



General principles

- Infection and sepsis are common causes of morbidity and mortality in the aged care population.
- Clinical presentations of infection and sepsis are often atypical.
- The decision to treat locally or transfer is dependent on clinical urgency, patient context and geographical location.
- Antimicrobial stewardship is a critical aspect of infection and sepsis care.
- There are particular challenges with infection and sepsis in the residential aged care facility environment.

Practice points

| Practice points | References | Grade |
|--|------------|--------------------------------|
| Prevention of infections via prophylactic vaccination is recommended, including pneumococcus vaccine and annual influenza vaccination | 11, 12 | Consensus-based recommendation |
| Ensure appropriate reminder systems are in place for regular, specific prophylaxis | – | Consensus-based recommendation |
| Within an enclosed healthcare facility, general practitioners have an important role in endorsing infection control procedures and promulgating the herd immunity concept | – | Consensus-based recommendation |
| Use the correct antibiotic for the correct indication; use the correct dose for the correct time | 13 | Consensus-based recommendation |
| If the use of an antibiotic is deemed urgent, it may be appropriate to commence an antibiotic reflecting a previous documented system-specific infection, and known sensitivities, while waiting for the microbiology result | 20 | Consensus-based recommendation |
| Consider a broad range of other differential diagnoses when making an assessment for infection and sepsis | – | Consensus-based recommendation |

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|--|-------|--------------------------------|
| Depending on the individual context, patients with high-risk criteria for sepsis must be urgently assessed with a view to immediate transfer to hospital | 7 | Consensus-based recommendation |
| Depending on the clinical scenario, when dealing with sepsis: <ul style="list-style-type: none"> swabs should be taken results reviewed when available antibiotics prescribed for the shortest possible duration and given by the most appropriate dosing regimen | 20 | Consensus-based recommendation |
| A mid-stream urine is recommended prior to commencing treatment for urinary tract infections (UTIs) | 14 | Consensus-based recommendation |
| Treating any underlying structural abnormalities and/or removal of indwelling catheter will reduce UTI frequency | 13 | Consensus-based recommendation |
| In the context of tissue infection, persistent localised pain is a red flag | 16 | Consensus-based recommendation |
| Treatment of gastrointestinal infections is via rehydration principles, and symptomatic support as required | 17–19 | Consensus-based recommendation |

Introduction

Infection and sepsis (ie life-threatening organ dysfunction) are responsible for nearly one third of all-cause mortalities in patients aged 65 years and over, and nearly 90% of deaths from pneumonia are in this patient population.¹ Additionally, sepsis is known to be associated with advanced age, and chronic complex comorbidities influence and increase risk.

There are significant changes to homeostasis in all organ systems as the body ages, and the immune system is no exception.² With advanced age, the immune system is impaired both quantitatively and qualitatively, which is reflected by an increased susceptibility to infection, and a delayed or ineffective recovery.

A protracted illness is not uncommon when an older person experiences infection or sepsis, with the probability of never fully regaining pre-morbid functional status. Therefore, a higher level of care is not uncommon as a consequence. Readmission to hospital after an episode of sepsis within 30 days is about 30% (Box 1).³

Box 1. Known risk factors for infection^{4,5}

- Immobility: 'dangers' of going to bed
- Impaired mobility
- Age-related impaired 'barrier changes' (eg skin, lungs, gastrointestinal tract)
- Poor oral hygiene and consequent poor nutritional status
- Impaired swallowing mechanism
- Gender-related factors
 - in women: lack of oestrogen in post-menopausal women predisposes to urinary tract infections (UTIs)
 - in men: benign prostatic hyperplasia contributes to urinary stasis and consequent UTIs
- Permanent indwelling catheters, and/or other types of implants or prosthesis
- Recognised syndromes of an altered immune state, including iatrogenic factors: medication review is mandatory (refer to Part A. Medication management)
- The presence of dementia itself is associated with a 50% higher risk of sepsis (refer to Part A. Dementia)

Institutional care (ie close living proximity) also brings with it its own unique susceptibility to infections.⁶ Responsibility for the prevention of common infections via prophylactic vaccination (eg influenza, pneumococcus, zoster vaccines) for patients in residential aged care facilities (RACFs) and those living in the community falls within the realm of general practitioners (GPs).

It is important to note that there may also be a suboptimal response to vaccines in older patients as a consequence of decreased antibody efficiency and changes in cellular and humoral immunity. It is important to ensure that appropriate reminder systems are in place to ensure regular specific prophylaxis.

GPs can also provide support and advice for infection control procedures within the RACF environment. The endorsement of staff and volunteers' vaccination will have the additional benefit of providing herd immunity.

Collaborative team-based care with allied health professionals can also help to reduce the risk of sepsis. For example, a poor nutritional status can have adverse effects on an already compromised immune system. Pharmacists, dentists, dietitians, physiotherapists, podiatrists, speech pathologists and other allied health professionals may have an important role to play in providing holistic care.

Clinical context

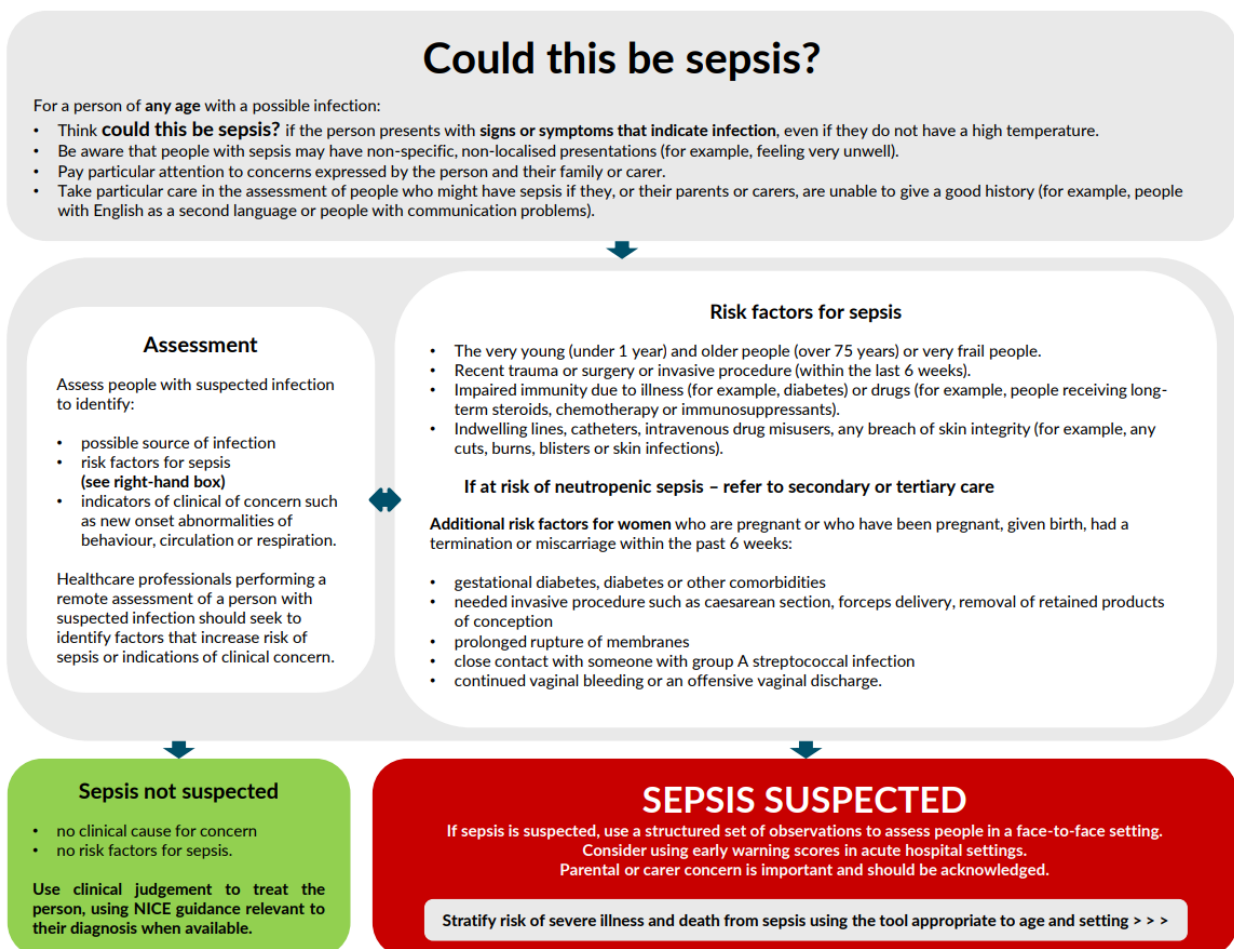
The clinical presentations of infection or sepsis in older people are multifarious, and the signs are often subtle and atypical. Other existing comorbidities can precipitate a cascade of deterioration (refer to Part A. Multimorbidity). Cognitive impairment adds yet another layer of complexity to an already ambiguous clinical situation. Clinical appraisal should be systematic and complete.

The National Institute for Health and Care Excellence (NICE) has created an assessment guideline and a risk stratification tool to aid the management of sepsis (Figure 1).

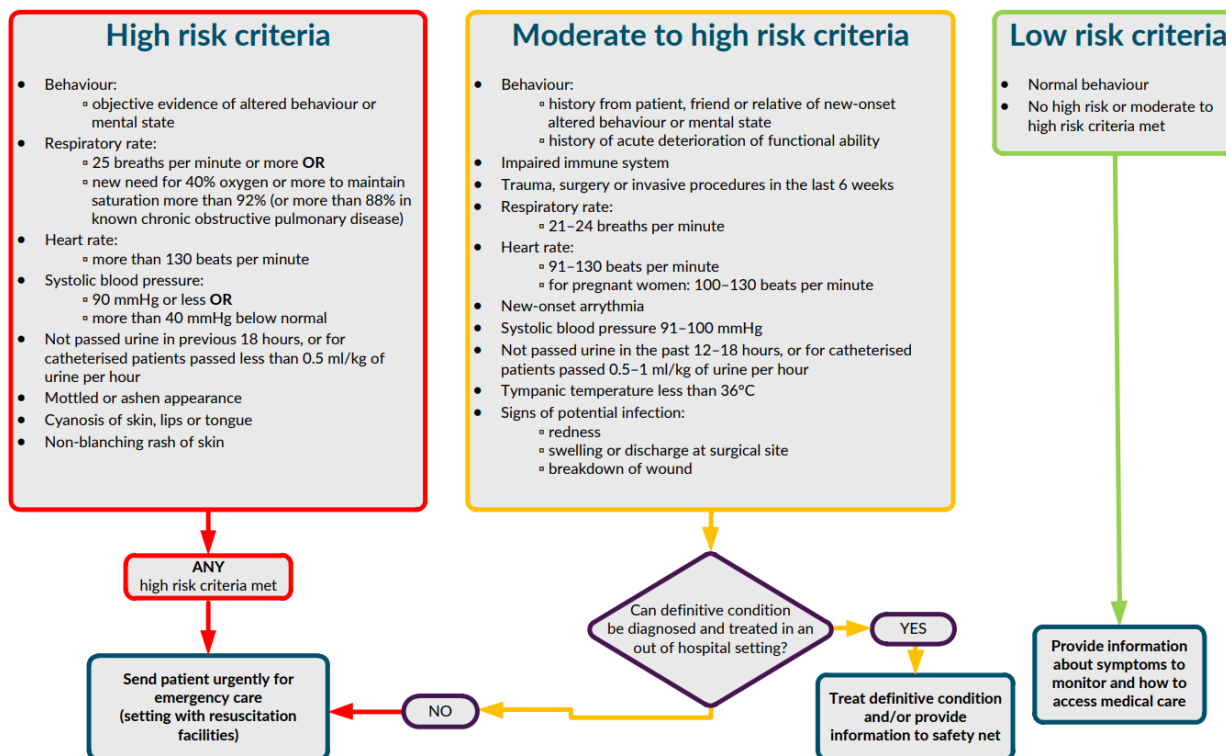
A history of new-onset changed behaviour (eg delirium spectrum; refer to Part A. Dementia and Part A. Behavioural and psychological symptoms of dementia) or an acute change in functional ability (eg sudden increase in falls; refer to Part A. Falls) are very common presentations of an infection syndrome in older people.

Of particular note is that fever, the cardinal sign of infection, is absent in 30–50% of frail older adults. A change from baseline temperature is important to note as the response to sepsis can be blunted.

Figure 1. Sepsis: Assessment guideline and risk stratification tool⁷



Sepsis risk stratification tool: people aged 18 years and over out of hospital



Reproduced with permission from National Institute for Health and Care Excellence. Sepsis: Risk stratification tools. London: NICE, 2017. Available at www.nice.org.uk/guidance/ng51/resources/algorithm-for-managing-suspected-sepsis-in-adults-and-young-people-aged-18-years-and-over-outside-an-acute-hospital-setting-2551485716 [Accessed 23 August 2019].

The increasing availability of mobile pathology and radiology services may reduce the need for hospital transfer for diagnosis and treatment. Appropriate point-of-care investigation, if available, may aid diagnosis and management (eg inflammatory markers, lactate level).

Remember that the classical signs and symptoms of the infectious focus may be absent, and the most common 'organ' origins are the respiratory tract, urinary tract, skin and soft tissues, and the gastrointestinal tract (refer to the lists of signs and symptoms below).

However, it is important to note that there are many other system-specific sources and causes of infection. The GP should therefore consider a broad range of differential diagnoses when making an assessment. A careful complete clinical assessment, along with considered investigations, will enhance the diagnostic process. A fever in older people may, in fact, indicate a non-infective cause (eg polymyalgia rheumatica, acute gout).

This clinical scenario and its clinical governance are very much within the skill set of general practice. The decision to treat locally or transfer is dependent on clinical urgency, patient context and geographical location.

The Hospital in the Home (HITH) phenomenon is having an effect, although the service availability is somewhat limited and reflects location. The HITH system is designed to assess and treat many 'hospital patients' at home, and includes residents of an RACF. HITHs can safely deliver intravenous antibiotics, antivirals and intravenous fluids to RACF residents, including those with pneumonia (includes aspiration), cellulitis and uro-sepsis. There is evidence that outcomes are equivalent to hospital-based care if patient selection is optimised.^{8,9,10}

Respiratory tract infection

Key features to consider:^{11,12}

- Respiratory tract infections are a leading cause of death among RACF patients.
- Respiratory tract infections can have a subtle presentation.
- Comorbidities confound and complicate assessment and management (eg co-existing heart failure).
- Pneumonia may be community-acquired or hospital-acquired.

- Aspiration pneumonia is common.
- Causative bacteria may differ from the general population.
- Pneumonia severity scores can aide management (eg [SMART-COP](#) tool, [CORB](#)).⁶
- Viral infections are still prevalent, and differentiation is problematic.
- 23-valent pneumococcal polysaccharide vaccine (23vPPV) is recommended for the prevention of invasive pneumococcal disease; vaccination should be done opportunistically. One dose is currently recommended except for those who have a condition that predisposes them to an increased risk of invasive pneumococcal disease.¹³ It is important to refer to the Department of Health's [Australian immunisation handbook](#) for specific guidance.
- Initial antibiotic treatment, if deemed necessary, should reflect best practice, as per guidelines.¹⁴

Urinary tract infection

Key features to consider:¹⁵

- Asymptomatic bacteriuria is very common (~50% of RACF patients): screening is not recommended, and a dipstick urinalysis is useful only to exclude urinary tract infections (UTIs) in patients who have a low pre-test probability.
- UTIs can have a subtle presentation (classical UTI symptoms are often absent).
- Consider contributing factors (eg localised pathology, other comorbidities, iatrogenic factors).
- Antibiotic resistance is common for multiple reasons, and a mid-stream urine is recommended prior to commencing treatment.
- Indwelling catheters predispose to bacteriuria: only treat if there are signs of systemic infection.
- Treatment decision will reflect clinical status and antibiotic sensitivities.¹⁴
- Treating underlying structural abnormalities and/or removal of indwelling catheter will reduce UTI frequency.¹⁶
- The evidence to support the use of prophylactic antibiotics, cranberry products, or topical oestrogen to prevent recurrent infections in patients within an RACF is lacking.¹⁷

Skin and soft tissue infection

Key features to consider:¹⁸

- Red-hot skin does not always equate with infection (refer to Part A. Dermatology).
- Skin integrity may be compromised by age and other comorbidities.
- A history of minor trauma is not infrequent.
- Localised simple infection with no signs of systemic spread is common.
- Cellulitis presents as a diffuse spreading area of skin erythema.
- More complicated infections can be necrotising, non-necrotising and/or suppurative or non-suppurative.
- Persistent localised pain is a red flag, and may indicate a rapidly progressive deep soft tissue infection.
- Adhere to antibiotic regimen as per guidelines (eg [Therapeutic Guidelines](#)).¹⁴

Gastrointestinal infections

Key features to consider:^{19,20,21}

- Infection control principles are critical because of close proximity living in RACFs.
- Gastrointestinal infections are often caused by norovirus or rotavirus.
- Gastrointestinal infections can have subtle and atypical presentations; dehydration and consequent metabolic imbalance are common.
- A change in bowel habit in an older patient can reflect multiple other causes (refer to Part A. Faecal incontinence).

- Treatment of gastrointestinal infections is via rehydration principles, and symptomatic support as required.
- There are public health implications and notification requirements.
- Antibiotics are rarely required and must reflect the clinical syndrome and relevant microbiology.

Antimicrobial stewardship

Antimicrobial stewardship in RACFs presents a unique challenge, and the current evidence base to guide best practice is incomplete. It has been estimated that 40–70% of antibiotic prescribing within an RACF is inappropriate, and antibiotic resistance is increasing.²² The frequent transfers between healthcare facilities (ie RACF to hospital and back) exacerbates antibiotic resistance.

There is a high infection burden among older patients in RACFs (ie colonised, infected). It is important that GPs prescribe in a judicious and prudent manner in order to avoid the increased emergence of multi-drug resistant microbes, and carefully follow available best-practice guidelines.²³

In general, swabs should be taken if possible, results reviewed when available, and antibiotics prescribed for the shortest possible duration and given by the most appropriate dosing regimen.¹² Maintaining close contact with the local pathology laboratory is essential, as knowledge of local microbe epidemiology can help decision-making. Patient context and environment will dictate whether or not to treat.

If the use of an antibiotic is deemed urgent, it may be appropriate to commence an antibiotic reflecting a previous documented system-specific infection, and known sensitivities, while waiting for the microbiology result.¹² Antimicrobials may be prescribed not only by the residents' GP, but also by locum doctors, nurse practitioners, specialists, dentists and hospitals. Handovers and contemporaneous records are critical in optimising care if antimicrobials are prescribed.

The aged care home pharmacist (if available) is well placed to review antimicrobial prescriptions to help minimise inappropriate or unnecessary antimicrobial use (refer to Part A. Medication management).

The known science underpinning appropriate antibiotic prescribing, along with personal, cultural and societal issues need to be considered. These include:

- the premorbid clinical status of the patient
- quality-of-life issues
- personal and family beliefs and expectations
- advanced health directives
- whether active antibiotic treatment should be withdrawn when there is lack of clinical response.

Clinical governance within the RACF environment is geographically variable, and may reflect a lack of appropriate responsibility, resourcing and commitment, which can affect felicitous prescribing.

However, GPs have a deep understanding of pathophysiology and therapeutics, and can therefore drive change and provide the leadership required to enhance clinical governance and consequent antibiotic stewardship. Cultural and structural changes are urgently required.

Use the correct antibiotic for the correct indication; use the correct dose for the correct time.¹⁴

In practice

General practice remains a clinical relationship specialty. Although episodic care can be part of a GP's responsibility, it is the consistent awareness of the context via continuity of care that differentiates general practice from other medical specialties, and aids individual assessments.⁶

Contemporaneous quality records and clinical handover are always critical in general practice, but this is especially the case in the RACF context, specifically for patients whom the GP does not know well, as may well be the case in the after-hours provision of care.

The medical assessment and management of older patients in RACFs and the community with a potential infection presents unique challenges, including:

- the clinical presentation
- whether to investigate

- whether to treat locally
- whether to transfer.

Knowing the patient and their context can make the management of infections in older patients less problematic. Respecting the patient and their family's wishes and expectations remains a critical part of the GP skill set: informed choice and patient-centred care reflects best practice (refer to Part A. Palliative and end-of-life care).

In the context of infection and potential sepsis, knowledge of local microbiological epidemiology and antibiotic stewardship are also critical.

Telephone enquiries

In RACFs, telephone enquiries to the GP from the nursing staff regarding possible infection in an older patient are common. Here, the GP has to make a judgement call based on an initial verbal description (ie collateral history). Knowing the patient helps, but, periodically, there is no prior contact or context available to the GP. It is therefore important to consider the following:

- What is the presentation?
- What are the underlying comorbidities?
- What is the past medical history?
- Do we have access to the therapeutic regimen?
- What is the present care level?
- What are the patient and/or family expectations?
- Is there an advanced health directive in place?

Best practice should mean that the GP has access to contemporaneous and up-to-date records; however, individual RACFs use different software packages, making clinical decisions even more challenging.

The availability of a senior nurse who knows the patient can be invaluable in making the right management decision; however, the rapid turnover of nursing staff in RACFs adds an additional complexity.

Triaging

Depending on the clinical triage decision made by the GP, and the location of the RACF or patient's home, a decision may have to be made to transfer the patient urgently, or for the GP to perform an acute visit for assessment. Most commonly, the situation is not acute and will require a non-urgent visit and assessment.

With potential signs of severe sepsis (eg persistent hypotension), the GP has to be prepared to visit the patient urgently to assist in resuscitation and stabilisation prior to transfer to a higher level of care. It is important to note that each hour of delay in commencing an appropriate antibiotic, if deemed appropriate, increases mortality.²⁴

For severe sepsis, contrary to the 'start low, go slow' approach for the older cohort, if a serious infection is suspected, and the decision for active treatment made, the first dose antibiotic at the highest level should be administered, within the known safety level of the drug.²⁵

References

1. Mouton CP, Bazaldua OV. Common infections in older adults. *Am Fam Physician* 2001;63(2):257–69. Available at www.aafp.org/afp/2001/0115/p257.html [Accessed 8 August 2019].
2. Navaratnarajah A, Jackson SHD. The physiology of ageing. *Medicine* 2017;45(1):6–10. Available at [www.medicinejournal.co.uk/article/S1357-3039\(16\)30229-8/abstract](http://www.medicinejournal.co.uk/article/S1357-3039(16)30229-8/abstract) [Accessed 8 August 2019].
3. Norman BC, Cooke CR, Ely EW, Graves JA. Sepsis-associated 30-day risk-standardized readmissions: Analysis of a nationwide Medicare sample. *Crit Care Med* 2017;45(7):1130–37.
4. Asher RAJ. Dangers of going to bed. *Br Med J* 1947;2:967. Available at www.bmj.com/content/2/4536/967 [Accessed 8 August 2019].
5. Rowe TA. Sepsis in older adults. *Infect Dis Clin North Am* 2017;31(4):731–42. Available at [www.id.theclinics.com/article/S0891-5520\(17\)30064-8/fulltext](http://www.id.theclinics.com/article/S0891-5520(17)30064-8/fulltext) [Accessed 8 August 2019].

6. The Royal Australian College of General Practitioners. Standards for general practices. 5th edn. East Melbourne, Vic: RACGP, 2017. Available at www.racgp.org.au/running-a-practice/practice-standards/standards-5th-edition/standards-for-general-practices-5th-ed [Accessed 8 August 2019].
7. National Institute for Health and Care Excellence. Sepsis: Risk stratification tools. Available at www.nice.org.uk/guidance/ng51/resources/algorithm-for-managing-suspected-sepsis-in-adults-and-young-people-aged-18-years-and-over-outside-an-acute-hospital-setting-2551485716 [Accessed 8 August 2019].
8. Montalto M, Chu MY, Spelman T, Ratnam I, Thursky K. The treatment of nursing home acquired pneumonia using a medically intensive Hospital in the Home service. *Med J Aust* 2015;203(11):441–42.
9. Montalto M. Hospital in the nursing home: Treating acute hospital problems in nursing home residents using HHU model. *Aust Fam Physician* 2001;30(10):1010–12.
10. Montalto M, Shay S, Le A. Evaluation of a mobile X-ray service for elderly residents of residential aged care facilities. *Aust Health Rev* 2015;39(5):517–21.
11. Infectious Disease Advisor. Community acquired pneumonia guidelines. New York: Infectious Disease Advisor, 2018.
12. Therapeutic Guidelines. Community-acquired pneumonia in adults. Melbourne: eTG, 2019. Available at https://tgldcdp.tg.org.au/viewTopic?topicfile=community-acquired-pneumonia#toc_d1e1225 [Accessed 8 August 2019].
13. The Royal Australian College of General Practitioners. Guidelines for preventive activities in general practice. 9th edn. East Melbourne, Vic: RACGP, 2015. Available at www.racgp.org.au/clinical-resources/clinical-guidelines/key-racgp-guidelines/view-all-racgp-guidelines/red-book/preventive-activities-in-older-age/immunisation [Accessed 8 August 2019].
14. Therapeutic Guidelines. Antibiotics. Melbourne: eTG, 2019. Available at <https://tgldcdp.tg.org.au/guideLine?guidelinePage=Antibiotic&frompage=etgcomplete> [Accessed 8 August 2019].
15. Jarvis TR, Chan L, Gottlieb T. Assessment and management of lower urinary tract infection in adults. *Aust Prescr* 2014;37:7–9. Available at www.nps.org.au/australian-prescriber/articles/assessment-and-management-of-lower-urinary-tract-infection-in-adults [Accessed 8 August 2019].
16. Nicolle LE. Catheter associated urinary tract infections. *Antimicrob Resist Infect Control* 2014;3:23.
17. Jarvis TR, Chan L, Gottlieb T. Assessment and management of lower urinary tract infection in adults. *Aust Prescr* 2014;37(1):7–9. Available at www.nps.org.au/australian-prescriber/articles/assessment-and-management-of-lower-urinary-tract-infection-in-adults#treatment [Accessed 8 August 2019].
18. Ramakrishnan K, Salinas RC, Hiugita NIA. Skin and soft tissue infections. *Am Fam Physician* 2015;92(6):474–83. Available at www.aafp.org/afp/2015/0915/p474.html [Accessed 8 August 2019].
19. Department of Health. Viral gastroenteritis in residential aged care. Canberra: DoH, 2016. Available at <https://agedcare.health.gov.au/overview/advice-to-the-aged-care-industry/aged-care-entry-record/viral-gastroenteritis-in-residential-aged-care> [Accessed 8 August 2019].
20. Australian Commission on Safety and Quality in Health Care. Antimicrobial stewardship in Australian health care 2018. Sydney: ACSQHC, 2018. Available at www.safetyandquality.gov.au/our-work/healthcare-associated-infection/antimicrobial-stewardship [Accessed 8 August 2019].
21. Department of Health. Antimicrobial resistance – Aged care. Canberra: DoH, 2019. Available at www.amr.gov.au/what-you-can-do/aged-care [Accessed 8 August 2019].
22. Turnidge J. Antimicrobial use and resistance in Australia. *Aust Prescr* 2017;40:2–3. Available at www.nps.org.au/australian-prescriber/articles/antimicrobial-use-and-resistance-in-australia [Accessed 8 August 2019].
23. Lim CJ, Stuart RL, Kong DCM. Antibiotic use in residential aged care facilities. *Aust Fam Physician* 2015;44(4):192–96. Available at www.racgp.org.au/afp/2015/april/antibiotic-use-in-residential-%E2%80%A8aged-care-facilities [Accessed 8 August 2019].
24. Patterson B. How important is the timing of antibiotics for surviving sepsis. New York: Infectious Disease Advisor, 2018. Available at www.infectiousdiseaseadvisor.com/sepsis/timing-of-antibiotics-for-surviving-sepsis/article/761995 [Accessed 8 August 2019].
25. Australian Commission on Safety and Quality in Health Care. AURA 2019 at a glance. Canberra: ACSQHC, 2019.