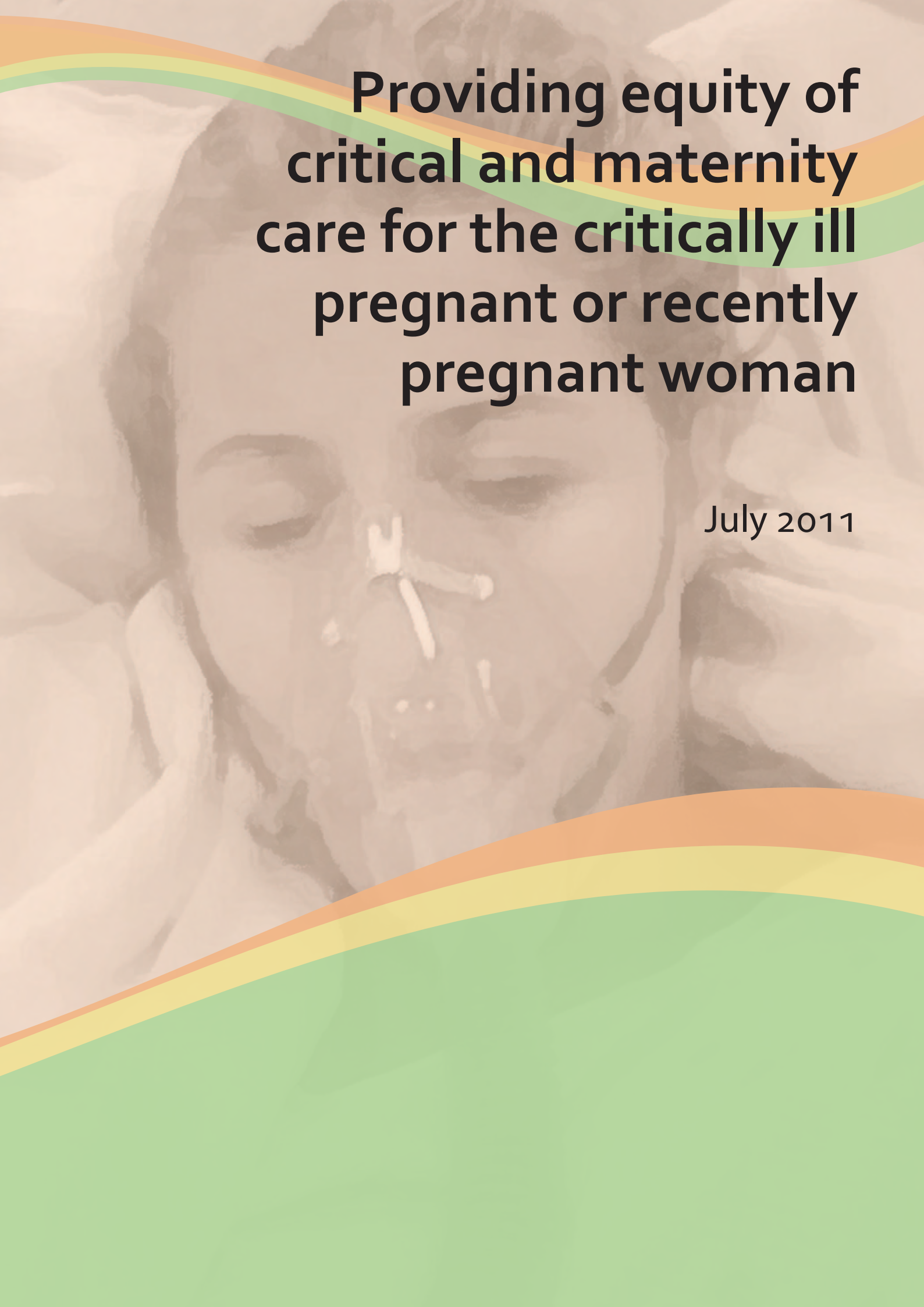

Providing equity of critical and maternity care for the critically ill pregnant or recently pregnant woman

July 2011

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Introduction to document

The remit in producing this document was to summarise, in one place, existing standards and recommendations relevant to the care of the pregnant or recently pregnant critically ill woman for Maternity and Critical Care Services and Commissioners to respond to. There was no remit to make new recommendations. This document was drafted by the Maternal Critical Care Working Group, a subcommittee of the Joint Standing Committee of the Royal College of Obstetricians and Gynaecologists (RCOG) and the Royal College of Anaesthetists (RCoA) together with representation from the Royal College of Midwives (RCM), Intensive Care Society (ICS), British Maternal and Fetal Medicine Society (BMFMS), the Obstetric Anaesthetists Association (OAA) and the Department of Health (DH). It was hosted by the Royal College of Anaesthetists. The multidisciplinary Working Group was formed to look at source documents relating to matters of critical care in the parturient and to provide critical appraisal and advice for those tasked with providing this care to women.

Childbirth is a major life event for women and their families. The few women who become critically ill during this time should receive the same standard of care for both their pregnancy related and critical care needs, delivered by professionals with the same level of competences irrespective of whether these are provided in a maternity or general critical care setting.

Background

Maternal critical care is an area which is less discussed than other parts of obstetric, midwifery and critical care practice. There may be many reasons for this. Of late, however, there has been a growing need to address this area from a national point of view: to collate, to standardise, to share and to learn. Maternal mortality has been analysed by the confidential enquiries and what has become apparent is that there is still a significant number of deaths associated with suboptimal care. Furthermore, there are recurrent and new themes emerging, most recently the problem of maternal sepsis and mortality has a higher incidence among ethnic minority groups, particularly black African women, than among white women.[1] For every death there are nine women who develop severe maternal morbidity. We need to address the implementation of the most up-to-date published standards on recognising, and managing with the appropriate interventions, maternal critical care and its sequelae (long-term organ dysfunction, hysterectomy, fetal death, etc). The aim of this document is to identify and bring together reports on critical care and view them with respect to maternity services.

Aims and objectives

The aim of this work was to review the evidence base and give examples of models of care to ensure that both maternal and critical care aspects of the pathway are delivered equitably, always remembering the goal of keeping mother and baby together unless precluded by a clinical indication.

How many women require maternal critical care?

Birth rates are measured in various ways, but using the most recent Confidential Enquiry into Maternal Death[1] report there were 261 maternal deaths in the triennium 2006–2008 from causes directly or indirectly related to pregnancy (11.39 per 100,000 maternities including miscarriages below 24 weeks).

Complementary to this data is the report from the Intensive Care National Audit and Research Centre (ICNARC) Case Mix Programme (CMP) on female admissions to adult general critical care units in England, Wales and Northern Ireland.[2] This covers admissions (pregnant and recently pregnant) to CMP participating critical care units. In 2007 there were 513 women pregnant or recently pregnant women admitted (260/100,000). Of the 418 recently pregnant, there was an obstetric reason for the admission, in 72%. Eighty percent had a live birth and 65% of their babies were not admitted to a neonatal intensive care unit.

Differentiating the level of critical care required by this population has been made more complex by the amalgamation of high dependency and intensive services into the single entity of 'Critical Care'. However analysis of the Critical Care Minimum Dataset (CCMDS)[3] can assist by identifying the type and level of organ support required by each woman. Thirty-two percent of the bed days provided to women identified as recently pregnant provided high dependency, rather than intensive, care.

The rates of admission in ICNARC data are comparable with that quoted by Baskett of 0.05% to 1.7% in developed countries.[4] Say et al found that within different definitions of morbidity, the prevalence varied from 0.8% to 8.2% for disease specific criteria and 0.1%–3% for studies using management-based criteria.[5]

The diagnoses precipitating admission to critical care are predictable and include massive haemorrhage (>2,500ml loss), eclampsia, sepsis, thromboembolism, acute organ dysfunction (renal, hepatic, cardiac, respiratory, neurological) and anaesthesia-related morbidity such as aspiration, anaphylaxis and muscle relaxant-related problems. Several studies have attempted to quantify each of these sequelae. The most pertinent is the 6th Scottish Confidential Audit of Severe Maternal Morbidity which gives incidences of haemorrhage of 4.6 per 1,000 live births; eclampsia 0.3/1,000; sepsis 01/1,000; embolism 0.1/1,000; renal and liver dysfunction 0.3/1,000; pulmonary oedema 0.2/1,000 and acute respiratory dysfunction 0.2/1,000.[6] See Appendix 1.

An audit of severe maternal morbidity in Dublin, with 13 systems and management-based definitions, showed a rate of 320/100,000[7] for massive obstetric haemorrhage, as defined by the requirement of greater than or equal to five units of blood transfusion, occurred in 125/100,000 deliveries in one large multicentre study.[8]

Estimation of the overall level-2-need is more complicated. Assessing potential level 1, 'high dependency care', need is even more so. The reason for this relates to the fact that all level 3, 'intensive care', patients will be admitted to a level 3 unit and will therefore be included in the ICNARC data. Women requiring level 2 care, on the other hand, may currently have all or part of their critical care needs met in a maternity unit and at the present time there is no national data recording this activity. Admission to a dedicated critical care facility will depend on the type of organ support required, clinical diagnosis, potential for further deterioration and experience/competency of the current location. A number of studies have assessed the incidence of serious morbidity in obstetric practice.

A South African study by Mantel set 14 inclusion criteria.[9] These were massive obstetric haemorrhage (>2,500m blood loss), eclampsia, biochemical renal or hepatic dysfunction.

The 6th annual Scottish Maternal Morbidity Audit[6] calculated a risk of serious morbidity of 570/100,000 deliveries. This is similar to other audits in Westernised countries where rates of 210–400/100,000 have been quoted by Baskett. The required level of critical care each patient needs will be dependent on which organ requires support and the level of such support. For example a patient with respiratory failure, irrespective of the diagnosis, may only require oxygen therapy (50%), non-invasive modes of support, e.g. continuous positive airway pressure (CPAP) or pressure support mode, but will on some occasions require tracheal intubation and mechanical ventilation.

In addition, maternity units frequently record a significant number of women with a high acuity of illness necessitating a level of cardiovascular and respiratory monitoring that exceeds 'normal' practice in delivery units. Such clinical needs are associated with a range of diagnoses; from small post-partum haemorrhages (>1,500ml), to pre-eclampsia, uterine rupture and HELLP syndrome. An obstetric High Dependency Unit admission rate of 5% has been cited in a number of recent reports.[10–12] To summarise, we have excellent data regarding maternal death rates (14/100,000) and critical care utilisation (260/100,000). However, prevalence

rates for women who require a higher level of monitoring or single organ support is more difficult to quantify and may be as high as 1,200/100,000, 20 times the numbers represented in the ICNARC report.

What is maternal critical care?

Maternal critical care, high dependency care and high risk maternity care are not interchangeable, the term critical care having a more precise definition. The DH document 'Comprehensive Critical Care' recommends that the terms 'high dependency' and 'intensive care' be replaced by the term 'critical care'.[13] The document also proposes that the care required by an individual be independent of location, coining the phrase 'critical care without walls'. Within the term, care is subdivided into four levels, dependent on organ support and the level of monitoring required independent of diagnosis.

Defining the level of critical care required by the mother will be dependent on the number of organs requiring support and the type of support required as determined by the Intensive Care Society's 'Level of Care' document.[14] This term was first defined in Comprehensive Critical Care and subsequently updated in 2009. The levels of support are:

Level 0 Patients whose needs can be met through normal ward care.

Level 1 Patients at risk of their condition deteriorating and needing a higher level of observation or those recently relocated from higher levels of care.

Level 2 Patients requiring invasive monitoring/intervention that includes support for a single failing organ system (excluding advanced respiratory support).

Level 3 Patients requiring advanced respiratory support (mechanical ventilation) alone or basic respiratory support along with support of at least one additional organ. The nature of organ support is captured using the Critical Care Minimum Dataset (CCMDS).[3] Any area which satisfies the DH definition for Critical Care setting, will qualify for submission of data.

The advantage of using this dataset to reflect organ support in maternity units is obvious. A standardised platform will provide accurate data and facilitate comparative audit, utilising the Case Mix Programme.

This approach has been beneficial as it has facilitated some aspects of critical illness management, particularly some aspects of level 2 care, to be delivered in alternative clinical locations with the proviso that the non-critical care location possesses competent staff with appropriate clinical expertise to manage the clinical situation, either with or independently of critical care consultant medical/nursing/midwifery staff. An example of such care would be women requiring invasive cardiovascular monitoring and intervention for pre-eclampsia or massive haemorrhage on the delivery suite.

Thus, maternal critical care can be distinguished from 'high risk' obstetrics because;

1 Fetal issues are excluded, and
2 Maternal risk factors or obstetric complications that require closer observations or intervention, but, not support of an organ system, are also outside the term.

Table 1 Examples of Maternity Care Required at ICS Levels of Support for Critical Care[12]

Level of Care	Maternity Example
Level 0: normal ward care	Care of low risk mother
Level 1: Additional monitoring or intervention, or step down from higher level of care	» Risk of haemorrhage » Oxytocin infusion » Mild pre-eclampsia on oral anti-hypertensives/fluid restriction etc » Woman with medical condition such as congenital heart disease, diabetic on insulin infusion
Level 2: single organ support	**Basic Respiratory Support (BRS)** » 50% or more oxygen via face-mask to maintain oxygen saturation » Continuous Positive Airway Pressure (CPAP), Bi-Level Positive Airway Pressure (BIPAP) **Basic Cardiovascular Support (BCVS)** » Intravenous anti-hypertensives, to control blood pressure in pre-eclampsia » Arterial line used for pressure monitoring or sampling » CVP line used for fluid management and CVP monitoring to guide therapy **Advanced Cardiovascular Support (ACVS)** » Simultaneous use of at least two intravenous, anti-arrythmic/anti-hypertensive/vasoactive drugs, one of which must be a vasoactive drug » Need to measure and treat cardiac output **Neurological Support** » Magnesium infusion to control seizures (not prophylaxis) » Intracranial pressure monitoring » Hepatic support » Management of acute fulminant hepatic failure, e.g. from HELLP syndrome or acute fatty liver, such that transplantation is being considered
Level 3: advanced respiratory support alone, or support of two or more organ systems above	**Advanced Respiratory Support** » Invasive mechanical ventilation **Support of two or more organ systems** » Renal support and BRS » BRS/BCVS and an additional organ supported*
*a BRS and BCVS occurring simultaneously during the episode count as a single organ support	

Care of the critically ill parturient in different settings

Delivering high quality critical care or obstetric management outside designated speciality specific areas is always challenging. The national Service Framework for Children, Young People and Maternity Services[15] requires consultant-led services have adequate facilities, expertise, capacity and back-up for timely and comprehensive obstetric emergency care, including transfer to intensive care. It is therefore imperative that commissioners and maternity and critical care services design pathways at a local level which ensure that a critically ill parturient accesses equitable care for both components, irrespective of location. Such pathways should facilitate mother and baby remaining together unless precluded by a clinical reason. Such arrangements should detail defined escalation arrangements for bringing critical care, midwifery and obstetric competences into the maternity or critical care unit. These arrangements need to take into account local configuration, size and complexity of maternity and critical care services. Models may include:

- Having a suitable area[16] and equipment (Appendix 3) with medical input from anaesthetists and obstetricians, staffed by a team of midwives who have additional training which equips them with the necessary critical care competences. Local arrangements for input from other disciplines and allied professionals as required with escalation protocols should level 3 care be required.
- Importing critical care skills onto labour ward through outreach or other arrangements with local critical care services.
- Transferring women to a general level 2 unit with local arrangements for providing obstetric and midwifery input and competences and maintaining direct contact with their baby.

Standards for the recognition and care of the acutely ill parturient

Maternity services should implement the NICE guideline on the care of the critically ill in hospital.[17] Admissions to maternity services should have physiological observations recorded at the time of their admission or an initial assessment together with a clear written monitoring plan that specifies which physiological observations should be recorded and how often. This could take the form of defined requirements for specific clinical situations. An example is included in Appendices 4a and 4b.

The plan should take into account:

- whether the woman has a high or low risk pregnancy
- the reason for the admission
- the presence of co-morbidities
- an agreed treatment plan.

Physiological observations should be recorded and acted upon by staff who have been trained to undertake these procedures and who understand their clinical relevance.

Physiological track and trigger systems should be used to monitor all antenatal and postnatal admissions. There are a number of charts in use nationally that take into account physiological changes that occur in parameters measured, such as blood pressure and respiratory rate. There is not currently, however, a validated chart for use in pregnancy. An example is included in Appendices 4a and 4b. A longer-term goal is the production of a validated system and observation chart for use nationally in maternity services which is compatible with the proposed National Health Service Early Warning Score (NEWS) which excludes pregnancy. Following labour and delivery, physiological observations should be monitored at least every 12 hours, unless a decision has been made at a senior level to increase or decrease this frequency for an individual patient or group of patients. The frequency of monitoring should increase if abnormal physiology is detected, as outlined in the recommendation on graded response strategy.

Staff caring for patients in acute hospital settings should have competences in monitoring, measurement, interpretation and prompt response to the acutely ill patient appropriate to the level of care they are providing. Education and training should be provided to ensure staff have these competencies and they should be assessed to ensure they can demonstrate them.[18]

A graded response strategy for patients identified as being at risk of clinical deterioration should be agreed and delivered locally. It should consist of the following three levels.[18]

- **Low-score group: (EWS =3)**
  - Increased frequency of observations and the midwife in charge alerted.

- **Medium-score group: (EWS =4, 5)**
  - Urgent call to team with primary medical responsibility for the patient.
  - Simultaneous call to personnel with core competences for acute illness. These competences can be delivered by a variety of models at local level, such as a critical care outreach team, a hospital-at-night team or a specialist trainee in anaesthesia, obstetrics, acute medical or surgical specialty.
- **High-score group: (EWS ≥ 6)**
  - Emergency call to team with critical care competences and maternity team. The team should include a medical practitioner skilled in the assessment of the critically ill patient, who possesses advanced airway management and resuscitation skills. There should be an immediate response. Appendix 6 gives an example.

Competences for recognition and care of the critically ill parturient within the maternity service

The acute care competences are defined within the DH document 'Competencies for Recognising and Responding to Acutely Ill Patients in Hospital' (DH, 2008).[18] The competences are targeted at staff who are involved in the care of acutely ill patients in hospital but they may be adapted for use in other settings, such as maternity, or across sectors. They define the knowledge, skills and attitudes required for safe and effective treatment and care along the Chain of Response (Figure 1).

Figure 1 Safe and effective treatment and care along the Chain of Response (DH, 2008)[18]

It is likely that one staff group or banding will cover more than one role in the chain, e.g. the recogniser may also fulfil the role as primary responder or on occasions may fulfil the recorder role.

- **Non-clinical supporter** who may also be the 'alerter' and may include the woman or visitor.
- **The recorder** who takes designated measurements, records observations and information. In maternity services this could be a maternity support worker, healthcare assistant or midwife.
- **The recogniser** who monitors the patient's condition; interprets designated measurements, observations and information and adjusts the frequency of observations and level of monitoring. In the maternity setting this could be a midwife, recovery or other nurse working within the unit or foundation doctor.
- **The primary responder** who goes beyond recording and further observation by interpreting the measurements and initiating a clinical management plan, e.g. commencing oxygen therapy; insertion of airway adjuncts; selection and administration of a bolus of intravenous fluids. This would be a junior doctor or specialist trainee 1–2 or foundation doctor with appropriate competencies.
- **The secondary responder** who is likely to be called to attend when the patient fails to respond to the primary intervention, or continues to 'trigger' or 're-trigger' a response. This individual will assess the clinical effect of the primary intervention; formulate a diagnosis; refine the management plan, initiate a secondary response and will have the knowledge to recognise when referral to critical care is indicated. This would be an obstetric or anaesthetic specialist trainee 3–7.

- **Tertiary responder** whose role will be undertaken by staff possessing appropriate critical care competences such as advanced airway management, resuscitation, and clinical examination and interpretation of critically ill patients. In the maternity unit this role would be provided by consultants in anaesthesia and obstetrics.

For units providing level 2 care, these should be at least intermediate level. Obstetricians and midwifery staff providing this care should have additional training in the care of the critically ill women to achieve the relevant competencies.

The competences required (see Appendix 7) focus primarily on the clinical and technical aspects of care and the delivery of effective patient management, but they are not exclusive. They assume the possession and application at every level of complementary generic competences such as record keeping, team working, interpersonal skills and clinical decision-making. Of particular note in this context is the ability to rapidly access hospital information systems and retrieve patient information, such as blood results and X-rays.

Implementing the competences

Maternity services should define which of their staff take on each one of the above roles and ensure that they have suitable training and assessment of the competences they require. The point at which there is a need to bring professionals with the required competences into the maternity unit or transfer the woman to a setting where they are available, should also be defined using this framework whilst the continuation of obstetric and midwifery care is ensured.

Implementing the competences will require a system-wide approach with effective leadership and rigorous change management from board through to ward. This may include the following:

- Identifying a designated clinical and managerial lead and implementation team who will also secure training provision.
- Monitoring outcomes at all levels with board reporting and intervention.
- Critical incident analysis and peer supervision with regular multidisciplinary meetings to review severe maternal morbidity cases.
- The incorporation of recommendations for education/training and assessment of competence into induction and ongoing provision, as well as into formal performance review and development processes.
- Making sure that resources, such as equipment, are in place.
- Adapting local policies to support people meeting the competences and clarifying levels of authority and responsibility.
- Developing team working, assertiveness and inter-professional working relationships. It is essential that staff have confidence in the competence of colleagues; are willing to challenge and to be challenged.

Workforce development

Lead professionals in maternity services have a responsibility to ensure staff are deemed competent in the early recognition of acutely ill and deteriorating patients and are able to perform the initial resuscitation of such patients. There are a number of national, certified courses available to support workforce development in this area such as the AIM (Acute Illness Management) or ALERT (Acute Life-threatening Events: Recognition and Treatment) courses (see Appendix 8).

Whichever course is selected, assessment of competences is essential. Scenario-based training has been found to be valuable, particularly when developing team drills for life-threatening clinical situations.

In addition to these resources, a number of services have been developed; local teaching initiatives, acute care sessions at clinical simulation centres and some e-learning packages are also being developed (Appendices 9 and 10). A bi-annual course is run by BMFMS and RCoA in association with OAA and RCM.

Transfer

Transfer to ward from critical care area

After the decision to transfer a patient from a critical care area to the maternity ward has been made, she should be transferred as early as possible during the day. Transfer from critical care areas to the maternity ward between 22.00 and 07.00 should be avoided whenever possible and, if it does occur, should be documented as a critical incident.[19]

Both the critical care and receiving maternity ward teams should take shared responsibility for the care of the patient being transferred. They should jointly ensure that:

- there is continuity of care through a formal structured handover from critical care staff to ward staff (including both medical and nursing staff) supported by a written plan (see Appendix 11)
- the receiving ward, with support from critical care if required, can deliver the agreed plan
- the formal structured handover of care should include:
  - a summary of critical care stay, including diagnosis treatment and outstanding investigations
  - a monitoring plan detailing the frequency of observations
  - a plan for ongoing treatment including drugs and therapies, nutrition plan, infection status and any agreed limitations of treatment
  - physical and rehabilitation needs
  - psychological and emotional needs
  - specific communication or language needs.

Transfer to critical care area from a maternity unit

Women may require transfer to a critical care area for a higher level of care (both level 2 and level 3) both pre-delivery and postpartum. Such transfers need to satisfy the ICS Standards for 'Guidelines for the transport of the critically ill adult'[19] and need to be accompanied by an additional plan addressing the maternal, fetal and postnatal needs of the patient. The plan should also indicate whether or not pre-delivery shared care between Obstetrics and Critical Care is essential.

All maternity sites must have the facilities and staff to resuscitate, stabilise and transfer critical care patients. This includes:

- non-invasive and invasive cardiovascular monitoring modalities (invasive arterial and venous pressures)
- ECG
- oximetry
- capnography (for ventilated patients)

- monitor
- ventilator
- portable suction
- syringe drivers
- transport ventilator which is capable of delivering positive end expiratory pressure; pressure and volume control ventilation; pressure support mode of ventilation; adjustable IE ratios and flow profiles and equipped with full range of pressure, volume and oxygen alarms.

It is essential that the battery life of this equipment is appropriate for the anticipated journey time required for the transfer and a dedicated site for charging of equipment is identified within the maternity unit. In addition, separate syringe drivers should be available for use within the maternity unit. Transfer equipment should be dedicated only for transfer.

The transfer should take place with an appropriately trained practitioner. Although this is generally an anaesthetist, it can be a specific transfer clinician or an intensivist. Positioning of the pregnant patient poses additional risks in the avoidance of aortocaval compression.

The acutely ill parturient in a general critical care area

The over arching principle in managing the acutely ill pregnant woman is that optimal management of the condition, including essential imaging and medication, is paramount. The fetus is always secondary to this. The following[20] need to be taken into account in a pregnant woman whatever the cause:

- Aortocaval compression significantly reduces cardiac output from 20 weeks of gestation thus reducing venous return and, as a consequence, cardiac output by up to 30–40%, causing what is known as supine hypotension. It also significantly reduces the efficacy of chest compressions during resuscitation and reduces cardiac output to around 10%.
- Changes in lung function, diaphragmatic splinting by the enlarged uterus and increased oxygen consumption make the pregnant woman become hypoxic more readily and make ventilation more difficult. This means that the pregnant woman becomes hypoxic much more rapidly during periods of hypoventilation.
- Difficult intubation is more likely in pregnancy because of large breasts inhibiting the working space and laryngeal oedema can contribute to make intubation more difficult.
- Pregnant women are at an increased risk of aspiration requiring early intubation with effective cricoid pressure and the use of H2 antagonists and antacids prophylactically.
- Maternal resuscitation should follow the Resuscitation Council (UK) guidelines. From 20 weeks of gestation onwards, the pressure of the gravid uterus must be relieved from the inferior vena cava and aorta. Approach with a left lateral tilt of 15° on a firm surface or manual displacement of the uterus.
- If there is no response to correctly performed CPR within four minutes of maternal collapse or if resuscitation is continued beyond this in women beyond 20 weeks of gestation, delivery should be undertaken to assist maternal resuscitation. This should be achieved within five minutes of the collapse.

Additional points include:

- BP of 90/60 is a normal blood pressure in pregnancy and hypertension aim of BP < 150/100 mmHg. If there is organ damage, aim for BP < 140 mmHg.

- Increased cardiac output means that large volumes can be lost rapidly, especially from the uterus which receives 10% blood volume at term.
- Increased coagulation – increased risk of VTE – prophylaxis is required.
- Nutritional requirements – macronutrients – 300 kcal required daily extra. Micronutrients – iron, Vit D, omega-3 etc.

These physiological alterations will require adjustment of delivery of critical care as detailed below.

Table 2 Physiological and physical changes in pregnancy[20]

	Changes in pregnancy	Impact on resuscitation
Cardiovascular system		
Plasma volume	Increased by up to 50%	Dilutional anaemia Reduced oxygen-carrying capacity
Heart rate	Increased by 15–20 bpm	Increased CPR circulation demands
Cardiac output	Increased by 40% Significantly reduced by pressure of gravid uterus on IVC	Increased CPR circulation demands
Uterine blood flow	10% of cardiac output at term	Potential for rapid massive haemorrhage
Systemic vascular resistance	Decreased	Sequesters blood during CPR
Arterial blood pressure	Decreased by 10–15 mmHg	Decreased reserve
Venous return	Decreased by pressure of gravid uterus on IVC	Increased CPR circulation demands Decreased reserve
Respiratory system		
Respiratory rate	Increased	Decreased buffering capacity, acidosis more likely
Oxygen consumption	Increased by 20%	Hypoxia develops more quickly
Residual capacity	Decreased by 25%	Decreased buffering capacity, acidosis more likely
Arterial PCO_2	Decreased	Decreased buffering capacity, acidosis more likely
Laryngeal oedema	Increased	Difficult intubation
Other changes		
Gastric motility	Decreased	Increased risk of aspiration
Lower oesophageal sphincter	Relaxed	Increased risk of aspiration
Uterus	Enlarged	Diaphragmatic splinting reduces residual capacity and makes ventilation more difficult Aortocaval compression causes supine hypotension, reduces venous return and significantly impairs CPR
Weight	Increases	Large breasts may interfere with intubation Makes ventilation more difficult
CPR = cardiopulmonary resuscitation; IVC = inferior vena cava; PCO_2 = partial pressure of carbon dioxide		

Reproduced from Green-top Guideline No.56: Maternal collapse in pregnancy and the puerperium, 2011.[20]
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Specific additional care points for antenatal care

- Maternal position: A left lateral tilt of 15° on a firm surface will relieve aortocaval compression.
- Thrombophylaxis: (following RCOG guidelines)[21–23] pregnant women hospitalised for any length of time require prophylactic Low Molecular Weight Heparin (LMWH).
- Increased risk of Urinary Tract Infection (UTI): regular mid-stream specimen (MSU) should be taken.
- Use of drugs: be aware of haemodilution, in the presence of epidural/spinal increased peripheral vascular resistance can result an increase in the volume of drug distribution.
- Fluid balance: in cases of severe pre-eclampsia and eclampsia, fluid overload can contribute to poor outcome. Follow the NICE guideline on management of hypertension in pregnancy in the critical care setting.[23]
- Access to a delivery set/vaginal delivery/caesarean section in case of urgent delivery: obstetric trolley.
- Listed emergency drugs: hydralazine, MgSo4, oxytocin, ergometrine, carboprost, labetolol, eclampsia pack, Post-Partum Haemorrhage (PPH) pack.
- Antenatal steroids – RCOG Green-top guidelines.[24]
- Dietetic input.
- Named obstetrician/midwife: daily communication and combined ward rounds.
- Fetal monitoring surveillance plan.
- Regular fetal growth ultrasound.
- Daily fetal heart rate monitoring if no maternal perception of fetal movements greater than 28 weeks gestation.

Postpartum care

- Breastfeeding
- No TILT required
- A diuresis is normal
- Thromboprophylaxis: once clotting normalised for LMWH
- Debriefing and follow up during ICU admission
- OT/PT consults following ICU
- To have normal checks: anti-D, midwife to take care of perineum, breastfeeding, bonding as per NICE postnatal care guideline[25]
- Clinical pharmacists: drug safety, pregnancy and breastfeeding

The maternity and general critical care area interface

Wherever a pregnant woman is receiving care there must be a fundamental principle that her pregnancy care is continued and integrated into care plans and that this continues through to the postnatal period. The multiple care givers have to ensure that the needs of the critical care do not over shadow the needs of the woman and her family in regard to midwifery or obstetric care.

The pregnant woman being cared for in a general critical care area requires daily review by a multidisciplinary team including a named obstetric consultant and named senior midwife. Contact telephone numbers for midwifery, obstetric and neonatal staff should appear on the patient chart, with a management plan to facilitate delivery of ongoing obstetric and midwifery care during the critical care area admission.

The individualised patient management plan should include care during the antepartum, intrapartum and postpartum periods with significant midwifery input for normal midwifery care. A neonatologist may be required to advise on management of prematurity if a pre-term delivery is a possibility.

The maternity team role includes discussing any specific obstetric conditions with the critical care team, for example pre-eclampsia, which maybe obscured by the woman's current medical emergency. NICE guidelines are available for the management of hypertension[23] and diabetes[26] in pregnancy which are relevant to the critical care setting.

The majority of women have a named midwife and for continuity of care she should be informed of the woman's admission to a critical care unit. However, for more operational reasons, units should consider having a dedicated link midwifery team, who are contactable and will ensure regular and as-needed midwifery input. These midwives should act as the link for midwifery care in Neonatal Intensive Care Units (NICU) and other areas. They are well placed in maintaining contact with both baby and mother, who may be in different care environments, and therefore interlink the separate care plans.

NICE guidelines on antenatal, intrapartum and postnatal care[27–28, 25] cover the frequency and role of specific care during those periods of childbirth and midwives are fully competent to make these applicable to individual care plans. As these women are critically ill there should be regular communication between midwives, obstetricians and neonatologists as more complex aspects of obstetric care are considered.

Whilst the general critical care staff are experienced in communicating and updating family members, it has to be understood that there are different needs and information that the family requires from the midwife, e.g. emotional and social support, potential preparation for premature delivery, a baby in special care. The family should know how to contact a midwife and the midwife should have an opportunity to make a connection with the family. This may be the named midwife or member of the unit team. Awareness of mental health needs monitoring, following increased risk for adverse impact on pregnancy, is required from the midwife with education of the family members for their role later in the recovery period.

Auditable standards/outcome indicators

The following auditable standards/outcome indicators for maternal critical care reflect the NHS White paper[29] 'Equity and excellence: Liberating the NHS' and standards documents published by NICE, the RCOG and other organisations as referenced in the document above.

Their rationale is women who become critically ill during this time should receive the same standard of care for both their pregnancy related and critical care needs, delivered by professionals with the same level of competences irrespective of whether these are provided in a maternity or general critical care setting.

Effectiveness

- Number of admissions for level 3 care as defined by CCMDS
- Number of level 2 admissions as defined by CCMDS
- Readmissions
- Length of stay
- External transfers
- Maternal mortality
- Patient reported outcome measures

Safety

- Communication – handover of care (RCOG Green-top),[30] out-of-hours discharge, written discharge plan
- Availability of staff with appropriate critical care competencies for women receiving this in a maternity setting
- Obstetric and midwifery involvement for pregnant and recently delivered women receiving care in a general critical care setting
- Documented evidence of multidisciplinary working

Improving healthcare outcomes and Prevention

- Compliance with EWS monitoring
- Use of WHO sepsis care bundle[31]
- VTE[21–22, 32]
  - All patients, on admission, receive an assessment of VTE and bleeding risk using the clinical risk assessment criteria described in the national tool
  - Patients/carers are offered verbal and written information on VTE prevention as part of the admission process
  - Patients provided with anti-embolism stockings have them fitted and monitored in accordance with NICE guidance
  - Patients are re-assessed within 24 hours of admission for risk of VTE and bleeding
  - Patients assessed to be at risk of VTE are offered VTE prophylaxis in accordance with NICE guidance
  - Patients/carers are offered verbal and written information on VTE prevention as part of the discharge process
  - Patients are offered extended (post-hospital) VTE prophylaxis in accordance with NICE guidance[32]
- Breastfeeding rates for women requiring maternal critical care

Patient experience

- Separation of mum and baby for non-clinical reasons and length of time apart
- Single sex accommodation
- Patient satisfaction

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Appendices

Appendix 1

Numbers and rates of individual categories of severe maternal morbidity, 2008 and aggregated for 2006–2008

	Events 2008	Rate/1,000 live births 2008	Lower 95% CI	Upper 95% CI	Events 2006–2008	Rate/1,000 live births 2006–2008	Lower 95% CI	Upper 95% CI
Major obstetric haemorrhage	257	4.28	3.77	4.84	787	4.56	4.25	4.89
Eclampsia	18	0.30	0.18	0.47	48	0.28	0.21	0.37
Renal or liver dysfunction	13	0.22	0.12	0.37	52	0.30	0.23	0.40
Cardiac arrest	2	0.03	0.00	0.12	4	0.02	0.01	0.06
Pulmonary oedema	11	0.18	0.09	0.33	28	0.16	0.11	0.23
Acute respiratory dysfunction	4	0.07	0.02	0.17	14	0.08	0.04	0.14
Coma	0	0	0	0.06	2	0.01	0	0.04
Cerebrovascular event	1	0.02	0	0.09	3	0.02	0	0.05
Status epilepticus	0	0	0	0.06	0	0	0	0.02
Anaphylactic shock	2	0.03	0	0.12	4	0.02	0.01	0.06
Septicaemic shock	5	0.08	0.03	0.19	19	0.11	0.07	0.17
Anaesthetic problem	2	0.03	0	0.12	11	0.06	0.03	0.11
Massive pulmonary embolism	7	0.12	0.05	0.24	13	0.08	0.04	0.13
Intensive care or coronary care admission	90	1.50	1.21	1.84	252	1.46	1.29	1.65
GROS live births	**60,041**				**172,421**			

Reproduced from Scottish Confidential Audit of Severe Maternal Morbidity: 6th Annual Report 2008.[6]
With the permission of NHS Quality Improvement Scotland.

Appendix 2

Suggested equipment list for Maternal High Dependency Unit

Monitor for P, BP, ECG, SaO_2 and with transducer facility for invasive monitoring
Equipment for insertion and management of invasive monitoring (arterial and CVP)
Piped oxygen and suction
Intravenous fluid warmer
Forced air warming device
Blood gas analyser*
Infusion pumps
Emergency massive haemorrhage trolley*
Emergency eclampsia box*
Transfer equipment – monitor and ventilator
Computer terminal to facilitate access to blood results , PACS system
Copy of hospital obstetric guidelines (if not available on hospital intranet)
Resuscitation trolley with defibrillator and airway management equipment
***These items may already be available in theatres on delivery suite.**

Appendix 3

Frequency of EWS observations

Condition	Frequency of observations
LSCS	½ hourly for four hours Hourly for six hours Four hourly for 48 hours (use clinical judgement 24 hours during sleep) Daily until discharge
Other procedures under anaesthesia	½ hourly for four hours Hourly for six hours (or until discharge) Four hourly for 24 hours (or until discharge)
Postpartum haemorrhage	½ hourly for four hours (remain on CDS if possible) Four hourly for 24 hours
Prophylactic syntocinon	Four hourly for 24 hours
Diastolic of 90 or over **NB Women with diastolic of 110 or over and/or MAP of 125 or above should commence on the PIH protocol**	Minium four hourly until discharge or start of labour
Identified antenatal in patients (diabetics, ruptured membranes, known or suspected infection)	Four hourly (unless indicated otherwise) until discharge
Postnatal women with suspected or confirmed infection	Four hourly for a minimum of 24 hours Once daily until discharge
Medical management of miscarriage	Hourly from start of treatment until discharge
Blood transfusion	Prior to start of transfusion 15 minutes into transfusion Post transfusion **(Must be done for each unit of blood transfused)**

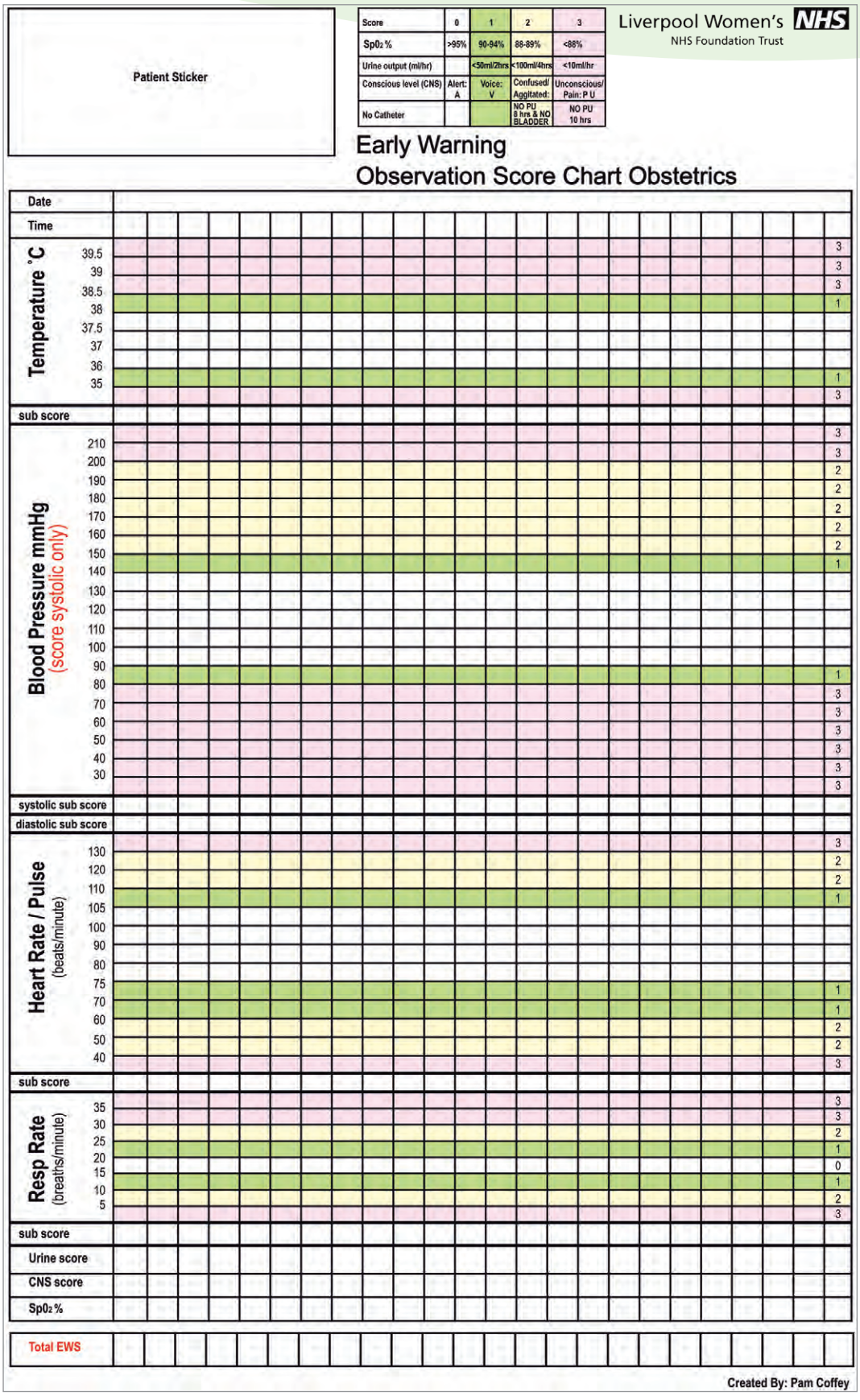
This is a minimum requirement for observation frequency and midwives and medical staff should use their clinical judgement in each individual case.

Reasons to trigger action checklist

EWS ≥ 3
Patient causing concern
Diastolic BP ≥ 110 mm/Hg
SpO2 <90% is air or <94% is 5 litres O2

Appendix 4a

Early Warning Observation Score Chart Obstetrics



Patient Sticker

Score	0	1	2	3
SpO_2 %	>95%	90-94%	88-89%	<88%
Urine output (ml/hr)		<50ml/2hrs	<100ml/4hrs	<10ml/hr
Conscious level (CNS)	Alert: A	Voice: V	Confused/ Aggitated:	Unconscious/ Pain: P U
No Catheter			NO PU 8 hrs & NO BLADDER	NO PU 10 hrs

Liverpool Women's NHS
NHS Foundation Trust

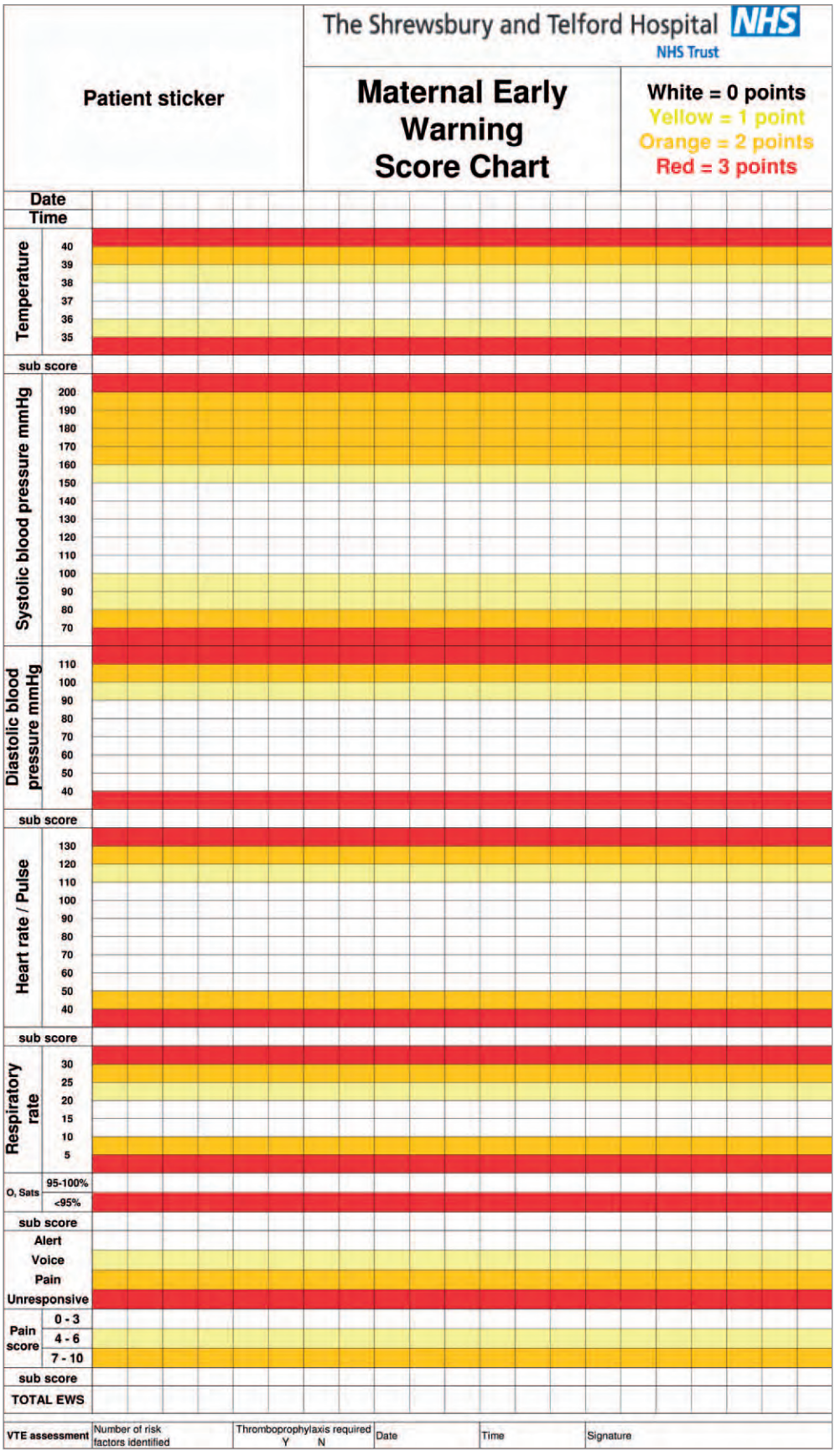
Early Warning
Observation Score Chart Obstetrics

Date																							
Time																							
Temperature °C	39.5																						3
	39																						3
	38.5																						3
	38																						1
	37.5																						
	37																						
	36																						
	35																						1
																							3
sub score																							
Blood Pressure mmHg (score systolic only)	210																						3
	200																						3
	190																						2
	180																						2
	170																						2
	160																						2
	150																						2
	140																						1
	130																						
	120																						
	110																						
	100																						
	90																						1
	80																						3
	70																						3
	60																						3
	50																						3
	40																						3
	30																						3
systolic sub score																							
diastolic sub score																							
Heart Rate / Pulse (beats/minute)	130																						3
	120																						2
	110																						2
	105																						1
	100																						
	90																						
	80																						
	75																						1
	70																						1
	60																						2
	50																						2
	40																						3
sub score																							
Resp Rate (breaths/minute)	35																						3
	30																						3
	25																						2
	20																						1
	15																						0
	10																						1
	5																						2
																							3
sub score																							
Urine score																							
CNS score																							
SpO_2 %																							
Total EWS																							

Created By: Pam Coffey

Appendix 4b

Early Warning Observation Score Chart Obstetrics



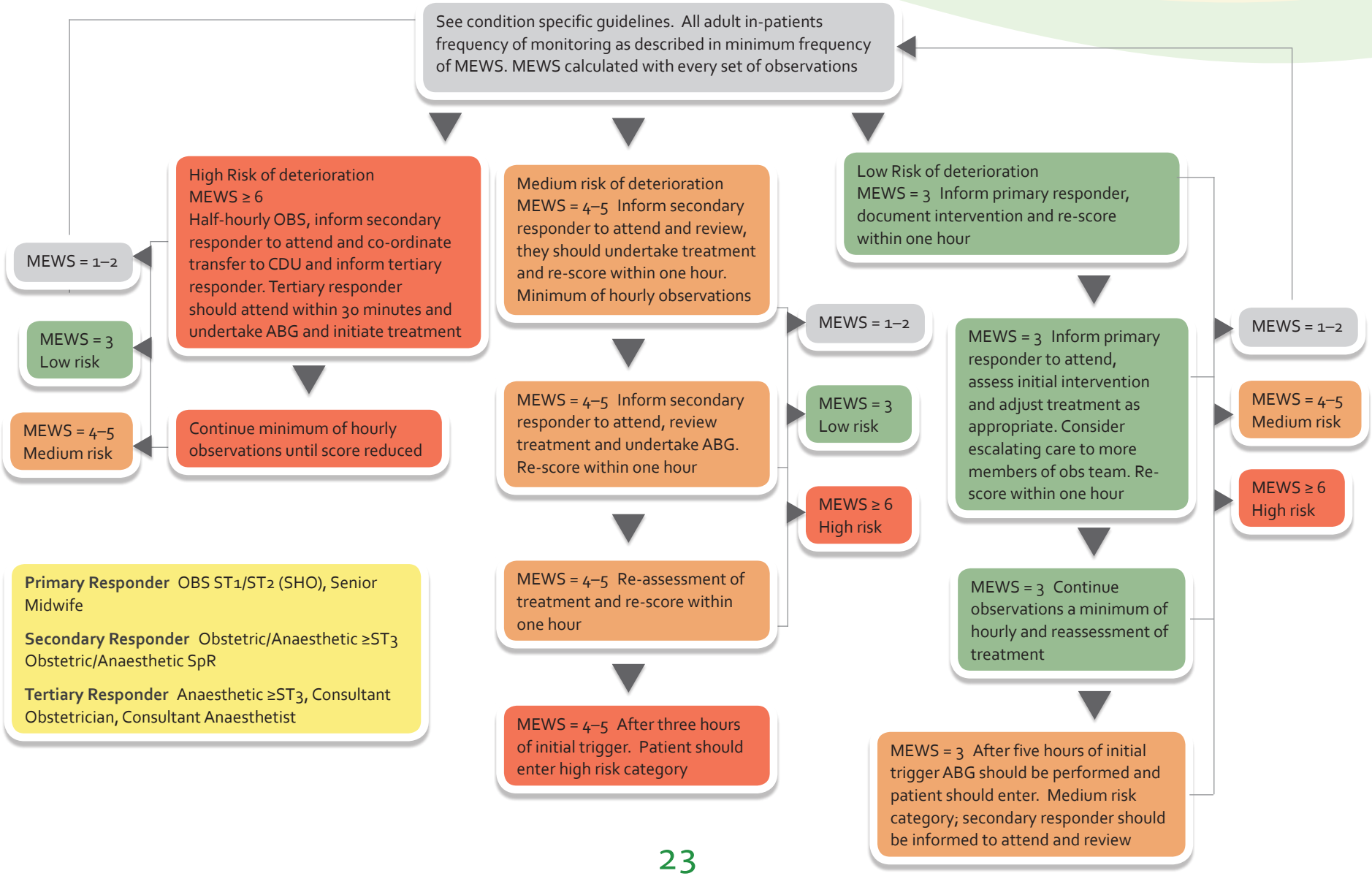
Patient sticker	The Shrewsbury and Telford Hospital NHS Trust	
	Maternal Early Warning Score Chart	White = 0 points Yellow = 1 point Orange = 2 points Red = 3 points

Date		
Time		
Temperature	40	
	39	
	38	
	37	
	36	
	35	
sub score		
Systolic blood pressure mmHg	200	
	190	
	180	
	170	
	160	
	150	
	140	
	130	
	120	
	110	
	100	
	90	
	80	
	70	
Diastolic blood pressure mmHg	110	
	100	
	90	
	80	
	70	
	60	
	50	
	40	
sub score		
Heart rate / Pulse	130	
	120	
	110	
	100	
	90	
	80	
	70	
	60	
	50	
	40	
sub score		
Respiratory rate	30	
	25	
	20	
	15	
	10	
	5	
O, Sats	95-100%	
	<95%	
sub score		
Alert		
Voice		
Pain		
Unresponsive		
Pain score	0 - 3	
	4 - 6	
	7 - 10	
sub score		
TOTAL EWS		

VTE assessment	Number of risk factors identified	Thromboprophylaxis required Y N	Date	Time	Signature

Appendix 5

Liverpool Women's MEWS flowchart



Appendix 6

The Acutely Ill Competency Framework

Reproduced from Competencies for Recognising and Responding to Acutely Ill Patients in Hospital, 2008.[18]

Airway, Breathing, Ventilation and Oxygenation

Competency Group	*Non-Clinical Staff*	*"Recorder"*	*"Recogniser"*	*"Primary Responder"*	*"Secondary Responder"*	*Critical Care*
Description of group role	Calls for help	Records and interprets within T&T protocol	Recognises and interprets observations in the context of the patient	Delivers a primary response and intervention	Delivers a secondary response and intervention	Delivers a tertiary response and intervention
NICE Response Level		**Low Risk**	**Low Risk**	**Low Risk**	**Medium Risk**	**High Risk**
Respiratory Rate	Recognises Respiratory Arrest and calls 2222.	Measures respiratory rate. Records result and assigns trigger score for respiratory rate. Has knowledge of what constitutes an abnormal value.	Interprets trigger in context of patient and responds in accordance with local escalation protocols. Adjusts frequency of observations in keeping with trigger.	Identifies inadequate respiratory effort and institutes clinical management therapies.	Evaluates effectiveness of treatment, refines treatment plan if necessary, formulates a diagnosis and recognises when referral to Critical Care is indicated.	Refer to critical care competencies as defined by the CoBaTrICE framework and mirrored in the Intercollegiate Board's training framework for Intensive Care Medicine in the United Kingdom
Oxygen Saturation		Measures oxygen saturation. Records result and assigns trigger score. Has knowledge of limitations of pulse oximetry and recognises abnormal result.	Interprets measurements in context and intervenes with basic measures in accordance with local escalation protocols including oxygen and airway support. Adjusts frequency of observations in keeping with trigger.	Identifies possible cause of hypoxia, prescribes oxygen therapy and institutes clinical management therapies.	Formulates diagnosis, evaluates effectiveness of treatment, refines treatment plan if necessary and recognises when referral to Critical Care is indicated.	

Competency Group	***Non-Clinical Staff***	***"Recorder"***	***"Recogniser"***	***"Primary Responder"***	***"Secondary Responder"***	***Critical Care***
Assessment of adequacy of ventilation and oxygenation	Recognises Respiratory Arrest and calls 2222.	Measures respiratory rate, and oxygen saturation. Assesses pattern of ventilation. Records measurements, has knowledge of abnormal values.	Interprets measurements in context and intervenes with basic measures in accordance with local protocols including oxygen and airway support. Adjusts frequency of observations in keeping with trigger.	Identifies inadequate ventilation and institutes clinical management therapies.	Formulates diagnosis**,** evaluates effectiveness of treatment, refines treatment plan if necessary and recognises when referral to Critical Care is indicated.	
Common causes of breathlessness			Describes the common causes of breathlessness. Recognises when a patient is breathless.	Identifies cause of breathlessness and institutes clinical management therapies.	Formulates diagnosis**,** evaluates effectiveness of treatment, refines treatment plan if necessary and recognises when referral to Critical Care is indicated.	
Tension Pneumothorax		Measures respiratory rate, and oxygen saturation. Assesses pattern of ventilation. Records measurements, has knowledge of abnormal values.	Describes the common causes of breathlessness. Recognises when a patient is breathless.	Identifies tension pneumothorax as a possible cause of breathlessness. Has knowledge of the management of a tension pneumothorax.	Formulates a diagnosis for and confirms the presence of a tension pneumothorax. Performs chest drain insertion and directs subsequent management.	
Peak Flow, Spirometry	Identifies equipment and seeks advice if unclear, transports equipment to ward.	Supervises patient performing peak expiratory flow measurement and records result.	Interprets reading in context, can undertake bedside spirometry when instructed to do so.	Has knowledge of which additional diagnostic tests are appropriate, institutes them and formulates a clinical management plan.	Reviews diagnosis**,** evaluates effectiveness of treatment, refines treatment plan if necessary and recognises when	

Competency Group	Non-Clinical Staff	"Recorder"	"Recogniser"	"Primary Responder"	"Secondary Responder"	Critical Care
					referral to Critical Care is indicated.	
Use of airway adjuncts and suction	Identifies equipment and seeks advice if unclear, transports equipment to ward.	Same as Non-Clinical staff.	Uses adjuncts and suction.	Same as "recogniser".	Same as "recogniser".	
Arterial blood gas sampling	Transports sample according to local protocol.	Collects equipment and transports sample.	Assists operator in performing task.	Undertakes arterial blood gas sampling and measurement. Has knowledge of and can interpret arterial blood gas measurement.	Recognises need for assistance from Critical Care.	
High flow and controlled oxygen therapy	Identifies and collects medical gases if designated.	Identifies and uses masks /nasal cannulae/venturi adapters at appropriate oxygen flow rates. Records oxygen concentration/flow.	Follows oxygen prescription. Understands the context when controlled oxygen is required and applies high flow oxygen effectively in emergencies.	Prescribes oxygen and evaluates effectiveness.	Has detailed knowledge of the use of controlled and high flow oxygen therapy. Evaluates effectiveness of oxygen therapy and revises treatment accordingly.	
Administration of drugs via nebuliser	Identifies and collects medical gases if designated.	Recognises nebuliser devices and can use under supervision.	Uses nebuliser device and administer therapy using correct driving gas as prescribed.	Prescribes nebulisers including appropriate driving gas.	Reviews effectiveness of nebuliser therapy and revises treatment accordingly.	

Competency Group	***Non-Clinical Staff***	***"Recorder"***	***"Recogniser"***	***"Primary Responder"***	***"Secondary Responder"***	***Critical Care***
Continuous Positive Airway Pressure (CPAP) and/or Non-Invasive Ventilation (NIV)	Identifies equipment and seeks advice if unclear, transports equipment to ward.	Identifies and transports equipment to the patient.	Uses CPAP and NIV therapy. Identifies the risks associated with CPAP and NIV therapy.	Has knowledge of indications for CPAP and NIV.	Prescribes, uses CPAP and/or NIV, evaluates effectiveness of treatment and revises accordingly. Recognises need for assistance from Critical Care.	
Urgent endotracheal intubation	Identifies and transports emergency equipment to the patient.	Recognises endotracheal tube and laryngoscope.	Assists with urgent intubation.	Same as "recogniser".	Same as "recogniser".	
Chest Radiograph				Requests and interprets Chest Radiograph.	Same as primary responder.	
Chest Drain	Recognises that transferring a patient with a chest drain needs clinical assistance.	Recognises drain presence. Has knowledge of the use of a chest drain. Records output from drain and/or position (swinging and bubbling).	Prepares equipment for and assist with insertion of drain. Manages a patient with a chest drain.	Same as "recogniser".	Inserts chest drain using either seldinger or traditional technique.	

Competency Group	***Non-Clinical Staff***	***"Recorder"***	***"Recogniser"***	***"Primary Responder"***	***"Secondary Responder"***	***Critical Care***
Description of group role	Calls for help	Records and interprets within T&T protocol	Recognises and interprets observations in the context of the patient	Delivers a primary response and intervention	Delivers a secondary response and intervention	Delivers a tertiary response and intervention
NICE Response Level		**Low Risk**	**Low Risk**	**Low Risk**	**Medium Risk**	**High Risk**
Measurement of Heart Rate		Measures heart rate, records measurement, assigns trigger score and has knowledge of what constitutes an abnormal value.	Interprets trigger in context of patient and responds in accordance with local escalation protocols. Adjusts frequency of observations in keeping with trigger.	Identifies abnormal heart rate (tachyarrhythmias and bradyarrhythmias) and institutes clinical management therapies.	Formulates diagnosis**,** evaluates effectiveness of treatment, refines treatment plan if necessary and recognises when referral to Critical Care is indicated.	Refer to critical care competencies as defined by the CoBaTrICE framework and mirrored in the Intercollegiate Board's training framework for Intensive Care Medicine in the United Kingdom

Competency Group	***Non-Clinical Staff***	***"Recorder"***	***"Recogniser"***	***"Primary Responder"***	***"Secondary Responder"***	***Critical Care***
ECG monitoring and recording of trace	Identifies equipment and seeks advice if unclear, transports equipment to the patient or ward as appropriate.	Recognises ECG machine.	Uses machine to perform 12 lead ECG. Knowledge of local equipment eg refilling paper/toner.	Has knowledge of common abnormalities and can interpret ECG in the context of the patient. Responds in accord with local protocols and institutes clinical management therapies.	Formulates diagnosis**,** evaluates effectiveness of treatment, refines treatment plan if necessary and recognises when referral to Critical Care is indicated.	
Measurement of Blood Pressure		Measures blood pressure, records measurement, assigns trigger score and has knowledge of what constitutes an abnormal value.	Interprets trigger in context of patient and responds in accordance with local escalation protocols. Adjusts frequency of observations in keeping with trigger.	Has knowledge of causes of an abnormal blood pressure, and which diagnostic investigations are appropriate. Institutes clinical management therapies.	Formulates diagnosis**,** evaluates effectiveness of treatment, refines treatment plan if necessary and recognises when referral to Critical Care is indicated	

Competency Group	*Non-Clinical Staff*	*"Recorder"*	*"Recogniser"*	*"Primary Responder"*	*"Secondary Responder"*	*Critical Care*
Arterial catheter		Recognises arterial catheter as distinct from venous catheter.	Understands principles of invasive arterial pressure measurement and has knowledge of technique for insertion, use and removal of catheter.	Samples from catheter under supervision.	Inserts arterial catheter, manages independently, displays and interprets arterial pressure waveform.	
Assessment of cardiac output		Has knowledge of how to assess adequacy of cardiac output clinically using colour of skin, capillary refill, temperature of skin, presence of sweating and level of consciousness. Alerts senior staff if assessment indicates inadequate cardiac output.	Interprets assessment in the context of the patient and responds in accord with local protocols.	Identifies low cardiac output and institutes diagnostic investigations and a clinical management plan.	Formulates diagnosis**,** evaluates effectiveness of treatment, refines treatment plan if necessary and recognises when referral to Critical Care is indicated.	

Competency Group	***Non-Clinical Staff***	***"Recorder"***	***"Recogniser"***	***"Primary Responder"***	***"Secondary Responder"***	***Critical Care***
Fluid status and balance assessment		Records input and output.	Interprets fluid balance status.	Identifies when clinical intervention is required and institutes diagnostic investigations and a clinical management plan.	Formulates diagnosis and evaluates effectiveness of treatment, refines treatment plan if necessary and recognises when referral to Critical Care is indicated.	
Urinary catheter		Collects and prepares equipment.	Inserts catheter.	Same as "Recogniser".	Same as "Recogniser".	
Nasogastric tube		Recognises tube, can record input and output.	Inserts tube in awake, uncomplicated patient and understands local protocol for checking position. Can use for drainage, drug administration and enteral feed administration.	Same as "Recogniser".	Inserts tube in unconscious non-intubated patients.	

Competency Group	***Non-Clinical Staff***	***"Recorder"***	***"Recogniser"***	***"Primary Responder"***	***"Secondary Responder"***	***Critical Care***
Peripheral Venous Cannula		Recognises peripheral cannula.	Assesses potential sites for peripheral IV access and inserts cannula in "simple" cases.	Inserts IV cannula in "difficult" cases.	Same as primary responder.	
Intravenous fluid maintenance and resuscitation	Recognises infusion equipment (eg in relation to patient transport).	Retrieves correct IV fluid, volume and infusion device.	Administers fluid as prescribed and in accord with local protocols.	Identifies need for, and initiates fluid challenge for resuscitation and institutes clinical management plan. Prescribes maintenance fluids.	Evaluates effectiveness of treatment, and refines treatment plan if required**.** Recognises when invasive monitoring is required and referral to Critical Care is indicated.	
IV infusions (giving sets and pumps)	Recognises presence of IVI and safely transfer patients with IVI's.	Assists patient to manoeuvre with IVI running. Calculate and record hourly fluid input. Has knowledge of how to use device.	Prepares infusion device for use and administers fluids and drugs as prescribed.	Prescribes intravenous fluids and drugs.	Administers larger range of drugs and infusions.	

Competency Group	***Non-Clinical Staff***	***"Recorder"***	***"Recogniser"***	***"Primary Responder"***	***"Secondary Responder"***	***Critical Care***
Hypodermic needles and syringes	Recognises and understands safety issues.	Has knowledge of safe practice for use and disposal of hypodermic needles and syringes.	Same as "recogniser".	Same as "recogniser".	Same as "recogniser".	
Care of peripheral venous access	Recognises presence of IV access.	Undertakes and records observation of IVI in situ in accordance with local protocol.	Identifies extravastated IVI and infected IV site. Removes infected IV cannula.	Identifies need for replacement.	Same as" primary" responder.	
Alternatives to peripheral venous access		Recognition of a Central Venous Catheter.	Has knowledge of when central venous access may be required and can assist in preparing equipment.	Performs central venous access under supervision.	Inserts central venous catheter in accord with NICE guideline and local protocol. Competent in the use of Ultrasound and Landmark techniques.	

Competency Group	***Non-Clinical Staff***	***"Recorder"***	***"Recogniser"***	***"Primary Responder"***	***"Secondary Responder"***	***Critical Care***
Central venous catheter		Recognises a Central Venous Catheter.	Has knowledge of when Central Venous Access may be required, understands risk/benefit associated with Central Venous Catheter and uses catheter including the administration of drugs.	Performs Central Venous Access under supervision.	Inserts central venous catheter in accord with NICE guideline and local protocol. Competent in the use of Ultrasound and Landmark techniques.	
Ultrasound machine	Identifies and transports equipment to the patient.	Recognises machine.	Has Knowledge of common indications for use.	Uses ultrasound under supervision for insertion of central venous catheter.	Uses ultrasound independently for insertion of central venous catheter.	
External haemorrhage	Recognises overt blood loss.	Same as "Non-Clinical Staff".	Assesses severity of overt blood loss and interprets loss in the context of the patient. Initiates first aid management eg compression, dressing.	Identifies source of bleeding, clinical impact and initiates definitive management. Commences resuscitation.	Evaluates effectiveness of resuscitation**,** management of haemostasis and appropriate use of blood products. Refines treatment plan if necessary and recognises when referral to specialist services and/or Critical Care is indicated.	

Competency Group	***Non-Clinical Staff***	***"Recorder"***	***"Recogniser"***	***"Primary Responder"***	***"Secondary Responder"***	***Critical Care***
Administration of blood products including warming	Collects blood products according to local protocols.	Documents administration of Blood Products.	Administers products including the use of a blood warmer. Ensures adherence to traceability protocol.	Has knowledge of indications for, and risks associated with, blood products. Prescribes blood products.	Same as "primary" responder.	
Blood sampling equipment	Transports samples according to local protocols.	Same as "Non-Clinical Staff".	Has knowledge of which tests are required in an emergency, can perform venesection.	Has knowledge of which tests are required in both elective and emergency situations. Can request test/s, performs venesection.	Same as "primary" responder.	
Collapsed/unresponsive patient	In hospital resuscitation according to local policy.	Same as "Non-Clinical Staff".	Same as "Non-Clinical Staff".	Identifies potential causes relevant to the individual patient.	Advanced life support with a broad approach to finding information and treatment of specific causes of collapse.	
External chest compressions	Recognises when cardio-pulmonary resuscitation is in progress.	In hospital resuscitation.	In hospital resuscitation.	In hospital resuscitation.	Advanced life support.	
Cardiac arrest rhythms (VF, pulseless VT, PEA and asystole)	Recognises when cardio-pulmonary resuscitation is in progress.	In hospital resuscitation.	In hospital resuscitation.	In hospital resuscitation.	Advanced life support.	

Emergency drugs		Recognises situations when emergency drugs are used.	Selects drug when instructed.	Understands rationale for therapeutic intervention and can administer drugs according to in hospital resuscitation standard.	Advanced life support.	
Automated external defibrillator	Recognises equipment and +/- in hospital resuscitation according to local policy.	In hospital resuscitation.	In hospital resuscitation.	In hospital resuscitation.	Advanced life support.	
Non-automated external defibrillation	Recognises equipment.	In hospital resuscitation.	In hospital resuscitation.	In hospital resuscitation.	Advanced life support.	

Competency Group	***Non-Clinical Staff***	***"Recorder"***	***"Recogniser"***	***"Primary Responder"***	***"Secondary Responder"***	***Critical Care***
Description of group role	Calls for help	Records and interprets within T&T protocol	Recognizes and interprets observations in the context of the patient	Delivers a primary response and intervention	Delivers a secondary response and intervention	Delivers a tertiary response and intervention
NICE Response Level		**Low Risk**	**Low Risk**	**Low Risk**	**Medium Risk**	**High Risk**
Patient handling equipment + beds	Recognizes equipment.	Uses in accord with local protocols.	Identifies need for specialist bed and handling requirements.	Same as "recognizer".	Same as "recognizer".	**Refer to critical care competencies as defined by the CoBaTrICE framework and mirrored in the Intercollegiate Board's training framework for Intensive Care Medicine in the United Kingdom**
Portable suction	Can identify equipment and seeks advice if unclear, transports equipment to the ward.	Uses in accord with local protocols.	Uses equipment and adjuncts (e.g. yakeur sucker and suction catheters).	Same as "recognizer".	Same as "recognizer".	
Portable monitoring		Identifies and transports equipment to the patient.	Assists in setting up of the equipment.	Uses portable monitoring equipment to measure heart rate, oxygen saturation, respiratory rate and blood pressure.	Same as "primary responder".	

Competency Group	***Non-Clinical Staff***	***"Recorder"***	***"Recogniser"***	***"Primary Responder"***	***"Secondary Responder"***	***Critical Care***
Description of group role	Calls for help	Records and interprets within T&T protocol	Recognizes and interprets observations in the context of the patient	Delivers a primary response and intervention	Delivers a secondary response and intervention	Delivers a tertiary response and intervention
NICE Response Level		**Low Risk**	**Low Risk**	**Low Risk**	**Medium Risk**	**High Risk**
Unconsciousness	Calls for help.	Recognizes the danger of airway obstruction and takes remedial action.	Has knowledge of common causes of unconscious state, eliminates these, provides in hospital resuscitation, and institutes local protocol for assistance.	Identifies the cause of reduced consciousness and institutes clinical management therapies.	Evaluates diagnosis and effectiveness of treatment, refines treatment plan if necessary and recognizes when referral to Critical Care is indicated.	Refer to critical care competencies as defined by the CoBaTrICE framework and mirrored in the Intercollegiate Board's training framework for Intensive Care Medicine in the United Kingdom
Blood Glucose measurement and interpretation	Identifies equipment and seeks advice if unclear, transports equipment to the patient or the ward.	Supervises patient to undertake own blood glucose measurement.	Performs blood glucose measurement. Has knowledge to interpret blood glucose value in context of the patient. Initiates local protocol for hypoglycaemia.	Identifies when clinical intervention is required and institutes clinical management therapies including the prescription of insulin or intravenous bolus of 50% glucose if the patient is hypoglycemic.	Evaluates effectiveness of treatment, refines treatment plan if necessary and recognizes when referral to Critical Care is indicated	

Competency Group	*Non-Clinical Staff*	*"Recorder"*	*"Recogniser"*	*"Primary Responder"*	*"Secondary Responder"*	*Critical Care*
Acute confusional states		Recognizes that confusion may be marker of illness.	Understands importance of these signs as markers of pathology, performs additional tests such as capillary blood glucose, checks for hypoxia.	Identifies when clinical intervention is required. Initiates diagnostic tests and institutes clinical management therapies.	Evaluates effectiveness of treatment, refines treatment plan if necessary and recognizes when referral to Critical Care is indicated.	
Acute sudden onset headache		Recognizes severe sudden onset headache as a problem.	Understands that severe sudden headache, temperature and stiff neck needs further urgent intervention.	Identifies when clinical intervention is required. Initiates diagnostic tests and institutes clinical management therapies.	Differentiates meningitis/encephalitis from other causes of severe sudden onset headache such as subarachnoid hemorrhage. Institutes appropriate interventions and investigations including lumbar puncture if appropriate. Refers for specialist neurological advice.	
Altered motor / sensory function		Recognizes new weakness as abnormal.	Interprets clinical signs in context of the patient and responds in accord with local protocol.	Identifies when clinical intervention is required. Initiates diagnostic tests and institutes clinical management therapies.	Reviews diagnosis**,** evaluates effectiveness of treatment, refines treatment plan if necessary and recognizes when referral to Critical Care or specialist neurology is indicated.	

Competency Group	*Non-Clinical Staff*	*"Recorder"*	*"Recogniser"*	*"Primary Responder"*	*"Secondary Responder"*	*Critical Care*
Swallowing difficulties		Understands clinical implications of oral intake.	Interprets clinical signs in context of the patient and responds in accord with local protocol.	Identifies when clinical intervention is required. Initiates diagnostic tests and institutes clinical management therapies.	Reviews diagnosis**,** evaluates effectiveness of treatment, refines treatment plan if necessary and recognizes when referral to Critical Care, Speech and Language Therapist or specialist neurology is indicated.	
Seizures		Recognizes and records seizures. Understands basic practical procedures that need to be done to maintain the safety of the patient e.g. posture, airway.	Confirms seizure activity, initiates airway protection, oxygen and positioning and responds further in accord with local protocol.	Has knowledge of the causes of seizures, eliminates hypoglycaemia and hypoxia as causes and responds in accord with local protocol.	Reviews diagnosis**,** evaluates effectiveness of treatment, refines treatment plan if necessary and recognizes when referral to Critical Care or specialist neurology is indicated.	
AVPU Scale (Awake and responsive, Responds to verbal commands, Responds to painful stimuli, Unresponsive)		Measures, records, assigns trigger score and has knowledge of what constitutes an abnormal value.	Interprets trigger in context of patient and understands clinical importance of an abnormal score. Responds in accordance with local escalation protocols.	Has knowledge of the diagnostic and clinical therapies that are indicated in the context of an abnormal score. Refers to "secondary responder".	Initiates definitive diagnostic and clinical treatment strategies and recognizes when referral to Critical Care or specialist neurology is indicated.	

Competency Group	*Non-Clinical Staff*	*"Recorder"*	*"Recogniser"*	*"Primary Responder"*	*"Secondary Responder"*	*Critical Care*
Assessment of pupillary size and light reflex		Measures size of pupils, assesses light reflex and has knowledge of what constitutes an abnormal reaction and pupil size.	Interprets pupillary size and response to light in context of patient Understands clinical significance of either abnormal pupil size or response to light reflex. Responds in accordance with local escalation protocols.	Has knowledge of the diagnostic and clinical therapies that are indicated in the context of an abnormal pupil size or light reflex. Refers to "secondary responder".	Initiates definitive diagnostic and clinical treatment strategies and recognizes when referral to Critical Care or specialist neurology is indicated.	
Glasgow Coma Score		Measures, and records score and has knowledge of what constitutes an abnormal value.	Interprets score in context of patient and understands clinical importance of an abnormal score. Responds in accordance with local escalation protocols.	Has knowledge of the diagnostic and clinical therapies that are indicated in the context of an abnormal score. Refers to "secondary responder".	Initiates definitive diagnostic and clinical treatment strategies and recognizes when referral to Critical Care or specialist neurology is indicated.	
Cervical spine protection	Recognizes not to move patient after major trauma unless instructed by clinical staff.	Maintains spinal immobilization once initiated.	Assesses risk for spinal immobilization. Initiate spinal immobilization procedures.	Identifies the indications for requesting imaging and when to request senior assistance.	Interprets cervical spine radiograph and recognizes when referral for specialist advice required.	
Computerised Tomography (CT) Scan of Head			Recognizes that CT scan may be needed.	Identifies indications and priorities for requesting imaging.	"Simple" interpretation of CT scan and recognizes when referral for specialist advice required.	
Lumbar Puncture	Transports samples according to local protocols.	Assists with patient positioning.	Prepares equipment and labels samples.	Performs lumbar puncture under supervision.	Independently performs lumbar puncture.	

Competency Group	***Non-Clinical Staff***	***"Recorder"***	***"Recogniser"***	***"Primary Responder"***	***"Secondary Responder"***	***Critical Care***
Recovery Position	Places patient in recovery position.	Same as "Non-Clinical Staff".	Same as "Non-Clinical Staff".	Same as "Non-Clinical Staff".	Same as "Non-Clinical Staff".	

Competency Group	***Non-Clinical Staff***	***"Recorder"***	***"Recogniser"***	***"Primary Responder"***	***"Secondary Responder"***	***Critical Care***
Description of group role	Calls for help	Records and interprets within T&T protocol	Recognizes and interprets observations in the context of the patient	Delivers a primary response and intervention	Delivers a secondary response and intervention	Delivers a tertiary response and intervention
NICE Response Level		**Low Risk**	**Low Risk**	**Low Risk**	**Medium Risk**	**High Risk**
Call for help: patient sick, or cause for concern	Communicates need for help in accord with local policy.	Same as "Non-Clinical Staff".	Interprets and documents patient condition, adjusts frequency of observations and level of monitoring in accord with local protocol.	Identifies when clinical intervention is required. Initiates diagnostic tests and institutes clinical management therapies.	Formulates diagnosis**,** evaluates effectiveness of treatment, refines treatment plan if necessary and recognizes when referral to Critical Care is indicated.	Refer to critical care competencies as defined by the CoBaTrICE framework and mirrored in the Intercollegiate Board's training framework for Intensive Care Medicine in the United Kingdom
Call for help: arrested or unconscious patient	Communicates need for help in accord with local policy.	Initiates in hospital resuscitation. Dials 2222.	Performs resuscitation to "in hospital" standard..	Recognition of potential causes pertinent to the individual patient.	Advanced life support with a broad approach to finding information and treatment of specific causes of unconsciousness or cardiac arrest.	

Competency Group	*Non-Clinical Staff*	*"Recorder"*	*"Recogniser"*	*"Primary Responder"*	*"Secondary Responder"*	*Critical Care*
Patient not improving		If aware or informed by patient that they are not improving, calls for help in accord with local policy and records communication pathway.	Interprets clinical deterioration in the context of the patient, adjusts frequency of observations and level of monitoring and initiates management strategies in accord with local protocols.	Identifies when clinical intervention is required. Initiates diagnostic tests and institutes clinical management therapies.	Formulates diagnosis**,** evaluates effectiveness of treatment, refines treatment plan if necessary and recognizes when referral to Critical Care is indicated.	
Need for management plan		Communicates to appropriate staff.	Recognizes lack of plan.	Documents plan request and / or formulates management plan.	Reviews management plan and refines if necessary.	
Breaking bad news		Supports patients and/or those close to them.	Identifies need to inform primary responder. Contacts friends or relatives, if time, to be with receiver of bad news.	Informs senior clinician and may deliver bad news. Documents discussion. Liaises with carers.	Breaks bad news and documents discussion in the notes.	

Competency Group	***Non-Clinical Staff***	***"Recorder"***	***"Recogniser"***	***"Primary Responder"***	***"Secondary Responder"***	***Critical Care***
End of shift handover		Undertakes handover to next shift. Receives information. Documents and communicates appropriately to other members of the multi -disciplinary team.	Communicates frequency of observations and ongoing management plans for all patients who have reached the low, medium or high trigger and also for those where there is clinical concern.	Same as "recognizer".	Evaluates clinical progress in conjunction with the ongoing management plans for all patients who have reached medium or high trigger and also for those where there is clinical concern. Communicates to next shift.	
Documentation		Produces clear, legible documentation of the event. E.g. Note of event, date, time, which is signed, name printed and contact bleep number given.	Writes a structured note of the event including a referral plan.	Incorporates within the documentation a management plan and timescale for reassessment. Identifies when referral to the secondary responder will be indicated.	Incorporates situations when referral to critical care is appropriate and timescale for reassessment after secondary intervention.	
Team working						

Competency Group	***Non-Clinical Staff***	***"Recorder"***	***"Recogniser"***	***"Primary Responder"***	***"Secondary Responder"***	***Critical Care***
a) Provides information in a structured format that conveys clinical urgency	Professional and respectful in approach. Actively listens. Gives clear information.	Communicates with patient/carers. Documents discussion in notes. Informs senior staff.	Gives clear instructions and communicates with senior staff when appropriate. Feedback given to junior members of the team.	Recognizes when secondary responder needs to be informed .	Evaluates effectiveness of communication. Recognizes when referral to Critical Care is indicated.	
b) Participation in whole team review and reassessment		Participates in review ,documents actions and communicates to senior staff.	Communicates to primary responder after review. Feedback given to junior members of the team.	Examines patient, gives clear instructions and communicates with secondary responder.	Leads the team, including giving feedback to all members of the team.	
c) Personal Responsibility and Accountability		Is aware of accountability.	Complies with code of professional conduct, complies with local policies.	Recognizes leadership role within the team and responsibility to refer to secondary responder.	Acknowledges overall responsibility for the care of a patient.	

Competency Group	***Non-Clinical Staff***	***"Recorder"***	***"Recogniser"***	***"Primary Responder"***	***"Secondary Responder"***	***Critical Care***
d) Decision Making		Is aware of policies, complies with policies.	Interprets observations, adjusts frequency of observations and level of monitoring, provides nursing intervention and communicates with primary responder when escalation of care is required. Feedback given to junior members of the team. Recognizes own limitations.	Identifies when clinical intervention is required. Initiates treatment ,monitors patient response, recognizes limitations. Communicates with secondary responder when further escalation or de-escalation of care is indicated.	Formulates diagnosis if not already done. Evaluates effectiveness of management plan, refines where appropriate and communicates with critical care when further escalation of care is needed. Recognizes when de-escalation of care is appropriate and the patient requires palliative care in-put. Communicates decisions with team.	
e) Leadership			Adopts leader or follower role as appropriate.	Same as "recognizer"	Reviews team working, develop local teams, identify and work to resolve problems.	

Competency Group	***Non-Clinical Staff***	***"Recorder"***	***"Recogniser"***	***"Primary Responder"***	***"Secondary Responder"***	***Critical Care***
Ethics/ medico-legal		Has an awareness of concepts. Acknowledges limitations.	Works within established hospital procedures. Acknowledges limitations.	Same as "recognizer"	Works independently, can review and agree plan. Seeks advice or second opinion as needed.	
Patient Safety:						
a) Electrical Safety	Recognizes basic electrical safety and associated clinical risk. Communicates concerns to ward staff and instigates appropriate action to avoid patient harm.	Recognizes and documents clinical risk associated with the equipment on which training has been given**.** Communicates risk to senior staff and initiates appropriate action.	Assesses, quantifies and documents risk in the workplace. Initiates appropriate action to minimize clinical risk and communicates risk to primary responder.	Quantifies individual risk, acts to prevent or minimize it.	Manages risk-benefit across groups of patients e.g. triage.	

Competency Group	***Non-Clinical Staff***	***"Recorder"***	***"Recogniser"***	***"Primary Responder"***	***"Secondary Responder"***	***Critical Care***
b) Moving and Handling	Recognizes clinical risk associated with moving and handling. Communicates concerns to ward staff and instigates appropriate action to avoid patient and personal harm.	Recognizes and documents clinical risk associated with the equipment for moving and handling on which training has been given**.** Communicates risk to senior staff and initiates appropriate action.	Assesses, quantifies and documents risk in the workplace. Initiates appropriate action to minimize clinical risk and communicates risk to primary responder.	Quantifies individual risk, acts to prevent or minimize it.	Manages risk-benefit across groups of patients e.g. triage.	
c) Falls	Recognizes clinical risk associated with falls. Communicates concerns to ward staff and instigates appropriate action to avoid harm.	Recognizes and documents clinical risk associated with falls**.** Communicates risk to senior staff and initiates appropriate action.	Assesses, quantifies and documents risk in the workplace. Initiates appropriate action to minimize clinical risk and communicates risk to primary responder.	Quantifies individual risk, acts to prevent or minimize it.	Manages risk-benefit across groups of patients e.g. triage.	
d) Applies infection control policies to minimize risk of Hospital Acquired Infections	Adheres to Trust's infection control policy.	Documents infection-related hazards and communicates such hazards to all staff.	Provides leadership on the ward for Hospital Acquired infections (HAI).	As per "Recogniser".	Implements measures in collaboration with infection control staff.	

Competency Group	*Non-Clinical Staff*	*"Recorder"*	*"Recogniser"*	*"Primary Responder"*	*"Secondary Responder"*	*Critical Care*
Blood culture	Can transport samples according to local protocols.	Identifies and transports equipment to the patient.	Recognizes when a blood culture is appropriate and identifies equipment required and procedure to undertake the intervention.	Performs blood cultures according to local aseptic policy.	As per "Primary Responder".	
Microbiology samples	Transports samples according to local protocols.	Performs microbiological sampling under supervision	Independently performs microbiological sampling as requested.	Has knowledge of which microbiological samples are required.	Same as "primary "responder.	
Measurement of Temperature		Measures temperature, records result and has knowledge of what constitutes an abnormal value.	Interprets trigger in context of patient and responds in accord with local protocols.	Identifies abnormal temperature and recognizes when clinical intervention is required. Institutes clinical management therapies.	Formulates diagnosis**,** evaluates effectiveness of treatment, refines treatment plan if necessary and recognizes when referral to Critical Care is indicated.	

Competency Group	***Non-Clinical Staff***	***"Recorder"***	***"Recogniser"***	***"Primary Responder"***	***"Secondary Responder"***	***Critical Care***
End of Life Care	Respects patient's dignity and privacy.	Ensures clear documentation of events.	Facilitates expression of a patient's and their family wishes. Provides holistic care.	Determines a patient and their family wishes. Communicates end of life wishes to all staff.	Institutes appropriate end of life care to comply with the patient's wishes and regularly reviews decisions and plan. Recognizes when to refer for palliative care.	

Appendix 7

Embedding the competences in practice

Reproduced from Competencies for Recognising and Responding to Acutely Ill Patients in Hospital, 2008.[18]

Leadership

There is Board level sponsor for implementation of the competences.

Responsibility for implementation is clearly allocated with accountability mechanisms in place.

FT Governors are informed, involved and reports are presented.

Capability gaps are monitored, reported and fed into strategic workforce force development plans and funding priorities.

Directors secure time and resources for learning needs analysis and training is provided.

People

There is designated clinical and educational lead for implementation.

People to train, supervise and assess competence are available.

People are clear about their individual and collective responsibilities and levels of authority for action.

People have the designated authority to demonstrate the competences at each level.

Policy and strategy

An implementation plan has been developed with stakeholders.

KSF profiles are reviewed and mapped across to the competencies.

Escalation and other policies are reviewed to ensure coherence with the competency sets.

Partnerships and resources

Partnerships with external education provider ensure competences are mapped to current and future provision.

Any new educational materials are commissioned.

Partnerships are in place with the PCT to monitor impact.

Technical resources are provided.

Enablers

Processes

There is a clear implementation process with measurable goal and progress is monitored and evaluated.

The NICE Guidelines and Competences are launched effectively to staff and readily accessible to staff.

A learning needs analysis drives training provision.

There is a high quality relevant and targeted education training and development at the start addressing technical, personal and team (whole team events) with learning materials or opportunities to support ongoing updating and development induction onwards for all identified staff.

Competence is monitored and developed through performance management.

Clinical/patient results

The introduction and use of the competences have a measurable impact on patient outcomes.

Organisational results

Practices adhere to NICE guidelines at all times.

Governance data shows continuous improving.

People results

Staff work within NICE Guidelines and express confidence in this area through staff surveys.

There is a measurable impact on staff performance.

Staff understand their contribution demonstrate the competence consistently in all settings at the right standard and level.

Results

Appendix 8

Educational initiatives to aid the management of the acutely ill

Reproduced from Competencies for Recognising and Responding to Acutely Ill Patients in Hospital, 2008.[17]

Many educational initiatives are available that address shortcomings that have been identified in some areas in the delivery of acute care. This document does not endorse or promote any particular one of these initiatives, but supports all efforts to educate staff to improve the care of acutely ill patients. Three main types of resources are available.

- National one/two day courses developed and peer reviewed by the medical and nursing professions.
- **Clinical simulation centres**
  Local educational initiatives including university degree courses, e-learning programmes and clinical skills facilities.

These resources promote best practice and all clinical staff should be encouraged to enhance their skills by one or more of these methods.

National professional courses

These differ in complexity and emphasis (see Table below). The primary focus of all is to prevent or manage cardiac arrests, reduce intensive care unit (ICU) admissions and in-hospital deaths by early intervention and treatment. The table is followed by a brief explanation of what each course offers. Those courses outlined in blue are intended for all hospital staff (including non-clinical staff), those in green are intended largely for recorders, recognisers and first responders and those in yellow for secondary responders.

Themes	Airway Breathing Circulation ethos	Cardiac arrest procedures	Neurological assessment	Multi disciplinary	Team working and leadership	Advanced medical management	Advanced surgical management
BLS	✗			✗			
ALERT	✗		✗	✗	✗		
AIM	✗		✗	✗	✗		
ILS	✗	✗		✗			
ALS	✗	✗		✗	✗		
IMPACT	✗		✗	✗	✗	✗	
CCrISP	✗		✗	Doctors only	✗		✗
MedicALS	✗		✗	Doctors only		✗	

BLS (Basic Life Support) can be taught locally within trusts and is mandatory for all hospital employees. Algorithms are endorsed by the Resuscitation Council UK (www.resusc.org.uk).

ALERT (Acute Life–threatening Events — Recognition and Treatment) is a one-day multi-professional course, using a structured and prioritised system of patient assessment and management to assist treating the acutely unwell (www.alert-course.com).

AIM (Acute Illness Management) is a one-day inter-professional course standardising the clinical approach to recognition, assessment and management of acutely ill adult patients (www.gmskillsinstitute.nhs.uk).

ILS (Immediate Life Support) is a one-day course. It develops skills in cardiopulmonary resuscitation, simple airway management and safe defibrillation. It is designed for first responders, who on arrival of a cardiac arrest team, may also participate as members of that team. ILS is administered by the Resuscitation Council UK (www.resusc.org.uk).

ALS (Advanced Life Support) is a two-day course. It develops skills in effective management of peri-arrest situations and cardiorespiratory arrest. It prepares senior members of a multidisciplinary team to treat the patient until transfer to a critical care area is possible. ALS courses are administered by the Resuscitation Council UK (www.resusc.org.uk) and the Advanced Life Support Group (www.alsg.org).

IMPACT (Ill Medical Patients Acute Care and Treatment) is a two-day inter-professional course designed to teach advanced principles and practice of acute general medical care to doctors at ST1/2 level and senior nurse practitioners. It is sponsored by the Federation of Royal Medical Colleges and the Royal College of Anaesthetists (www.impactmedical.org).

CCrISP (Care of the Critically Ill Surgical Patient) is a two-and-a-half day course designed to advance the practical, theoretical and personal skills necessary for the care of critically ill surgical patients. It is sponsored by the Royal College of Surgeons of England and is aimed at surgeons and those dealing with surgical patients who are in specialist training (www.rcseng.ac.uk/education/courses).

MedicALS (Medical Advanced Life Support) is a three-day advanced course teaching the management of medical emergencies. It is administered by the Advanced Life Support Group (ALSG) (www.alsg.org).

In addition to these professional courses there are a number of clinical simulation centres throughout the UK where advanced medical scenarios have been or are being developed. These allow real time complex physiological interactions to be simulated in a controlled environment with advanced mannequins and equipment. Individual simulation centres can be contacted about the acute care packages they may offer or develop.

Local educational initiatives including university degree courses, learning programmes and clinical skills facilities an MCC course based in Leeds and available to trainee obstetricians and qualified midwives. A blended-learning video podcast course, plus simulator training day (runs online over a six week window). Available in three formats: the generic course on http://web.me.com/geoffcross/YMTP-2010/Introduction.html, via the Yorkshire Modular Postgraduate Training scheme on www.yorksandhumberdeanery.nhs.uk/obsgynae/ymtp/teachings/year1obshdu.aspx and a certificate course via Leeds University school of Healthcare at: www.healthcare.leeds.ac.uk/study/PG/midwifery/.

SCOTTIE (Scottish Core Teaching and Training in Emergencies) has been developed to provide a standardised training course in managing emergencies for all healthcare professionals who participate in the care of pregnant women. The course has been designed to cover the fundamental aspects of maternal emergencies and is suitable for all maternity-care professionals working in all care environments in Scotland (www.scottishmaternity.org/Courses/Introduction%20to%20The%20Courses/obstetric_emergencies.html).

REACTS (Recognition, Evaluation, Assessment, Critical Treatment and Stabilisation) has been developed to provide a standardised training course in recognising and managing the critically ill obstetric patient for the many healthcare professionals who participate in the care of pregnant women. The course has been designed to cover the fundamental aspects of caring for critically ill women and is suitable for most maternity care professionals working in Scotland.

The Scottish Maternity REACTS course is one of the skills-based courses developed and rolled out by the SMMD Programme in support of maternity-care professionals across Scotland (www.scottishmaternity.org/Courses/Introduction%20to%20The%20Courses/scottish-maternity-reacts-course.htm).

Appendix 9

Suggested Core Curriculum, Maternal Critical Care

Normal physiology of pregnancy

Respiratory system

Anatomy and physiology of airway and respiratory function
Respiratory failure
Optimising airway and respiratory function
ABG and oxygen therapy
High flow oxygen therapy and CPAP
CXR interpretation

Cardiovascular system

Anatomy and physiology of heart and conductive system:
12 Lead ECG interpretation:
Cardiac disease in pregnancy

Other systems

Hypertensive disease in pregnancy
Hepato renal disease in pregnancy
Diabetes in pregnancy
Obesity in pregnancy
Neurological disease or altered conscious level in pregnancy
Coagulation and blood products within the High dependency setting

General critical care topics

Transfer of critically ill woman
Shock and sepsis:
MEWS in obstetrics and the outreach team
Infections in pregnancy: HIV and swine flu
Infection control

Others

Sudden collapse in pregnancy
Complications of anaesthesia and pain relief in labour and pregnancy
Fluid balance in critical care (including massive haemorrhage)
Advanced resuscitation in pregnancy including the five minute CS rule
Audit and documentation
Competency-based training
Psychological care after critical illness

BOX 2.6 DISCHARGE SHEET

for all patients being transferred from Recovery or
Maternity High Dependency Unit to Ante Natal / Post Natal Wards

NHS NORTHWICK PARK HOSPITAL

ALL BOXES MUST BE TICKED BEFORE A PATIENT IS DISCHARGED

	CHECKS TO BE DONE	TICK ☑
1	**A - Airway: the patient can maintain their airway.**	☐
2	**B - Breathing: respiratory rate and oxygen saturations are within normal limits and have been documented.**	☐
3	**C - HR & BP normal and have been stable for last four hours and have been documented.**	☐
4	**The patient is alert and orientated.**	☐
5	**The uterus is well contracted and the lochia is normal.**	☐
6	**Drainage from surgical drains is acceptable.**	☐
7	**The wound is clean and dry.**	☐
8	**The patient is comfortable.** (Pain score is less than 3/10*)	☐
9	**Patient has received treatment for post-operative nausea & vomiting.**	☐
10	**The patient is apyrexial.**	☐
11	**Intensive / invasive monitoring is no longer required and 4 hourly recording of vital signs is considered appropriate.**	☐
12	**Anti-embolic stocking worn as per guidelines for thromboprophylaxis.**	☐
13	**Drug chart has been reviewed by doctor and is accurate.** (with particular reference to DVT prophylaxis, if required, and antibiotics)	☐
14	**Bed has been booked on the postnatal wards.**	☐
15	**An on-going plan of care has been clearly written by the obstetrician.**	☐
16	**There has been a verbal hand over to the receiving ward - midwife to midwife.**	☐

Midwife's Name:

Signature:

Date:

** >90% women to have a worst pain score of < 3 on a VAS of 0-10. (Raising the Standard: A compendium of audit recipes, Second edition 2006)

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