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Independent learning program for GPs

Unit 498 September 2013

Emergency presentations

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Emergency presentations

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The five domains of general practice
Communication skills and the patient-doctor relationship
Applied professional knowledge and skills
Population health and the context of general practice
Professional and ethical role
Organisational and legal dimensions

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RACGP

Emergencies are an every day occurrence in general practice. The breadth and depth of general practice means that we can see a child with tonsillitis, followed by a man with severe chest pain, then a repeat script for the pill and identify a newly diagnosed diabetic all in one day.

We need to be able to recognise the emergency, assess its severity and put in place a management plan in a relatively short time. In a limited resource environment this may also mean being responsible for managing the emergency until further help becomes available.

This unit of *check* looks at a variety of clinical emergencies including meningitis, ectopic pregnancy and anaphylaxis.

We would like to thank the authors for providing a wealth of information on emergency presentations in this unit of *check*.

The authors of this unit are:

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The reviewer of this unit is:

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The learning objectives are that by the end of this unit, participants will be able to:

- list the symptoms of anaphylaxis
- discuss the relationship between positive pregnancy tests, ultrasound and vaginal bleeding in the diagnosis of ectopic pregnancy
- demonstrate awareness of an appropriate management plan in meningococcal disease
- formulate a triage system to help identify emergency presentations in general practice appropriate for reception staff
- recognise emergencies presenting with abdominal pain.

We hope this edition of *check* will help you to manage emergency presentations of patients in your clinic.

Kind regards,

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GUIDE TO ABBREVIATIONS AND ACRONYMS IN THIS UNIT OF *CHECK*

ABC	airway, breathing and circulation	IgE	immunoglobulin E	PCR	polymerase chain reaction
βhCG	beta human chorionic gonadotropin	IM	intramuscular	PML	polymorph leucocyte
BP	blood pressure	IUP	intrauterine pregnancy	SpO_2	saturation of peripheral oxygen
		IV	intravenous	TVS	transvaginal ultrasound

CASE 1

ELINOR HAS VAGINAL BLEEDING

Elinor, aged 27 years, is a single woman who presents with a 3-day history of intermittent cramping lower abdominal pain and mild constipation. She is feeling mildly nauseated and anorexic. She has not travelled overseas recently and the rest of her family are well. She can't remember when she had her last period. She noticed some vaginal bleeding this morning and wonders if this is her period. She is otherwise well and uses no medicine, or over the counter or illicit drugs.

QUESTION 1

What examination and investigations would you perform?

QUESTION 2

What is the probability diagnosis and what serious diagnoses should not be missed?

FURTHER INFORMATION

On examination, Elinor is comfortable and in no obvious pain. She is afebrile and haemodynamically stable. Her urine pregnancy test is positive. She has mild general lower abdominal tenderness with no rebound tenderness and no masses. The uterus is bulky but pelvic examination is otherwise normal. On speculum examination the cervix is closed with a moderate amount of bright blood at the cervix. No products of conception are visible.

QUESTION 3

How would you manage Elinor?

FURTHER INFORMATION

You order the investigations and review Elinor that afternoon. The trans-vaginal ultrasound (TVS) and does not show any contents in the uterus, adnexal masses or fluid in the pouch of Douglas. The beta human chorionic gonadotropin (βhCG) level is 1800 IU/L and her blood group is A negative with no antibodies. The urine chlamydia polymerase chain reaction (PCR) result is pending.

QUESTION 4

Given the above findings, how would you manage Elinor?

FURTHER INFORMATION

You review Elinor's βhCG and TVS in 2 days. The βhCG level has now risen to 2100 IU/L and there are still no relevant ultrasound findings.

QUESTION 5

What is your diagnosis and management?

QUESTION 6

What is the significance of Elinor's Rhesus negative blood group?

CASE 1 ANSWERS

ANSWER 1

Elinor needs to have her vital signs assessed. It is important to observe how unwell she is as well as her level of abdominal discomfort. It is essential that she has a urine pregnancy test performed during the consultation as this will guide the remainder of your examination. Examine her abdomen for tenderness, rebound tenderness and masses.

Investigations to order include a full blood evaluation (FBE) and urine screen.

If the pregnancy test is positive, she requires a:

- bimanual examination, looking for the size of the uterus, adnexal masses and tenderness, and cervical motion tenderness
- speculum examination to see if the cervix is inflamed, open or closed, and to assess the site and amount of bleeding and if there are any potential products of conception visible.

ANSWER 2

Elinor is well, afebrile and has normal vital signs. If she has a negative pregnancy test, the probability diagnosis is constipation or dysmenorrhoea. However, it is important to exclude pregnancy and in particular ectopic pregnancy. Pelvic inflammatory disease and appendicitis are also important to exclude.

If Elinor's pregnancy test is positive, she could have an ectopic pregnancy, be miscarrying or be experiencing a threatened miscarriage (ongoing pregnancy).

The trio of abdominal pain, amenorrhoea and vaginal bleeding are the classic symptoms of ectopic pregnancy and should be suspected in any women of reproductive age with these symptoms. Ectopic pregnancy can also be asymptomatic or present with shock or collapse.[1]

ANSWER 3

Given the positive pregnancy test, abdominal pain and vaginal bleeding, the differential diagnosis is related to pregnancy – that is, ectopic pregnancy, miscarriage or threatened miscarriage (see *Figure 1*).[2]

If Elinor had shown any signs of haemodynamic instability, acute abdomen, adnexal mass, or pain or tenderness on examination, she would need to be resuscitated with fluid and transferred immediately to an emergency department. The signs could indicate either intraperitoneal haemorrhage or ectopic pregnancy rupture, and these can be associated with morbidity and mortality.[3]

As Elinor has none of these signs, management at this stage can continue to occur in the community.

Elinor needs to be made aware of the differential diagnoses and the potential serious nature of these diagnoses. She needs to be reviewed promptly if she has new or worsening symptoms.

Elinor requires a TVS with a review later in the day or the following day; she also requires a quantitative βhCG and a blood group and

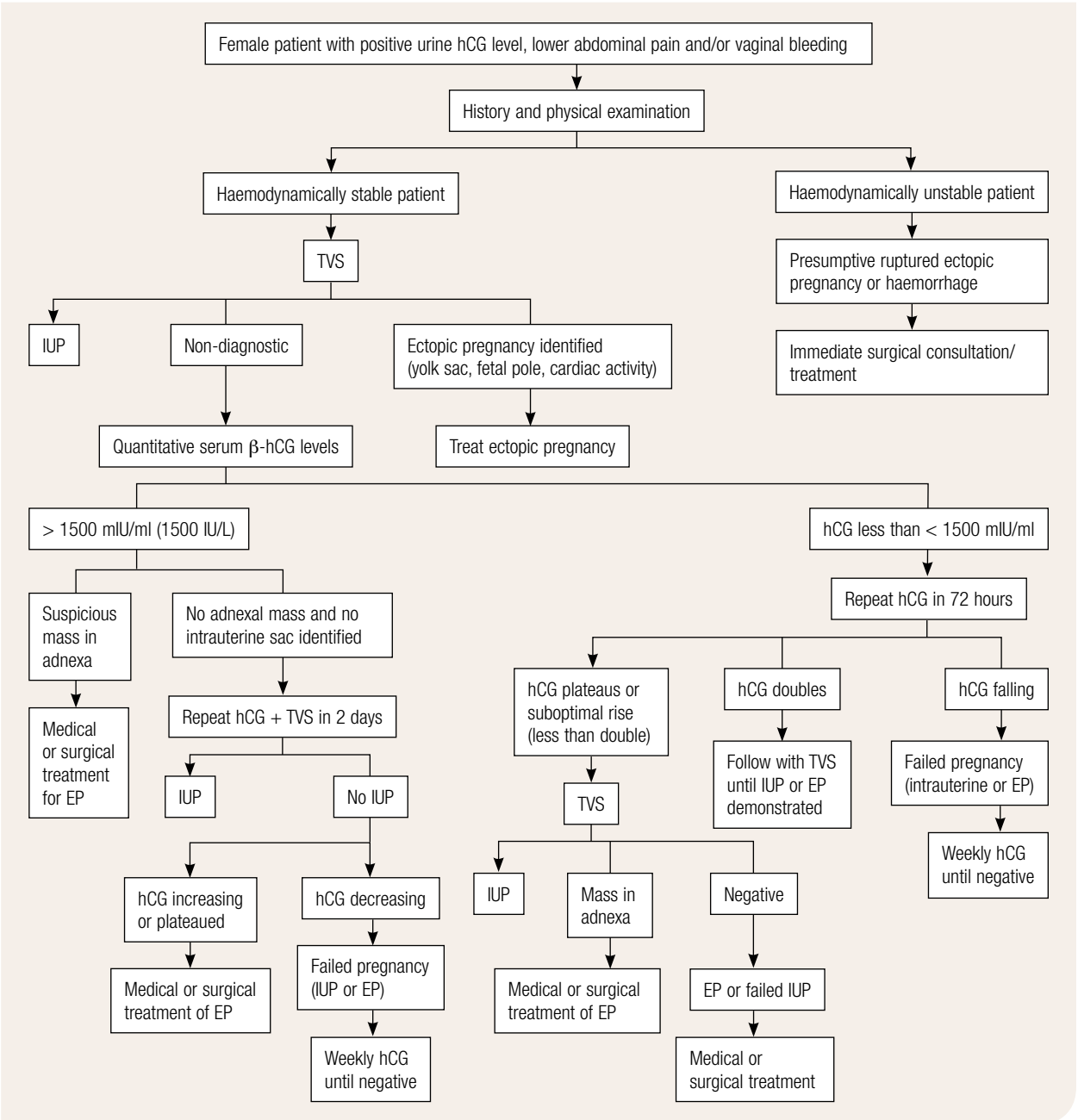

Figure 1. Management of female patient with positive urine hCG level, lower abdominal pain and/or vaginal bleeding. EP: ectopic pregnancy; IUP: intrauterine pregnancy; TVS: transvaginal ultrasound; hCG: human chorionic gonadotropin. Reproduced with permission from: Tulandi T. Clinical manifestations, diagnosis, and management of ectopic pregnancy. In: UpToDate, Basow DS (Ed), UpToDate, Waltham, MA 2013. Copyright © 2013 UpToDate, Inc. For more information visit www.uptodate.com.

antibody screen. Chlamydia testing is a recommended screening test in this age group (under 30 years) and can be considered as an opportunistic investigation.[4]

ANSWER 4

Based on a TVS result, bleeding in early pregnancy suggests three possibilities:[5,6]

1. **TVS is suggestive of an ectopic pregnancy**. Findings that are definite are an extra-uterine embryo, which is seen in 15–20% of ectopic pregnancies. Strongly suggestive findings include free pelvic/intraperitoneal fluid, tubal ring and a complex adnexal mass. In these cases, the woman requires immediate referral for hospital care for treatment of ectopic pregnancy.
2. **TVS shows an intrauterine pregnancy (IUP) and there is no concern for heterotopic pregnancy**. TVS may reveal normal findings confirming an IUP, and so ectopic pregnancy is likely to be excluded. In this case, evaluation for miscarriage should be undertaken. It is important to note that an ectopic pregnancy may

be mistakenly excluded in the case of heterotopic pregnancy (a combined intrauterine and ectopic pregnancy, which is rare except among women conceiving through assisted reproduction) and pseudosacs (false sacs that can be confused with gestational sacs; they occur in 10–20% of ectopic pregnancies).

3. **TVS is indeterminate, showing signs of neither an ectopic pregnancy or IUP**. In this case, the diagnosis or exclusion of ectopic pregnancy is less certain.

   Elinor's TVS is classified as 'indeterminate' as her TVS shows no signs of either an ectopic pregnancy or IUP. In this situation the βhCG level is used to classify the ultrasound results further into a 'non-diagnostic' or an 'abnormal pregnancy'.[5,6] This is done by comparing the βhCG level to the discriminatory zone. The discriminatory zone is the βhCG level above which a gestational sac is usually identified by an expert ultrasonographer on TVS if an IUP is present. It is usually 1500 to 2000 IU/L (with the level being much higher, at about 6500 IU/L, with transabdominal ultrasound).[7,8] The discriminatory zone is dependent upon a number of factors, including the skill of the ultrasonographer, the ultrasound equipment used, physical factors (such as fibroids, multiple gestation, obesity), and the βhCG assay used.[7,8]

   An *abnormal pregnancy* is where there is an indeterminate TVS and a βhCG above the discriminatory zone. It is strongly suggestive of ectopic pregnancy or recent spontaneous miscarriage.[3,9] However, since there is no proven discriminatory level for multiple gestations, it may represent a multiple gestation. Very careful follow-up is therefore needed in an abnormal pregnancy because of a high likelihood of ectopic pregnancy.[3] Depending on the clinical situation and the clinical suspicion of ectopic pregnancy, this may require referral to an emergency setting, follow-up at an early pregnancy assessment service or follow-up in the community by a GP.

   A *non-diagnostic pregnancy* is where there is an indeterminate TVS and a βhCG level below the discriminatory zone. It is consistent with an early viable IUP, a non-viable IUP (e.g. recent miscarriage) or an ectopic pregnancy (which is ultimately diagnosed in 8–40% of these cases[9]). In this case, if the patient is clinically well, the βhCG needs to be repeated in 48–72 hours and serially with a repeat TVS if the βhCG rises above the discriminatory zone.[3]

   - A falling βhCG supports a failed pregnancy. In this case, if clinically appropriate, βhCG levels should be undertaken weekly until negative for pregnancy.
   - A doubling of βhCG supports a developing IUP. In this case, if clinically appropriate, the βhCG should be followed until an IUP is visible on TVS.
   - A βhCG that plateaus or has a suboptimal rise suggests an ectopic pregnancy and the woman should be immediately transferred to a hospital setting for management of possible ectopic pregnancy.

   However, a normal rise of βhCG may be seen in up to 15% of ectopic pregnancies and an abnormal rise may be seen in 15% of IUPs.[10]

Therefore, if the TVS is indeterminate (either abnormal or non-diagnostic), careful assessment and follow-up is required as an ectopic pregnancy is not excluded until location is identified or complete miscarriage confirmed.[3,9]

For Elinor, the lack of a gestational sac in the uterus with a βhCG level above the discriminatory zone supports a likely ectopic pregnancy. Other possibilities include multiple pregnancy and a non-viable pregnancy (e.g. a recent miscarriage).

If your clinical suspicion of an ectopic pregnancy is high, you should transfer Elinor to an emergency setting; however, as Elinor is clinically well, it is reasonable to repeat a TVS and quantitative βhCG in 2 days. As before, Elinor needs to be fully aware of and agree with the management plan and know what to do in the case of new or worsening symptoms.

ANSWER 5

The continued lack of a gestational sac in the uterus with a slowly rising βhCG level above the discriminatory zone supports the diagnosis of an ectopic pregnancy. Elinor needs to be immediately transferred for hospital care for treatment of an ectopic pregnancy.

The standard approach for serial βhCG is looking for a rise of at least 63% over 48 hours, which is considered normal for a viable IUP (although this does not exclude the possibility of ectopic pregnancy).[10] Elinor's βhCG showed a rise of only 16%.

ANSWER 6

Elinor has an ectopic pregnancy and because her blood group is Rhesus negative with no preformed antibodies, she will require prophylactic anti-D immunoglobulin. For women with Rhesus negative blood group with no preformed antibodies, prophylactic anti-D immunoglobulin is routinely offered at 28 and 34 weeks gestation and postpartum if the baby is Rhesus positive.

FEEDBACK

In addition, prophylactic anti-D immunoglobulin is offered for:

- **1st trimester (<12 weeks) potential sensitising events – including ectopic pregnancy, termination of pregnancy, miscarriage and chorionic villus sampling**
- **2nd and 3rd trimester (from 12 weeks gestation onwards) potential sensitising events – including vaginal bleeding, obstetric haemorrhage, amniocentesis and cordocentesis, external cephalic version (whether successful or not), abdominal trauma, and any other suspected intra-uterine bleeding or sensitising event.**

There is insufficient evidence to suggest that a threatened miscarriage before 12 weeks gestation necessitates anti-D.[11]

CASE 2

LUCAS HAS A FEVER AND IS VOMITING

Lucas, aged 8 months, is brought in by his mother, Linda, with fever and vomiting for the past few hours. He was born at term by a normal vaginal delivery after an uneventful pregnancy, and has been a healthy and happy child, with no significant illnesses up until now. He has been followed regularly by a maternal and child health nurse, and is up to date with his vaccinations.

Linda states that Lucas woke up crying at around 7 am this morning. He felt hot, had vomited once and was floppy to hold. He was given a dose of ibuprofen by his mother, who then brought him to your clinic to be seen as an emergency appointment. He had been well the previous day and had fallen asleep normally with his usual bedtime routine. There is no history of upper respiratory tract infection symptoms and no diarrhoea. His family has not travelled overseas recently and no other member of the household has been ill.

On examination Lucas appears drowsy and is moaning continuously. There is no neck stiffness. His temperature is 39.2 °C, respiratory rate is 40, heart rate is 180 and blood pressure 80/50 mmHg. His airway appears patent and there is no stridor; auscultation of his lungs reveals good air entry bilaterally with no crackles or wheezing. Capillary refill is less than 2 seconds, and you note a diffuse maculopapular rash with several non-blanching lesions (petechiae) on the extremities (see *Figure 2*). His anterior fontanelle is not bulging.

Figure 2. Rash on Lucas's leg. Reproduced with permission from Meningitis Research Foundation.

QUESTION 1

What illnesses may be associated with a petechial rash?

QUESTION 2

What is your diagnosis?

QUESTION 3

What is your immediate management?

QUESTION 4

Which antibiotics would you consider and via which route of administration?

FURTHER INFORMATION

Lucas is transported by ambulance to the nearest hospital emergency department with paediatric facilities. Lumbar puncture is performed using appropriate precautions, and the results are indicative of bacterial meningitis.

QUESTION 5

What further management is indicated?

FURTHER INFORMATION

Lucas remains in hospital and improves significantly over the next 48 hours. Cerebrospinal fluid and blood cultures grow *Neisseria meningitidis*.

QUESTION 6

What further measures should be taken?

CASE 2 ANSWERS

ANSWER 1

Several illnesses can present with fever and petechiae or purpura, including viral infections such as enterovirus and bacterial infections caused by *N. meningitidis*, *Streptococcus pneumoniae* and *Haemophilus influenzae*.[12] Non-infectious causes of a purpuric rash include Henoch–Schönlein purpura, idiopathic thrombocytopenic purpura and leukaemia.[13] Petechiae around the head and neck may be caused by vomiting or coughing.

ANSWER 2

Lucas is clearly unwell, with fever, decreased tone and an altered level of consciousness. In this setting the diagnosis of acute meningococcal disease must be considered, and appropriate treatment instituted.

ANSWER 3

Immediate management starts with assessment of airway, breathing and circulation (ABCs). Lucas is moaning continuously, with no stridor and good air entry noted on auscultation. He is warm and well perfused with capillary refill of less than 2 seconds and a blood pressure in the normal range for his age. His ABCs thus appear intact. However, there is the potential for rapid deterioration in this setting, and he should be re-evaluated frequently.

Oxygen should be administered to Lucas and intravenous (IV) access obtained for the possibility of fluid resuscitation and administration of antibiotics. Blood cultures should also be taken when obtaining IV access, if possible. Obtaining IV access may be difficult due to hypotension and/or inexperience of the doctor. Intra-osseous access may be considered if the doctor is experienced.

If fluid resuscitation is deemed necessary, an initial bolus of 20 mL/kg of normal saline should be administered, with frequent reassessment of perfusion and the administration of additional boluses up to a total of 60 mL/kg if signs of hypoperfusion persist.[14]

Early contact with emergency services to arrange urgent hospital transfer is essential. Communication with paediatric critical care services is necessary to discuss management and to assist with hospital transfer if necessary.

ANSWER 4

Antibiotics should be administered to Lucas as soon as possible and before hospital transfer. Current recommendations[15] are for the administration of cefotaxime 50 mg/kg, the reason being that even though meningococcal isolates in Australia remain sensitive to treatment with penicillins,[16] it is not possible to immediately distinguish between disease caused by *N. meningitidis* and disease caused by other invasive bacterial pathogens, such as *S. pneumoniae*. Other third-generation cephalosporins such as ceftriaxone may be used. In the presence of previous anaphylactic reactions to cephalosporins, chloramphenicol is recommended.

The preferred route of antibiotic administration is IV. If IV or intra-osseous access cannot be obtained, the antibiotic may be administered via the intramuscular route, although this is not ideal as decreased perfusion in the setting of shock may limit absorption. It is, however, preferable to not giving any antibiotic.

ANSWER 5

Cefotaxime should be continued at the dose of 50 mg/kg IV every 6 hours. In addition, current evidence supports the use of steroids to reduce the risk of hearing loss and reduce cerebral oedema in bacterial meningitis.[17] Commence dexamethasone 0.15 mg/kg IV, before or shortly after the first dose of antibiotic, and continue for 4 days.

ANSWER 6

Meningococcal disease requires notification, and the department of public health needs to be contacted as soon as possible. Close contacts of the patient require chemoprophylaxis, as soon as possible, with rifampicin, ceftriaxone or ciprofloxacin. Close contacts include family members, childcare contacts and travel contacts (e.g. on a long plane flight), although exposure needs to have been prolonged and in the 7 days preceding the onset of the illness.[18] All unvaccinated household contacts should be offered information on meningococcal vaccination with the appropriate vaccine.

CASE 3

OSCAR PRESENTS WITH A RASH

Oscar, aged 18 months, is brought in urgently by his mother, Amanda, who is concerned about an itchy raised rash that appeared on Oscar's face and body this afternoon, shortly after Oscar ate lunch.

FURTHER INFORMATION

Over the next 5–10 minutes Oscar developed a hoarse, croaky voice and an intermittent cough. Amanda rushed him to your clinic by car. His voice has continued to sound hoarse during the 2-minute drive to the clinic, and he had a large vomit in the car.

QUESTION 1

What are the key features to elicit in your focused history and examination for Oscar with regard to an allergic response?

FURTHER INFORMATION

Oscar has been well in the last few days. He had an uneventful morning playing inside. For lunch today, Amanda gave Oscar a peanut butter sandwich and an apple. He then developed respiratory symptoms with a hoarse, croaky voice. This was the first time Oscar had eaten peanut butter. Amanda is unsure about previous exposure to peanuts.

Oscar ate half of his sandwich and 5 minutes later started to develop an urticarial rash, which was initially on his face but then spread to his torso and limbs.

On examination, Oscar is alert but distressed. He has an intermittent dry cough and his voice sounds hoarse. His heart rate is 150 beats/min, respiratory rate is 36 breaths/min, saturation of peripheral oxygen (SpO_2) is 97% and blood pressure (BP) is 90/60 mmHg. On respiratory examination Oscar has a mild increased work of breathing and an expiratory wheeze on auscultation. He has an urticarial rash on his face, torso and limbs that appears intensely pruritic. His mother estimates Oscar's weight is approximately 12 kg.

QUESTION 2

What are the immediate management priorities for Oscar?

FURTHER INFORMATION

You transfer Oscar to a treatment room and administer 0.12 mL of 1:1000 adrenaline via intramuscular (IM) injection. You administer supplemental oxygen and call an ambulance. Five minutes after administration of intramuscular adrenaline you reassess Oscar. His heart rate is 165 beats/min, SpO_2 99% and BP 95/65 mmHg. He is alert but distressed and crying. According to Oscar's mother, his voice has returned to normal. His cough appears to be settling and on auscultation he has a clear chest.

QUESTION 3

While waiting for the ambulance to arrive, what further management could you provide for Oscar?

QUESTION 4

Amanda asks you to explain why he needs to go to hospital when he is so much improved, and what will happen while he is in hospital. How would you respond to her question?

FURTHER INFORMATION

Oscar is taken by ambulance to the local hospital where he is admitted to a general paediatric ward. He has an uneventful admission and is discharged home after an observation period of 6 hours.

QUESTION 5

What is the likely management plan for Oscar following discharge from the hospital?

QUESTION 6

Twelve months later, Amanda brings Oscar's younger sibling, Isabelle, for review. Isabelle is aged 10 months and Amanda is concerned about introducing peanut into her diet given Oscar's history of peanut anaphylaxis. How would you counsel Amanda?

CASE 3 ANSWERS

ANSWER 1

The diagnosis of an immunoglobulin E (IgE)–mediated food allergy requires a detailed medical history and physical examination. This history should include identification of potential causal food(s) ingested, the form in which this was ingested (e.g. raw or cooked), the amount ingested and the time to progression of symptoms.[19] Typically, symptoms and signs of an IgE-mediated, acute food-induced allergic reaction occur within minutes to 1–2 hours of exposure to the allergen, and can involve four target organs – the skin (e.g. erythema, pruritus, urticaria, angioedema), gastrointestinal tract (e.g. oral pruritus, colicky abdominal pain, vomiting, diarrhoea), upper respiratory system (e.g. nasal congestion, rhinorrhoea, sneezing) and/or lower respiratory system (e.g. laryngeal oedema, hoarseness, persistent cough, chest tightness, dyspnoea, wheezing, accessory muscle use) and cardiovascular system (e.g. pallor and drowsiness [in infants and young children], tachycardia, hypotension, dizziness, collapse, loss of consciousness).[20] It is important to establish the severity of a reaction(s), with particular emphasis on identifying patients who have experienced anaphylaxis, which is the most severe form of an acute IgE-mediated allergic reaction. Anaphylaxis is defined as:

> any acute onset illness with typical skin features (urticarial rash or erythema/flushing, and/or angioedema), PLUS involvement of respiratory and/or cardiovascular and/or persistent severe gastrointestinal symptoms OR any acute onset of hypotension or bronchospasm or upper airway obstruction where anaphylaxis is considered possible, even if typical skin features are not present.[21]

Additional history should be sought to evaluate relevant differential diagnoses, depending on the presenting symptoms and signs (e.g. idiopathic urticaria, isolated angioedema).

In a child with a suspected acute allergic reaction, physical examination should begin with a rapid assessment of the child's airway, breathing and circulation.[22] Evaluation of a child's or infant's level of consciousness and mental state should also be performed as circulatory compromise in this age group may initially present as pallor and drowsiness, rather than hypotension.

FEEDBACK

Once the patient is stabilised, additional relevant history would include a dietary history, personal history of atopy (e.g. eczema, asthma) and current management of these. Family history, with particular reference to a history of atopy, should also be sought.

ANSWER 2

Anaphylaxis is a medical emergency and prompt initiation of therapy is essential. IM adrenaline injected into the upper anterolateral thigh is the first-line management at a recommended dose of 0.01 mL/kg (0.01 mg/kg) of a 1:1000 solution, up to a maximum of 0.5 mL (0.5 mg).[20] Adrenaline is readily metabolised and its effects may be shortlived. In up to 20% of patients, repeat doses of adrenaline may be required every 5–10 minutes for symptoms that do not improve or resolve with a single dose.[20] Intravenous administration of adrenaline is not recommended for the initial management of anaphylaxis and, if it is required, it should be provided in a setting where invasive monitoring and specialist support is available (e.g. intensive care unit).[22]

As changing to an upright posture has been associated with sudden death in adult patients with anaphylaxis, Oscar, with suspected anaphylaxis, should *not* be asked to stand or walk and should, if possible, be managed in a supine position with his legs elevated.[19,23]

Delayed administration of adrenaline is associated with increased morbidity and mortality in patients with anaphylaxis and other pharmacologic agents should be used as adjunctive therapy only.[20,24]

ANSWER 3

IM adrenaline is the first-line treatment for anaphylaxis, which has already been given. However, adjunctive therapies may be used as second-line management.

- **Oxygen**: Supplemental oxygen is recommended in patients with anaphylaxis, particularly if there is evidence of respiratory distress and/or hypoxaemia.[20,22] You have already given this.
- **Antihistamines**: Antihistamines may be used for the relief of the cutaneous symptoms (e.g. urticaria, erythema) and localised upper respiratory tract symptoms (e.g. rhinorrhoea, sneezing) that are commonly present in patients with anaphylaxis.[22] The mechanism of action of antihistamines does not prevent or relieve airway obstruction or hypotensive shock, so antihistamines should not be used as initial management.[22,25]
- **Corticosteroids**: Although there is limited evidence to support the use of glucocorticoids in the management of anaphylaxis, these medications are commonly prescribed to prevent biphasic (late-phase) or protracted reactions.[20, 26]
- **Beta-agonists (e.g. salbutamol)**: Inhaled or nebulised beta$_2$-adrenergic agonists may be used as additional therapy in patients with wheeze and shortness of breath as an adjunct to IM adrenaline. If airway symptoms are persistent following initial treatment with IM adrenaline, repeat administration of IM adrenaline is indicated.[22]
- **IV volume expanders**: For severe cases.

ANSWER 4

You explain to Amanda that patients who receive adrenaline for the management of acute food-induced anaphylaxis require observation in a hospital setting because of the risk of biphasic (late-phase) reactions that can occur in up to 20% of patients.[27,28] Oscar will be monitored for the recurrence of symptoms, which may require additional treatment. The majority of patients will be observed for 4–6 hours before discharge.[19]

ANSWER 5

Oscar will be discharged home with an 'anaphylaxis action plan' outlining the emergency management of subsequent reactions and a prescription for two adrenaline auto-injectors. Prior to discharge, Oscar's parents will also receive counselling regarding the avoidance of the causal food and the introduction of other food into his diet. Oscar will be referred to an allergy specialist to enable confirmation of the diagnosis and to optimise the long-term management of anaphylaxis. In some instances, a dietitian referral may be appropriate to assist with ongoing education regarding avoidance of the causal food and management of high-risk situations (e.g. parties outside the home).

ANSWER 6

The Australasian Society of Clinical Immunology and Allergy has produced a position statement, *Allergy prevention in children and infant feeding advice*, based on relevant evidence available in the literature (see Resources). These guidelines recommend the introduction of complementary solid foods from 4–6 months of age (including the allergenic foods, such as peanut and egg). Previous recommendations to delay introduction of potentially allergenic foods (e.g. peanuts) have been withdrawn, including in infants with siblings who have a known allergy to these foods and infants with other established allergic disease, such as eczema.

CASE 4

DAVID IS UNWELL AND HAS ABDOMINAL PAIN

You are called to the home of David, aged 56 years, by his neighbours, who are concerned that he is unwell. He has been confused and there has been deterioration in his self-care. When you see him, he complains of abdominal pain.

You know from his past history that he is an alcoholic and a heavy smoker.

You suspect that David might have underlying chronic liver disease.

Figure 3. Spider naevi. Reproduced with permission from Department Klinische Forschung. Available at www.ikp.unibe.ch/lab2/ppnew/pp6/etoh_files/slide0017_image003.gif.

QUESTION 1

What stigmata of chronic liver disease can be looked for on physical examination?

Figure 4. Palmar erythema. Reproduced from the Journal of Online Hepatology, 22 March 2012, Pathology: palmar erythema. Available at http://thebileflow.wordpress.com/2012/03/22/pathology-palmar-erythema Copyright Elsevier.

FURTHER INFORMATION

From the practice records you can see David has a 30-year history of alcoholism. He has chronic liver disease with Child–Pugh C cirrhosis, is hepatitis C positive, has alcoholic cardiomyopathy and has had banding of varices. His medications include lactulose, frusemide, spironolactone and bisoprolol.

He is a heavy smoker. He is divorced and lives in his own apartment. He has previously worked as an architect but has not been able to work for the last 10 years.

On examination David is an unkempt man appearing older than his years. His temperature is 38 °C, pulse rate 110, BP 105/70 mmHg and respiratory rate 22. He has dry mucous membranes.

David has multiple spider naevi on his chest (*Figure 3)* and arms, palmar erythema (*Figure 4*), leuconychia (white nails) and gynaecomastia. He appears confused and you note a hepatic flap.

On examination of his abdomen he has a caput medusa, a soft large distended abdomen and generalised abdominal tenderness with no guarding; bowel sounds are present. On rectal examination there are no masses, and there is normal stool colour.

QUESTION 2

What is the differential diagnosis for David's abdominal pain?

QUESTION 3

In a patient with advanced cirrhosis and abdominal pain, which potentially fatal diagnosis should be considered?

QUESTION 4

What could be the cause of David's confusion?

FUTHER INFORMATION

David's test results are shown in *Table 1*. The chest X-ray shows small bi-basal pleural effusions. Urinalysis shows no abnormalities. Ascitic fluid analysis shows white cell count of 700 cells/mm^3; red blood count of 50 cells/mm^3; and organisms: gram negative rods seen.

Table 1. David's results

	Result	Normal reference interval
Haemoglobin	110 g/L	130–180 g/L
White cell count	14 x 109/L	4–11 x 109/L
Platelet count	100 x 109/L	150–400 x 109/L
Sodium	130 mmol/L	135–145 mmol/L
Potassium	5.0 mmol/L	3.5–5.2 mmol/L
Chloride	102 mmol/L	95–110 mmol/L
Bicarbonate	24 mmol/L	22–30 mmol/L
Urea	14 mmol/L	3.5–8.5 mmol/L
Creatinine	170 µmol/L	60–110 µmol/L
Bilirubin	34 µmol/L	3–20 µmol/L
Alkaline phosphatase (ALP)	40 U/L	30–110 U/L
Gamma-glutamyl transferase (GGT)	156 U/L	10–50 U/L
Alanine transaminase (ALT)	88 U/L	5–40 U/L
Aspartate transaminase (AST)	78 U/L	5–40 U/L
Total protein	52 g/L	64–79 g/L
Albumin	27 g/L	35–48 g/L
Lipase	70 U/L	7–60 U
international normalised ratio (INR)	1.8	0.8–1.2
Activated partial thromboplastin time (APTT)	29 seconds	26–40 seconds

QUESTION 5

David is transferred to the emergency department, where some investigations are initiated to elucidate the aetiology of his abdominal pain. Which investigations should be performed?

QUESTION 6

What are the key management issues for David?

CASE 4 ANSWERS

ANSWER 1

Stigmata of chronic liver disease that can be looked for on physical examination are:

- spider naevi (greater than 3)
- palmar erythema
- leuconychia
- Dupuytren contracture
- gynaecomastia
- testicular atrophy
- caput medusa
- ascites
- foetor hepaticus
- jaundice
- asterixis (liver flap)
- loss of body hair.

ANSWER 2

The differential diagnoses of David's condition are:

- spontaneous bacterial peritonitis
- peptic ulcer disease
- gastritis
- pancreatitis
- diverticulitis
- perforated viscus
- gastro-oesophageal reflux disease
- appendicitis
- bowel ischaemia
- bleeding hepatomas.

ANSWER 3

The potentially fatal disease that should be considered in David is spontaneous bacterial peritonitis.

Spontaneous bacterial peritonitis is defined as an ascitic fluid infection without an evident intra-abdominal surgically treatable source. It primarily occurs in patients with advanced cirrhosis.[29] It must be differentiated from a surgically treatable cause of secondary peritonitis. The mortality rate from a single episode of spontaneous bacterial peritonitis has been estimated as 10–46%.[30] It is a condition that can be overlooked, especially in the patient presenting with other diagnoses such as gastrointestinal bleeding or, much less commonly, hepatic encephalopathy.

Spontaneous bacterial peritonitis usually occurs in patients with advanced cirrhosis who have established large-volume, clinically

detectable ascites. Typical presenting symptoms include fever, abdominal pain, confusion and haemodynamic instability. Fever can be low grade as patients with advanced cirrhosis may have a baseline hypothermia. Abdominal pain and abdominal signs are typically less pronounced than patients with peritonitis from a surgical cause. The separation of the peritoneal surfaces by large volume ascitic fluid prevents the development of a rigid abdomen.

The pathogenesis is thought to be multifactorial. Factors are bacterial translocation from the gut to the mesenteric nodes and from there to the bloodstream, reduced function of the hepatic reticulo-endothelial phagocytic system and decreased antimicrobial activity of the ascitic fluid.[31]

Early diagnosis and treatment improves mortality. Renal impairment develops in approximately one-third of patients, probably due to a further reduction in effective blood volume.[32] Patients who have delayed diagnosis subsequently develop septic shock are unlikely to survive.

ANSWER 4

A large proportion of patients with spontaneous bacterial peritonitis display altered mental status. This may be a subtle deterioration only detected by people who know the patient well. The alteration in mental status may be a result of hepatic encephalopathy or simply due to the presence of infection.

Other potential causes of confusion in David are:

- head trauma
- intracranial event
- Wernicke encephalopathy
- alcohol withdrawal
- electrolyte disturbance.

ANSWER 5

Investigations for David at this stage are full blood examination; urea, electrolytes, creatinine; liver function test, coagulation studies; chest X-ray; blood cultures; and ascitic fluid analysis.

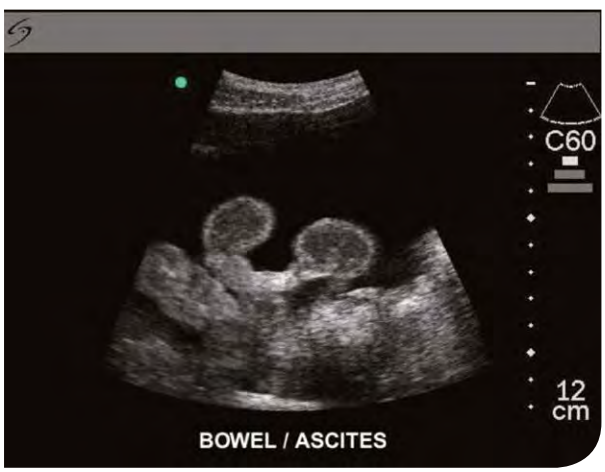

Figure 5. Ultrasound of abdomen showing ascites (the dark area above the loops of bowel). Reproduced with permission from Anaesthesia UK. Available at www.frca.co.uk/article.aspx?articleid=100019.

A low threshold for performing an abdominal paracentesis is essential for early diagnosis and treatment.[30] An ascitic tap should be performed prior to the administration of antibiotics. The widespread use of bedside ultrasound in emergency departments allows an ascitic tap to be done easily (*Figure 5*). Coagulopathy, which is common in these patients, is not a contraindication to the procedure.[33]

The diagnosis of spontaneous bacterial peritonitis is established by positive bacterial culture results and an elevated polymorph leucocyte (PML) count of >250 cells/mm^3. Treatment can begin presumptively in the presence of elevated PML count pending final culture results.

ANSWER 6

David's results indicate that he has spontaneous bacterial peritonitis.

Early treatment with antibiotics is the cornerstone of management for David. For patients with the classical symptoms and signs of spontaneous bacterial peritonitis, antibiotic treatment can begin as soon as the ascitic fluid has been obtained. In patients without the classical presentations, a presumptive diagnosis of spontaneous bacterial peritonitis can be made with the finding of an ascitic PML count >250 cells/mm^3, pending formal culture results. Intravenous third-generation cephalosporin is first-line therapy. The most commonly cultured bacteria are *Escherichia coli* and *Klebsiella*. Others include *S. pneumoniae* and the enterococci.

David should also be given intravenous thiamine.

David should be discharged with antibiotic prophylaxis. Long-term antibiotic prophylaxis to prevent spontaneous bacterial peritonitis is indicated in patients with previous history of proven spontaneous bacterial peritonitis, and patients with ascites and very low ascitic protein concentration (less than 10 g/L). The first-line drug for prophylaxis is trimethoprim + sulfamethoxazole; second-line is norfloxacin.

Patients on long-term norfloxacin should be observed for developing infections from quinolone-resistant gram negative organisms.[31]

CASE 5

SUSAN HAS ABDOMINAL PAIN

Susan, aged 19 years, comes to your clinic for an evaluation of some abdominal pain. She describes it as 'all over' and 'nagging' for the last 3–4 days. She is worried that she might be having acid reflux or indigestion.

Your clinic is her usual medical provider and she is not known to have any relevant past medical history. Her only medication is an oral contraceptive and she does not drink alcohol. Her family history is remarkable only for a mother with diabetes.

QUESTION 1

What differential diagnosis might you think of?

QUESTION 2

What specific questions should you ask to gain more history into Susan's complaint?

QUESTION 3

Should you order any laboratory investigations? If so, what? What tests can you do in your clinic, now?

QUESTION 4

What are a few 'cannot miss' diagnoses in this patient?

FURTHER INFORMATION

When you take a detailed history, Susan reveals a history of increased weight loss, hyperphagia (increased appetite) and increased urination.

Her urine pregnancy test is negative; her blood glucose level is 24 mmol/L.

QUESTION 5

What are your initial and immediate concerns about Susan?

QUESTION 6

What steps should you take in your clinic?

CASE 5 ANSWERS

ANSWER 1

Gastrointestinal

- intestinal obstruction
- gastritis
- gastroenteritis
- appendicitis
- constipation

Gynaecological

- dysmenorrhea
- ovarian e.g. torsion
- mittleschmerz
- endometriosis
- ectopic pregnancy

Genitourinary infection

- pelvic inflammatory disease
- pelvic abscess
- sexually transmitted disease (STI)
- urinary tract infection (UTI)

Miscellaneous

- pancreatitis
- drugs
- metabolic - diabetic ketoacidosis
- Addison disease.

ANSWER 2

You should ask Susan to quantify the pain further and also ask her about its onset, provocation, radiation, severity and duration. The character of the pain and its nature also help to clearly determine an aetiology. You should also ask Susan about her sexual and reproductive history.

ANSWER 3

A young female presenting with abdominal pain needs to be asked about the following:

- general health, e.g. malaise, weight loss and fever
- urinary symptoms
- bowel function
- menstruation
- sexual and reproductive history.

Depending on the history and examination, you might order laboratory blood tests and urine tests. Common investigations might include a full blood count (FBC), electrolyte panel and liver function tests (LFTs). Consider a lipase test if you suspect pancreatic disease. Urine exams might include a culture and sensitivity and a pregnancy test.[35]

Tests that might be able to be done in the clinic include a hand-held blood analysis panel (such as i-STAT), a urine dipstick with pregnancy test, and a blood glucose.[35]

ANSWER 4

'Red flag' differential diagnoses for Susan are:

- ectopic pregnancy
- perforated viscous
- appendicitis
- pelvic inflammatory disease
- diabetic ketoacidosis
- malignant disease, e.g. ovarian cancer.

ANSWER 5

Given Susan's increased blood glucose level, you should be suspicious of new-onset diabetes, type 1, and be concerned about ketoacidosis.[36]

Initial concerns should centre on ensuring Susan having adequate airway, breathing and circulation (ABC). Often patients with these symptoms and results are profoundly dehydrated and in hypovolaemic shock. Fluids and insulin are the immediate concerns, while electrolytes such as potassium and sodium are also important.[36]

ANSWER 6

In the clinic, the initial decision should be made quickly about where best to manage Susan.[37] Is she a candidate for the emergency department? Does she require hospitalisation? How can she be transported? Susan would probably benefit from hospitalisation and admission through the emergency department. An ambulance transport is a good consideration.

Knowing that certain office-based clinics are limited with diagnostics and treatment modalities, initial interventions might be hard to make. Blood should be taken and sent with the ambulance. A full blood count and electrolyte panel should be the minimum. If possible, initiate IV fluids with normal saline for Susan. If possible, an electrocardiogram should be performed to reveal any gross electrolyte abnormalities such as hyperkalaemia. Administration of insulin will probably be deferred until Susan is at the hospital.

CASE 6

BRAD IS NOT HIS NORMAL SELF

Brad, a single taxi driver aged 26 years, comes to your clinic for the first time. He has booked a long appointment and he wrote some odd things when registering at the front desk. He begins the consultation with 'small talk' but seems distracted. You note some facial bruising and he admits to being in a fight.

You are not clear why he's come, so you ask him directly. He says, while grinning broadly, 'What I need is something which is not really the way that people are staring and yelling at me … I have to rule it out so then I'll be the one'. His answers are disorganised and sometimes miss the point. He picks at his clothes and glances around the room while he sometimes seems not to hear you.

QUESTION 1

What are the diagnostic possibilities for Brad?

QUESTION 2

How should you proceed?

FURTHER INFORMATION

Brad asks you to look for the 'speakers in his ears'. You feel safe but make an excuse to step outside briefly to ask the practice manager and your colleagues to keep an ear out for trouble.

Physical examination, vital signs and blood glucose level are unremarkable. While examining Brad, you confirm that he is oriented to time, place and person.

Brad admits to auditory hallucinations, echoing his thoughts, which he attributes to the people he was fighting with (he names them).

He denies any recent illicit recreational substance use other than some occasional alcohol in social contexts.

He consents for you to contact his girlfriend, Liz. Liz says he hasn't been his usual self in the last 2 months; she confirms the absence of illicit substance use and is unaware of any past psychiatric history, family psychiatric history or significant developmental trauma. She hasn't seen him since he left her house abruptly 2 days ago.

You explain to Brad that you feel that ongoing support can best be provided by the local community mental health team and offer to organise an urgent appointment. He leaves angrily saying he's not 'mental' and will 'sort things out (his) own way'.

QUESTION 3

What is your working diagnosis and immediate management plan?

FURTHER INFORMATION

You are practising in a rural area and the nearest specialist mental health staff are 90 minutes drive away. You complete paperwork, under your state's Mental Health Act, authorising police assistance with transport to the nearest authorised psychiatric facility.

Brad is picked up by the police and taken to the local hospital's emergency department where you happen to be on duty.

QUESTION 4

What psychotropic medications and other issues should you consider at the local hospital while awaiting transfer to the mental health hospital?

CASE 6 ANSWERS

ANSWER 1

The suspicion of delirium is raised by Brad's odd behaviour, possible confusion and probable perceptual disturbance (picking at clothes, people yelling at him and distraction); this needs to be ruled out as a matter of urgency. In Brad's case, you must consider head injury.

Intoxication (e.g. amphetamines, hallucinogens and cannabis) can masquerade as psychosis.

Mania can present with psychotic symptoms and is suggested by Brad's affect at the consultation although grandiosity and pressure of speech are not evident.

Schizophrenia should be considered; however, an organic cause for Brad's presentation needs to be excluded. You need to consider neurological (e.g. epilepsy), metabolic (e.g. porphyria), autoimmune (e.g. systemic lupus erythematosus), infectious (e.g. HIV and tertiary syphilis) and iatrogenic (prescribed steroids) causes.

ANSWER 2

It is imperative that you only proceed after considering safety (of you, him and others). Is support available? Do you and the patient have unimpeded access to exits? Is there a past history of violence? There are published lists of other risk factors for violence but, at the individual patient level in a clinical setting, sensible clinical judgement and a cautious risk management approach is best practice.

You should adopt a calm/supportive stance while clarifying Brad's reasons for presentation, which will assist with engagement and rapport.

Conduct a physical examination including neurological screen, vital signs and blood glucose level.

Further assessment should include:

- screening for further psychotic symptoms including command hallucinations (may suggest high risk), inclusion of any known (therefore potentially at-risk) individuals in delusional system
- screening for thoughts of harm to self or others
- performing a cognitive assessment (e.g. Mini Mental State Examination)
- eliciting a substance use history
- asking about past psychiatric history, family history, personal history and developmental history
- considering seeking a corroborative history.

ANSWER 3

Although an organic cause cannot be excluded at this point, Brad's presentation with a prodrome (period of deteriorating psychosocial function) followed by acute psychotic symptoms is otherwise consistent with schizophreniform disorder – meeting diagnostic criteria for schizophrenia with duration less than 6 months.[38]

In clinical practice, 'first episode psychosis' is the most useful label as there is significant disparity in the clinical course, treatment response, relapse rate and diagnostic stability of patients receiving an early diagnosis of schizophrenia.

Mental health legislation mandates least restrictive treatment approaches. But, in view of Brad's uncooperativeness, apparent lack of capacity to give informed refusal, the probably rapid deterioration in his mental state and the apparent risk to others, it is reasonable to organise involuntary assessment and to seek urgent assistance from local specialist mental health services.

ANSWER 4

You should ask the police to stay until the situation is safe. Communication should be simple and calm. You should enlist the help of family/familiar persons if possible. Don't reinforce or debate delusional content. Try to find some common ground.

A detailed description of emergency tranquilisation and appropriate subsequent cardiorespiratory monitoring is beyond the scope of this case but it's likely that medication will be required in the face of agitation and arousal.

Current practice is to favour benzodiazepines such as lorazepam (1–2 mg orally) or diazepam (5–20 mg orally) initially; if the parenteral route is necessary, use midazolam (5–10 mg intramuscularly or 2.5–5 mg intravenously) initially. Midazolam has a short half-life so consider using a longer-acting benzodiazepine if there will be some delay before transfer and admission.[39,40]

Sedating oral antipsychotics such as olanzapine (5–10 mg initially) or risperidone (0.5–1 mg initially)[39] may be suitable as first-line or if benzodiazepines are not effective. Their antipsychotic effects tend to be delayed by some days.

Further investigations will be ordered on admission but it may be useful to obtain urine for drug screen if there will be some delay (amphetamines clear quickly).

CASE 7

CASPAR IS HAVING TROUBLE BREATHING

You are the first to arrive at your clinic early in the morning, when Georgina, a mother of three, arrives unannounced with her son Caspar, aged 3 years, who woke from sleep with dyspnoea. Caspar's family is known to you as you have been the family's GP for several years. Caspar has an older sister and a younger brother.

QUESTION 1

How do you determine the degree of respiratory distress?

FURTHER INFORMATION

Caspar has moderate to severe respiratory distress, indicated by some chest wall retraction and he is using his accessory muscles.

QUESTION 2

What are the important immediate management steps?

QUESTION 3

You believe Caspar has viral croup. What are the important and relatively common differential diagnoses to consider in Caspar?

FURTHER INFORMATION

Caspar has stridor at rest, is using his accessory muscles and has some chest wall retraction on breathing.

QUESTION 4

You diagnose that Caspar has moderate to severe croup. Describe your detailed management?

CASE 7 ANSWERS

ANSWER 1

The severity of croup is defined in research studies by the Westley score but key features are:

- Mild airway obstruction: mild chest wall retraction and tachycardia, but no stridor at rest
- Moderate airway obstruction: stridor at rest, chest wall retractions, use of accessory respiratory muscles and tachycardia
- Severe airway obstruction: persisting stridor at rest, increasing fatigue, markedly decreased air entry, marked tachycardia.

Restlessness, decreased level of consciousness, hypotonia, cyanosis and pallor are signs of life-threatening airway obstruction.[41]

Focus on three elements: appearance/neurological, work of breathing and circulation. These physical signs of respiratory distress require minimal contact with the child and do not require any equipment; although removing the clothing, which the parent can assist with, will make visual inspection quicker. The oxygen saturation probe has been purposely left off this list as it can create additional problems that may waste valuable time in the initial rapid assessment of a very sick child; apart from having to locate the machine and attach the probe, there is the risk that a low reading due to hypoxia may be misconstrued as difficulty in attaching the probe.

The degree of respiratory distress is on a continuum from mild respiratory distress, where at worst only the respiratory rate is elevated, through to respiratory failure. The presence or absence of a runny nose, cough, sputum and noisy breathing are not reliable indicators of severity in the rapid initial assessment. Also, the pulse and blood pressure are unhelpful, as they will not fall until the very late stages of respiratory failure as a pre-terminal event just prior to cardio-respiratory arrest.

ANSWER 2

1. Call for help:
    a. Ring ambulance service
    b. Consider ringing your clinic staff to attend if the ambulance could be delayed.
2. Perform a rapid assessement to help consider the diagnosis:
    a. Is this a generalised allergic reaction?
    b. Is this upper airway (laryngeal or pharyngeal) obstruction?
    c. Is this lower airway disease (focal or bilateral, symmetrical or asymmetrical); are there added sounds (rhochi, crepitation)?
    d. Is infection present: runny nose, temperature?
    e. Is Caspar septicaemic: do you need to consider meningitis?

ANSWER 3

All significant upper airway obstructions present with inspiratory stridor unless the respiratory distress is too severe to allow any significant airflow. Stridor may be heard in the chest as a transmitted sound, which could then be confused with a lower airway added sound. Lower airway obstruction begins with expiratory added sounds but can progress to inspiratory added sounds with worsening of the condition before all sounds fade when the respiratory distress is too severe to allow any significant airflow.

Differential diagnoses of viral croup are generalised anaphylaxis with airway oedema, upper airway obstruction from a foreign body, and lower airway obstruction from foreign body, asthma or pneumonia.[42] All of these conditions can present with a cough that is usually not diagnostic. Infection usually has an associated fever and the child looks toxic and septic (although administration of paracetamol or ibuprofen may have caused a lull in the fever, or the child may be too sick to mount a febrile reaction).

ANSWER 4

Treat Caspar sitting up in whatever position he feels most comfortable and is least distressed. This will probably be in Georgina's arms. Caspar is aged 3 years, which can be approximated to 15 kg if his exact weight is not known.

1. Oral or parenteral steroids[43,44] (use the parenteral route only if Caspar is unable to tolerate oral medications)
    - prednisolone syrup 1 mg/kg oral single dose on day 1
      For a 15 kg patient = 15 mg (Caspar will need a second dose for the evening of the next day)

    OR
    - dexamethasone 0.15 mg/kg oral or IM
      For a 15 kg patient = 2.25 mg (single dose only as biological half-life is 2–3 days).
2. Nebulised adrenaline may be needed for severe croup[45]
    - 1:1000 adrenaline (1 mg/mL) 5 mL by nebuliser
      Effect lasts approximately 90–120 minutes but patient requires observation for 3 hours because of risk of rebound respiratory distress or persisting tachycardia.
3. Oxygen may be needed for severe croup
    - Nasal cannula: 1 L/min = 24%; 2 L/min = 28%; cannot be used at a higher rate of delivery than 2 L/min

    OR
    - Face mask: 5–10 L/ minute gives 45–60% oxygen; a minimum of 5 L/min is required for the mask to work

    OR
    - Non-re-breathing mask (facemask + oxygen reservoir with a one-way valve + side ports with one-way valves): 8–15 L/min gives 80–100% oxygen; a minimum of 8 L/min is required for the mask to work.
4. Antipyretic/analgesic if required
    - paracetamol oral or rectal 20 mg/kg if initial dose or 15 mg/kg if subsequent dose
      For a 15 kg patient = 300 mg initial or 225 mg subsequent

    AND/OR
    - ibuprofen oral 5–10 mg/kg
      For a 15 kg patient = 75–150 mg.

Cool mist (steam tent) was the mainstay of therapy for over 100 years but has not been shown to be effective in randomised controlled trials.

1. Ankum WM, Mol BW, Van der Veen F, Bossuyt PM. Risk factors for ectopic pregnancy: a meta-analysis. Fertil Steril 1996;656:1093–9.
2. Tulandi T. Clinical manifestations, diagnosis, and management of ectopic pregnancy. UpToDate 2012: 2 November.
3. American College of Emergency Physicians Clinical Policies Subcommittee (Writing Committee) on Early Pregnancy. Clinical policy: critical issues in the initial evaluation and management of patients presenting to the emergency department in early pregnancy. Ann Emerg Med 2003;411:123–33.
4. The Royal Australian College of General Practitioners. Guidelines for preventive activities in general practice, 8th edn. East Melbourne: The Royal Australian College of General Practitioners, 2012.
5. Brennan DF. Ectopic pregnancy. Part II: Diagnostic procedures and imaging. Acad Emerg Med 1995;2:1081–97.
6. Ma OJ, Mateer JR. First Trimester Pregnancy. In: Emergency. 1st edn. McGraw Hill, 2002.
7. Paul M, Schaff E, Nichols M. The roles of clinical assessment, human chorionic gonadotropin assays, and ultrasonography in medical abortion practice. Am J Obstet Gynecol 2000;183:S34.
8. Kadar N, DeVore G, Romero R. Discriminatory βHCG zone: its use in the sonographic evaluation for ectopic pregnancy. Obstet Gynecol 1981;58(2):156–61.
9. Condous G, Kirk E, Lu C, et al. Diagnostic accuracy of varying discriminatory zones for the prediction of ectopic pregnancy in women with a pregnancy of unknown location. Ultrasound Obstet Gynecol 2005; 26(7):770–5.
10. National Institute for Health and Clinical Excellence. NICE clinical guideline 154. Ectopic pregnancy and miscarriage: diagnosis and initial management in early pregnancy of ectopic pregnancy and miscarriage. London: NICE, 2012. Available at http://guidance.nice.org.uk/cg154.
11. RANZCOG Guidelines for the use of Rh (D) immunoglobulin (anti-D) in obstetrics in Australia, 2011. East Melbourne: RANZCOG, 2011. Available at www.ranzcog.edu.au/documents/doc_view/940-c-obs-06-guidelines-for-the-use-of-rhd-immunoglobulin-anti-d-in-obstetrics-in-australia.html.
12. Rajapaksa S, Starr M. Meningococcal sepsis. Aust Fam Physician 2010;39(5):276–8.
13. The Royal Children's Hospital Melbourne. Clinical practice guidelines: fever and petechiae – purpura. Melbourne: RCH. Available at www.rch.org.au/clinicalguide/index.cfm.
14. National Institute for Health and Clinical Excellence. NICE clinical guideline 102. Bacterial meningitis and meningococcal septicaemia. Management of bacterial meningitis and meningococcal septicaemia in children and young people younger than 16 years in primary and secondary care. London: NICE, 2010. Available at www.nice.org.uk/guidance/CG102.
15. The Royal Children's Hospital Melbourne. Clinical practice guidelines: acute meningococcal disease. Melbourne: RCH. Available at www.rch.org.au/clinicalguide/index.cfm.
16. Lahra M, Enriquez R. Annual report of the Australian Meningococcal Surveillance Programme, 2011. Commun Dis Intell 2012;36(3):E251–62.
17. Tacon C, Flower O. Diagnosis and management of bacterial meningitis in the paediatric population: a review. Emerg Med Int 2012;2012:320309. doi:10.1155/2012/320309.
18. Communicable Diseases Network Australia. Guidelines for the early clinical and public health management of meningococcal disease in Australia. Canberra: CDNA, 2007.
19. Burks AW, Tang M, Sicherer S, et al. ICON: food allergy. J Allergy Clin Immunol 2012;129(4):906–20.
20. Boyce JA, Assa'ad A Burks AW, et al. Guidelines for the diagnosis and management of food allergy in the United States: report of the NIAID-sponsored expert panel. J Allergy Clin Immunol 2010;126(6 Suppl):S1–58.
21. Australasian Society of Clinical Immunology and Allergy. Health professional information paper: Anaphylaxis 2013. Available at www.allergy.org.au/health-professionals/hp-information/asthma-and-allergy/anaphylaxis (accessed 5 June 2013).
22. Simons FE, Ardusso LR, Bilo MB, et al. World Allergy Organization anaphylaxis guidelines: summary. J Allergy Clin Immunol 2011;127(3):587–93,e1–22.
23. Pumphrey RS. Fatal posture in anaphylactic shock. J Allergy Clin Immunol 2003;112(2):451–2.
24. Sheikh A, Shehata YA, Brown SG, et al. Adrenaline (epinephrine) for the treatment of anaphylaxis with and without shock. Cochrane Database Syst Rev 2008;4:CD006312.
25. Sheikh A, ten Broek V, Brown SG, et al. H1-antihistamines for the treatment of anaphylaxis with and without shock. Cochrane Database Syst Rev 2007;1:CD006160.
26. Choo KJ, Simons FE, Sheikh A. Glucocorticoids for the treatment of anaphylaxis. Cochrane Database Syst Rev 2012;4:CD007596.
27. Tole JW, Lieberman P. Biphasic anaphylaxis: review of incidence, clinical predictors, and observation recommendations. Immunol Allergy Clin North Am 2007;27(2):309–26,viii.
28. Mehr S, Liew WK, Tey D, et al. Clinical predictors for biphasic reactions in children presenting with anaphylaxis. Clin Expl Allergy 2009;39(9):1390–6.
29. Strauss E, Caly WR. Spontaneous bacterial peritonitis: a therapeutic update. Expert Rev Anti Infect Ther 2006;4(2):249–60.
30. Ozmen S, Dursun M, Yilmaz S. Spontaneous bacterial peritonitis: pathogenesis, diagnosis, and management. Acta Gastroenterol Belg 2006;69(3):276–82.
31. Guarner C, Soriano G. Spontaneous bacterial peritonitis. Semin Liver Disease 1997;17(3):203–17.
32. Garcia-Tsao G. Spontaneous bacterial peritonitis. Gastroenterol Clin North Am 1992;21(1):257–75.
33. Grabau CM, Crago SF, Hoff LKet al. Performance standards for therapeutic abdominal paracentesis. Hepatology 2004;40(2):484.
34. Tintinalli J, Stapczynski J, Ma OJ, et al. Tintinalli's emergency medicine: a comprehensive study guide. 7th edn. New York: McGraw-Hill Medical, 2010:Chapter 220.
35. Sloane P, Slatt LM, Ebell MH et al. Essentials of family medicine. 6th edn. Philadelphia, PA: Lippincott Williams & Wilkins, 2011:227–84.
36. Umpierrez G, Freire AX. Abdominal pain in patients with hyperglycemic crisis. J Crit Care 2002;17(1):63–7.
37. Kitabchi A. DM ketoacidosis on endocrinology and endocrine emergencies. Available at http://endoemergencies.org (accessed 5 June 2013).
38. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4th edn. Text revision. Virginia: American Psychiatric Association Ltd, 2000.
39. Psychotropic expert group. Behavioural emergencies. Revised February 2013. In: eTG complete [CD-ROM]. Melbourne: Therapeutic Guidelines Limited, 2013.
40. The Royal Australian and New Zealand College of Psychiatrists. Clinical practice guidelines for the treatment of schizophrenia and related disorders. Aust N Z J Psychiatry 2005;39:1–30. Available at www.ranzcp.org/Files/ranzcp-attachments/Resources/Publications/CPG/Clinician/CPG_Clinician_Full_Schizophrenia-pdf.aspx.
41. Westley CR, Cotton EK, Brooks JG. Nebulized racemic epinephrine by IPPB for the treatment of croup: a double-blind study. Am J Dis Child.1978;132(5):484–7.
42. Thomson K, Tey D, Marks M. Paediatric Handbook. 8th edn. Melbourne: BMJ Books 2011;8–9, 515.
43. Karam O. Drug doses. 4.0 edn. Available at https://itunes.apple.com/au/app/drugdoses/id322681972?mt=82013.
44. Respiratory Expert Group. Therapeutic guidelines: respiratory. Version 4. Melbourne: Therapeutic Guidelines Limited; 2009:151–3.
45. The Royal Children's Hospital Melbourne. Clinical practice guidelines: croup (laryngotracheobronchitis). Melbourne: RCH, 2011. Available at www.rch.org.au/clinicalguide/guideline_index/Croup_Laryngotracheobronchitis.

RESOURCES FOR DOCTORS

Ectopic pregnancy

Many maternity hospitals in Australia have early pregnancy assessment services, which are often associated with emergency departments. These provide follow-up, diagnosis and management for women with bleeding in early pregnancy.

Anaphylaxis

- The Australasian Society of Clinical Immunology and Allergy (ASCIA) (www.allergy.org.au) is the peak professional body of clinical immunologists and allergists in Australia and New Zealand. This site enables access to resources for health professionals, including e-training, allergy/anaphylaxis action plans and management guidelines.
- The ASCIA health professionals website (www.allergy.org.au/health-professionals) enables access to ASCIA health professionals e-training, position statements, health professional information papers and clinical guidelines.
- The ASCIA anaphylaxis resources website (www.allergy.org.au/health-professionals/anaphylaxis-resources) provides access to ASCIA action plans, anaphylaxis guidelines and information for parents.

Psychiatric emergency

- Twenty-four hour mobile on-call psychiatric services are available in most, but not all, parts of Australia. Contact details vary depending on the state or territory of Australia or location within that state or territory.
- Therapeutic Guidelines: Psychotropic expert group. Behavioural emergencies. Revised February 2013. In: eTG complete [CD-ROM]. Melbourne: Therapeutic Guidelines Limited; 2013 Mar.
- The Commonwealth Department of Health and Ageing funds the mindhealthconnect website, with useful and up to date information and resource links covering a wide range of mental health. See www.mindhealthconnect.org.au
- GP Psych Support provides GPs throughout Australia with access to patient management advice from a psychiatrist within 24 hours. It is available by calling 1800 200 588 or at www.psychsupport.com.au. This service does not provide urgent advice in emergencies and queries involving moderate to high risk of harm to self or others are considered out of its scope.

Croup

- The Royal Children's Hospital has clinical practice guidelines about croup. See www.rch.org.au/clinicalguide/guideline_index/Croup_Laryngotracheobronchitis.
- See also the Respiratory Expert Group. Therapeutic guidelines: respiratory. Version 4. Melbourne: Therapeutic Guidelines Limited; 2009:151–3.

RESOURCES FOR PATIENTS

Ectopic pregnancy

Many maternity hospitals in Australia have early pregnancy assessment services, which are often associated with emergency departments. These provide follow-up, diagnosis and management for women with bleeding in early pregnancy.

Anaphylaxis

- The ASCIA patients and consumer website (www.allergy.org.au/patients) enables access for patients and parents to ASCIA education resources and patient support information.
- Allergy & Anaphylaxis Australia (www.allergyfacts.org.au) provides telephone support and information resources for patients and parents.

Psychiatric emergency

- Sane Australia (www.sane.org.au) and Lifeline (www.lifeline.org.au or phone 131114) are useful resources.
- The Commonwealth Department of Health and Ageing funds the mindhealthconnect website, which has useful and up-to-date information and resource links covering a wide range of mental health problems. See www.mindhealthconnect.org.au

Croup

- The Royal Children's Hospital has a patient leaflet about croup. See www.rch.org.au/kidsinfo/fact_sheets/Croup/
- Medscape has a webpage on croup. See http://emedicine.medscape.com/article/962972-overview.

Emergency presentations

In order to qualify for 6 Category 2 points for the QI&CPD activity associated with this unit:

- read and complete the unit of *check* in hard copy or online at the *gplearning* website at www.gplearning.com.au, and
- log onto the *gplearning* website at www.gplearning.com.au and answer the following 10 multiple choice questions (MCQs) online, and
- complete the online evaluation.

If you are not an RACGP member, please contact the *gplearning* helpdesk on 1800 284 789 to register in the first instance. You will be provided with a username and password that will enable you access to the test.

The expected time to complete this activity is 3 hours.

Do not send answers to the MCQs into the *check* office. This activity can only be completed online at www.gplearning.com.au.

If you have any queries or technical issues accessing the test online, please contact the *gplearning* helpdesk on 1800 284 789.

FOR A FULL LIST OF ABBREVIATIONS AND ACRONYMS USED IN THESE QUESTIONS PLEASE GO TO PAGE 3.
FOR EACH QUESTION BELOW SELECT ONE OPTION ONLY.

QUESTION 1

Jasmine is aged 4 years. She presents with a sudden onset of a stridor at rest, a hoarse voice and obvious difficulty in breathing. You diagnose moderate croup. Which of the following is the most appropriate course of action?

A. Take a nasopharyngeal aspirate or swab.
B. Reassure and review the next day.
C. Give oral antibiotics.
D. Give prednisolone syrup.
E. Use a 'steam' tent.

QUESTION 2

In the next hour (see question 1) Jasmine's respiratory distress worsens. With respect to severe croup, which of the following is NOT true?

A. Softer stridor is indicative of improvement.
B. Rebound respiratory distress can occur after nebulised adrenaline.
C. The clinical effect of nebulised adrenaline lasts 90–120 minutes.
D. Oxygen should be given.
E. Jasmine should be treated in the position she is most comfortable in.

QUESTION 3

Jonathan, aged 16 months, is brought to your clinic and you are called to see him immediately. His mother says he has been unwell with high fevers for 12 hours and has vomited once. On examination, Jonathan is obviously very unwell. He is listless and drowsy, with a heart rate of 140, respiratory rate of 48 and a systolic blood pressure of 80 mmHg. You suspect acute meningococcal disease. You call an ambulance. Which of the following antibiotics would be the most preferred for Jonathan before transferring him to hospital?

A. Benzylpenicillin
B. Amoxicillin
C. Cefotaxime
D. Chloramphenicol
E. Norfloxacin.

QUESTION 4

Samuel, aged 18 months, is rushed to your clinic and you are called to see him immediately. His mother is worried because he has become progressively pale and floppy, with swollen lips, noisy breathing and an urticarial rash over the trunk in the past 30 minutes. What is your first management step?

A. Give adrenaline 1:1000 at a dose of 0.01 mg/kg into the upper anterolateral thigh.
B. Give adrenaline 1:1000 at a dose of 0.5 mg into the upper anterolateral thigh.
C. Give adrenaline 1:10 000 at a dose of 0.01 mg/kg into the upper anterolateral thigh.
D. Give 5 mL adrenaline 1:1000 via nebuliser mask and oxygen pump.
E. Commence CPR at a rate of 30 compressions: 2 breaths.

QUESTION 5

Samuel (see question 4) is still pale and floppy, although his breathing is no longer noisy. He is normotensive, and you note his tongue is swollen. It has been 7 minutes since he first presented. You have obtained IV access. What will you do next?

A. Give IM adrenaline into the upper anterolateral thigh.
B. Give IM antihistamine into the upper anterolateral thigh.
C. Give IV normal/saline bolus 20 mL/kg.
D. Give IV atropine at 0.01 mg/kg.
E. Give IV adrenaline infusion.

QUESTION 6

Julie, aged 25 years, presents with vaginal spotting and right lower quadrant abdominal pain. There is some dark blood in the vaginal vault, and her cervix is closed. Serum βhCG is 4000 IU/L. TVS shows no evidence of pregnancy inside the uterus. What is the most likely diagnosis?

A. Hydatidiform mole
B. Ectopic pregnancy
C. Normal pregnancy
D. Appendicitis
E. Endometriosis.

QUESTION 7

Jane, aged 28 years, comes to the clinic complaining of spotting for the past week. Her last normal menstrual period was approximately 5 weeks ago. Her βhCG is 1220 IU/L, and a TVS shows no gestational sac in the endometrial cavity, no adnexal masses and no free fluid in the pouch of Douglas. Jane is clinically well. What is the next best step in the management of Jane?

A. Admit to hospital for laparoscopy.
B. Admit to hospital for laparotomy.
C. Admit to hospital for dilation and curettage.
D. Repeat βhCG in 2 days.
E. Repeat TVS in 2 days.

QUESTION 8

Jane (see question 7) had a repeat βhCG 2 days later, which was 2400 IU/L. What is the most likely diagnosis?

A. Ectopic pregnancy
B. Normal pregnancy
C. Multiple pregnancy
D. Spontaneous miscarriage
E. Non-viable pregnancy.

QUESTION 9

Which of the following is true of spontaneous bacterial peritonitis?

A. Gentamycin is the treatment of choice.
B. It is rarely fatal.
C. It requires surgical treatment.
D. It is caused by bowel perforation.
E. Delay in diagnosis can lead to septic shock.

QUESTION 10

Which organism is most likely to be the cause of spontaneous bacterial peritonitis?

A. *Mycobacterium tuberculosis*
B. *Streptococcus pneumoniae*
C. Enterococci
D. Enterobacteriaceae
E. *Escherichia coli.*

NOTES