



Acute care toolkit 15

Managing acute medical problems in pregnancy Nov 2019

Over two-thirds of all maternal deaths in the UK are due to non-obstetric, medical problems in pregnancy and postpartum. This may be linked with increasing maternal age and obesity. This toolkit provides practical guidance on managing women with acute medical problems in pregnancy for hospital physicians and others who may be unfamiliar with the normal physiology of pregnancy and/or diseases that present in pregnancy.

Who should
read this
toolkit?

This toolkit is intended to be used widely, including by front-line NHS healthcare professionals and those involved in local and national planning and policy.

Summary of key recommendations/standards

- > Named clinical lead from acute medicine to liaise with obstetrics
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- > Contact details for emergency obstetrics on-call or midwife readily available to staff on the acute medical unit (AMU)
- > All clinical staff receive ongoing education and training in the management of acute medical problems in pregnancy and the postpartum period (including use of MEOWS*)
- > Escalation measures in place for the acute deterioration of a pregnant woman
- > Local inpatient shared care pathways/services in place for pregnant women presenting with acute medical problems, including where they should be cared for
- > Local clinical guidelines available for staff looking after pregnant women presenting with acute medical problems
- > Joint inpatient medical and obstetric care for women with complex medical problems (such as inflammatory bowel disease, connective tissue diseases, cardiac disease) and acute medical problems where a decision may need to be taken regarding timing of delivery

* MEOWS is a scoring system specifically for pregnant women, similar to the NEWS2 score. Please refer to your local maternity-specific MEOWS chart; there is no nationally standardised chart for maternity.

Background

Pregnant women can present to any acute hospital service at any time during their pregnancy or the postpartum period, which is up to 12 months post-delivery. Women may present with acute medical problems that need to be managed differently because of pregnancy, or may present with obstetric syndromes. Women aged over 40 years, those of a black ethnic background and those who have had *in vitro* fertilisation (IVF) resulting in the current pregnancy have a higher risk of morbidity and mortality.

Deaths occurring between 42 days and 1 year after the end of pregnancy are called late maternal deaths. Most of the women who die up to a year after pregnancy have had longstanding and multiple health conditions and lead socially complex lives. MBRRACE (Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries) undertakes a confidential enquiry into every maternal death in the UK and Ireland; the most common medical causes of maternal death are cardiac disease, venous thromboembolism (VTE), neurological and psychiatric disorders. Suicide is a significant cause of postpartum mortality.¹

Safe practice

- > All clinicians looking after pregnant women should make an entry in the woman's handheld notes, which may also be digital and found on an app on the mobile phone.
- > Early involvement of experienced decision makers should take place if red flags are present.
- > Women of childbearing age seen by acute medical services should be given the opportunity to discuss any pre-existing medical condition and how it could affect or be affected by a pregnancy.

‘Challenges arise in managing two lives – the mother and the baby – often leading to a state of clinical inertia.’

Clinical management

All women of childbearing potential presenting with acute medical conditions should have a pregnancy test.

Physiology of pregnancy

Observations and laboratory measures have different ranges in pregnancy. Physiological monitoring of women who are pregnant and require acute assessment should use the Modified Early Obstetric Warning Signs (MEOWS) scoring

and not the National Early Warning Score (NEWS2), which has not been validated in pregnancy. There is no nationally standardised MEOWS chart; therefore, all women should have their observations recorded on the locally agreed MEOWS chart.

Table 1. Physiological changes and normal findings in pregnancy

Indicator	What's normal in pregnancy?
Heart rate	An increase of 10–20 beats per minute, particularly in third trimester
Blood pressure	Can decrease by 10–15 mmHg by 20 weeks, but returns to pre-pregnancy levels by term
Respiratory rate (RR)	Unaltered in pregnancy If RR >20 breaths per minute, consider a pathological cause
Oxygen saturation	Unchanged throughout pregnancy
Temperature	Unchanged throughout pregnancy
Full blood count	Ranges altered in pregnancy: Hb (105–140 g/L) WBC (6–16 x10 ⁹ /L)
Renal function	Increased glomerular filtration rate Creatinine falls in first and second trimesters Normal urea reference range 2.5–4.0 mmol/L Normal creatinine <77 µmol/L
Liver tests	Raised alkaline phosphatase up to three- to fourfold of pre-pregnancy level is normal during pregnancy
Troponin	Not elevated during normal pregnancy May be elevated in pre-eclampsia, pulmonary embolism, myocarditis, arrhythmias and sepsis

Table 1. Physiological changes and normal findings in pregnancy (continued)

Indicator	What's normal in pregnancy?
D-dimer	Not recommended for use in pregnancy
Creatinine kinase	Normal range 5–40 IU/L, ie lower in pregnancy
Cholesterol	Up to five times elevated in pregnancy (therefore should not be checked routinely)
Thyroid function tests (TFTs)	Use local gestation-specific ranges
ECG	Sinus tachycardia 15° left axis deviation due to diaphragmatic elevation T wave changes – commonly T wave inversion in lead III and aVF Non-specific ST changes eg depression, small Q waves
Holter monitor	Supraventricular and ventricular ectopics are more common
Chest X-ray (CXR)	Prominent vascular markings, raised diaphragm due to gravid uterus, flattened left hemidiaphragm
Peak expiratory flow rate (PEFR)	Unchanged in pregnancy
Arterial blood gas	Mild, fully compensated respiratory alkalosis is normal during pregnancy

Radiological investigations in pregnancy

- > The first-line radiological investigation in women with breathlessness or chest pain is a CXR. Radiation from a CXR is equivalent to a week's exposure to background radiation in London and is therefore safe throughout pregnancy.
- > Ultrasound, CT scans of head and chest, and MRI are safe throughout pregnancy. **Gadolinium contrast should be avoided.**
- > For women with suspected pulmonary embolism and a normal CXR, a perfusion lung scan should be requested in preference to CT pulmonary angiography (CTPA), because the radiation dose to maternal lung and breast tissue is lower.

‘Recurrent presentations or readmission during pregnancy are red flags and should be discussed with the obstetric and medical team.’

Common medications used in acute medical conditions, and their use in pregnancy

- > **Antibiotics:** avoid trimethoprim and tetracyclines, all others safe
- > **Antiemetics:** all safe
- > **Analgesia:** paracetamol safe, NSAIDs safe **except in third trimester**
- > **Opiates:** generally safe, but **risk of withdrawal in the baby.** Rarely, breastfed babies have developed sedation, respiratory depression, and bradycardia – advise the mother of this;² use dihydrocodeine³
- > **Antihypertensive agents: avoid ACE inhibitors (ACEIs) and angiotensin receptor blockers throughout pregnancy,** enalapril has been shown to be safe postpartum if breastfeeding. Evidence is lacking for other ACEIs in breastfeeding
- > **Antiarrhythmic agents:** adenosine, β -blockers, flecainide and verapamil are all safe
- > **Anticoagulants:** twice-daily dosing of low-molecular-weight heparins for VTE treatment in pregnancy, once daily postpartum. Warfarin is teratogenic, and only used in exceptional circumstances under expert supervision. It is safe in breastfeeding
- > **Direct oral anticoagulants (DOACS):** There is insufficient evidence to support the use of DOACS in pregnancy and in breastfeeding
- > **Antiepileptic agents: sodium valproate contraindicated.** For status epilepticus, intravenous benzodiazepines or levetiracetam safe
- > **Bronchodilators:** all safe
- > **Steroids:** all safe*

* Risk of gestational diabetes mellitus and pregnancy-induced hypertension and infections. If >7.5 mg per day prednisolone equivalent >3 weeks needs intrapartum steroid cover

Case study

A woman attended the emergency department in her third trimester with breathlessness. She had a respiratory rate of 40 breaths per minute. As investigations for suspected pulmonary embolism were negative, she was discharged home with a diagnosis of presumed pneumonia. Neither an obstetrician nor a physician was asked to review her. Two days later she re-presented, acutely unwell with suspected cholecystitis and was admitted to the intensive care unit. She was not seen by an obstetrician for a further 36 hours. Her metastatic liver disease was diagnosed on a preoperative ultrasound scan.

Modified from MBRRACE-UK, Nov 2018.¹

‘Make a positive diagnosis; don’t simply exclude a diagnosis.’

Case study

A woman in her third trimester presented with severe interscapular pain, causing her to sit upright in a chair, and require repeated analgesia. Serial troponins and a perfusion scan were normal and she was discharged home. Approximately 36 hours later she collapsed with severe chest and abdominal pain, and had a cardiac arrest. She underwent a perimortem section. Autopsy showed aortic dissection. For this woman, once pulmonary embolism had been excluded no other diagnoses were considered. An echocardiogram or CT aorta at the time of presentation may have prevented her death, and this opportunity was missed.

Modified from MBRRACE-UK, Dec 2016.¹

Common clinical presentations of medical problems in pregnancy

Chest pain

Any cause of chest pain can occur at any gestation. Management is as for non-pregnant patients.

Table 2. Differential diagnosis of chest pain during pregnancy and the postpartum period

	First trimester	Second trimester	Third trimester	Postpartum
Aortic dissection	Can occur	Can occur	More common	Can occur
Pulmonary embolism	More common throughout pregnancy and the postpartum period Highest risk occurs immediately postpartum Incidence: 0.1–0.67 per 1,000 pregnancies Mortality: 1.13 per 100,000 pregnancies			
Gastro-oesophageal reflux disease	More common throughout pregnancy and the postpartum period			
Acute coronary syndrome (ACS)	Three- to fourfold-increased risk of myocardial infarction in pregnancy and the postpartum period			
Pneumomediastinum	More common if protracted vomiting	Can occur	Most frequent in second stage of labour	Can occur
Biliary disease	Can occur throughout pregnancy and postpartum			

Adapted from the 2018 European Society of Cardiology (ESC) Guidelines.⁴

Red flags in a pregnant patient presenting with chest pain:

- > Pain requiring opioids
- > Pain radiating to arm, shoulder, back or jaw
- > Sudden-onset, tearing or exertional chest pain
- > Associated with haemoptysis, breathlessness, syncope or abnormal neurology
- > Abnormal observations



Palpitations

Palpitations are a common physiological symptom during pregnancy. Differential diagnoses of palpitations other than an arrhythmia in pregnancy include:

- > Physiological
- > Hypovolaemic states
- > Anaemia
- > Thyrotoxicosis
- > Sepsis
- > Pheochromocytoma
- > Pulmonary embolism

Supraventricular tachycardias are common. Management is the same as outside of pregnancy. Vagotonic manoeuvres, adenosine, calcium channel blockers and β -blockers are safe. Direct-current cardioversion can be performed with fetal monitoring and anaesthetic input.

Red flags in a pregnant patient presenting with palpitations:

- > Palpitations in a woman with a family history of sudden cardiac death
- > Palpitations in a woman who has structural heart disease or previous cardiac surgery
- > Palpitations with syncope
- > Palpitations with chest pain
- > Persistent, severe tachycardia



Red flags in a pregnant patient presenting with breathlessness:

- > Sudden-onset breathlessness
- > Orthopnoea
- > Breathlessness with chest pain or syncope
- > Respiratory rate >20 breaths per minute
- > Oxygen saturation <94 % or falls to <94 % on exertion
- > Breathlessness with associated tachycardia



Breathlessness

Physiological breathlessness is a common symptom in pregnancy affecting up to 75% of women. Its onset can be in early pregnancy and it is not always due to the bulky uterus. Women with physiological breathlessness of pregnancy often describe an ‘air hunger’, which

is worse at rest or talking and relieved by mild exertion. Peripartum cardiomyopathy can occur in the third trimester or postpartum; pre-existing and undiagnosed heart disease may deteriorate from the second trimester onwards.

Table 3. Differential diagnosis of breathlessness in pregnancy and the postpartum period

	First trimester	Second trimester	Third trimester	Postpartum
Physiological breathlessness of pregnancy	Can occur	Can occur	More common	n/a
Anaemia	Can occur	Can occur	More common	More common
Asthma	Can occur throughout pregnancy and in the postpartum period			
Pulmonary embolism	Can occur throughout pregnancy and is most common in the postpartum period			
Dilated cardiomyopathy (DCM)	Rarely presents	May decompensate	Could be decompensated pre-existing DCM or peripartum cardiomyopathy (PPCM)	Could be decompensated pre-existing DCM or PPCM
Pneumonia	Can occur throughout pregnancy and postpartum			
Pneumothorax	Can occur	Can occur	Can occur	Most common after vaginal delivery
Hyperventilation	Can occur throughout pregnancy and postpartum			

Headache

Headaches are common in pregnancy. The challenge lies in distinguishing between primary headaches and potentially life-threatening causes.

Primary headaches are more common in the first trimester. Other causes are more common in the third trimester and postpartum period.

Table 4. Differential diagnosis of headache during pregnancy and the postpartum period

	First trimester	Second trimester	Third trimester	Postpartum
Migraine	More common	Can occur	Can occur	More common
Cluster headache	More common	Can occur	Can occur	Can occur
Meningitis	Can occur throughout pregnancy and the postpartum period			
Pre-eclampsia	Does not present in first trimester	Can occur but not common	Most common	Can occur
Post-dural puncture headache				Can occur up to 5 days after a regional anaesthetic procedure (spinal/epidural)

Table 4. Differential diagnosis of headache during pregnancy and the postpartum period (continued)

	First trimester	Second trimester	Third trimester	Postpartum
Cerebral vein thrombosis	Can occur	Can occur	More common	Can occur
Posterior reversible encephalopathy syndrome (PRES)	Very rare	Uncommon	Occurs in the presence of pre-eclampsia	
Reversible cerebral vasoconstriction syndrome (RCVS)				Occurs postpartum
Stroke	Can occur	Can occur	More common	More common
Idiopathic intracranial hypertension	Can occur	Can occur	Can occur	Less common
Subarachnoid haemorrhage	Can occur	Can occur	More common	More common

Clinical pointers:

- > **Posterior reversible encephalopathy syndrome (PRES)** can present with headache in the third trimester. PRES is associated with headaches, seizures and cortical blindness, caused by vasogenic brain oedema.
- > **Reversible cerebral vasoconstriction syndrome (RCVS)** only occurs postpartum and is associated with severe hypertension and recurrent thunderclap headaches. The hallmark of RCVS is multifocal segmental cerebral artery vasoconstriction on cerebral angiography.
- > **Cerebral vein thrombosis** can be associated with pregnancy, most commonly in the third trimester and postpartum.

Management of headache is as for non-pregnant patients.

Clinical pointers:

- > **Migraine:** NSAIDs are safe to take up to 32 weeks' gestation
- > **Meningitis/encephalitis:** *Streptococcus pneumoniae* and *Listeria monocytogenes* are more common during pregnancy
- > **Pre-eclampsia:** blood pressure >140/90 mmHg and urinary protein : creatinine ratio (PCR) >50: **refer to obstetric team**
- > **Posterior reversible encephalopathy syndrome (PRES):** treat hypertension, give intravenous magnesium sulphate as per NICE pre-eclampsia guidelines⁵
- > **Reversible cerebral vasoconstriction syndrome (RCVS):** self-limiting condition in pregnancy. Treat with nimodipine. Resolves within 1–3 months of onset
- > **Idiopathic intracranial hypertension:** can worsen as weight increases. Acetazolamide is safe in pregnancy
- > **Stroke:** no contraindication to thrombolysis, thrombectomy or stenting during pregnancy for ischaemic stroke

‘Those with a history of mental health problems such as postpartum psychosis and bipolar affective disorder are more likely to develop new symptoms during pregnancy.’

Red flags in the history and examination of a pregnant patient presenting with headaches:

- > Sudden-onset headache / thunderclap or worst headache ever
- > Headache that takes longer than usual to resolve or persists for more than 48 hours
- > Has associated symptoms – fever, seizures, focal neurology, photophobia, diplopia
- > Excessive use of opioids



Psychiatric disorders

Pregnancy is a happy and fulfilling time for most, but this isn't the case for everyone. Take the opportunity to enquire after a woman's mental wellbeing when she presents to acute medical services during pregnancy and the postpartum period.

Mental illness can affect anyone, but those with a history of mental health problems such as postpartum psychosis and bipolar affective disorder are more likely to develop new symptoms during pregnancy and the postpartum period, even if they have been well for a number of years. Anxiety and depression are also common. Specialist perinatal psychiatric services have expertise in this area for women who experience symptoms during this time.

Red flags in a pregnant or postpartum patient presenting with psychiatric symptoms and signs:

- > Recent significant change in mental state or emergence of new symptoms
- > New thoughts or acts of violent self-harm
- > New and persistent expressions of incompetence as a mother or estrangement from the baby



Abnormal liver function tests in pregnancy

Consider the patient's medical history, previous pregnancy history and gestation of pregnancy when interpreting abnormal liver function tests in pregnancy.

Table 5. Pregnancy-related causes of abnormal liver function tests

	First trimester	Second trimester	Third trimester	Postpartum
Hyperemesis gravidarum	Most common	Unusual	Unusual	Does not present postpartum
Acute fatty liver of pregnancy	Does not occur	Occurs rarely	Most common	Occurs rarely
HELLP* syndrome	Does not occur	Occurs rarely	Most common	Can occur
Intrahepatic cholestasis of pregnancy	Does not occur	Occurs rarely	Most common	Does not occur

*HELLP = haemolysis, elevated liver enzymes and low platelet count

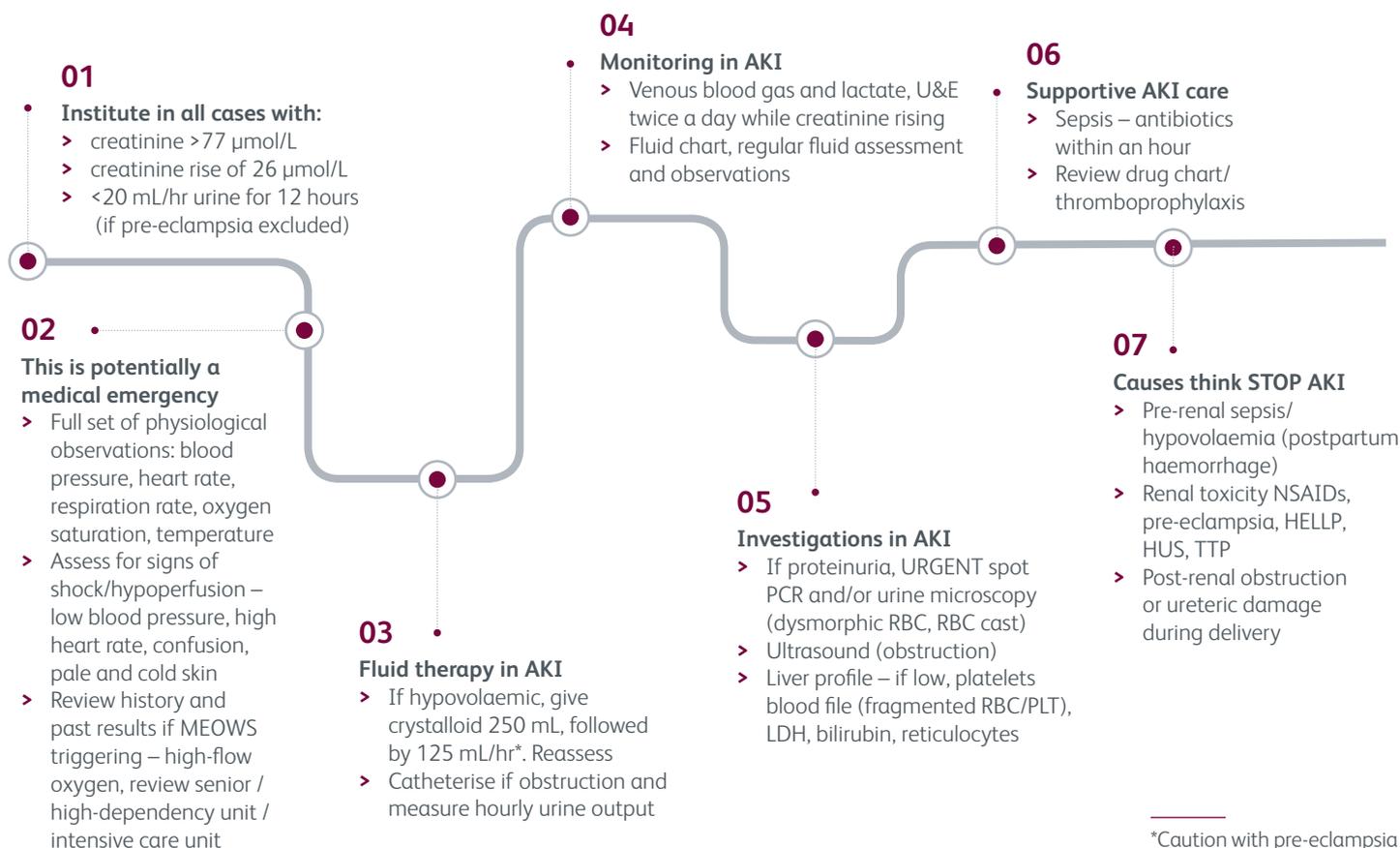
Clinical pointers:

- > **Hypertension and proteinuria:** consider pre-eclampsia/HELLP
- > **Pruritus:** consider intrahepatic cholestasis of pregnancy
- > **Nausea and vomiting in first trimester:** consider hyperemesis gravidarum
- > **New medication:** think of drug-induced liver injury
- > **Obstetric haemorrhage:** think of ischaemic hepatitis

Acute kidney injury (AKI)

International classifications of acute kidney injury (AKI) and eGFR are not validated in pregnancy. Diagnosis of AKI in pregnancy remains a challenge, due to limited evidence-based guidance. A creatinine >77 µmol/L should trigger investigations for AKI in pregnancy. However, most pregnant women do not have a pre-pregnancy or early pregnancy renal profile as a baseline; hence this may confound the diagnosis, as some may have pre-existing chronic kidney disease. AKI in pregnancy is more common in the third trimester and postpartum period.

Figure 1. Obstetric AKI pathway. Adapted with permission from the London Acute Kidney Network.⁶



Further material available online

Educational and quality improvement tools are available online at www.rcplondon.ac.uk/act15

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Acknowledgement

Thanks to Drs Anita Banerjee, Francesca Neuberger, Paarul Prinja and Nicola Cooper for their significant contributions to writing this toolkit.

Further resources

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