



<sup>1</sup> Oxford University Hospitals NHS Foundation Trust, Headington, Oxford, UK

<sup>2</sup> Nuffield Department of Primary Care Health Sciences, University of Oxford, Oxford, UK

<sup>3</sup> London, UK

<sup>4</sup> Nuffield Department of Women's and Reproductive Health, University of Oxford, Oxford, UK

Correspondence to M Bhatia  
meena.bhatia@ouh.nhs.uk

Cite this as: *BMJ* 2020;370:m2248

<http://dx.doi.org/10.1136/bmj.m2248>

Published: 27 July 2020

## PRACTICE POINTER

# Primary care assessment and management of common physical symptoms in pregnancy

Meena Bhatia,<sup>1</sup> Kamal R Mahtani,<sup>2</sup> Ruby Rochman,<sup>3</sup> Sally L Collins<sup>1,4</sup>

### What you need to know

- Many symptoms in pregnancy are related to hormonal and physiological adaptations
- Clear, effective communication regarding the nature of symptoms and the management plan allays fears and offers reassurance
- Offer a reason for referring, explain the potential concerns, and explain the likely course of management
- Surgical causes of abdominal pain can present atypically in pregnancy

### Considerations for covid-19

This article was commissioned and peer reviewed before the covid-19 pandemic. For further guidance on the management of symptoms related to covid-19 in pregnancy, please see guidance from the Royal College of Obstetricians and Gynaecologists: *Coronavirus (COVID-19) infection in pregnancy* <https://www.rcog.org.uk/coronavirus-pregnancy>

A wide range of physical symptoms commonly occur during pregnancy, and it can be challenging to

- Assess whether the symptom is pregnancy related—is it gastroenteritis or hyperemesis gravidarum? Is it asthma or restricted lung volume? Is it abruption or appendicitis? Is it increased urinary frequency or an infection?

- Decide whether the pregnancy changes your management—what medications are safe? When is specialist assessment needed?

Determining whether a symptom is concerning involves clinical judgment and interpretation of vital signs compared with baseline. Published research to

establish reference ranges for vital signs in pregnancy may help clinicians distinguish when a symptom is physiological or pathological.<sup>1</sup>

In this article we discuss the primary care assessment and management of headache, breathlessness, nausea and vomiting, urinary symptoms, and abdominal pain—common presentations in primary care that can have more serious underlying causes; and we highlight red flags that suggest when specialist referral might be warranted. We refer to the most up-to-date evidence on vital signs.

We suggest when to consider same day referral and urgent (within a few hours) referral. When a referral timescale is not specified, use clinical judgment to assess whether same day, urgent, or non-urgent referral is suitable. Questions that might help with non-urgent referral decisions include: What are the patient's concerns? Is it a high risk pregnancy? How well is the patient coping? Are there polypharmacy concerns? Has the patient attended on multiple occasions?

Evidence on common symptoms in pregnancy is fairly limited, so much of the advice in this article is based on our clinical experience; however, we have cited relevant evidence when available.

### What are the reference ranges for maternal vital signs during pregnancy?

Evidence from a five year, three centre, prospective longitudinal cohort study of 1041 pregnant women in the UK<sup>1</sup> offers reference ranges for maternal vital signs during pregnancy (fig 1, fig 2, fig 3, fig 4, fig 5). These are relevant predominantly when assessing women with red flag symptoms, or symptoms that are worsening or persistent.

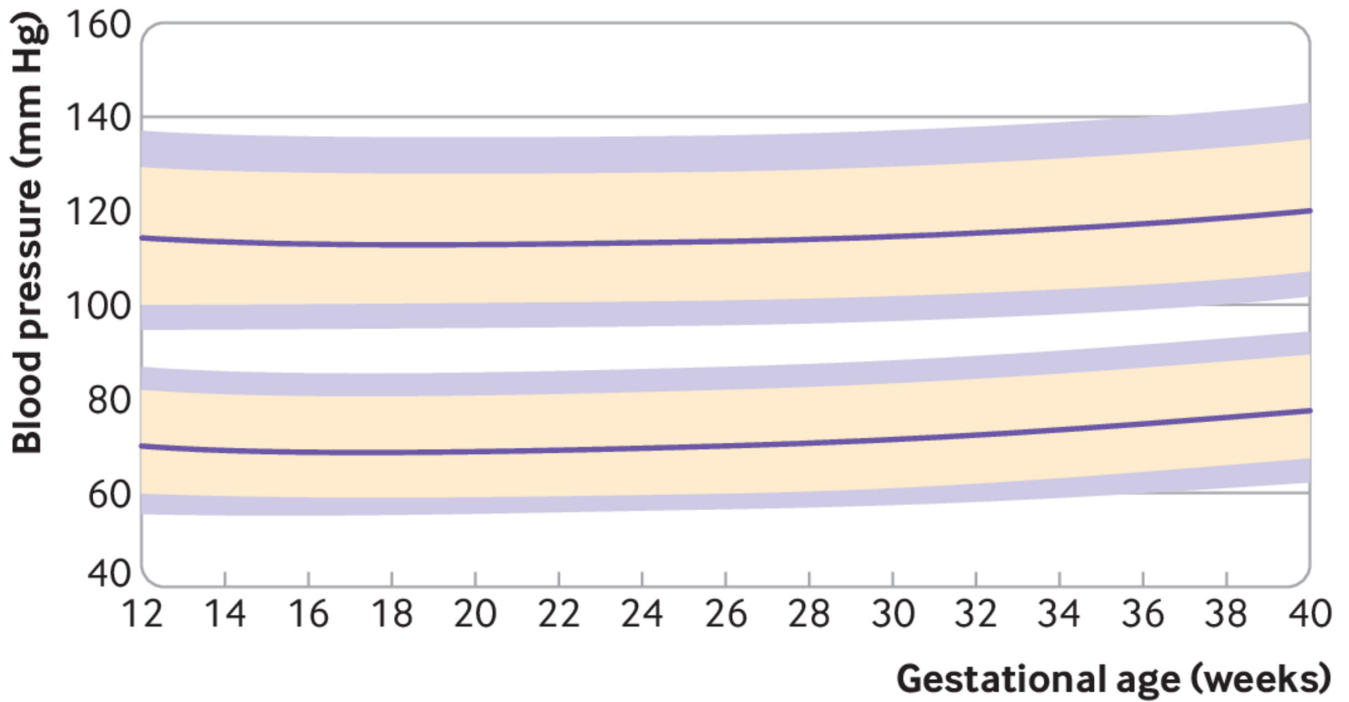


Fig 1 | Reference ranges according to gestation for maternal systolic and diastolic blood pressure during pregnancy. Data extrapolated from Green et al<sup>1</sup>

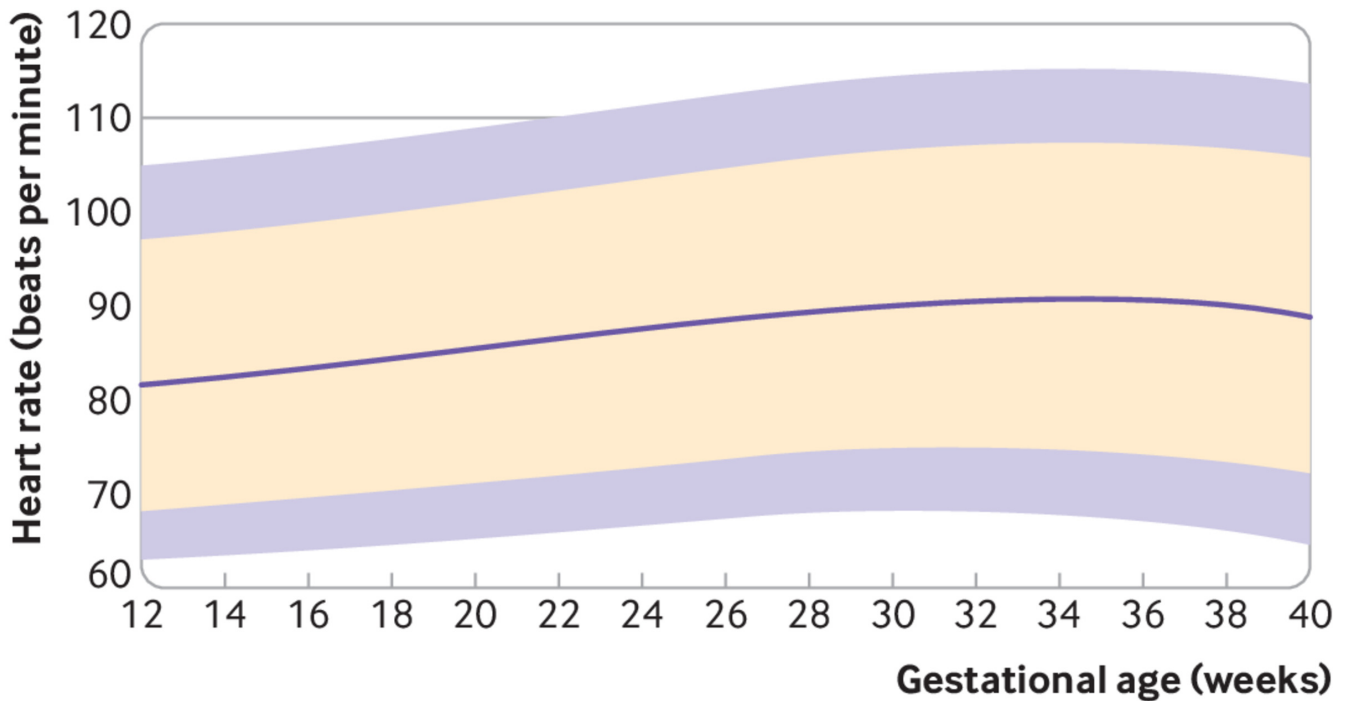


Fig 2 | Reference ranges according to gestation for maternal heart rate during pregnancy. Data extrapolated from Green et al<sup>1</sup>

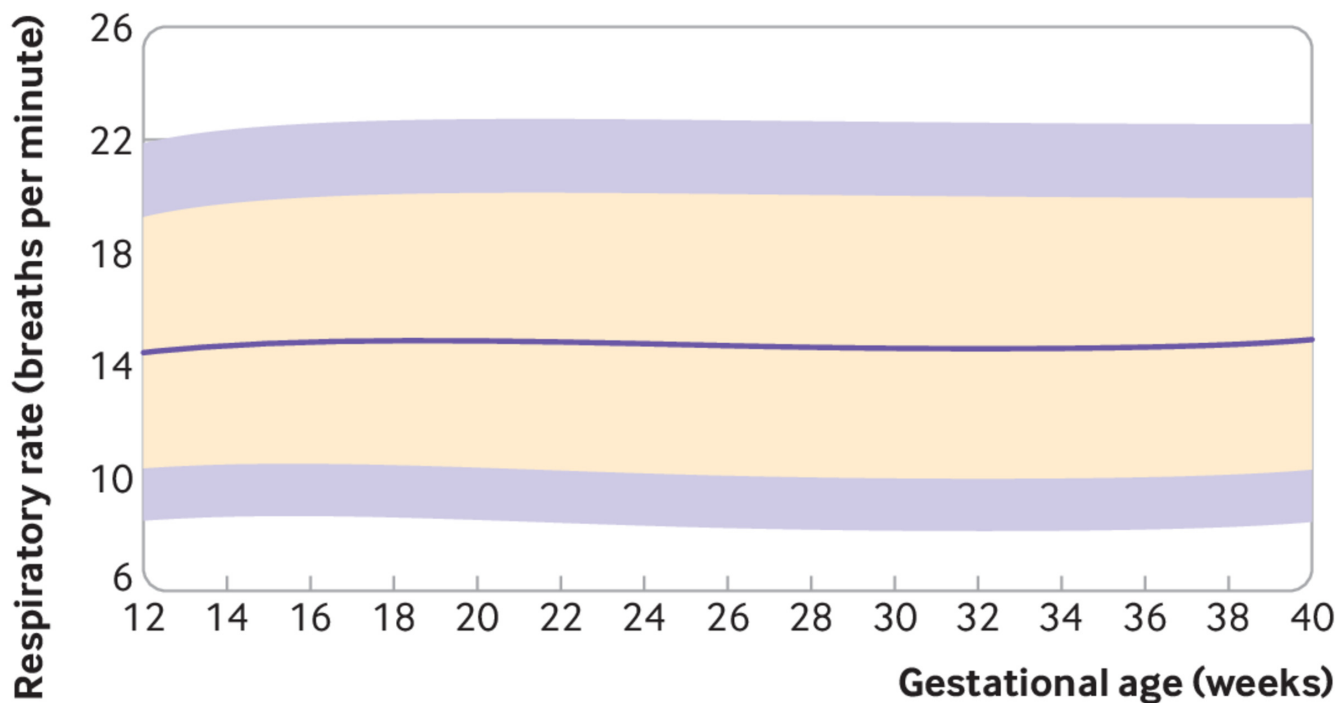


Fig 3 | Reference ranges according to gestation for maternal respiratory rate during pregnancy. Data extrapolated from Green et al <sup>1</sup>

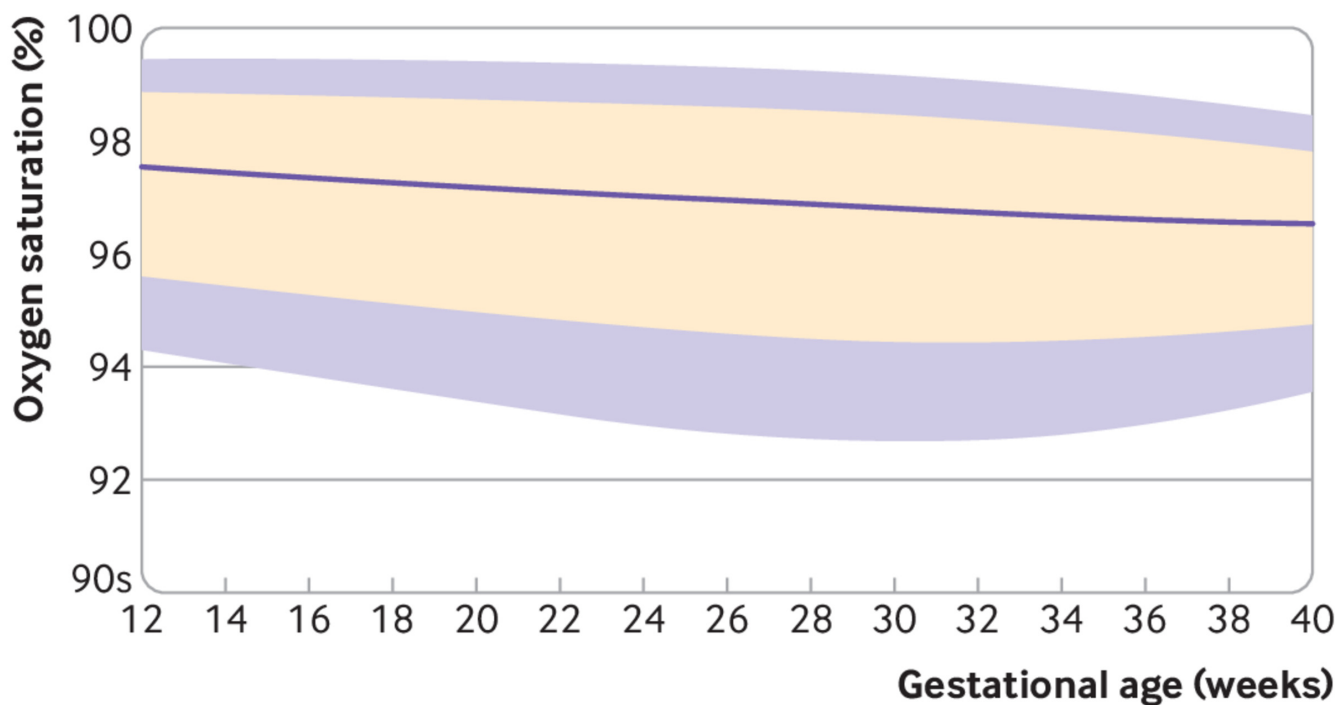


Fig 4 | Reference ranges according to gestation for maternal oxygen saturation during pregnancy. Data extrapolated from Green et al <sup>1</sup>

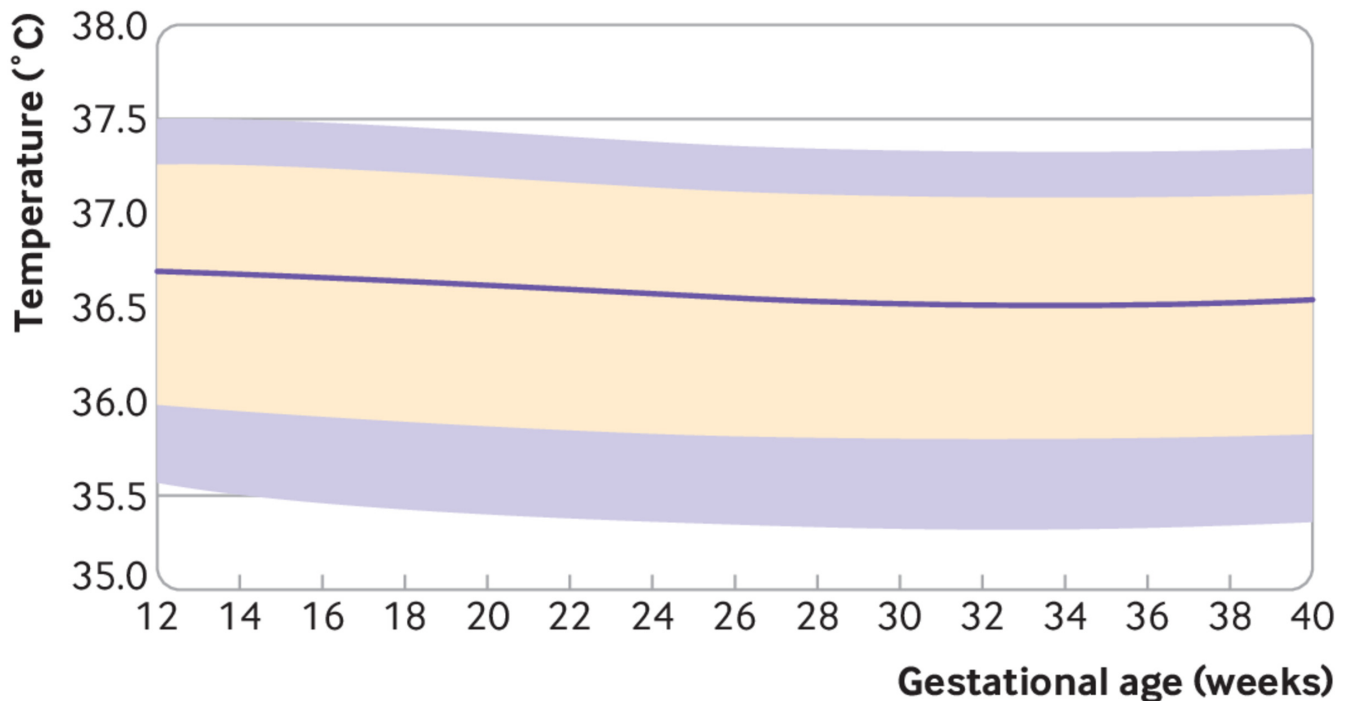


Fig 5 | Reference ranges according to gestation for maternal temperature during pregnancy. Data extrapolated from Green et al<sup>1</sup>

### How might women with headache present?

Around one in three pregnant women experiences headache.<sup>23</sup> This may be continuation of an underlying headache, a new headache syndrome unrelated to pregnancy, or a headache specific to pregnancy. Migraine, tension headaches, and to a lesser extent cluster headaches are common in pregnancy.<sup>4,5</sup>

A 2017 systematic review of observational studies suggested that most women continue to experience headaches similar to those they experienced when not pregnant, or that some find that symptoms improve in pregnancy.<sup>3,4</sup> Improvement might occur if non-pregnant headaches are triggered by fluctuating oestrogen levels (eg, with migraines) because during pregnancy oestrogen levels are high and stable. Relapse of improved migraine symptoms might occur in the first month post partum.<sup>6</sup>

Approximately two thirds of headaches in pregnancy have no underlying pathology and usually occur in the first trimester.<sup>7,8</sup> However, increased coagulability in pregnancy can increase the risk of underlying pathology,<sup>5</sup> including stroke and cerebral venous thrombosis, at any gestation.

Headache can also be a sign of pre-eclampsia, a major cause of maternal and fetal mortality.<sup>9</sup>

Reversible cerebral vasoconstriction syndrome occurs most commonly in the postpartum period. It presents as a severe sudden onset headache and it may be associated with hypertension or stroke. It appears to be caused by underlying vasoconstriction. It is diagnosed by magnetic resonance angiography based on the

finding of arterial constriction. The headache may last for several months until it resolves.

### How do you assess headache in primary care?

Undertake neurological history and examination as you would with non-pregnant patients.<sup>10</sup>

Identify whether it is a primary headache (eg, tension headache, cluster headache, migraine) or secondary to a serious pathology (eg, pre-eclampsia, cerebral venous thrombosis).<sup>11</sup>

Assess vital signs (fig 1-fig 5).<sup>1</sup>

Assess for pre-eclampsia<sup>12</sup>:

- Ask about associated visual disturbances, swelling (most commonly of the hands, feet, or face), right upper quadrant or epigastric abdominal pain, and nausea and vomiting<sup>12</sup>
- Look for peripheral and facial oedema, proteinuria on dipstick, and blood pressure increases >140/90 mm Hg on at least two occasions.

Assess for cerebral venous thrombosis and ischaemic stroke<sup>13,14</sup>:

- Ask about associated cognitive disturbance, seizure, family history, previous venous thromboembolism, reduced mobility, thrombophilia, and/or obesity.
- Look for focal neurological signs, papilloedema, raised intracranial pressure, and/or extensive varicose veins.

Table 1 summarises the features of the common and serious causes of headache in pregnancy.

Table 1 | Obstetric related and non-obstetric related causes of headache in pregnancy

Obstetric related causes	Features
Pre-eclampsia	Usually presents after 20 weeks' gestation. Raised blood pressure ( $>140/90$ mm Hg on at least two occasions) and proteinuria ( $\geq 1$ and/or $>300$ mg/24 hours). <sup>15</sup> Varied clinical presentation, which can include severe headache, visual disturbance (eg, flashing lights, blurred vision, floaters), epigastric or right upper quadrant pain, swelling of the hands, feet, or face, and/or nausea and vomiting. <sup>9</sup>
Non-obstetric causes where risk is increased by hypercoagulability	
Reversible cerebral vasoconstriction syndrome	Sudden onset thunderclap headache. Usually postnatal
Cerebral venous thrombosis	Acute onset of headache. Moderate to severe pain. Cognitive disturbance, seizure, papilloedema, raised intracranial pressure, and/or focal neurology. Risk factors: as for venous thromboembolism
Ischaemic stroke	Focal neurological symptoms—eg, sensory loss, weakness, speech problems, visual disturbances
Other non-obstetric causes	
Tension headache	Typically, bilateral, non-pulsating pain (lasting minutes to days); described as a tight band around the head
Cluster headache	Typically, unilateral severe periorbital pain (lasting minutes to hours; may recur several days in a row); ipsilateral red eye and/or eyelid swelling might be present
Migraine	Typically, intense, moderate to severe, unilateral, throbbing pain; nausea, sensitivity to light, and/or visual disturbances might be present.
Subarachnoid haemorrhage	Thunderclap headache reaching a peak of intensity in $<5$ minutes; might be precipitated by physical exertion
Idiopathic intracranial hypertension	Awakens patient, generalised, non-throbbing, diplopia, visual loss, Risk factors: obesity
Meningitis	Fever, rash, neck stiffness, photophobia

## How do you manage headache in primary care?

Initially treat benign headaches as you would in non-pregnant patients<sup>4</sup>:

- Encourage good sleep, adequate hydration, and avoidance of potential precipitants
- Consider paracetamol and anti-emetics if conservative measures are ineffective.

Request specialist advice before

- prescribing sumatriptan for migraine
- prescribing non-steroidal anti-inflammatory (NSAID) medication—avoid NSAIDs completely in the third trimester as they are associated with premature closure of the fetal ductus arteriosus.<sup>16</sup>

Refer to obstetric physicians or neurologists for review and consideration of second line medications if<sup>9-13 17</sup>

- the pregnancy is high risk or complex (eg, pre-existing or newly diagnosed medical condition, age under 20 or over 40, overweight/obese, carrying more than one fetus)<sup>17</sup>
- headaches are severe or persistent despite first line medication.

Box 1 lists red flag signs and symptoms associated with headache in pregnancy that warrant urgent/same day opinion from secondary care teams (general medicine, neurology, and/or obstetrician, dependent on local referral pathways).<sup>17</sup>

**Box 1: Request same day/urgent specialist opinion for these headache red flags<sup>18 19</sup>**

### Symptoms

- Marked change in a previously stable headache pattern

- Sudden onset at peak of severity
- Described as the “worst ever” headache
- Pain takes longer to resolve than usual or persists for longer than 48 hours
- Focal neurological symptoms
- Seizures
- Fever (fig 5)
- Trauma
- Visual changes
- Associated loss of consciousness
- Headache persists despite first line treatments

### Signs

- Focal neurological signs (table 1)
- Signs of meningism (neck stiffness and photophobia)
- Diplopia or papilloedema
- Reduced Glasgow coma score (GCS)
- Petechial rash

## How might women with breathlessness present?

A small observational study of 62 women found that more than 75% of women with uncomplicated pregnancy reported some degree of breathlessness to an obstetrician in their final trimester<sup>20-22</sup> but breathlessness can start at any gestation.

In most cases, breathlessness is physiological. The combination of increased progesterone causing the respiratory drive to be increased, and oxygen requirements increasing as pregnancy advances, can cause physiological hyperventilation which some women experience as breathlessness.<sup>23</sup> Typically, this physiological breathlessness is present at rest; may improve on mild activity, and is not associated

with any oxygen desaturation.<sup>2</sup> Women describe it as “air hunger” and it may interrupt their normal speech pattern—eg, they pause to take a breath during a sentence without appearing breathless to others.

However, breathlessness can also be a symptom of underlying pathology.

- The relative risk of venous thromboembolism is higher during pregnancy and the postnatal period, particularly in the first six postpartum weeks<sup>24 25</sup>
- Varicella zoster pneumonitis and flu have higher morbidity and mortality in pregnancy, and can cause fetal varicella syndrome and varicella of the newborn<sup>26</sup>
- A systematic review and meta-analysis showed that for one third of pregnant women asthma gets better, for one third it deteriorates, and for one third it stays the same.<sup>27</sup> In a large population based study in Sweden, uncontrolled asthma was associated with preterm birth, low birth weight, gestational diabetes, infant hypoglycaemia, and pre-eclampsia<sup>28</sup>
- Anaemia, community acquired pneumonia, and heart failure from peripartum cardiomyopathy can also cause breathlessness in pregnancy.

### How do you assess breathlessness in primary care?

Assess vital signs at rest and on exertion (fig 1-fig 5).<sup>1</sup>

Look for features of embolic phenomena: sudden onset dyspnoea, pleuritic chest pain, and haemoptysis. The Wells score is not currently validated for use in pregnancy.

Look for features of varicella zoster pneumonitis (vesicular rash), flu, or community acquired pneumonia—fever, cough, tachypnoea—and consider sepsis if bacterial infection is suspected.

Look for exacerbations in asthma—increased wheeze, cough, chest tightness; measure peak flow and consider other lung function tests.<sup>29</sup>

Look for signs of heart failure, which might suggest peripartum cardiomyopathy.

Consider a full blood count for suspected anaemia, or measure C reactive protein and full blood count for suspected respiratory tract infection.

Table 2 summarises the features of the common and serious causes of breathlessness in pregnancy.

Table 2 | Obstetric related and non-obstetric related causes of breathlessness in pregnancy<sup>2 30</sup>

Obstetric causes	Features
Physiological dyspnoea of pregnancy	Need to take a deep breath intermittently, including while talking, or sensation of inability to get a deep enough breath. No associated wheeze, cough, chest pain, or tachypnoea. Normal heart rate at rest (fig 2). Normal oxygen saturations on exertion (fig 4). Consider this diagnosis when the causes below have been excluded
Non-obstetric causes	
Asthma	Associated wheeze, cough, chest tightness, history of atopy; corroborative lung function tests
Anaemia	May be mild. May be associated with lethargy. Confirm with full blood count when anaemia is suspected. A normal recent blood count is reassuring if anaemia is further down the list of differentials
Venous thromboembolism	May have associated features of deep vein thrombosis and additional risk factors other than pregnancy (including reduced mobility, thrombophilia, obesity, previous venous thromboembolism, family history, extensive varicose veins). <sup>31</sup> Sudden onset breathlessness accompanied by pleuritic chest pain +/- haemoptysis. Tachycardia and a drop in oxygen saturation on exertion (fig 2, fig 4)
Peripartum cardiomyopathy causing heart failure	Can occur at any stage of pregnancy, most common postnatally. Risk factors: older age (highest incidence >40 years) <sup>2</sup> multiparous, pre-eclampsia, or hypertension. Nocturnal dyspnoea, orthopnoea, wheeze, oedema, tachycardia, peripheral oedema, audible wheeze
Pneumonia	Fever (see fig 5 for normal temperature levels in pregnancy), productive cough, and dyspnoea. Uncommon in pregnancy, but pregnant women are more susceptible to flu and varicella zoster pneumonitis, putting them at increased risk. Give greater consideration to susceptible individuals (eg, those with asthma, cystic fibrosis, HIV, immunosuppression, smoking history)
Sepsis	New altered mental state, tachypnoea (see fig 3 for normal respiratory rate in pregnancy), reduced oxygen saturation levels (see fig 4 for normal levels in pregnancy), hypotension (see fig 1 for normal levels in pregnancy), tachycardia (see fig 2 for normal levels in pregnancy), reduced urine output, mottled or ashen appearance, cyanosis of skin/lips/tongue, non-blanching rash <sup>32</sup>

### How do you manage breathlessness in primary care?

If the woman’s symptoms of breathlessness are mild and vital signs are within normal ranges (fig 1-fig 5), explain that symptoms are most likely due to expected pregnancy changes, and ask her to return if symptoms persist or worsen.

If she has signs of asthma

- Manage them as you would in non-pregnant patients and escalate treatment based on symptom frequency<sup>30 33</sup>
- Consider same day/urgent referral to secondary care for women with exacerbation of asthma in pregnancy<sup>33</sup>
- Provide sufficient inhalers to manage symptoms, even if asthma has improved in pregnancy.

Safety of inhaled and oral steroids is a common concern during pregnancy. Guidelines from the Scottish Intercollegiate Guidelines Network (SIGN) and the British Thoracic Society (BTS) suggest that evidence is sufficient to support the use of inhaled corticosteroids as normal during pregnancy. For oral steroids, these guidelines recommend use as normal for severe asthma, with explanation that the benefits outweigh the risks.<sup>29</sup>

Offer flu vaccination at all gestations in line with national recommendations.<sup>34</sup> Arrange same day hospital assessment if you suspect flu infection or symptoms suggestive of varicella associated pneumonia (urgent referral if there is haemodynamic instability)—and take appropriate measures to avoid exposing other pregnant women to chickenpox.<sup>34</sup> Speak to the obstetrics and infectious disease teams regarding the correct location and referral pathway.

Box 2 lists red flag signs and symptoms associated with breathlessness in pregnancy that warrant urgent/same day opinion from secondary care teams (general medicine, respiratory medicine, cardiology, and/or obstetrics, dependent on local referral pathways).

**Box 2: Request specialist same day/urgent opinion if patients present with these breathlessness red flags**

**Symptoms**

- Haemoptysis
- Associated orthopnoea, paroxysmal nocturnal dyspnoea, and oedema
- Palpitations
- Suspicion of venous thromboembolism
- Suspicion of pneumonia
- Suspicion of sepsis

**Signs**

- Calf swelling
- Fever and/or suggestion of sepsis (fig 5)
- Tachypnoea (fig 3)
- Desaturating levels of oxygen at rest or on mild exertion (fig 4)
- Raised jugular venous pressure

**How might women with nausea and/or vomiting present?**

Nausea and vomiting are the most commonly reported symptoms in pregnancy, affecting almost 80% of pregnant women.<sup>35</sup> Symptoms

typically start at 6-7 weeks' gestation and usually resolve by 16 weeks. They are a common reason for hospital admission.<sup>26</sup>

Guidelines from the Royal College of Obstetricians and Gynaecologists (RCOG) define hyperemesis gravidarum as protracted nausea and/or vomiting, with a triad of more than 5% pre-pregnancy weight loss, dehydration, and electrolyte imbalance.<sup>36</sup> Ketonuria in the absence of other symptoms is not considered a feature that guides referral or treatment of hyperemesis gravidarum.<sup>37</sup>

More serious obstetric conditions may initially present with non-specific symptoms of nausea and vomiting, usually at more advanced gestation:

- Acute fatty liver disease of pregnancy is rare but potentially fatal (typically presents after 30 weeks)
- Pre-eclampsia occasionally presents with nausea and vomiting (typically presents after 20 weeks)

Nausea and vomiting might also be caused by antibiotics, iron supplements, viral gastroenteritis, and surgical causes of abdominal pain.

**How do you assess nausea and vomiting in primary care?**

Assess vital signs (fig 1-fig 5).<sup>1</sup>

Ask about associated symptoms, such as diarrhoea and abdominal pain, and about recent food and drug ingestion.

Determine hydration status:

- Ask about symptom improvement with hydration
- Assess fluid balance
- Look for signs of dehydration on examination and urine dipstick.

Use clinical judgment to decide whether vomiting can be considered as “protracted” (the National Institute for Health and Care Excellence (NICE) does not offer parameters for “protracted vomiting” in its definition of hyperemesis gravidarum).

Measure whether there has been weight loss of >5% of the pre-pregnant weight.

RCOG guidelines recommend assessing symptom severity using a Pregnancy-Unique Quantification of Emesis (PUQE) score (fig 6).<sup>36 38 39</sup>

**PUQE form:****Pregnancy-Unique Quantification of Emesis and nausea**

Circle the answer that best suits your situation in the last 24 hours

1. On average in a day, for how long do you feel nauseated or sick to your stomach?

>6 hours  
5 points

4–6 hours  
4 points

2–3 hours  
3 points

≤1 hour  
2 points

Not at all  
1 point

2. On average in a day, how many times do you vomit or throw up?

≥7 times  
5 points

5–6 times  
4 points

3–4 times  
3 points

1–2 times  
2 points

Not at all  
1 point

3. On average in a day, how many times have you had retching or dry heaves without bringing anything up?

≥7 times  
5 points

5–6 times  
4 points

3–4 times  
3 points

1–2 times  
2 points

Not at all  
1 point

Total score (sum of replies to 1, 2 and 3): mild NVP ≤6; moderate NVP, 7–12; severe NVP ≥13.

**Quality of life question:**

On a scale of 0 to 10, how would you rate your well-being? \_\_\_\_\_

0 (worst possible) 10 (as good as you felt before pregnancy)

Fig 6 | PUQE index—reproduced from the RCOG green-top guideline<sup>28</sup>

Arrange laboratory investigations to check for electrolyte imbalance, thyroid dysfunction, or inflammatory marker derangement.

Assess for acute fatty liver disease of pregnancy:

- Ask about right upper quadrant pain, generalised malaise, polydypsia, polyuria

- Look for signs of encephalopathy.<sup>40</sup>

Assess for pre-eclampsia as above (under *headache*).

Table 3 summarises the features and causes of nausea and/or vomiting in pregnancy.<sup>27</sup>



Table 3 | Obstetric related and non-obstetric related causes of nausea and/or vomiting in pregnancy<sup>27</sup>

Obstetric causes	Features
Nausea and vomiting of pregnancy	Affects ~80% of women. <sup>35</sup> Usually occurs between 6 and 16 weeks' gestation
Hyperemesis gravidarum	Protracted nausea and/or vomiting with a triad of more than 5% pre-pregnancy weight loss, dehydration, and electrolyte imbalance <sup>36</sup>
Pre-eclampsia	Usually presents after 20 weeks' gestation. Raised blood pressure (>140/90 mm Hg on at least two occasions) and proteinuria (≥1 and/or >300 mg/24 hours). <sup>15</sup> Varied clinical presentation, which can include severe headache, visual disturbance (eg, flashing lights, blurred vision, floaters), epigastric or right upper quadrant pain, swelling of the hands, feet, or face, and/or nausea and vomiting <sup>9</sup>
Acute fatty liver of pregnancy	Potentially fatal complication usually presents after 30 weeks' gestation but can be earlier. More common in multiple pregnancies. Severe nausea and vomiting, pain in right upper quadrant, and anorexia. Abnormal liver function and hypoglycaemia. See Swansea Criteria <sup>40 41</sup>
Non-obstetric causes	
Gastroenteritis	History of contaminated intake, relevant contact history, fever (fig 5), diarrhoea
Drug related vomiting	Occurs more commonly with antibiotics and iron supplements
Other causes of abdominal pain	Any cause of abdominal pain, including acute pancreatitis or appendicitis, may also initially present with vomiting (see section on abdominal pain)

### How do you manage nausea and vomiting in primary care?

A systematic review of 67 randomised clinical trials and 11 non-randomised studies showed that mild symptoms can be managed effectively in the community using ginger (fresh or ginger-containing food items: teas, tinctures, or tablets), vitamin B6, and/or acupressure.<sup>42 43</sup>

If vomiting is related to antibiotic, iron, or other medication intake, consider changing preparations if symptoms persist. If symptoms are not well controlled, or if a woman is finding the symptoms very challenging, consider the following safe and effective anti-emetics: promethazine, cyclizine, or prochlorperazine. If symptoms persist and clinical judgment dictates that a secondary care referral is not needed, consider trying chlorpromazine, metoclopramide, ondansetron, or domperidone.<sup>29 33</sup>

If one medication is not controlling symptoms effectively, consider changing the medication or building up to dual/triple anti-emetic therapy. A combination of up to three of these anti-emetics can be used safely if they provide symptomatic relief.<sup>36</sup>

Treatment progress may be tracked with RCOG PUQE scores (fig 6.)<sup>36 38 39</sup>

If the PUQE score is less than 13 and primary care measures are unsuccessful, RCOG green-top guidelines advise clinicians to consider ambulatory day care management; and to consider inpatient management if there is continued nausea and vomiting and one or more of the following applies<sup>36</sup>:

- Unable to keep down oral anti-emetics
- Ketonuria (1+ ketones on urine dipstick) and/or weight loss (greater than 5% of pre-pregnant body weight. However, a systematic review and meta-analysis did not find support for the use of ketonuria as feature that guides referral or treatment of hyperemesis gravidarum.<sup>37</sup>
- Suspected comorbidity (eg, urinary tract infection and unable to keep down oral antibiotics).

Refer women with hyperemesis gravidarum to secondary care—this could be obstetrics or gynaecology, according to local policy.<sup>36</sup> Determine the level of urgency of referral on a case-by-case basis.

Box 3 lists red flag signs and symptoms associated with nausea and/or vomiting in pregnancy that warrant same day/urgent opinion from secondary care teams (general medicine, and/or obstetrics, dependent on local referral pathways).

#### Box 3: Request urgent/same specialist opinion if patients present with these nausea and/or vomiting red flags<sup>36</sup>

##### Symptoms

- Inability to tolerate oral intake despite anti-emetics, with associated weight loss or signs of severe dehydration
- Confirmed or suspected comorbidity (eg, urinary tract infection, diabetes)
- Severe headache
- Severe abdominal pain, especially epigastric or right upper quadrant pain

##### Signs

- Weight loss > 5% of total body weight
- Severe dehydration (decreased urine output, dizziness, increased thirst, dry mouth)
- Haemodynamic instability (fig 1-fig 5)
- Biochemical abnormality

### How might urinary symptoms present?

Urinary symptoms are very common in pregnancy.<sup>4</sup>

One observational study of 256 pregnant women found that 91% experienced increased frequency.<sup>44</sup> Another observational study of 100 pregnant women found that 72% experienced increased frequency, 63% experienced urgency, and 79% experienced nocturia.<sup>45</sup>

Physiologically, with advancing gestation, the plasma volume increases and the pressure effect of the uterus on the bladder may cause increased frequency of micturition and nocturia.<sup>46</sup>

Urinary tract infections may present as asymptomatic bacteriuria, acute cystitis, or pyelonephritis.

Pyelonephritis is more common during pregnancy because of physiological dilatation of the upper renal tract, and it is associated with increased risk of preterm labour and low birth weight infant.<sup>47 48</sup> It is one of the main reasons for urine screening tests in

pregnancy, and the reason urinary tract infections in pregnancy are treated so aggressively.

Polyuria may be a sign of acute fatty liver disease of pregnancy, and reduced urine output can be a sign of sepsis or acute kidney injury in pregnancy.

**How do you assess urinary symptoms in primary care?**

- Ask about dysuria, frequency, and nocturia and haematuria in anyone who is unwell or describes a change of urinary habit and perform a urine dipstick test.

- Consider pyelonephritis if there is associated fever and lumbar and/or flank pain.
- Internationally, guidelines vary on how often to perform urinalysis.<sup>49</sup> However, consider performing urinalysis at all antenatal visits to GPs, midwives, and obstetricians because asymptomatic bacteriuria is also an important cause of preterm labour that requires immediate treatment in the community.<sup>50</sup>

Table 4 summarises features and causes of urinary symptoms in pregnancy.<sup>27</sup>

Table 4 | Obstetric related and non-obstetric related causes of urinary symptoms in pregnancy<sup>27</sup>

Obstetric causes	Features
Pregnant physiology	Frequency, nocturia, urgency
Acute kidney disease in pregnancy	Reduced urine output, peripheral oedema, raised creatinine, obstetric complications
Non-obstetric causes	
Asymptomatic bacteriuria	Positive dipstick findings
Acute cystitis	Frequency, nocturia, urgency, dysuria, fever
Pyelonephritis	Frequency, nocturia, urgency, dysuria, fever, lumbar/flank pain
Sepsis	New altered mental state, tachypnoea (see fig 3 for normal respiratory rate in pregnancy), reduced oxygen saturation levels (see fig 4 for normal levels in pregnancy), hypotension (see fig 1 for normal levels in pregnancy), tachycardia (see fig 2 for normal levels in pregnancy), reduced urine output, mottled or ashen appearance, cyanosis of skin/lips/tongue, non-blanching rash <sup>32</sup>

**How do you manage urinary symptoms in primary care?**

If patients have lower urinary tract infection symptoms, start empirical antibiotics regardless of the urine dipstick result. Concerns about resistance can be reduced by avoiding empirical treatment with broad spectrum antibiotics.<sup>51</sup>

- Longer courses of antibiotic therapy offer better cure rates, reduce women’s risk of pyelonephritis, and reduce the risk of urinary tract infection inducing pre-term labour.<sup>52-53</sup>
- NICE guidelines recommend seven day courses of antibiotics for urinary tract infection in pregnancy and recommend nitrofurantoin as the first choice antibiotic for urinary tract infection in pregnancy (nitrofurantoin is to be avoided at term). If symptoms do not improve after 48 hours, or if nitrofurantoin is not suitable, NICE recommends amoxicillin (if culture results confirm susceptibility) or cefalexin, or to consult the microbiologist for a suitable antibiotic based on the culture results.<sup>54</sup>
- Trimethoprim can be used; however, it is generally avoided during the first trimester because of the risk of neural tube defects in the fetus.<sup>55-56</sup>
- Request an obstetrician’s opinion if symptoms fail to respond to treatment or if urinary tract infections are recurrent. Determine the level of urgency of referral on a case-by-case basis.
- No evidence supports cranberry juice as treatment for urinary tract infection in pregnancy.
- If you suspect pyelonephritis refer for same day/urgent intravenous antibiotics.

Box 4 lists red flag urinary signs and symptoms in pregnancy that warrant same day/urgent opinion from secondary care teams (general medicine, urology, and/or obstetrics, dependent on local referral pathways).

**Box 4: Request same day/urgent specialist opinion if patients present with these urinary symptom red flags**

**Symptoms**

- Severe abdominal pain/loin pain
- Vomiting
- Frank haematuria
- Rigid/tender uterus
- Uterine irritability or contractions
- Rigors
- Unwell pregnant woman with urinary tract infection and medical comorbidity

**Signs**

- Dehydration
- Fever (fig 5)
- Tachycardia (fig 2)
- Hypotension (fig 1)
- Suspicion of pyelonephritis

**How might patients with abdominal pain present?**

Abdominal pain is one of the most frequently reported symptoms in pregnancy.<sup>57</sup> The differential is wide and includes pregnancy related causes and numerous non-obstetric intra or extra-abdominal causes.<sup>58-59</sup>

Physiological and anatomical changes in pregnancy can make diagnosis challenging. For example, appendicitis may occur atypically in pregnancy,<sup>60-61</sup> and in late pregnancy guarding from peritonitis may not occur, owing to loss of elasticity of the abdominal wall musculature.<sup>62</sup> Additionally, physiological leucocytosis that typically occurs in pregnancy (6-16 10<sup>9</sup>/L in the first and second trimesters, and 20-30 10<sup>9</sup>/L in the third trimester) can complicate

interpretation of white cell count.<sup>60</sup> The displacement and potential compression of intra-abdominal organs by the gravid uterus during pregnancy can create anatomical distortion.<sup>62</sup>

However, mild symptoms that self-resolve and have no associated features are generally less likely to be concerning and more in keeping with normal physiology. Round ligament pain is associated with the gravid uterus pulling on the round ligament with maternal movements—for example, turning in bed.

Acute pancreatitis in pregnancy is rare but most commonly occurs in the third trimester because of the presence of gallstones.<sup>63</sup>

Placental abruption (where the placenta begins to detach from the uterine wall, reducing blood flow to the fetus) and uterine rupture are obstetric emergencies which have potentially fatal consequences for mother and fetus. Acute fatty liver of pregnancy, chorioamnionitis, and pre-eclampsia are not classed as obstetric emergencies, but they also have potentially fatal consequences for mother and fetus.

### How do you assess abdominal pain in primary care?

Establish where the pain is, and its severity:

- Stitch-like pain radiating to the groin might suggest round ligament pain
- Severe unilateral pain could suggest torsion, haemorrhage, or rupture of an ovarian cyst; or in the first trimester it could suggest ectopic pregnancy or fibroid degeneration
- Intermittent, tightening pains could suggest labour, pre-term labour, or Braxton-Hicks contractions if they are short lived.
- Severe constant pain (with or without bleeding) could suggest uterine rupture or placental abruption.
- Right upper quadrant or epigastric pain could suggest pre-eclampsia.
- Assess for vaginal bleeding—this may occur with miscarriage, placental abruption, and uterine rupture.
- Assess for foul smelling or green vaginal loss—this is suggestive of chorioamnionitis.
- [Table 5](#) summarises features and causes of abdominal pain in pregnancy.

Table 5 | Obstetric related, gynaecological related, and non-obstetric/gynaecological related causes of abdominal pain in pregnancy

Gynaecological causes	Features
Ectopic pregnancy	Severe onset abdominal pain, usually unilateral, presents in the first trimester
Miscarriage	Abdominal pain usually accompanied by vaginal bleeding, most commonly in the early stages of pregnancy. If the pain or bleeding are severe or there is haemodynamic compromise, this will require referral to the emergency gynaecology team
Ovarian cyst accident	Severe abdominal pain may result from torsion, haemorrhage, or rupture of an ovarian cyst. Pain is often unilateral. There may be a history of ovarian cysts
Ovarian hyperstimulation syndrome	This is a complication of fertility treatment, where ovarian stimulation occurs to increase the number of oocytes. Emergency gynaecology review is required because of the risk morbidity and mortality
Fibroid degeneration	This may occur in any trimester; however, it is more common in the first trimester. The pain is usually localised and may be severe and require admission for opioid analgesia and monitoring
Obstetric causes	
Pelvic girdle pain	This is benign but may cause severe discomfort, requiring physiotherapy, regular oral analgesia, and mobility aids—eg, crutches. It usually occurs in later stages of pregnancy and is a diagnosis of exclusion
Braxton-Hicks contractions	These are “false contractions” that are intermittent, short lived, and self-limiting
Round ligament pain	Lower abdominal pain radiating around the side of the uterus to the groin. The pain is seldom severe and resolves spontaneously. Usually stitch-like, it is often precipitated by turning over in bed or getting up from sitting
Labour	This is the onset of regular uterine contractions. The pain is intermittent. The uterus tightens and firms up with each contraction. The cervix shortens and dilates
Abruption	Associated pain is usually severe. Bleeding may or may not occur. The uterus is typically palpated as “woody hard”
Chorioamnionitis	This may be associated with moderate or severe pain and fever. Offensive or green fluid loss may occur. Signs of mild infection or severe overwhelming sepsis may be present
Uterine rupture	Severe constant pain, may be accompanied by bleeding
Pre-eclampsia	Usually presents after 20 weeks’ gestation. Raised blood pressure (>140/90 mm Hg on at least two occasions) and proteinuria ( $\geq 1$ or >300 mg/24 hours) <sup>15</sup> Varied clinical presentation, can include: severe headache, visual disturbance (eg, flashing lights, blurred vision, floaters), epigastric or right upper quadrant pain, swelling of the hands, feet, or face, and/or nausea and vomiting <sup>9</sup>
Acute fatty liver of pregnancy	Usually presents after 30 weeks’ gestation but can be earlier. More common in multiple pregnancies. Severe nausea and vomiting, right upper quadrant pain, and anorexia. Abnormal liver function and hypoglycaemia (see Swansea criteria) <sup>40 41</sup>
Non-obstetric/gynaecological surgical causes	
Acute pancreatitis	In pregnancy: sudden onset upper abdominal pain, nausea and/or vomiting, anorexia, fever, and raised serum lipase or amylase levels <sup>63</sup>
Appendicitis	In pregnancy: may present with heartburn, constipation, diarrhoea, urinary symptoms, or general malaise. Right iliac fossa pain may or may not be present but the classic signs of rebound tenderness and guarding might be absent <sup>64</sup>

### How do you manage abdominal pain in primary care?

- Manage mild or moderate pain with simple analgesia initially.
- Urgently refer any severe pain to the obstetric team for diagnosis. If a surgical cause is suspected, referral to the surgical team is made by the obstetric team after obstetric assessment.

Box 5 lists red flag signs and symptoms associated with abdominal pain in pregnancy that warrant same day/urgent opinion from secondary care teams (general medicine, surgery, and/or obstetrics, dependent on local referral pathways).

#### Box 5: Abdominal pain: red flags

##### Symptoms

- Vaginal bleeding
- Constant or severe abdominal pain
- Green or foul smelling discharge
- Accompanying loss of fluid vaginally
- Prolonged moderate pain not settling with oral analgesia

##### Signs

- Syncope
- Any sign of sepsis
- Woody hard and tender uterus
- Guarding and/or rebound tenderness

### Statements of fitness in pregnancy

For women who experience common symptoms of pregnancy resulting from expected physiological changes, a fit note can improve the likelihood of continuous supportive employment during pregnancy. The fit note may allow for shared decision making in clinical settings and facilitate effective communication between employers and employees.<sup>65</sup> Consider issuing a fit note when there is a protracted period away from work or where symptoms potentially require modifications to be made to the work schedule or role.

## Fitness to work notes

- Consider symptoms, work roles, and potential modifications to schedules or roles
- Consider referral to occupational health for a “fit to work” assessment.
- Health and safety considerations during pregnancy:
  - Heavy lifting or carrying
  - Standing or sitting for long periods without adequate breaks
  - Exposure to toxic substances
  - Long working hours.
- In the UK, all pregnant employees have the right to
  - Paid time off for antenatal care (including appointments and recommended classes; partners are entitled to unpaid time off work for two antenatal appointments)
  - Maternity leave, maternity pay, or maternity allowance
  - Free dental treatment and NHS prescriptions (with a valid exemption certificate)
  - Protection against unfair treatment, discrimination, or dismissal.

### Good antenatal care: a woman's perspective

I recently delivered my daughter and am aware of how important good medical care during pregnancy is for women and their partners. For many women, as was the case for me, pregnancy, and the catalogue of experiences it brings, is a new and emotional event. As pregnancy is already a vulnerable time, I think it is key when things do get more complicated that the professionals caring for women are kind, confident, and competent.

I was lucky enough to have a positive experience most of the time. Both my GP and midwife were excellent. I always saw the same midwife throughout the course of my pregnancy. She was warm and kind and really provided expertise with the magic ingredients of empathy and compassion. I valued the continuity that the ongoing relationship brought. We built a rapport and bond and I looked forward to my appointments with an individual whose opinion I valued and trusted.

Also, where she thought it was necessary she advised me to go and see my GP. Although I was not always able to see my regular GP in person, I was able to speak to her on the phone when the need arose. As my pregnancy caused me a significant amount of nausea, vomiting, and general feelings of being unwell it was reassuring to be able to speak to my GP. My main question was always “Doctor, is the baby ok? Is everything ok with the pregnancy?”

The prospect of going up to the hospital “just in case” something serious was going on was a frightening one. I did on a couple of occasions have to do so and these experiences were not my ideal as the doctors, although they provided good care, were essentially strangers to me. My preference was always to have contact either with my midwife or GP. There is great comfort in being able to book in an appointment at your doctor's surgery and ask the people you know and trust for advice, especially when pregnant. I also had great confidence in my GP that when they did refer me up to the hospital team it was because they thought it was really necessary.

### Education into practice

- How would you reassure a woman with physiological symptoms of pregnancy?
- How would you reduce a woman's anxiety when referring her to secondary care?

### Search strategy

We searched PubMed using the following terms ((nausea and vomiting OR urinary symptoms OR abdominal pain OR breathlessness OR headache OR common symptoms) AND (pregnan\*[ti])). We used the Oxford Centre for Evidence Based Medicine Levels of Evidence to prioritise the best available evidence, beginning with relevant systematic reviews, and screened non-systematic reviews and evidence summaries for relevant citations.

### Useful websites for GPs

- Royal College of Obstetricians and Gynaecologists (RCOG) Green-top guidelines <https://www.rcog.org.uk/guidelines>
- National Institute for Health and Care Excellence (NICE) maternity guidelines <https://www.nice.org.uk>
- NICE clinical knowledge summaries—antenatal care <https://cks.nice.org.uk/antenatal-care-uncomplicated-pregnancy>
- Scottish Intercollegiate Guidelines Network (SIGN) <https://www.sign.ac.uk/index.html>
- UpToDate <https://www.uptodate.com/login>
- BMJ Learning <https://learning.bmj.com/learning/home.html>
- Royal College of GPs (RCGP) Learning: Maternal Health <https://elearning.rcgp.org.uk/course/view.php?id=234>

### Useful websites for patients

- <https://www.nhs.uk/conditions/pregnancy-and-baby/headaches-pregnant/> Advice on headaches in pregnancy
- [www.maternityaction.org.uk](http://www.maternityaction.org.uk) Advice on rights and benefits during pregnancy and maternity leave
- <https://www.citizensadvice.org.uk> Citizens advice
- <https://www.medicinesinpregnancy.org/> BUMPS (Best use of medicines in pregnancy)
- <https://www.rcog.org.uk/en/patients/patient-leaflets/> RCOG patient information leaflets
- <https://patient.info/pregnancy> General pregnancy advice
- <https://www.gov.uk/taking-sick-leave> Employee advice on taking sick leave

### How patients were involved in the creation of this article

One of the authors (RR) received antenatal care via her GP, midwife, and obstetrician during her pregnancy. She has been directly involved from the planning of the article to editing of the final version of the manuscript. She wrote the section entitled “Good antenatal care: a woman's perspective.”

This paper was also reviewed positively by external patient reviewers enlisted by *The BMJ*.

Competing interests *The BMJ* has judged that there are no disqualifying financial ties to commercial companies. The authors declare the following other interests: none.

Further details of *The BMJ* policy on financial interests are here: <https://www.bmj.com/about-bmj/re-sources-authors/forms-policies-and-checklists/declaration-competing-interests>

Provenance and peer review: commissioned; externally peer reviewed

- 1 Green LJ, Mackillop LH, Salvi D, et al. Gestation-specific vital sign reference ranges in pregnancy. *Obstet Gynecol* 2020;135:653-64. doi: 10.1097/AOG.0000000000003721 pmid: 32028507
- 2 Nelson-Piercy C. *Handbook of Obstetric Medicine*. 5th ed. CRC Press, 2015;doi: 10.1201/b18316
- 3 Martin SR, Foley MR. Approach to the pregnant patient with headache. *Clin Obstet Gynecol* 2005;48:2-11. doi: 10.1097/O1.grf.0000153208.93620.39 pmid: 15725852

- 4 Negro A, Delaruelle Z, Ivanova TA, et al. European Headache Federation School of Advanced Studies (EHF-SAS). Headache and pregnancy: a systematic review. *J Headache Pain* 2017;18:106. doi: 10.1186/s10194-017-0816-0 pmid: 29052046
- 5 Pearce CF, Hansen WF. Headache and neurological disease in pregnancy. *Clin Obstet Gynaecol* 2012;55:810-28. doi: 10.1097/GRF.0b013e31825d7b68 pmid: 22828113
- 6 Dixit A, Bhardwaj M, Sharma B. Headache in pregnancy: a nuisance or a new sense? *Obstet Gynaecol Int* 2012;2012. doi: 10.1155/2012/697697 pmid: 22518165
- 7 Robbins MS, Farmakidis C, Dayal AK, Lipton RB. Acute headache diagnosis in pregnant women: a hospital-based study. *Neurology* 2015;85:1024-30. doi: 10.1212/WNL.0000000000001954 pmid: 26291282
- 8 Royal College of Physicians. Acute care toolkit 15: Managing acute medical problems in pregnancy. 2019. <https://www.rcplondon.ac.uk/guidelines-policy/acute-care-toolkit-15-managing-acute-medical-problems-pregnancy>
- 9 Mol BWJ, Roberts CT, Thangaratnam S, Magee LA, de Groot CJM, Hofmeyr GJ. Pre-eclampsia. *Lancet* 2016;387:999-1011. doi: 10.1016/S0140-6736(15)00070-7 pmid: 26342729
- 10 Revell K. Headaches in pregnancy. *Obstet Gynaecol* 2014;16:179-84doi: 10.1111/tog.12101 .
- 11 Jarvis S, Dassan P, Piercy CN. Managing migraine in pregnancy. *BMJ* 2018;360:k80. doi: 10.1136/bmj.k80 pmid: 29371217
- 12 National Institute for Health and Care Excellence. Hypertension in pregnancy. <https://cks.nice.org.uk/hypertension-in-pregnancy>.
- 13 Allroggen H, Abbott RJ. Cerebral venous sinus thrombosis. *Postgrad Med J* 2000;76:12-5. doi: 10.1136/pmj.76.891.12 pmid: 10622773
- 14 Behrouzi R, Punter M. Diagnosis and management of cerebral venous thrombosis. *Clin Med (Lond)* 2018;18:75-9. doi: 10.7861/clinmedicine.18-1-75 pmid: 29436443
- 15 Sibai B, Dekker G, Kupferminc M. Pre-eclampsia. *Lancet* 2005;365:785-99. doi: 10.1016/S0140-6736(05)17987-2 pmid: 15733721
- 16 Flint J, Panchal S, Hurrell A, et al. BSR and BHPR Standards, Guidelines and Audit Working Group. BSR and BHPR guideline on prescribing drugs in pregnancy and breastfeeding-Part II: analgesics and other drugs used in rheumatology practice. *Rheumatology (Oxford)* 2016;55:1698-702. doi: 10.1093/rheumatology/kev405 pmid: 26750125
- 17 What is a high-risk pregnancy? <https://www.nichd.nih.gov/>. <https://www.nichd.nih.gov/health/topics/pregnancy/conditioninfo/high-risk> [This link doesn't work. Please could you check?]
- 18 Knight M, Nair M, Tuffnell D, et al. MBRRACE-UK. Saving lives, improving mothers' care—surveillance of maternal deaths in the UK 2013-15 and lessons learned to inform maternity care from the UK and Ireland. Confidential Enquiries into Maternal Deaths and Morbidity. 2017. <https://www.npeu.ox.ac.uk/downloads/files/mbrace-uk/reports/MBRRACE-UK%20Maternal%20Report%202017%20-%20Web.pdf>
- 19 Mitsikostas DD, Ashina M, Craven A, et al. EHF committee. European Headache Federation consensus on technical investigation for primary headache disorders. *J Headache Pain* 2015;17:5. doi: 10.1186/s10194-016-0596-y pmid: 26857820
- 20 Lee S-Y, Chien D-K, Huang C-H, Shih SC, Lee WC, Chang WH. Dyspnea in pregnancy. *Taiwan J Obstet Gynaecol* 2017;56:432-6. doi: 10.1016/j.tjog.2017.04.035 pmid: 28805596
- 21 Moore LG, McCullough RE, Weil JV. Increased HVR in pregnancy: relationship to hormonal and metabolic changes. *J Appl Physiol (1985)* 1987;62:158-63. doi: 10.1152/jappl.1987.62.1.158 pmid: 3104285
- 22 Milne JA, Howie AD, Pack AI. Dyspnoea during normal pregnancy. *Br J Obstet Gynaecol* 1978;85:260-3. doi: 10.1111/j.1471-0528.1978.tb10497.x pmid: 638094
- 23 Coad F, Nelson-Piercy C. Acute medical problems in pregnancy. *Br J Hosp Med (Lond)* 2018;79:571-7. doi: 10.12968/hmed.2018.79.10.571 pmid: 30290741
- 24 Heit JA, Kobbervig CE, James AH, Petterson TM, Bailey KR, Melton LJ 3rd. Trends in the incidence of venous thromboembolism during pregnancy or postpartum: a 30-year population-based study. *Ann Intern Med* 2005;143:697-706. doi: 10.7326/0003-4819-143-10-200511150-00006 pmid: 16287790
- 25 Sultan AA, West J, Tata LJ, Fleming KM, Nelson-Piercy C, Grainge MJ. Risk of first venous thromboembolism in and around pregnancy: a population-based cohort study. *Br J Haematol* 2012;156:366-73. doi: 10.1111/j.1365-2141.2011.08956.x pmid: 22145820
- 26 Silasi M, Cardenas J, Kwon J-Y, Racicot K, Aldo P, Mor G. Viral infections during pregnancy. *Am J Reprod Immunol* 2015;73:199-213. doi: 10.1111/aji.12355 pmid: 25582523
- 27 Schatz M. *Asthma and Immunological Diseases in Pregnancy and Early Infancy*. Taylor & Francis, 1997.
- 28 Källén B, Rydhstroem H, Aberg A. Asthma during pregnancy—a population based study. *Eur J Epidemiol* 2000;16:167-71. doi: 10.1023/A:1007678404911 pmid: 10845267
- 29 SIGN 158 British guideline on the management of asthma. <https://www.sign.ac.uk/sign-158-british-guideline-on-the-management-of-asthma>
- 30 Mehta N, Chen K, Hardy E, Powrie R. Respiratory disease in pregnancy. *Best Pract Res Clin Obstet Gynaecol* 2015;29:598-611. doi: 10.1016/j.bpobgyn.2015.04.005 pmid: 25997564
- 31 Treasure T, Hill J. NICE guidance on reducing the risk of venous thromboembolism in patients admitted to hospital. *J R Soc Med* 2010;103:210-2. doi: 10.1258/jrsm.2010.100086 pmid: 20513894
- 32 National Institute for Health and Care Excellence. Recommendations Sepsis: recognition, diagnosis and early management. 2017. <https://www.nice.org.uk/guidance/NG51/chapter/Recommendations>.
- 33 British Thoracic Society/Scottish Intercollegiate Guidelines Network. British guideline on the management of asthma. *Thorax* 2014;69(Suppl 1):1-192.pmid: 25323740
- 34 Legge A, Dodds L, MacDonald NE, Scott J, McNeil S. Rates and determinants of seasonal influenza vaccination in pregnancy and association with neonatal outcomes. *CMAJ* 2014;186:E157-64. doi: 10.1503/cmaj.130499 pmid: 24396098
- 35 Einarson TR, Piwko C, Koren G. Quantifying the global rates of nausea and vomiting of pregnancy: a meta analysis. *J Popul Ther Clin Pharmacol* 2013;20:e171-83.pmid: 23863575
- 36 Royal College College of Obstetricians and Gynaecologists. The management of nausea and vomiting of pregnancy and hyperemesis gravidarum: green-top guideline 69. 2016. <https://www.researchgate.net/file.PostFileLoader.html?id=59778590217e20f84b2e52e0&as-setKey=AS%3A520067659952128%401501005200623>
- 37 Niemeijer MN, Grooten IJ, Vos N, et al. Diagnostic markers for hyperemesis gravidarum: a systematic review and metaanalysis. *Am J Obstet Gynaecol* 2014;211:150e1-15.
- 38 Ebrahimi N, Maltepe C, Bourmisen FG, Koren G. Nausea and vomiting of pregnancy: using the 24-hour Pregnancy-Unique Quantification of Emesis (PUQE-24) scale. *J Obstet Gynaecol Can* 2009;31:803-7. doi: 10.1016/S1701-2163(16)34298-0 pmid: 19941704
- 39 Koren G, Boskovic R, Hard M, Maltepe C, Navioz Y, Einarson A. Motherisk-PUQE (pregnancy-unique quantification of emesis and nausea) scoring system for nausea and vomiting of pregnancy. *Am J Obstet Gynaecol* 2002;186(Suppl Understanding):S228-31. doi: 10.1067/mob.2002.123054 pmid: 12011891
- 40 Liu J, Ghaziani TT, Wolf JL. Acute fatty liver disease of pregnancy: updates in pathogenesis, diagnosis, and management. *Am J Gastroenterol* 2017;112:838-46. doi: 10.1038/ajg.2017.54 pmid: 28291236
- 41 Morton A, Laurie J. Physiological changes of pregnancy and the Swansea criteria in diagnosing acute fatty liver of pregnancy. *Obstet Med* 2018;11:126-31. doi: 10.1177/1753495X18759353 pmid: 30214478
- 42 McParlin C, O'Donnell A, Robson SC, et al. Treatments for hyperemesis gravidarum and nausea and vomiting in pregnancy: a systematic review. *JAMA* 2016;316:1392-401. doi: 10.1001/jama.2016.14337 pmid: 27701665
- 43 National Collaborating Centre for Women's and Children's Health (UK). *Antenatal Care: Routine Care for the Healthy Pregnant Woman*. RCOG Press, 2011.
- 44 Cutner A, Carey A, Cardozo L. Lower urinary tract symptoms in early pregnancy. *J Obstet Gynaecol* 1992;12:75-8doi: 10.3109/01443619209013599 .
- 45 Salick A, Tajammul A, Sheikh S, et al. Frequency of urinary symptoms in pregnancy. *Biomedica* 2005;21:22.
- 46 Collins S, Arulkumaran S, Hayes K, et al. *Oxford Handbook of Obstetrics and Gynaecology*. 3rd ed. OUP Oxford, 2013doi: 10.1093/med/9780199698400.001.0001 .
- 47 Kalinderi K, Delkos D, Kalinderis M, Athanasiadis A, Kalogiannidis I. Urinary tract infection during pregnancy: current concepts on a common multifaceted problem. *J Obstet Gynaecol* 2018;38:448-53. doi: 10.1080/01443615.2017.1370579 pmid: 29402148
- 48 Mazor-Dray E, Levy A, Schlaeffer F, Sheiner E. Maternal urinary tract infection: is it independently associated with adverse pregnancy outcome? *J Matern Fetal Neonatal Med* 2009;22:124-8. doi: 10.1080/14767050802488246 pmid: 19085630
- 49 CADTH. Routine urinalysis for low-risk pregnancies: clinical utility and guidelines. 2017. <https://www.cadth.ca/routine-urinalysis-low-risk-pregnancies-clinical-utility-and-guidelines-0>.
- 50 Köves B, Cai T, Veeratterapillay R, et al. Benefits and harms of treatment of asymptomatic bacteriuria: a systematic review and meta-analysis by the European Association of Urology Urological Infection Guidelines Panel. *Eur Urol* 2017;72:865-8. doi: 10.1016/j.euro.2017.07.014 pmid: 28754533
- 51 Public Health England. Management of infection guidance for primary care for consultation and local adaptation. Public Health England. 2010 [Is this the correct reference? <https://www.gov.uk/government/publications/managing-common-infections-guidance-for-primary-care>]
- 52 Widmer M, Lopez I, Gülmezoglu AM, et al. Duration of treatment for asymptomatic bacteriuria during pregnancy. *Cochrane Database Syst Rev* 2015. <https://pubmed.ncbi.nlm.nih.gov/22161364/>
- 53 Lumbiganon P, Villar J, Laopaiboon M, et al. World Health Organization Asymptomatic Bacteriuria Trial Group. One-day compared with 7-day nitrofurantoin for asymptomatic bacteriuria in pregnancy: a randomized controlled trial. *Obstet Gynaecol* 2009;113:339-45. doi: 10.1097/AOG.0b013e318195c2a2 pmid: 19155904
- 54 National Institute for Health and Care Excellence. Urinary tract infection (lower): antimicrobial prescribing. 2018. <https://www.nice.org.uk/guidance/ng109/chapter/recommendations>
- 55 Matuszkiewicz-Rowińska J, Malyszko J, Wieliczko M. Urinary tract infections in pregnancy: old and new unresolved diagnostic and therapeutic problems. *Arch Med Sci* 2015;11:67-77. doi: 10.5114/aoms.2013.39202 pmid: 25861291
- 56 BPAACNZ. Managing urinary tract infections in pregnancy. 2011. <https://bpac.org.nz/bpj/2011/april/pregnant-uti.aspx>
- 57 Devarajan S, Chandrarahan E. Abdominal pain in pregnancy: a rational approach to management. *Obstetrics, Gynaecol Reprod Med* 2011;21:198-206doi: 10.1016/j.ogrm.2011.04.001 .
- 58 Blakely SB. Abdominal pain in pregnancy. *JAMA* 1933;101:970-5doi: 10.1001/jama.1933.02740380006003 .
- 59 Jones D, Wilson J, Warnock NG, Alexander DJ. Abdominal pain in pregnancy. *BMJ* 2012;345. doi: 10.1136/bmj.e6818 pmid: 23077350
- 60 Woodfield CA, Lazarus E, Chen KC, Mayo-Smith WW. Abdominal pain in pregnancy: diagnoses and imaging unique to pregnancy—review. *AJR Am J Roentgenol* 2010;194(Suppl):WS14-30. doi: 10.2214/AJR.07.7139 pmid: 20489125

- 61 Melnick DM, Wahl WL, Dalton VK. Management of general surgical problems in the pregnant patient. *Am J Surg* 2004;187:170-80. doi: 10.1016/j.amjsurg.2003.11.023 pmid: 14769301
- 62 Mayer IE, Hussain H. Abdominal pain during pregnancy. *Gastroenterol Clin North Am* 1998;27:1-36. doi: 10.1016/S0889-8553(05)70346-0 pmid: 9546083
- 63 Ducarme G, Maire F, Chatel P, Luton D, Hammel P. Acute pancreatitis during pregnancy: a review. *J Perinatol* 2014;34:87-94. doi: 10.1038/jp.2013.161 pmid: 24355941
- 64 Weston P, Moroz P. Appendicitis in pregnancy: how to manage and whether to deliver. *Obstet Gynecol* 2015;17:105-10doi: 10.1111/tog.12188 .
- 65 UK Department for Work and Pensions. Fit note. 2018. <https://www.gov.uk/government/collections/fit-note>
- 66 Liang C-C, Chang S-D, Lin S-J, Lin YJ. Lower urinary tract symptoms in primiparous women before and during pregnancy. *Arch Gynecol Obstet* 2012;285:1205-10. doi: 10.1007/s00404-011-2124-2 pmid: 22042166