory support and take appropriate action where required.

Assessment will include:

- respiratory rate/depth/pattern of respirations **(R)**
- pulse oximetry **(R)**
- use of accessory muscles **(R)**
- sputum **(R)**
- peak flow **(R)**.

Demonstrate an appropriate response to the observations that you have recorded including:

- re-positioning the woman **(R)**
- referral to and working with physiotherapists **(R)**
- obtaining and processing samples **(R)**
- assisting with deep breathing and expectoration **(C)**
- reporting results of ABG sampling from arterial lines to appropriate team member **(C)**
- offer basic interpretation **(C)**
- suggest actions following interpretation **(C)**.

Oxygen therapy

Assemble relevant equipment and administer oxygen therapy via:

- a simple face mask **(R)**
- a variable flow 02 delivery system **(R)**
- nasal cannula **(R)**
- reservoir mask **(R)**
- set-up and use humidification methods **(R)**.

Pulse oximetry

Set-up, use, read and interpret pulse oximetry:

- select appropriate probe site **(R)**
- set alarms appropriately**(R)**
- understand limitations of pulse oximetry **(R)**.

Provide appropriate intervention for women experiencing airway problems

- Position **(R)**.
- Head-tilt/chin-lift/jaw-thrust **(R)**.
- Have knowledge of emergency equipment **(R)**.
- Have appropriate airway device **(R)**.
- Demonstrate safe insertion of airway **(R)**.
- Demonstrate bag-valve-mask ventilation two-person technique **(R)**.

Pharmacology

- Safely prepare and administer medications used in respiratory care:
  - bronchodilators and steroid inhalers **(R)**
  - systemic steroids **(C)**.
- Monitor effects of medication **(R)**.

Cardiovascular system

The following competency statements relate to monitoring and caring for women who require cardiovascular monitoring and management.

Assess and monitor women requiring cardiovascular support.

Accurately perform and correctly document a full cardiovascular assessment including:

- pulse strength/volume/character – manual if irregular **(R)**
- blood pressure, including manual systolic and diastolic with different cuff sizes and lying and standing assessment **(R)**
- temperature **(R)**
- urine output and fluid balance **(R)**
- capillary refill time **(R)**
- skin turgor/elasticity **(R)**
- basic blood results **(R)**.

Manage fluid (including blood) replacement

- Recognise altered fluid status **(R)**.
- Recognise the need for fluid intervention and therapies including need for blood transfusion **(R)**.
- Recognise the need for fluid restriction **(R)**.
- Administer fluids in accordance with local and national guidelines **(R)**.
- Accurately record fluid balance **(R)**.

Central venous access

- Safely prepare for and assist with the insertion of a central line **(EMC)**.
- Discuss checking the line position before use in accordance with local policy **(EMC)**.
- Correctly prime a transducer **(EMC)**.
- Correctly attach a transducer to a central line **(EMC)**.
- Correctly zero a transducer **(EMC)**.
- Correctly identify when re-zeroing is required **(EMC)**.
- Correctly set appropriate alarm limits **(EMC)**.
- Apply an appropriate dressing in accordance with local policy **(EMC)**.
- Safely use and change needle-free ports **(EMC)**.
- Safely remove a central line **(EMC)**.

Arterial line management

- Prepare for and assist in the safe insertion of an arterial line **(EMC)**.
- Correctly prime a transducer **(EMC)**.
- Correctly attach a transducer to an arterial line **(EMC)**.
- Correctly zero a transducer **(EMC)**.
- Correctly identify when re-zeroing is required **(EMC)**.
- Correctly set appropriate alarm limits **(EMC)**.
- Apply an appropriate dressing in accordance with local policy **(EMC)**.
- Safely remove an arterial line **(EMC)**.

Shock

Recognise and interpret signs and symptoms of:

- cardiovascular shock **(R)**
- hypovolaemic shock **(R)**
- anaphylactic shock **(R)**
- septic shock (including 1st hour care duties) **(R)**.

Cardiac rhythms

- Correctly check 'emergency' equipment including defibrillator **(R)**.
- Correctly attach the patient to a cardiac monitor **(R)**.
- Correctly identify from the cardiac monitor output:
  - bradycardia **(R)**
  - tachycardia **(R)**
  - ectopic beats **(C)**.

Correctly identify and follow BLS/ILS guidelines where appropriate for the following life threatening dysrhythmias:

- asystole **(C)**
- pulseless electrical activity **(C)**
- ventricular tachycardia **(C)**
- ventricular fibrillation **(C)**.

Associated pharmacology

Demonstrate knowledge and understanding of prescribed medications used to support the cardiovascular system including:

- anti-hypertensive drugs **(R)**
- magnesium sulphate **(R)**
- safely prepare and administer prescribed medications used to support the cardiovascular system, including:
  - anti-hypertensive drugs **(C)**
  - magnesium Sulphate **(C)**.
- titrate medication under supervision to achieve targets set by medical staff (eg MAP, systolic pressure) **(EMC)**.

Renal system

The following competency statements relate to the safe and effective assessment of renal function, monitoring of fluid balance, and care of women at risk of acute kidney injury:

- determine the monitoring needs for women at risk of deteriorating renal function **(R)**
- demonstrate the ability to accurately measure and record fluid balance and report abnormalities appropriately **(R)**
- identify factors which may affect the assessment of renal function (e.g. blocked catheters and urinary retention) **(R)**
- evaluate the effectiveness of fluid replacement **(R)**
- administer appropriate care to women with a urinary/urinary tract catheter (according to national guidelines and local policy) **(R)**
- utilise locally available equipment:
  - catheterisation equipment **(R)**
  - urometers **(R)**.
- identify women who are fluid-depleted **(R)**
- identify women who are fluid-overloaded **(R)**
- review biochemistry results and take appropriate action **(R)**
- monitor and review women's biochemistry and haematology results **(R)**.

Neurological system

The following competency statements relate to the assessment and management of women who are neurologically compromised.

Identify deterioration in neurological status:

- undertake a neurological assessment using the AVPU scoring system **(R)**
- check blood glucose and take appropriate action **(R)**.

Identify focal deficits such as:

- gag and swallow reflex **(R)**
- pupillary response **(R)**.

Demonstrate an appropriate response to the observations recorded, including:

- protecting the airway **(R)**
- placing women in the recovery position **(R)**.

General

The following competency statements relate to general elements of care required when supporting women in need of enhanced maternal care:

- complete the MEOWS accurately **(R)**
- follow 'track and trigger' system to escalate care **(R)**
- provide accurate documentation of assessment/intervention/evaluation and referrals **(R)**
- contribute to the ongoing management plan **(R)**.

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