Emergency medicine
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Facsimile 03 8699 0400
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Emergency medicine

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About this activity

Acronyms

Case 1  Sue has sunburn

Case 2  Bruce has a sudden-onset wheeze

Case 3  Jim is breathless

Case 4  Margot notices suddenly blurry and distorted vision

Case 5  Natalie has type 1 diabetes and her medications have been burnt

Case 6  Hayden presents unwell

Multiple choice questions

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
ABOUT THIS ACTIVITY

Emergency cases in general practice can include physical and psychological injuries. Providing care for patients during emergencies is an essential part of general practice. While some need to be referred to the emergency department, others can be managed at the general practice level. The high level of care offered for emergency cases often includes treating the patient’s immediate and acute needs, as well as their long-term recovery needs. An estimated 14% of adults, 24% of teenagers and 8% of children experience sunburn on an average Australian summer weekend. Presentations of anaphylaxis in Australia has more than doubled in the 10 years prior to 2005 and continues to increase. Given the nature and spontaneity of medical emergencies, general practitioners (GPs) need to ensure they have contingency plans and protocols in place in the event that need to leave the practice to attend to an emergency. Age-related macular degeneration (ARMD) is the leading cause of severe vision impairment in Australians older than 40 years of age and has no cure. GPs have longstanding and trusting relationships with their patients and communities, and can play a vital role in the aftermath of a disaster. An estimated 15–67% of patients who have been newly diagnosed with type 1 diabetes present when they are in a state of diabetic ketoacidosis. Of these patients, 79% present to their GPs. This edition of check considers the management and treatment of emergency presentations that may present in general practice.

LEARNING OUTCOMES

At the end of this activity, participants will be able to:
• describe the management of a patient presenting with severe sunburn
• discuss the approach to treating anaphylaxis
• outline the management of a patient with acute breathlessness
• summarise the assessment and management of an ocular emergency presentation
• discuss the role of the general practitioner in attending to a patient involved in an environmental disaster
• identify the signs and symptoms of diabetic ketoacidosis.

AUTHORS

Andrew Baird (Case 3) MA, MBChB, DRANZCOG, DA, FRACGP, FACRRM, is a general practitioner in Elwood, Victoria. He has previously worked as a rural general practitioner in western Victoria and Western Australia. Dr Baird is a medical educator with Eastern Victoria General Practice Training and a senior lecturer in the Discipline of General Practice at Flinders University.

James Baird (Case 3) is a third-year Bachelor of Emergency Health student at Monash University.

Penny Burns (Case 5) BMed, MPhHTM, is the RACGP NSW&ACT’s Disaster Response Representative and an RACGP representative on the National GP Round Table. She is Chair of the World Association of Disaster and Emergency Medicine (WADEM) Oceania Chapter. Dr Burns holds roles on the NSW Mental Health Disaster Advisory Committee, Diabetes Australia Disaster Planning expert reference group and Australian Child & Adolescent Trauma Loss & Grief Network steering committee. Dr Burns is currently undertaking a PhD on GP involvement in disasters at the Australian National University and, works as a Senior Lecturer at Western Sydney University. She is an instructor for Major Incident Medical Management Support (MIMMS) and EMERGO TS system of disaster exercises.

Georgina Clark (Case 4) MBBS, MA, is a senior ophthalmology registrar at Westmead Hospital.

Gary Deed (Case 6) MBBS (Hons), FACNEM, DipHerbMed, MRACGP is a general practitioner in Brisbane with a special interest in diabetes. Dr Deed is chair of the RACGP Specific Interest’s Diabetes Network, past president of Diabetes Australia and, until recently, was director of Diabetes Australia – Queensland. Gary is a member of the Endocrinology Today editorial board and associate editor of Advances in Integrative Medicine. Dr Deed has received travel and research grants and/or speaker fees from most of the pharmaceutical companies licensing oral hypoglycemic and insulin preparations in Australia. He does not believe there is any conflict of interest that affects the content of this material.

Nicholas Forgione (Case 6) MBBS, MBA, FRACMA, FACEM, GradDipBus, FAIM, is a general practitioner in Perth with a special interest in diabetes, chronic disease management and medical education. He is a member of the RACGP Specific Interest’s Diabetes Network, and a member of the Editorial Committee and chairman of the Education Committee of the Primary Care Diabetes Society Australia. Dr Forgione sits on the External Advisory Board to the School of Medicine, Notre Dame University, Fremantle and has a teaching appointment with the University of Western Australia.

Hugh Grantham (Case 1) MBBS, FRACGP, has been the medical director of the South Australia Ambulance Service (SAAS) for more than 11 years and also Director of the Ambulance Education Unit. Dr Grantham has contributed in advancing the role of paramedics through education, medical/clinical leadership and management. He holds an academic appointment within the Anaesthesia and Intensive Care Unit of the Faculty of Medicine at Flinders University. Dr Grantham teaches in a broad range of pre-hospital areas, including early management of severe trauma (EMST) and advanced paediatric life support. He also contributes to the Education and Clinical Councils of the Convention of Ambulance Authorities and is a member of the Australian Resuscitation Council (ARC) on behalf of the Convention of Ambulance Authorities.

Michael Lovegrove (Case 2) MBBS, FACEM is an emergency specialist working at Princess Margaret Hospital and Joondalup Health Campus in Perth, Western Australia. He has been an Advanced Paediatric Life Support instructor for more than 10 years and wrote the ‘Kids Quiz’ articles for Australian Doctor magazine between 2012 and 2015.

Ju-Lee Ooi (Case 2) BSc(Med), MBBS, MPH, FRANZCO, is an ophthalmologist at Eye and Retina Specialists Green Square, Sydney, and a consultant ophthalmologist at Westmead Hospital. Her special interests include cataract surgery, macular degeneration and diabetic retinopathy.

Kate Sandy (Case 5) MBBS, is a member of the RACGP Specific Interest’s Disaster Management group. She is a graduate of the Australian Film, Television & Radio School and has been involved in disaster management education over the past five years. Dr Sandy has compiled and presented disaster scenarios for GPs, practice nurses and postgraduate students. She is currently an intern at Nepean hospital.

Neil Sharma (Case 4) MBBS (Hons), MPhil MMed (Refract Surg), FRANZCO, is an ophthalmologist at Eye and Retina Specialists Green Square,
Sydney, and a consultant ophthalmologist at Westmead Hospital. His special interests include laser eye surgery, cataract surgery and macular degeneration.

PEER REVIEWERS

Genevieve Gabb MBBS (Hons), FRACP, GradDipClinEpi, is a senior consultant physician with SA Health with extensive experience in acute and general inpatient medicine, and ambulatory cardiovascular medicine. Dr Gabb is also a clinical senior lecturer in the School of Medicine at the University of Sydney. She has an interest in drug safety and pharmacoepidemiology, particularly in relation to medicines commonly used in the prevention and treatment of cardiovascular disease. Dr Gabb is a member of the Advisory Committee on the Safety of Medicines, TGA, and has recently worked on the review of guidelines for the management of hypertension in Australia with the Heart Foundation.

Emma Manifold BHSc, BMBS (Hons), FRACGP, graduated from postgraduate medicine at Flinders University in 2004. Eventually deciding on a career in general practice, she now works in the Adelaide Hills in a group practice providing care to a diverse patient population. Combining this with a registrar post in emergency medicine at the Royal Adelaide Hospital, Dr Manifold enjoys a case mix of acute and chronic disease management and prevention.

ACRONYMS

<table>
<thead>
<tr>
<th>AION</th>
<th>arteritic anterior ischaemic optic neuropathy</th>
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<td>ACD</td>
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REFERENCES

CASE 1

SUE HAS SUNBURN

Sue, 45 years of age, comes to see you with sunburn. She was at a social event the previous day and thought she was in the shade during the course of the afternoon. Sue had consumed several glasses of wine, but she did not feel that this had impaired her judgement. She noticed that her right leg was red and painful at the end of the afternoon. Her first aid management involved ice and moisturising creams overnight, but the pain was worse the following morning.

She has a previous history of multiple sclerosis (MS) that, although not disabling, left her with some sensory changes on her right side. Since her diagnosis five years ago, she has not had any further neurological episodes. The appearance of her leg is shown in Figure 1.

Figure 1. Sue’s sunburnt leg

QUESTION 1

What initial treatment would you offer?

QUESTION 2

Why is Sue thirsty?

QUESTION 3

What additional treatment should you provide to Sue?

FURTHER INFORMATION

Sue complains of feeling very thirsty despite having drunk an adequate amount of fluid.

When reviewed the following day, Sue reports that her leg seems to be getting very tight and her foot is becoming more swollen.
QUESTION 4 🥁
What other diagnoses would you consider?

QUESTION 5 🥁
What investigations would you consider?

FURTHER INFORMATION
The results of Sue’s FBE are shown in Table 1. Her ultrasound is positive for a DVT below the knee.

<table>
<thead>
<tr>
<th>Test</th>
<th>Result</th>
<th>Normal range</th>
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<tr>
<td>Haemoglobin</td>
<td>144 g/L</td>
<td>115–155 g/L</td>
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<td>White cell count</td>
<td>7.4 x 10⁹/L</td>
<td>4–11 x 10⁹/L</td>
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<td>Platelets</td>
<td>247 x 10⁹/L</td>
<td>150–450 x 10⁹/L</td>
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<td>Sodium</td>
<td>137 mmol/L</td>
<td>137–145 mmol/L</td>
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<td>3.8 mmol/L</td>
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<td>Bicarbonate</td>
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<td>22–32 mmol/L</td>
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<td>Anion gap</td>
<td>14 mmol/L</td>
<td>7–17 mmol/L</td>
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<tr>
<td>Urea</td>
<td>6.3 mmol/L</td>
<td>2.7–8.0 mmol/L</td>
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<tr>
<td>Creatinine</td>
<td>107 μmol/L</td>
<td>50–100 μmol/L</td>
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<tr>
<td>C-reactive protein</td>
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<tr>
<td>D-dimer</td>
<td>1.7 μg/mL</td>
<td>&lt;0.5 μg/mL</td>
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</table>

QUESTION 6 🥁
What do the results indicate? How will you manage Sue?

CASE 1 ANSWERS

ANSWER 1
Sensory changes associated with Sue’s MS may have prevented her from appreciating the severity of her burn at the time as might the consumption of alcohol, despite her being unaware of any impairment. As she has severe sunburn to the back of her leg (8–9% of her overall body surface area), causing a blister, her primary need is analgesia. The pain is associated with an inflammatory response to ultraviolet (UV) radiation burn. Steroids, both topical and systemic, have been proposed for sunburn, but have proved disappointing as they have little or no effect on the injury if used after the burn occurs and a role in exacerbating infection has been suggested.2,3 Non-steroidal anti-inflammatory drugs (NSAIDs) have also been considered as a means of limiting the inflammatory damage. However, there is no evidence that they have a significant impact.2,3

ANSWER 2
Inflammatory mediators, including prostaglandins and leukotrienes acting both locally and systemically, mediate the inflammatory processes associated with this burn. Sue will be hypovolaemic (a mild tachycardia at 105 beats per minute and a slight reduction in blood pressure to 100/70 mmHg) because the inflammatory mediators increase vascular permeability and cause vascular dilatation; hence, Sue will be thirsty and will feel cold, partly because of the effect of the inflammation on the thermoregulatory centre causing an elevated temperature and partly because of excessive heat loss through the skin.

ANSWER 3
The main treatment aims should be analgesia and rehydration. Simple analgesics, including aspirin/NSAIDs, are effective, although these should be used with caution in the setting of volume loss; oral fluids, supplemented by intravenous fluids, if necessary, will address the
hypovolaemia; simple moisturising skin creams will reduce itching as the burn dries out.

Referral to a burns unit should be considered if:

- the burn area is extensive (>15%),
- the patient requires intravenous fluid replacement, or
- the patient’s requirement for opiate analgesia renders outpatient treatment impractical.

Although there are divided opinions on what to do with blisters, the evidence seems to support debriding large blisters and using a silver-impregnated dressing.

**ANSWER 4**

Worsening symptoms on the second day raise the possibilities of infection, deep vein thrombosis (DVT) or compartment syndrome. The sunburn will obscure the classic signs of redness associated with infection, and the pain of the sunburn will make it difficult to examine the calf properly for tenderness.

**ANSWER 5**

Investigations should include a full blood evaluation (FBE), and a D-dimer test and/or ultrasonography to check for DVT. A high index of suspicion warrants moving straight to ultrasonography.

**ANSWER 6**

The white cell count is normal, but C-reactive protein (CRP) is raised and creatinine marginally raised; the creatinine level should be followed up at a later date to ensure that it has returned to normal. A D-dimer of 1.7 does not rule out DVT, and the ultrasound confirms a DVT. Sue will need DVT anticoagulation for three months, as well as symptomatic management of her burn.

**REFERENCES**

BRUCE HAS A SUDDEN-ONSET WHEEZE
Bruce is 11 months of age, weighs 10 kg and is just starting to toddle around. His mother, Evie, found him outside on the grass crying and distressed. Bruce was refusing to stand up and his crying sounded hoarse. His mother rushed him in to your surgery (which is just around the corner) and asks you for help.

QUESTION 1
What is your initial approach to this child?

QUESTION 2
What is the likely diagnosis?

FURTHER INFORMATION
Evie says that they were just out under the trees when he suddenly started crying. He has been a healthy normal child up to this point and has had no recent illnesses. She did not see Bruce picking up anything or putting anything in his mouth. You examine Bruce and find that he has a widespread wheeze with a soft stridor; his voice is hoarse. His lips have become mildly swollen and he becomes pale when Evie tries to sit him up in your office. You find a tender, red swollen area on his right foot.

QUESTION 3
What features are the most dangerous in this setting?

QUESTION 4
What immediate actions do you need to take?

FURTHER INFORMATION
Despite the adrenaline, five minutes later, Bruce remains wheezy and develops a widespread urticarial rash. His lip swelling and stridor settle, but he is still struggling to breathe properly.
QUESTION 5
What options are there to further treat Bruce at this time?

FURTHER INFORMATION
Following further treatment, Bruce’s symptoms settle and the wheeze resolves. Evie asks you what needs to happen from this point.

QUESTION 6
What further management does Bruce require today?

QUESTION 7
What further management will Bruce need in the longer term?

CASE 2 ANSWERS

ANSWER 1
The initial response in this situation is to administer first aid:1
- Danger
- Response, call for help
- Assess for airway compromise
- Check breathing and give oxygen if needed
- Check for pulse and signs of adequate circulation

ANSWER 2
The likely diagnosis is anaphylaxis, most likely secondary to a bee or wasp sting. In the locations where Jumping Jack or Fire ants are known to exist, the anaphylactic reaction could be to these ants (which sting rather than bite), although bee or wasp sting is still the most likely cause.2

ANSWER 3
Evolving airway compromise with lip swelling and laryngeal swelling (as shown by the hoarse voice and stridor), bronchospasm (as shown by the wheeze), and likely hypotension (as shown by the pallor indicating postural drop in blood pressure as he sat up) are the most dangerous features in this setting.1

ANSWER 4
Bruce needs to be given oxygen, managed flat (to avoid hypotension), and requires urgent intramuscular (IM) adrenaline.1–4 The dose required is 10 µg/kg IM given immediately.2,3

The best way to make this up is to get 1 mg of adrenaline (1 ml of 1:1000 solution) in a 10 ml syringe and fill it up with 9 ml of 0.9% saline. The resulting solution in the syringe is 1:10000 or 100 µg/ml of adrenaline. Bruce is 10 kg, so 1 ml of this solution (100 µg, or 0.1 ml/kg) should be given intramuscularly in this case, into the lateral thigh by preference.2–4 The adrenaline should not be given subcutaneously, as absorption from this route is less reliable than the IM route (a 25G needle should be used to ensure that the adrenaline reaches the muscle).2 For larger children, the adrenaline can be given undiluted (ie 1:1000 solution), with the dose required being the same (10 µg/kg) and the amount of solution given being 0.01 mL/kg.1–4 A poster clearly explaining how to make up and give IM adrenaline should be considered by all general practices to expedite the delivery of adrenaline in an emergency. An intravenous (IV) line should also be placed as soon as possible and, if the child is in shock, a bolus of 20 mL/kg of normal saline should be given. In the case where IV access is difficult to obtain and the child is in shock, intraosseus access is a reasonable alternative.1–4

ANSWER 5
Bruce requires further adrenaline to treat the ongoing anaphylaxis. A further dose of 100 µg (1 ml of the 1:10000 prepared earlier) IM would be an effective treatment.2–4

The other options are to give him nebulised adrenaline (2.5 mg via a nebuliser), which will have some direct effect on the airway as well as
treatment of bronchospasm. Salbutamol (2.5 mg via a nebuliser) could also be used for bronchospasm, but will not improve the other features of anaphylaxis.2–4

Antihistamines do not have an effect in the acute management of anaphylaxis and should not be used as an alternative to adrenaline.3 They may have a role in symptom treatment (eg, itchy rash) once the anaphylaxis is treated. Promethazine, IM or IV, should be avoided because of the risk of exacerbating hypotension and sedating a child who is unwell. In addition, there is a risk of causing muscle necrosis at the injection site.3

Corticosteroids do not have a clear role in acute anaphylaxis.2–4 They may help reduce recurrence of the symptoms over the next couple of days, especially if there was a prolonged wheeze, although they do not prevent a rebound reaction. They are most commonly prescribed for 24–48 hours following an episode of anaphylaxis.2,3

ANSWER 6

Bruce should be taken by ambulance to the closest emergency department that is able to manage children. He will need a period of observation for at least four hours after the last dose of adrenaline2–4 and may require overnight observation if these events occurred late in the day. Most emergency departments will aim to discharge a patient during daylight hours following anaphylaxis treated with adrenaline. This is standard practice in emergency departments, as it is easier for parents to observe their child after discharge during daylight hours rather than overnight. After four hours, the risk of recurrence steadily decreases.

A rebound reaction occurs in 3–20% of cases, where there is recurrence of the symptoms of anaphylaxis. It will usually occur within four to eight hours, but has been described to have occurred up to 12–16 or even 24 hours later, although this is very rare.5 In the vast majority of cases, these reactions will be the same or less in severity than the original event, but given that adrenaline was required initially, they will potentially need access to this treatment again.

It would be best practice to provide an EpiPen Jr for Bruce’s parents to take home, preferably two so that one can be at home and one with the patient at all times. The emergency department should provide the EpiPen Jr, or at least a script with instructions for it to be filled on the way home. Instructions on the use of the EpiPen Jr should also be provided for Bruce’s parents and anyone else who might be involved in his care.

ANSWER 7

Bruce should be referred to an immunologist or immunology outpatient clinic for further investigation and consideration of bee sting desensitisation. Referrals should state clearly that he had an anaphylactic reaction as this will make his case stand out from less serious allergic reactions that are also referred to these clinics or specialists.

Evie needs to be advised to always ensure that Bruce wears shoes when in a risky situation, but because bee stings are not easily preventable, provision of an adrenaline autoinjector with a paediatric dose (0.15 mg) is very important, along with education and an anaphylaxis action plan. Plans can be accessed and filled out from the Australasian Society of Clinical Immunology and Allergy web page (refer to ‘Resources for doctors’). All children with anaphylaxis and their parents need to have both plans and understand the meaning of their allergy. If Bruce is in childcare, his allergy should be made known and the allergy action plan/EpiPen provided to staff. Other family members and close friends should also be aware of Bruce’s allergy and taught how to administer the EpiPen.

Some education about the safety of adrenaline is also useful, as many parents and children are very frightened to give it.

Discussions about bee sting allergy desensitisation are also worth having and can be organised in conjunction with the immunology service or specialist to whom you make a referral.

RESOURCES FOR DOCTORS


REFERENCES


CASE 3

JIM IS BREATHLESS

Jim, 75 years of age, is a widower who lives at the Oaklands Aged Care Facility, 2 km from your clinic. During your second consultation on Monday morning, your receptionist transfers a telephone call from Mark, a registered nurse at Oaklands, to you. Mark has asked to speak with you urgently about Jim.

QUESTION 1

What are the potential risks in discussing Jim with Mark? How do you manage these risks?

FURTHER INFORMATION

You ask your patient to return to the waiting room.

Although Jim’s progress notes are maintained in a paper-based file at Oaklands, you maintain his medical summary in your practice’s computer system. You open Jim’s file in the clinical management program and ask Mark to describe the problem.

Mark tells you that Jim woke up at about 5.00 am and felt breathless and ‘a bit funny’. He felt better after he sat up in a chair; however, over the past hour, Jim has become distressed with increasing breathlessness and exhaustion. There are no other symptoms. Mark checked Jim’s ‘obs’ 30 minutes ago – his pulse was 98 beats per minute, blood pressure (BP) was 148/92 mmHg, respiratory rate was 26 breaths/minute and temperature was 36.8°C. There is no oximeter at Oaklands. You ask Mark about Jim’s colour and he tells you that Jim looks ‘a bit pale’ and that ‘his lips are bluish’.

You have been visiting Jim every six weeks for review and refer to his medical history (Table 1).

Table 1. Jim’s medical history

<table>
<thead>
<tr>
<th>Year</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>Cerebrovascular accident (CVA) – mild left hemiparesis; expressive dysphasia</td>
</tr>
<tr>
<td>2010</td>
<td>Paroxysmal atrial fibrillation</td>
</tr>
<tr>
<td>2009</td>
<td>ST-segment elevation myocardial infarction (STEMI) – percutaneous coronary intervention (PCI) and insertion of stent</td>
</tr>
<tr>
<td>2005</td>
<td>Type 2 diabetes mellitus (T2DM; glycated haemoglobin: 7.2–8.2%)</td>
</tr>
<tr>
<td>2005</td>
<td>Obesity (November 2015: body mass index [BMI] = 31 kg/m²)</td>
</tr>
<tr>
<td>2005</td>
<td>Hypertension</td>
</tr>
<tr>
<td>2000</td>
<td>Generalised osteoarthritis</td>
</tr>
</tbody>
</table>

Current medications (all once daily, except paracetamol):
- Aspirin 100 mg
- Rivaroxaban 20 mg
- Simvastatin 40 mg
- Atenolol 50 mg
- Irbesartan 150 mg
- Metformin extended release 1 g
- Paracetamol (sustained release) 665 mg tablet, two tablets twice daily

Jim has no known allergies.

QUESTION 2

On the basis of Jim’s medical history, what should you do?
QUESTION 3

What are the key steps you should take in preparing to attend Oaklands?

FURTHER INFORMATION

The patient who was in your office when Mark called says she ‘understands’, and that ‘it’s ok – I don’t have anything urgent’.

You take the doctor’s bag. Fortunately, you remembered where this was located and that it was checked by your practice nurse two weeks ago. You also take the practice’s oximeter to go to Oaklands. You are unsure if there is a defibrillator or a bag-valve-mask resuscitation system at Oaklands; however, you decide not to take the practice’s equipment with you.

Jim has a mild left hemiparesis and expressive dysphasia secondary to a stroke three years ago. He walks with the assistance of a stick. Although Jim’s speech is slow, verbal communication is satisfactory. He has no cognitive impairment. He is a widower who had been living alone and independently prior to the stroke. He smoked 20 cigarettes daily until he quit smoking six years ago. Jim consumed six units of alcohol daily until his stroke; but since then, his alcohol consumption has been two units (or less) once weekly.

You meet Mark in the nurses’ station and both of you attend Jim in his room.

You ask Jim about his current symptoms. Jim tells you that he was ‘fine’ yesterday. When he woke up this morning, he felt ‘like I just couldn’t get my breath’. Jim felt ‘a bit better’ when he sat up, but over the past hour or so, ‘it’s been getting harder to breathe’. He says he feels ‘pretty lousy’ and ‘washed out’, but there are no other symptoms – specifically, no chest pain, cough, wheeze or fever. Jim tells you – in short phrases – that he needs to get better as he is going to his granddaughter’s birthday party on the weekend.

QUESTION 4

What other questions should you ask Jim in order to help with your assessment? What other physical examination and ‘bedside tests’ will help with your assessment?

FURTHER INFORMATION

On examination, Jim is alert and orientated. There is moderately increased work of breathing. He talks in short phrases, although this is difficult to assess because of his dysphasia. Jim is pale and cyanosed, but not diaphoretic.

You document the following examination findings.

‘The five vital signs’:
- Temperature – 37.0 °C
- Pulse – 118 beats/min (irregularly irregular)
- BP – 142/84 mmHg
- Respiratory rate (RR) – 28 breaths/min
- Arterial oxygen saturation (SpO₂) – 90%

Cardiorespiratory examination:
- Jugular venous pressure (JVP) – difficult to assess due to obesity. However, there is a positive hepatojugular reflux sign.
- Heart sounds – soft systolic murmur at the lower left sternal edge and the apex (not noted previously)
- Lower limbs – no pitting oedema
- Lungs – good air entry, inspiratory crepitations to mid-zones (symmetrical), some variable expiratory rhonchi in lower zones and mid-zones (symmetrical)

Jim’s blood sugar level is 9.2 mmol/L and ketones are 0.0 mmol/L. There is no electrocardiogram (ECG) machine at Oaklands.
QUESTION 5

What is the significance of these clinical findings? What is your ‘working diagnosis’ and what are the factors that support this? What are the differential diagnoses that you consider in this context?

QUESTION 6

What is your approach to managing Jim’s presentation?

FURTHER INFORMATION

Jim has appointed his daughter, Jenny, as his ‘substitute decision-maker’ (eg ‘enduring power of attorney for medical treatment’ in Victoria). He has an advanced care directive (ACD), which describes his wishes for medical treatment. However, on the basis of your assessment, Jim is currently competent to make decisions about his treatment, so this is not relevant.

QUESTION 7

What actions do you take to manage Jim’s presentation?

FURTHER INFORMATION

Jim has had two doses of glyeryl trinitrate (GTN) and he is receiving oxygen at 10 L/min by face mask. He tells you that he ‘feels terrible’ and his ‘breathing’s getting worse’. His SpO₂ is 92%, pulse is 124 beats/minute (irregularly irregular) and blood pressure is 118/70 mmHg.

The paramedics arrive (one intensive care paramedic [ICP], one non-ICP). You introduce yourself and describe Jim’s history, the examination findings, the assessment and the treatment that Jim has received. Amanda, the ICP, thanks you for your handover, and she clarifies some points in your description. Amanda and her colleagues conduct their assessment of Jim. Amanda agrees with your provisional diagnosis.

QUESTION 8

What actions will the paramedics take that have not already been taken? What actions should you take while the paramedics are attending to Jim?

FURTHER INFORMATION

Amanda examines the ECG tracing. She hands the tracing to you and asks for your opinion.
**QUESTION 9**

What is your interpretation of the key features of Jim’s ECG tracing (Figure 1)?

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**FURTHER INFORMATION**

After 15 minutes of continuous positive airway pressure (CPAP) at 5 cm H₂O, Jim’s condition has improved. He says that his breathing ‘is a bit easier’. His oxygen saturation is 96% (FiO₂ is 30%) pulse is 108 beats per minute (irregularly irregular). Jim’s blood pressure is 116/74 mmHg.

**QUESTION 10**

What is the mechanism of CPAP in the treatment of acute pulmonary oedema (APO)? How is CPAP administered?

What are the potential adverse effects with the use of CPAP? What are the contraindications to the use of CPAP?

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**CASE 3 ANSWERS**

**ANSWER 1**

To avoid compromising Jim’s privacy, this discussion should not occur in the presence of another person, even if the discussion is de-identified by omitting references to Jim’s name and location.

With an explanation and apology, you may ask the patient who is consulting you to return to the waiting room while you manage the telephone call.

Alternatively, you may go to an unoccupied room to take the call in privacy, ensuring that your patient has no access to any patients’ reports or notes in the consulting room. You should ensure that your patient cannot use your computer, or view patients’ information on the screen (eg ‘lock’ your computer).

Regarding this telephone consultation, for informed clinical assessment and management, and for documentation, you need access to Jim’s medical record. Familiarity with Jim’s medical history is helpful, but this is not a substitute for his medical record.

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**ANSWER 2**

Jim needs urgent medical attention and you have a duty to provide care to him.

If you decide not to attend Jim and ask Mark to call for an ambulance, Jim’s care remains your responsibility until the paramedics attend. His condition may not warrant paramedic attendance.

If you decide to attend, you may still consider asking Mark to call for an ambulance now, or you may make this decision once you have assessed Jim.

You decide to attend Jim at Oaklands now and will make a decision on calling for an ambulance once you have assessed him.

You should advise Mark that Jim will need to be observed continuously, that measurements of pulse, blood pressure, and respiratory rate should be rechecked, and that Jim should be sitting upright. Although Jim’s oxygen saturation is not known at this stage, Mark has reported that Jim has the signs of cyanosis. You advise Mark to administer oxygen at 10L/min with a standard face mask (oxygen treats hypoxia, not breathlessness).

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**ANSWER 3**

Ask your patient to return to the consulting room. Explain that you must attend an emergency away from the practice and apologise that it will be necessary to finish the consultation now without addressing further issues. Provide any repeat prescriptions that your patient has requested and check that there are no urgent issues. Inform the patient that they may return later in the day for a consultation, or wait to see one of your colleagues.

In preparing to leave the practice, ask your reception team to manage the patients in the waiting room and those with appointments booked for later in the morning. The receptionists should follow the relevant
practice policy. Patients are given an apology, explanation and options (wait, return later, make another appointment or see another general practitioner [GP] at the practice).

Collect your doctor’s bag, which should include emergency drugs and airways and intravenous cannula. Certain medications are provided to doctors, without charge, through the Pharmaceutical Benefit Scheme (PBS), by completing a ‘prescriber bag supply’ order form. You should also take one of the practice’s oximeters. It is essential that you know where the doctor’s bag is located, and that it is checked regularly.

ANSWER 4

The questions that you have asked are appropriate for an initial, focused history. You may consider asking specifically about palpitations, nausea, light-headedness and pain in the lower legs (possible symptoms of venous thromboembolism), but the responses are unlikely to influence the initial assessment and decision making.

Jim has T2DM. Although it is unlikely that this is directly relevant to his presentation, it is straightforward to test a capillary blood sample for glucose and ketones. Hyperventilation can occur with diabetic ketoacidosis (‘Kussmaul breathing’).

An ECG is an important component of Jim’s overall assessment. However, with the exception of ST-elevation, it is unlikely that ECG findings will change Jim’s initial management.

High-sensitivity troponin testing is not indicated for Jim’s initial assessment. Baseline time (‘onset of symptoms’) and serial measurements (a second test three to six hours after an initial test, and at least six hours after the onset of symptoms) are necessary to determine the significance of troponin in regards to possible myocardial infarction. The troponin level may be elevated due to factors other than myocardial injury (eg atrial fibrillation, heart failure, pulmonary embolus). Unless there is ‘point-of-care testing’, there will be a delay in obtaining a troponin result.

The level of B-type natriuretic peptide (BNP) correlates with left ventricular dysfunction, and this may help to distinguish between cardiac and respiratory causes of dyspnoea. In Jim’s situation, clinical assessment will determine his initial management; BNP testing is not indicated. A hepato-jugular reflux test is also a useful clinical sign.

ANSWER 5

The key features are the acute onset of progressive dyspnoea with tachypnoea, tachycardia, irregularly irregular pulse, hypoxaemia (as estimated by low oxygen saturation), systolic murmur, symmetrical inspiratory crepitations, and variable expiratory rhonchi.

These features are consistent with APO, secondary to acute decompensated heart failure and rapid atrial fibrillation. Jim has multiple risk factors for cardiomyopathy as a cause of heart failure: ischaemic heart disease, hypertension, diabetes, obesity and previously excessive alcohol consumption.

The expiratory rhonchi are likely to be non-specific and reflect pulmonary oedema rather than bronchospasm.

The systolic murmur has not been noted previously. In this context, this is most likely to represent increased blood flow rather than an acute structural anomaly (eg mitral or tricuspid regurgitation [or prolapse], or aortic or pulmonary stenosis) as the murmur is soft and there are no other clinical features of acute valvular dysfunction.

Differential diagnoses for Jim’s breathlessness are:

- cardiorespiratory
  - acute myocardial infarction (AMI)
  - fluid overload
  - pulmonary embolus
  - asthma
  - pneumonia
  - pneumothorax
- non-cardiorespiratory
  - high-output heart failure (anaemia, thyrotoxicosis, sepsis)
  - low-output heart failure (haemorrhage, dehydration)
  - metabolic disorder (acute renal failure, diabetic ketoacidosis)
  - neurogenic APO (eg intracerebral haemorrhage – Jim takes rivaroxaban)
  - adverse drug effects (eg non-steroidal anti-inflammatory drugs [NSAIDs] causing fluid overload and renal impairment – although Jim does not take these).

One or more of the above may be causing Jim’s breathlessness.

ANSWER 6

In this situation, starting treatment on the basis of probable diagnosis is more important than establishing a definitive diagnosis. Given your clinical assessment and ‘working diagnosis’, Jim’s condition is a medical emergency. You need to consider the principles of crisis resource management – getting appropriate help, communication, leadership, teamwork, resources (personnel, equipment and drugs) and situational awareness (eg the patient’s condition, and team members’ roles and actions).

In practice, in a medical emergency, history-taking, examination, assessment and management will be concurrent and iterative (eg asking questions while applying an oxygen mask or rechecking the pulse).

Before progressing with definitive active treatment, it is appropriate to take a brief ‘step back’ to consider consent to treatment and treatment objectives. It is important that Jim’s wishes for care are known in case he is unable to make these wishes clear. If there is an ACD, this should be given to the paramedics to take into hospital. If Jim does not have an ACD, his preferences should be sought and documented in the transfer letter.

ANSWER 7

Management of Jim’s presentation should include:

- Calling for help
  - Ask Mark to call for an ambulance.
  - Ask for one or two nurses, or care attendants, to assist in providing care.
- Explanation and reassurance
– Tell Jim that his breathlessness is probably due to a ‘rapid irregular pulse’ and ‘fluid in the lungs’, and that you will give treatment to help to ‘sort this out’ and to ‘get him better’.

• Having Jim in a sitting-up position – supported if necessary

• Monitoring
  – Continuous lead II ECG (if there is no cardiac monitor at Oaklands, this will be provided by the paramedics)
  – Oximeter
  – Respiratory rate, pulse and blood pressure (every 5 minutes) – one nurse assigned to this task

• Insertion of an intravenous cannula

• Oxygen7 (Oaklands should have a full and checked oxygen cylinder)
  – High-flow oxygen (10 L/min) can be administered via a simple (Hudson-type) face mask. This will deliver a fraction of inspired oxygen (FiO2) of about 50% (the actual FiO2 depends not only on the oxygen flow rate, but also on the patient’s respiratory rate and tidal volume). High-flow oxygen can also be provided via a non-rebreather face mask with a reservoir bag (a flow rate of 10 L/min will deliver a FiO2 of about 60%).
  – Titrate oxygen flow to maintain SpO2 at 94–96%.
  – If you suspect that Jim has had an AMI without chest pain (‘silent AMI’),8 oxygen should not be administered unless Jim’s SpO2 is <94% (which it is). Oxygen may be toxic to infarcting myocardium and may reduce coronary artery flow.9 Patients with diabetes and AMI have a relatively higher incidence of silent AMI, compared with non-diabetic patients with AMI.10

– If Jim had chronic obstructive pulmonary disease, to minimise the risk of hypercapnic respiratory failure, the oxygen flow should be titrated to maintain SpO2 at 88–92% (the minimum flow rate with a simple face mask to avoid rebreathing carbon dioxide is 5 L/min).11 Alternatively, controlled oxygen therapy can be administered (eg using a Venturi mask delivering 28% inspired oxygen; this will not be available at aged care facilities, but intensive care ambulance paramedics may have Venturi masks in their equipment).

• GTN7,12
  – GTN is a vasodilator that reduces preload, reduces left ventricular afterload, and improves coronary artery flow.
  – Administer 400 µg sublingually (metered dose spray). Repeat after five minutes if there is no clinical improvement.
  – GTN is contraindicated if the systolic blood pressure is below 100 mmHg.

• Documentation
  – One of the nurses should record observation data and medications administered.

Other drugs to consider:

• It has been standard practice to administer intravenous frusemide in the treatment of APO.12 However, the role of frusemide is not clear and there is no evidence to support its efficacy. Frusemide may have a venodilator effect. Its use may be detrimental for patients who are hypovolaemic, and for patients who have diastolic heart failure with normal systolic function (‘heart failure with preserved ejection fraction’) in whom adequate ventricular filling is required to maintain adequate cardiac output. Diastolic heart failure is difficult to diagnose clinically – an echocardiogram is required to determine left ventricular ejection fraction.
  – Frusemide may be administered intravenously at a dose of 20–40 mg (for patients who are not taking a regular loop diuretic), or in a dose of one to two times the patient’s daily oral dose of frusemide.

• There is no evidence to support the use of morphine in the treatment of APO.12

• Although Jim has rhonchi on respiratory examination, salbutamol is not indicated, because there are no clear clinical features of bronchospasm as a cause of his breathlessness.

• Aspirin 300 mg orally should be given if you consider that Jim has an acute coronary syndrome.4

• Intravenous amiodarone and intravenous digoxin can be used to treat rapid atrial fibrillation. These drugs are only used with continuous cardiac monitoring in an intensive care unit. They may cause other arrhythmias and hypotension. The priority in this setting is to treat Jim’s probable APO and to arrange his transfer to hospital, not to treat atrial fibrillation.

• Adrenaline 1 mg should be available on ‘standby’ in the event of cardiac arrest.13

ANSWER 8
The paramedics will:14
• record a 12-lead ECG (Figure 1)
• attach a cardiac monitor
• place defibrillator on standby
• CPAP.

Actions you should take include:
• Offer to provide the paramedics with any assistance required.
• make a formal ‘transfer of care’ to the paramedics to ensure that there is a clear understanding about who is responsible for Jim’s medical care.
• phone the emergency physician to discuss Jim’s presentation, management and transfer to hospital.
• write a referral letter for the emergency physician (with a copy for the paramedics).
• phone Jenny (Jim’s daughter) to inform her about Jim’s condition and his transfer to hospital.

ANSWER 9
Jim’s ECG showed that he has a heart rate of 120–150 beats/minute, with an irregular rhythm. There are no P-waves and the axis is within normal limits. There is no ST-elevation and no pathological Q-waves (probable rapid and successful perfusion by percutaneous coronary intervention for the previous STEMI). These features indicate rapid atrial fibrillation.
**CASE 3**

**ANSWER 10**

CPAP reduces the work of breathing, improves alveolar ventilation, maintains patency of fluid-filled alveoli and increases intrathoracic pressure (reducing left ventricular preload, and reducing left ventricular afterload, which improves left ventricular function). In patients with APO, CPAP has been shown to induce a more rapid improvement in respiratory distress than standard oxygen therapy — but CPAP has no effect on short-term mortality.13

CPAP is the application of positive pressure respiratory support via a sealed face mask. Initially, the airway pressure is set at 5 cm H2O. If there is no improvement, this can be increased to 10 cm H2O. Controlled oxygen therapy can be administered with CPAP (it is possible to set the FiO2).

The principal potential adverse effect is patient intolerance due to face mask discomfort, or due to breathing effort.

Contraindications to the use of CPAP are sedation, impaired conscious state, head injury, facial injury, hypotension (systolic blood pressure below 100 mmHg), vomiting and practitioner inexperience.14 None of these apply in this situation.

**CONCLUSION**

The paramedics transfer Jim to a trolley and take him to the ambulance for transport to hospital. You thank Amanda and her colleagues for their help. You thank Mark and the nursing staff for their assistance. You will arrange formal debriefing with the staff after you have received information about Jim’s assessment, management, and response to treatment. You return to the nurses’ station to write your clinical notes.

You drive back to the practice. The reception team have rescheduled your consulting session and your next patient is not due for 30 minutes. You take the opportunity for a tea-break. You reflect on your assessment and your next patient is not due for 30 minutes. You return to the practice and your next patient is not due for 30 minutes. You return to the nurses’ station to write your clinical notes.

One week later, you receive a discharge summary for Jim. The diagnosis was acute heart failure secondary to rapid atrial fibrillation and cardiomyopathy (ischaemic, diabetic and obesity related). He did not have a myocardial infarction. Echocardiography confirmed a significantly reduced left ventricular ejection fraction (35%), with normal cardiac valve function. Jim’s condition improved after 24 hours of CPAP, transdermal GTN and a single dose of intravenous frusemide. Cardioversion (electrical or pharmacological) was not considered appropriate to treat his atrial fibrillation.

Metoprolol 50 mg twice daily has replaced atenolol 50 mg daily. Ramipril 5 mg daily has replaced irbesartan 150 mg daily. No follow-up had been arranged.

You plan to review Jim at Oaklands later in the week. You know that rehabilitation following an episode of acute heart failure and optimal management of chronic heart failure are essential to control symptoms, maximise exercise tolerance and prevent relapses. Weight control, fluid restriction, salt restriction and exercise will be challenging for Jim. He would have missed his granddaughter’s birthday party.

**RESOURCES FOR DOCTORS**


**REFERENCES**


CASE 4

MARGOT NOTICES SUDDENLY BLURRY AND DISTORTED VISION

Margot, a retired schoolteacher aged 73 years, presents with a three-day history of central blurring in her right eye. She is quite frustrated as it is making it difficult to drive. Margot reports she has noticed gradually worsening vision in both eyes over the past year. However, for the past three days she has been unable to read crosswords with her right eye, and says the straight lines appear distorted. Margot is a smoker and is on treatment for hypertension and hypercholesterolaemia.

QUESTION 1

How would you manage this consultation?

QUESTION 2

What are your differential diagnoses at this stage? What are the most important conditions to consider?

QUESTION 3

What is the likely diagnosis? What course of action should you take?

FURTHER INFORMATION

Margot denies any significant past ocular history. She has never had trauma or surgery to her eyes and has worn reading glasses since she was in her 50s. Margot has had no pain or redness in either eye and denies seeing flashes of light (photopsia) or floaters.

You find that Margot’s best corrected visual acuity (BCVA) in the right eye is 6/36, with no improvement with pinhole. She indicates that she still has good peripheral vision in her right eye. Her BCVA in the left eye is 6/6. The conjunctivae are not injected, and there are no signs of ocular inflammation. Her pupils are equal and reactive to light, and ocular motility is normal.

FURTHER INFORMATION

You refer Margot to an ophthalmologist. One week later, you receive a letter from the ophthalmologist thanking you for your referral and confirming that Margot has neovascular age-related macula degeneration (ARMD) in her right eye and dry ARMD in her left eye. Margot has been commenced on a course of ranibizumab injections in her right eye. The investigations suggestive of this diagnosis are shown in Figures 1–4.
QUESTION 4
How is neovascular ARMD managed? What is the prognosis of this condition?

QUESTION 5
What steps can you take as a general practitioner (GP) to help Margot with the management of her ARMD?
ANSWER 1
First, take a thorough history, including an ocular history. It is important to obtain the following information:

- Nature of symptoms
  - Pain
  - Time course of onset
  - Getting better/worse or remaining the same
  - Previous episodes of symptoms
  - Strictly unilateral or bilateral to lesser degree
  - Any associated symptoms, including features of a transient ischaemic attack (TIA) or cerebrovascular accident (CVA)

- Features of giant cell arteritis (GCA)
  - Headache, temporal tenderness, jaw claudication, myalgias, night sweats and unexplained weight loss
  - Temporal pulses and, if indicated, order urgent tests for erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) and referral to emergency department

- Ocular history
  - Past ophthalmic history, including previous laser treatment or surgery
  - Spectacles or contact lenses
  - Family history of eye disease
  - Previous ocular trauma

- Medical history
- Medications, including eye drops
- Allergies

- Social history
  - History of smoking
  - Driving status
  - Social support
  - Coping functionally with decreased vision

- Ocular examination
  - BCVA using Snellen chart
  - Near reading vision
  - Ishihara colour vision testing
  - Pupil examination
  - Ocular motility
  - External exam of eyes including lids, sclera, cornea and anterior chamber, with slit lamp if available
  - Direct ophthalmoscopy
  - Amsler grid assessment for scotoma and distortions (Figure 5)

Note that when performing an Amsler grid assessment, ask the patient to look at the central dot with one eye and occlude the other eye. Any areas of blurring or scotoma should be marked out on the grid.

ANSWER 2
In the general practice setting, it can be difficult to do a full ophthalmic examination. It is important to be aware of signs or symptoms that need prompt specialist attention, as delays in treatment can affect the long-term prognosis. Given that the examination of the anterior portion of Margot’s eye is normal, her loss of vision is most likely to be due to a posterior segment ocular pathology or a neuro-ophthalmic cause.

Any patient with sudden monocular loss of vision should be screened on history and examination for features of optic neuropathy and stroke. An important differential diagnosis is arteritic anterior ischaemic optic neuropathy (AAION) due to GCA (Box 1), which can cause bilateral, profound irreversible blindness and even death if it is left untreated.

All patients over 50 years of age with sudden loss of vision should be asked about features of GCA, including headache, temporal tenderness, jaw claudication, night sweats and proximal myalgia. Consideration should be given to doing urgent ESR and CRP tests, and referral if required.

In this particular case, Margot has no features of GCA or stroke. The history is more suggestive of ARMD. She reports a year of gradually decreasing vision in both eyes, which may be suggestive of the dry form of macular degeneration. The sudden deterioration of her central vision with distortion is suggestive of progression to ‘wet’ macular degeneration (neovascular ARMD).
Box 1. Differential diagnosis summary

Most likely cause:
- ARMD

Less common retinal causes of central blurring:
- macular hole
- central serous chorioretinopathy (usually younger age group)

Conditions that need to be considered and ruled out:
- optic neuropathy
- giant cell arteritis

ANSWER 3

The most likely diagnosis, on the basis of the history and examination, is neovascular ARMD. This is otherwise known as ‘wet ARMD’. In neovascular ARMD, newly formed blood vessels grow from the choriocapillaris through Bruch’s membrane into the retina. When these abnormal vessels bleed or leak, a sudden onset of central visual distortion and scotoma can occur. Urgent referral to an ophthalmologist is required. It is important to promptly refer these cases. Effective therapies are available. The sooner treatment is instituted, the higher the chance of protecting macular photoreceptors and better the visual prognosis.

Current treatment options are based on the inhibition of vascular endothelial growth factor (VEGF). These treatments will be described in detail in the next question.

ANSWER 4

The current gold standard treatment for neovascular AMD is regular intravitreal injections of anti-VEGF agents. These agents include ranibizumab and aflibercept.

In terms of Pharmaceutical Benefits Scheme (PBS) funding, the main indications for approval of ranibizumab and aflibercept are:
- patient has been diagnosed with subfoveal CNV due to AMD by fundus fluorescein angiography
- baseline visual acuity equal to or better than 6/60.

Importantly, anti-VEGF treatments do not cure the underlying disease but reduce the adverse impact of the condition by inhibiting angiogenesis. This slows the development of new aberrant vessels, and minimises fluid leak from these vessels. Patients commonly require ongoing treatment.

Initially, treatment is typically given monthly for three months. Beyond the three-month mark, many ophthalmologists use a ‘treat and extend’ protocol in which the length of time between injections is gradually increased as tolerated. To begin with, patients will return for monthly clinical assessment and OCT. If there is clinical improvement and regression of intraretinal and subretinal fluid on the OCT, the ophthalmologist will inject anti-VEGF and consider next treating the patient in five or six weeks rather than four weeks. This gradual process of extending the time between treatments continues as tolerated. The aim is to achieve maximal inhibition of angiogenesis with the fewest number of injections possible. If signs and symptoms of the CNV recur, the frequency of treatment will be increased again.

For the majority of patients, intravitreal injections are ongoing. This creates a significant practical burden for the patient and a significant public healthcare expense. However, anti-VEGF treatment has shown a substantial improvement of visual outcomes. Without treatment, the natural history of wet ARMD is rapid and irreversible central visual loss. Recent population-based data have shown that legal blindness attributable to ARMD has been halved in some countries since the introduction of anti-VEGF therapy.

ANSWER 5

Smoking cessation

Smoking is a proven risk factor for ARMD. It is an important modifiable risk factor, and thus GP support in helping patients quit smoking is beneficial.

Vitamin supplementation

It is not uncommon for patients to ask their GP about whether they require vitamin supplementation to help reduce the risk of vision loss from macular degeneration.

The Age-Related Eye Disease Study (AREDS) showed that supplementation of certain vitamins and zinc can reduce the progression of macular degeneration from intermediate-stage to late-stage disease. There is no evidence to support prescription of these supplements for the prevention of macular degeneration or for the management of patients with other retinal disease.

For this reason, the decision about vitamin supplementation is best made in consultation with an ophthalmologist.

A healthy, varied diet rich in antioxidants is believed to be effective in reducing the risk of ARMD. Foods such as green leafy vegetables, almonds and fish are recommended.

Awareness of Charles Bonnet syndrome

Charles Bonnet syndrome (CBS) is an increasingly recognised condition in people with low vision. It is characterised by vivid, elaborate and recurrent visual hallucinations in psychologically normal people. It most often occurs in older, visually impaired persons, with ARMD the leading cause. One study reported the prevalence of CBS in an elderly, low-vision population to be 17.5%. In a prospective study in the Netherlands, the prevalence in patients with ARMD with low vision was 11%. The hallucinations can range from simple shapes and dots of colours, to detailed images of people, animals, landscapes or buildings. Typically, the hallucinations last for a number of months before becoming less frequent. However, it is highly variable and may never subside.

The phenomenon of visual hallucinations among people who have lost vision has been compared to the phantom limb sensations that may occur after amputation. Put simply, the hallucinations may occur because the brain is active and filling in vision gaps caused by the underlying disorder.

CBS can be very distressing for patients and they may not be forthcoming with their health professionals for fear of being...


CASE 5

NATALIE HAS TYPE 1 DIABETES AND HER MEDICATIONS HAVE BEEN BURNT

A bushfire has just blazed through the small rural town where you are a general practitioner (GP). Eighteen houses have been destroyed and three people have died. You arrive at work early to find Natalie, one of your longstanding patients, waiting on the doorstep. Natalie is 45 years of age and has type 1 diabetes mellitus and anxiety. She is distraught and says, ‘I just want to see my doctor’.

Natalie is stunned and dazed. She tells you she has lost her house and most of her belongings. Natalie is in disbelief and does not know what to do.

QUESTION 1

How would you manage Natalie? What do patients need immediately after a disaster (hours and days) from their GP?

QUESTION 2

How might Natalie’s diabetes be acutely affected by a disaster?

QUESTION 3

How are Natalie’s results likely to be affected by the disaster at these times?

QUESTION 4

What mental health conditions are more prevalent after a disaster? How might they affect Natalie’s diabetes?

FURTHER INFORMATION

Natalie is currently housed in temporary accommodation. She lives alone and has no family in Australia, but has several good friends who are her main support.

Natalie returns to see you at three months and at six months for review of her diabetes, including the results of recent serology including glycated haemoglobin (HbA1c) and lipid levels.

Natalie relays concerns about one of her friends who narrowly escaped from the flames and is hesitant to seek medical help as she thinks other people need it more than herself.
QUESTION 5

After such a devastating disaster, who among your patients are most at risk? Who should be considered for outreach?

Immediate support
- Safety is paramount.
- Immediate medical management:
  - General assessment including, review of Natalie’s type 1 diabetes: checking glucose and ketone levels, recent dosages and self-monitoring
  - Assessment of any acute physical injuries, including lacerations, burns, smoke inhalation, etc
  - Review and supply of ongoing medications and medical supplies
- Immediate psychosocial support

Medical review
A priority for patients with chronic conditions in disasters is securing medications, yet many have difficulty remembering medication names or dosages.1

The most important immediate need for Natalie in this situation is provision of a minimum two-week supply of her usual medication, including glucose monitoring supplies and urine ketone testing strips. Insulin may be stored at room temperature for 28 days, so difficulty with power or refrigerator access should not be an immediate issue. Individualised advice on management of her diabetes to prevent hypoglycaemia is important because her exercise levels and dietary habits are likely to change with her relocation to alternative accommodation and with involvement in clean-up activities in the aftermath.

Pre-existing conditions, such as anxiety, may be affected. Review and basic observations are important as heart rate and blood pressure may be increased after traumatic events; the increases may persist for months.2-7

Natalie may also require assistance with issues of insomnia, poor appetite, medically unexplained physical symptoms (MUPS), difficulty concentrating or difficulty making decisions during this time.

Psychosocial support
In the first hours to days, GPs often deliver what is now called psychological first aid (PFA). PFA is ‘listening, linking and enabling’. It is what GPs do intuitively for their distraught patients. PFA is an evidence-informed response endorsed by the World Health Organization (WHO)1 and the Red Cross for those in distress after a disaster.8,9 See www.who.int/mental_health/publications/guide_field_workers/en for more details.

In providing PFA during Natalie’s visit:
- Listen, comfort and accept – respect Natalie’s decision on how much she wishes to discuss the disaster. Some individuals are helped by talking, whereas others find talking makes it more difficult. There is no right way to respond.
- Link and establish safety – ensure Natalie has a safe place to stay. Connect her with friends and family.
- Enable – in order to decrease her sense of helplessness, help provide a sense of structure and safety by orienting Natalie towards practical activities and simple goals. Everyone can do something – look after a pet or volunteer to provide meals for emergency

QUESTION 6

What should GPs do to help their patients and practice to be prepared for the next disaster?

FURTHER INFORMATION
Natalie is worried that a fire may occur again.
responders. It is important to re-establish basic routines of meals and school.

Skills for psychological recovery (SPR) have been developed following the Victorian Bushfires of 2009.10–12 These activities aim to support recovery and prevent maladaptive coping behaviours. They involve:

- prioritising assistance
- building problem-solving skills
- promoting positive activities
- managing anxiety, loss and grief
- promoting helpful thinking
- rebuilding healthy social connections.

The Australian Centre for Posttraumatic Mental Health has produced a quick guide for SPR (refer to Resources for doctors).

Preventive care

In many cases, more injuries occur during the disaster clean-up and recovery than during the event itself. Tetanus and influenza vaccinations should be up to date, as appropriate for the season and Natalie’s planned clean-up activities.

Outreach

Patients are excellent sources of information about how their friends and relatives are faring. This can inform you of patients who may require outreach to check they are okay or whom you should ask to come in for a consultation and review.

Continuity of care

Follow-up on patients is essential through this difficult time. Patients will require different follow-up depending on initial assessment.

ANSWER 2

Issues for Natalie in the immediate period may include:

- fluctuations in glycaemic control; that is hyperglycaemia or hypoglycaemia due to:
  - loss of medication and/or testing equipment
  - changes in exercise and diet requiring medication adjustment
  - insufficient glucose/ketone monitoring
  - relocation and change of routine and meal times
  - stress
- increased risk of infection, especially during the clean-up13
  - eye irritation or injury
  - foot injury, blisters or sores
- risk of dehydration
- exacerbation of comorbidities, including her anxiety.14,15

Natalie may be at risk of not prioritising her medical condition, instead focusing on the stressful events around her.

The literature identifies certain at-risk groups among those with diabetes. These include pregnant women and their increased risk of developing gestational diabetes mellitus (GDM),16 those with diabetes,17 and mental health comorbidity.18 Note that some studies have also suggested that there is an increased incidence of new diabetes diagnoses in the period immediately after a disaster.19 So there is a need to be aware of the potential for patients presenting with new incident diabetes.

ANSWER 3

The literature from flood disasters such as Hurricane Katrina (2005), river plain flooding in Hull England (2007), and the Great East Japan Earthquake and Tohoku tsunami (2011) demonstrate the variable worsening control of pre-existing diabetes, and increases in blood pressure.2,3,16,17,20 These studies, along with anecdotal reports from the eastern Australian (2011) floods, reinforce the importance of optimising post-disaster care to control and minimise this effect.

On the basis of these studies, Natalie’s HbA1c is likely to have worsened at her three-month review, peaking at six to nine months, but returning to baseline by 12 months with good management.4,17

Natalie’s lipid levels may also have increased. Mean low-density lipid (LDL) cholesterol has also been shown to increase in the three to 12 months post-disaster.4,5 Adjustment of Natalie’s medication dosages may be required. A blood pressure review at this time would also be useful.2,5,6

ANSWER 4

Most people recover from disasters with only minimal support such as PFA or education about what is a normal reaction. Common normal reactions during the first days to weeks can include:

- Emotional: Fear, helplessness, grief, anger, arousal, numbness, disbelief, edginess, insomnia, poor appetite
- Cognitive: Difficulty concentrating, poor decision-making ability, worry, frequent memories of the event
- Social: Social withdrawal, conflict, behavioural change in children, poor school performance

Exacerbation of Natalie’s pre-existing anxiety may occur.21 If she is highly upset during this time, her ability to monitor her glycaemic control may be limited and more regular medical review and/or assistance from a family member may be useful. Natalie’s psychological stress and anxiety may also contribute to worsening glycaemic control.1

As the weeks and months progress, a minority of people may continue to have persistent or emerging mental health issues. These include:21,22

- anxiety, depression
- exacerbation of existing mental health conditions
- risk-taking, substance overuse
- post-traumatic stress disorder (PTSD)
- complicated or prolonged grief
- medically unexplained physical symptoms
- domestic violence or relationship difficulties.

PTSD has been shown to have an association with new incident diabetes.18,23
Review of those individuals with persisting symptoms that disrupt daily functioning after a disaster is an important role of the GP. This could include referral to a psychologist under the Better Access initiative or Access to Allied Psychological Services (ATAPS) program.

ANSWER 5
Most people are resilient in disasters and need minimal support to recover. GPs are well placed to know who among their patients are most likely to benefit from a telephone call to offer assistance or advice. Individuals vary greatly in their response to such events but studies have shown that there are groups that are generally at greater risk for differing reasons. These include the young, elderly, isolated, physically or mentally impaired, pregnant women and those with significant pre-existing health conditions. Studies show greater impact on individuals if they thought they would die or thought someone they knew would die. One prospective study of 301 pregnant women exposed to Hurricane Katrina looked at the frequency of what they defined as ‘severe hurricane events’ and found that these were associated with a risk of GDM. Seven ‘severe hurricane events’ increased the risk of having GDM:16

- significant home damage
- feeling one’s life was in danger
- experiencing illness or injury to self or family member
- walking through flood waters
- not having electricity for more than one week
- having someone close die
- seeing someone die.

Women with two or more experiences were at 3.1 times higher risk of GDM, after adjusting for confounders. The risk was markedly increased to 8.9 with four or more experiences. In the authors’ discussion with medical practitioners with experience in this field, survivor guilt can prevent patients from presenting for regular check-ups or attending for injuries after the incident. It contributes to people feeling that they should not seek medical attention because they survived when others did not.

Disasters are not all the same. Some are worse and have greater impact and longer recovery times than others. Characteristics of a disaster that can contribute to a more difficult recovery include:

- greater loss of life
- greater injury to children or number of child deaths
- more gruesome injuries
- prolonged evacuation
- recurrent ongoing hazards (eg earthquakes with tremors)
- malevolent intent.

ANSWER 6
After disastrous events, calls are frequently made for greater preparedness:

Guidelines are needed for healthcare professionals and people with chronic diseases like diabetes to have a plan of action for disasters. Each patient will have different needs tailored to their particular medical conditions and personal situation. People with diabetes have particular risks in disasters, and these risks guide the strategies that should be implemented in preparing them for disasters. There are also policies around the provision of medications by pharmacists in emergency situations (refer “Resources for doctors”). Suggestions for Natalie would include:

- optimising diabetic care and general patient health prior to an event
- ensuring vaccinations, including tetanus and influenza, are up to date
- assisting her preparedness with a ‘to go’ bag containing a two-week supply kit including all medications, testing supplies (blood glucose and urine ketone testing kits as appropriate), hypoglycaemia treatment, food, fluids, eye-protection, foot care kit (with solid protective shoes to wear) and a basic first aid kit
- having supplies ready to go in several locations — work, home, school
- awareness of the high risk of infection
- encouraging her to have a plan that includes evacuation and pets.

My Diabetes Emergency Plan is available from the Australian Diabetes Educators Association (refer to ‘Resources for patients and doctors’). This plan recommends having up-to-date documentation of a full medical history, especially medication names and dosages, the patient’s team of carers with contact details including those of the GP, pharmacist, endocrinologist, diabetes educator and next of kin. In the same manner, being prepared for disasters from a general practice perspective assists all patients. In particular, the general practice should be prepared with:

- a plan, no matter how simple
- a lead member of the practice who knows the plan
- backup of electronic medical files and staff contact details readily available off site
- backup power/generator source or linkage with another practice to provide mutual support
- ability to communicate with other local health providers including local pharmacists, GPs, aged care facilities, primary health network, public health unit and hospitals
- a practice run of the plan, even if this involves talking through the plan, and even if this is done every few years.

The RACGP’s Standards for general practices requires contingency planning for natural disasters, pandemics and adverse, unexpected events. References and websites of use in practice planning are listed in the ‘Resources for doctors’ section.

RESOURCES FOR PATIENTS AND DOCTORS

RESOURCES FOR DOCTORS
- Australian Centre for Posttraumatic Mental Health. Skills for


Kauffman FR, Devgan S. An increase in newly onset IDDM admissions following the Los Angeles earthquake. Diabetes Care 1995;18(3):422.


**CASE 6**

**HAYDEN PRESENTS UNWELL**

Hayden, 27 years of age, is unemployed and presents with a one-week history of fatigue, urinary frequency, dysuria and fevers. Over the past 12 hours, he has developed nausea and vomiting as well as generalised abdominal discomfort.

**QUESTION 1**

How would you assess Hayden’s presenting complaint?

**FURTHER INFORMATION**

Hayden says he has been feeling increasingly unwell over the past week. Until then, he had considered his health to be excellent, although he was concerned that since being made redundant in the past year, he had become inactive and had gained about 12 kg.

**QUESTION 2**

What other history or information do you need?

**FURTHER INFORMATION**

On specific questioning, Hayden reports that he has had some irritation under his foreskin for several months, but there are no ulcers or blisters. He has no urethral discharge and has had no sexual contacts for at least three months.

Hayden is a non-smoker and consumes alcohol only occasionally. He takes no medications and there is nothing of note in his past medical history.

His parents are immigrants from India and both have type 2 diabetes mellitus (T2DM), hypertension and hypercholesterolaemia, and are obese. His sister is overweight but otherwise well.

On examination, Hayden looks unwell and is mildly dehydrated. You note he has some thickening and hyperpigmentation of the skin around his neck. Hayden has a body mass index (BMI) of 32.8 kg/m² (weight = 105 kg, height = 179 cm), waist circumference of 100 cm and his blood pressure is 130/70 mmHg. He is febrile (38.2°C), he has a sweet smelling breath, and his respiratory rate is 18/minute.

Abdominal examination is normal. He has some redness and a slightly smelly, white discharge under his foreskin. The remainder of the examination is normal.

**QUESTION 3**

What are your most likely differential diagnoses?
On the basis of the differential diagnoses listed above, how would you investigate Hayden in the clinic and with formal pathology?

You arrange urgent testing and the results are seen in Table 1.

<table>
<thead>
<tr>
<th>Table 1. Hayden’s results</th>
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<tbody>
<tr>
<td><strong>Office-based tests</strong></td>
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<tr>
<td>Urinalysis</td>
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<tr>
<td>Protein</td>
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<tr>
<td>Glucose</td>
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<td>Ketones</td>
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<td>Leucocytes</td>
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<td>Red cells</td>
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<tr>
<td>Nitrite</td>
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<tr>
<td>Glucometer — blood glucose level</td>
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<tr>
<td>Sent to pathology</td>
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<tr>
<td>Urine culture</td>
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</tbody>
</table>

**FURTHER INFORMATION**

You arrange urgent testing and the results are seen in Table 1.

<table>
<thead>
<tr>
<th>Table 2. Hayden’s pathology results</th>
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<tbody>
<tr>
<td><strong>Tests</strong></td>
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<tr>
<td>Haemoglobin (Hb)</td>
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<tr>
<td>White cell count</td>
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<tr>
<td>Erythrocyte sedimentation rate (ESR)</td>
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<tr>
<td>C-reactive protein (CRP)</td>
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<td>Liver function test (LFT)</td>
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<td>Urea</td>
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<td>Bicarbonate</td>
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<td>Glucose</td>
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</tbody>
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**QUESTION 4**

On the basis of the differential diagnoses listed above, how would you investigate Hayden in the clinic and with formal pathology?

**FURTHER INFORMATION**

Hayden is managed at the clinic and observed closely by the practice nurses. The pathology results are urgently faxed to you 1.5 hours later (Table 2).

**QUESTION 5**

What is your working diagnosis?

**QUESTION 6**

How would you manage Hayden from this point?

**QUESTION 7**

How can you prevent a recurrence of Hayden’s problem?
ANSWER 1
Hayden’s symptoms are of relatively acute onset. An accurate history is essential to better define his non-specific symptoms, which would help to exclude a number of possible diagnoses. It would be easy to dismiss this presentation as a urinary tract infection (UTI) or early gastroenteritis without looking further into the history.

Fatigue is a common complaint and a complete history, together with questions about associated symptoms, is required to narrow down the possible cause. Questions would need to cover possibilities such as use of medications or other drugs, change in weight, changes in diet and alcohol intake, evidence suggesting infection (including recent overseas travel), emotional state, multi-joint pain and disrupted sleep. A systems enquiry is helpful to better define the likely cause of the presenting symptoms and identify additional information that may not have been noted by the patient.

A history of urinary frequency and dysuria needs consideration of sexually transmissible infections (STIs), and non-infectious urinary tract inflammation (eg urethral stricture, bladder stones), as well as UTIs and the possible underlying associations (prostatitis, pyelonephritis).¹

Nausea and vomiting are non-specific symptoms that accompany a variety of conditions. A very detailed enquiry is required to narrow down the wide range of possibilities.

ANSWER 2
Knowledge of Hayden’s past history is important. In particular, questions to ask are:

- Does he have a history of renal calculi or other renal problems?
- Does he consume excessive amounts of alcohol or take drugs of any description?
- Has he had recent sexual contacts, or recent overseas travel?

Family history is also valuable in providing possible clues to a potential diagnosis.

Physical examination should ensure that all vital signs are documented. Given his presenting symptoms, a particular focus on the abdomen and urinary tract is warranted.

ANSWER 3
The differential diagnoses should take into account the acute onset of Hayden’s illness, but there is also the possibility that this could be an acute presentation of an undiagnosed and possibly chronic illness. The most likely possibilities that should be considered are:

- infection – UTI or sepsicaemia
- gastroenteritis
- candidiasis.

Hayden’s family history puts him at increased risk of developing T2DM. If both parents have diabetes, the odds ratio risk of developing T2DM is increased six times.² Major risk factors also include obesity and a sedentary lifestyle. Skin thickening with pigmentation around the neck is consistent with acanthosis nigricans, which is a sign of insulin resistance.³

Thus, other diagnoses may include metabolic illnesses such as acute onset diabetes type 1 or type 2, with possible hyperosmolar hyperglycaemic state (HHS), or diabetic ketoacidosis (DKA) or even an Addisonian crisis.

ANSWER 4
It is important to consider that office-based testing may assist with the urgent assessment of a patient with less defined symptoms that may have multiple diagnostic possibilities. In Hayden’s case, urinalysis using a ‘clean catch’, mid-stream urine sampling (instructing to carefully clean and retract his foreskin prior to collection) for culture, would be the first simple test that could provide valuable information. Point-of-care glucometer testing and/or ketone testing can assist in excluding some metabolic causes of Hayden’s symptoms. Additional specimens may be taken for pathology testing to exclude some infective causes. This may involve, for instance, urine chlamydial polymerase chain reaction sampling or anorectal swabs should the history suggest possible sexual aetiology. In Hayden’s case, he has had no history of sexual contact for at least three months.

When looking for infection, the proper collection of the sample is important to avoid contamination. A combination of increased leucocytes and nitrite is a good predictor of a UTI.

Subsequent relevant testing would include a full blood evaluation (FBE), CRP, LFTs, urea, electrolytes and creatinine, blood glucose, and urine microscopy, culture and sensitivity.

ANSWER 5
The elevated glucose and ketonuria suggests Hayden has acute DKA secondary to UTI (sepsis) although he is previously undiagnosed. Until plasma sodium and osmolality are obtained, the secondary diagnosis of an HHS is a possibility. The fever, sepsis and ketosis create an emergency situation where delays in correct diagnosis and management may have serious and sometimes fatal consequences.⁴ The pathophysiology creating Hayden’s problems is that as plasma glucose concentration increases, so too does the glucose load filtered through the kidney. When the glucose level exceeds the re-absorbptive capacity of the proximal tubule, glucose is excreted in the urine. In healthy individuals, the renal threshold for the appearance of glycosuria equates to a blood glucose level of approximately ≥10 mmol/L.⁵ Insulin deficiency is usually accompanied by an increase in counter-regulatory hormones (glucagon, cortisol, adrenaline, growth hormone), which in turn stimulates hepatic gluconeogenesis, glycogenolysis and lipolysis. The result is an increase in blood glucose, and ketones and ketoacids from the metabolism of free fatty acids. When the level of blood ketones exceeds the body’s capacity to deal with them, they spill over into the urine. Non-diabetic causes of ketoacidemia include starvation, high-protein diet, prolonged vomiting, hyperthyroidism, fever, pregnancy and lactation.

T2DM is increased six times.² Major risk factors also include obesity and a sedentary lifestyle. Skin thickening with pigmentation around the neck is consistent with acanthosis nigricans, which is a sign of insulin resistance.³
When assessing a patient with a presentation like Hayden’s, symptoms such as altered respiratory rate, elevated temperature and sudden onset of malaise, plus the presence of frank glycosuria and ketonuria, indicate a clinically unstable state. In this case, expediting pathology collection should be a priority. A timely telephone call to your pathology provider to arrange urgent return contact with any abnormal results could be organised. In some cases, it may be better to observe a patient like Hayden within the clinic, using frequent one-to-two-hourly glycaemia assessment, and supportive hydration, if urgent transfer to a specialist centre cannot be immediately possible and any pathology results are to be reported.

**ANSWER 6**

Given that Hayden has ketonuria, DKA rather than HHS is the diagnosis. DKA is an acute, life-threatening complication of diabetes. It is usually associated with type 1 diabetes mellitus (T1DM), but is increasingly recognised as also occurring in T2DM. DKA is characterised by hyperglycaemia, ketoacidosis, ketonaemia and ketonuria.

The diagnostic criteria for DKA are: 3,8

- blood glucose level >11 mmol/L
- venous pH <7.3 or bicarbonate <15 mmol/L
- ketonaemia >3 mmol/L or significant urine ketones >2 on standard urinalysis.

Point-of-care testing and subsequent pathology have confirmed the hyperglycaemia in Hayden’s case. These have also raised an urgency associated with the complicating metabolic decompensation demonstrated by the ketosis-related acidosis. Delays between patient presentations and clinical action have led to potentially serious and fatal outcomes with ketosis in patients with diabetes.9

Certainly, ongoing pathology reassessment is appropriate to accurately document the glycaemia and progression of the ketosis, but this should be in conjunction with, and not delay urgent medical assistance in Hayden’s or other cases.

**Clinical stabilisation is required**

- Seek urgent specialist assistance via telephone and arrange transfer to a hospital setting. In rural and remote communities, urgent specialist support via telephone or telemedicine contact should be sought to assist with the resuscitation and stabilisation of cases such as Hayden’s. Support the patient with emergency maintenance of airways (if neurological compromise is present such as altered consciousness, seizures and paresis), establish venous access for fluid resuscitation and monitor cardiac rhythm with an electrocardiogram. Oxygen may assist those with circulatory shock. Insulin therapy may be instituted with specialist support before transfer where glucose monitoring is available.

- Manage the aetiology – UTI. In Hayden’s case, urgent analysis showed a positive urine culture for *Escherichia coli*. If intravenous access is obtained, urgent blood cultures, with accompanying baseline electrolyte and blood cell counts, may assist identification and management of sepsis with antibiotics and further metabolic resuscitation.

**Non-urgent management**

There remains a dilemma that Hayden could have T2DM or a less common onset of T1DM, or other forms of diabetes including maturity-onset diabetes of the young (MODY) or latent autoimmune diabetes in adults (LADA). MODY has a strong genetic component to aetiology and has four major subtypes, with the most common being MODY 1 with a hepatocyte nuclear factor 1A (HFN1A) gene mutation. This form of diabetes is particularly sensitive to use of sulphonylureas and the patient may not need ongoing insulin. With Hayden’s strong family history, he would be a candidate for counselling about appropriate testing.

Additionally, in Hayden’s case, anti-glutamic acid decarboxylase antibodies, anti-islet cell antibodies (if present and elevated) and C-peptide levels (if lowered) may help identify autoimmune beta cell failure such as in some forms of T1DM, thus making long-term use of insulin a possibility. These tests may require some time for analysis, so clinical decisions on management may need to proceed until they become available.3 Supportive education, and patient-centred specialist and allied health support are best practice in any patient with complex, newly diagnosed diabetes.

**ANSWER 7**

Patients with newly diagnosed diabetes require sick-day management education that includes the principles of sick-day management as well as the role of glucose self-monitoring and capillary beta-hydroxybutyrate (ketone) monitoring. The Royal Australian College of General Practitioners’ (RACGP’s) *General practice management of type 2 diabetes 2014–15* has important sections on sick-day management for patients.3

Intercurrent illnesses and travel-related stressors (such as changing time zones, erratic meal times and dehydration) can precipitate both hypoglycaemic and hyperglycaemic emergencies. Prevention through timely referral to a credentialled diabetes educator (CDE) for the education of patients should encompass planning for illness and stressful periods, such as travel, and is of special importance for patients using insulin.

**CONCLUSION**

New-onset diabetes, even T2DM, may present acutely as DKA or HHS. Levels of clinical suspicion should be considered in patients with hyperglycaemia and symptoms suggestive of metabolic decompensation, such as polyuria, polydipsia, nausea, vomiting and certainly a change in consciousness. Point-of-care testing (glucose and ketone testing) will assist early diagnosis, facilitate urgent clinical support and avert serious clinical outcomes.

The prevalence of DKA at time of diagnosis is 25.5% in patients before the age of 25 years, with decreasing prevalence with advancing age.12 In addition, 33% of young patients with newly diagnosed T2DM may also present with ketonuria, and 5–25% present with DKA.13–15 A study in Denmark found that 12% of DKA cases occurred in patients aged >50 years, with an overall 4% mortality rate, with increasing mortality with age >70 years. Ethnicity may be important in prevalence, where studies have found high
clustering in patients with T2DM in South Africa (up to 50% of all presentations)\(^3\) and high incidences in Taiwan.\(^{17}\)

DKA and HHS are medical emergencies and management should address the multiple metabolic abnormalities as well as the precipitating factors. Children with DKA may have a differing manifestation, compared with adults, and a higher incidence of cerebral oedema, whereas in adults HHS is associated with a high incidence of neurological complications due to extreme osmotic and electrolyte abnormalities associated with this condition.\(^{18}\)

More recently, the rare condition of eu glycaemic ketoacidosis has been recognised, often in conjunction with the use of sodium–glucose co-transporter 2 (SGLT2) inhibitors.\(^{19}\) Early diagnosis of ketoacidosis may be difficult in patients on SGLT2 inhibitors.

Use of point-of-care measurement of capillary blood beta-hydroxybutyrate (combined with glucose monitoring) in general practice is sensitive and specific for DKA, and may allow more rapid identification of patients with hyperglycaemia at risk of DKA.\(^5,8\) Monitors are available for clinic use in Australia and should be considered as a useful tool in astute emergency assessment of the unwell patient.

REFERENCES


CASE 1 – LOLA

It’s the end of February and Lola, 25 years of age, presents with a painful blister on her back, just below her right shoulder, which she thinks was caused by sunburn. She spent an afternoon reading in the park two days ago. It was a sunny day and she found a quiet spot in the sun where she could read her book and enjoy the warmth of the afternoon sun. She was wearing a cotton dress and hat but her shoulders were exposed to the sun and she had not thought of using sunscreen.

QUESTION 1
Which of the following is Lola’s primary need at this stage?
A. Limiting inflammatory damage
B. Analgesia
C. Limiting heat loss
D. A full blood evaluation

CASE 2 – LEO

Leo, 15 months of age, is brought to see you by his mother Cara. Leo is clearly distressed, has difficulty breathing and his lips are swollen. Cara fears that Leo may have eaten some nuts from a box of breakfast cereal that she accidentally knocked over this morning. Leo weighs 12 kg.

QUESTION 2
What immediate treatment does Leo require?
A. Intramuscular (IM) adrenaline, 10 µg/kg
B. Subcutaneous adrenaline, 100 µg
C. Nebulised salbutamol, 2.5 mg
D. Intramuscular promethazine

CASE 3 – HAROLD

You have just seen your last patient for the day and are about to go home when the receptionist puts a call through from Jeanette, the wife of Harold, one of your long-term patients. Jeanette tells you that Harold, aged 75 years, has been having difficulty breathing for the last hour and this seems to be getting worse. She is worried but not sure whether to take him to the emergency department. You decide to see Harold on your way home and you collect the practice’s doctor’s bag. Harold is clearly distressed and looks pale. With difficulty, he tells you he ‘feels like drowning’. On examination, you note that Harold’s pulse is 110 beats per minute and irregularly irregular, his blood pressure is 160/110 mm Hg and respiratory rate is 30 breaths per minute. Your preliminary assessment leads you to a provisional diagnosis of acute pulmonary oedema.

QUESTION 3
Which of the following is appropriate in managing Harold?
A. Have Harold in a sitting position.
B. Call for an ambulance.
C. Reassure Harold that you will give him treatment to help him.
D. All of the above.

QUESTION 4
Which of the following medications would be beneficial in this situation?
A. Frusemide
B. Glyceryl trinitrate
C. Morphine
D. All of the above

CASE 4 – CALVIN

Calvin, 50 years of age, lives in a small town that has just been affected by a cyclone. Calvin’s house, along with many others in the town, has been destroyed and the residents are in temporary accommodation. Calvin comes to see you this morning because he ‘doesn’t know what to do’.

QUESTION 5
Which of the following options is the priority in managing this consultation?
MULTIPLE CHOICE QUESTIONS

A. Prescribe medication for Calvin’s anxiety.
B. Check if Calvin has any family who have been affected by the cyclone.
C. Check if Calvin has any chronic conditions.
D. All of the above.

QUESTION 6
In providing psychological first aid (PFA), which of the following options would be most helpful?
A. Encourage Calvin to describe his feelings and thoughts about the disaster.
B. Help to provide a sense of structure and safety by suggesting practical activities and simple goals.
C. Encourage Calvin to think positively.
D. Explore Calvin’s sense of 'not knowing what to do'.

CASE 5 – MIA
Mia is 56 years of age and presents with headaches, night sweats, visual disturbances and sudden deterioration of her central vision.

QUESTION 7
Given Mia’s symptoms, which of the following is an important differential diagnosis to consider in April?
A. Charles Bonnet syndrome (CBS)
B. Stroke
C. Giant cell arteritis
D. Central serous chorioretinopathy

FURTHER INFORMATION
History and examination suggest that Mia has age-related macular degeneration (ARMD). You urgently refer Mia to an ophthalmologist, who confirms the diagnosis of ARMD and commences her on ranibizumab treatment.

QUESTION 8
What additional management can you, as the general practitioner, provide for Mia?
A. Advise Mia to eat a healthy, varied diet rich in antioxidants.
B. Be able to discuss the possibility of CBS.
C. Help Mia to access psychological support, if necessary.
D. All of the above.

CASE 6 – APRIL
April is 10 years of age and was recently diagnosed with type 1 diabetes mellitus. Her father brings her to see you today because April has had bouts of vomiting and seems to have a fever. You do some tests and find that April’s blood glucose level is high and she has high levels of glucose and ketones in her urine. You suspect that she may have diabetic ketoacidosis (DKA) and order pathology testing.

QUESTION 9
Which of the following biochemical results confirms a diagnosis of DKA?
A. Blood glucose >15 mmol/L
B. Bicarbonates >11 mmol/L
C. Venous pH >7.3
D. Ketonaemia >3 mmol/L

QUESTION 10
Which of the following options describes the best management for April while awaiting test results?
A. Advise April’s father to take her home and ensure she has an adequate intake of fluids.
B. Seek urgent specialist assistance via telephone.
C. Arrange for urgent return of abnormal pathology results and observe April within the clinic.
D. Check if April has had any difficulties with her insulin injections.