



18 Antimicrobial stewardship in dental practice

**Antimicrobial Stewardship
in Australian Health Care
2022**

Chapter contents

Acronyms and Abbreviations	422
Key Points.....	423
18.1 Introduction.....	424
18.1.1 Association between antimicrobial use and resistance	424
18.2 Antimicrobial prescribing in dental practice	424
18.2.1 Indications for prescribing of antimicrobials in dental practice	425
18.2.2 Overuse of antimicrobials in managing odontogenic complaints	426
18.2.3 Factors that influence antimicrobial prescribing in dental practice.....	427
18.3 Antimicrobial stewardship strategies in dental practice	428
18.3.1 Understanding the context and identifying priorities.....	428
18.3.2 Interventions to support antimicrobial stewardship	428
18.3.3 Monitoring the outcomes of antimicrobial stewardship activities	430
18.4 Clinical governance and leadership	430
18.5 Conclusions	431
Resources	432
References.....	433

Acronyms and Abbreviations

Abbreviation	Definition
ADA	Australian Dental Association
AMR	antimicrobial resistance
AMS	antimicrobial stewardship
AURA	Antimicrobial Use and Resistance in Australia
CDI	Clostridioides difficile infection (previously referred to as Clostridium difficile)
IPC	infection prevention and control
NAPS	National Antimicrobial Prescribing Survey
NPS	National Prescribing Service
NSQHS	National Safety and Quality Health Service
PBS	Pharmaceutical Benefits Scheme
QUM	quality use of medicines

Key Points

- Antimicrobial resistance (AMR) continues to be one of the greatest threats for our community, with the overuse of antimicrobials a significant contributor increases in AMR.
- Overprescribing and inappropriate prescribing of antimicrobials in the management of odontogenic complaints is well documented.
- Antimicrobials are prescribed in dental practice for surgical and endocarditis prophylaxis, or as an adjunct to managing dental or orofacial infection.
- Antimicrobial prescriptions written by dentists contribute greatly to the overall volume of antimicrobials dispensed to the Australian community each year.
- Antimicrobial stewardship (AMS) programs are evidence-based, multicomponent strategies that aim to decrease inappropriate use of antimicrobials to improve patient outcomes and decrease AMR.
- Dental practice has a crucial role to play in AMS to reduce inappropriate antimicrobial use and AMR in the community.
- AMS activities in dental practice encompass multiple interventions, including:
 - Professional education for dentists
 - Increased adherence to dental-specific prescribing guidelines and clinical decision tools
 - Audit and individual clinician feedback on prescribing practices
 - Engaging with consumers about antimicrobial use.
- Monitoring AMS program outcomes ensures AMS activities within dental practice are effective and continue to be updated to address changing requirements.
- Leadership for AMS in dental practices occurs at the national, state and territory, professional and practice level. Each level is important for a nationally coordinated, effective response to AMR.
- The National Safety and Quality Primary and Community Healthcare Standards, and the National Safety and Quality Health Service Standards, include AMS actions relevant to dental practice.

18.1 Introduction

Australia's National Antimicrobial Resistance Strategy 2020 and Beyond describes priority actions to address the growing public health threat of antimicrobial resistance (AMR).¹ Antimicrobial stewardship (AMS) is a key component of the national strategy. Antimicrobial stewardship is 'the safe and appropriate use of antimicrobials to reduce harm while also curtailing the incidence of antimicrobial resistance'.¹

Antimicrobial Stewardship in Dental Practice, added in 2022, was developed to strengthen AMS in specific topic areas not addressed in earlier chapters.

Antimicrobial Stewardship in Dental Practice is an important addition to the [AMS Book](#).

The [National Safety and Quality Primary and Community Healthcare Standards](#), (Primary and Community Healthcare Standards), which were released in October 2021, and the [National Safety and Quality Health Service \(NSQHS\) Standards](#), include AMS actions relevant to dental practice.

AMS in dental practice is in early stages of development; however, many lessons from implementation of AMS in other settings (hospital and community) are transferrable to dental practice.

This chapter provides an overview of the current evidence on antimicrobial prescribing by dentists, including the factors that may influence it.

Suggested approaches to implementing an AMS program in a dental practice setting are provided, including prescribing principles and suggestions for establishing and conducting AMS programs, based on the elements of AMS outlined in Chapter 1 and implementation strategies in Chapter 2.

18.1.1 Association between antimicrobial use and resistance

The ability of antimicrobial agents to control infection is critical for the treatment of infectious disease. The increasing use of antimicrobials is contributing to growing rates of AMR.

AMR is a threat to the ability to treat and prevent infections. It increases morbidity, mortality, and healthcare costs. Inappropriate or suboptimal

antimicrobial use contributes to the development of AMR and leads to poor outcomes for patients (see Chapter 1 of this book).

18.2 Antimicrobial prescribing in dental practice

AMS programs have developed as a patient safety issue and in response to AMR. As a systematic approach to optimising antimicrobial use, AMS aims to minimise the unnecessary use of antimicrobials and promote the appropriateness of antimicrobial prescribing.¹

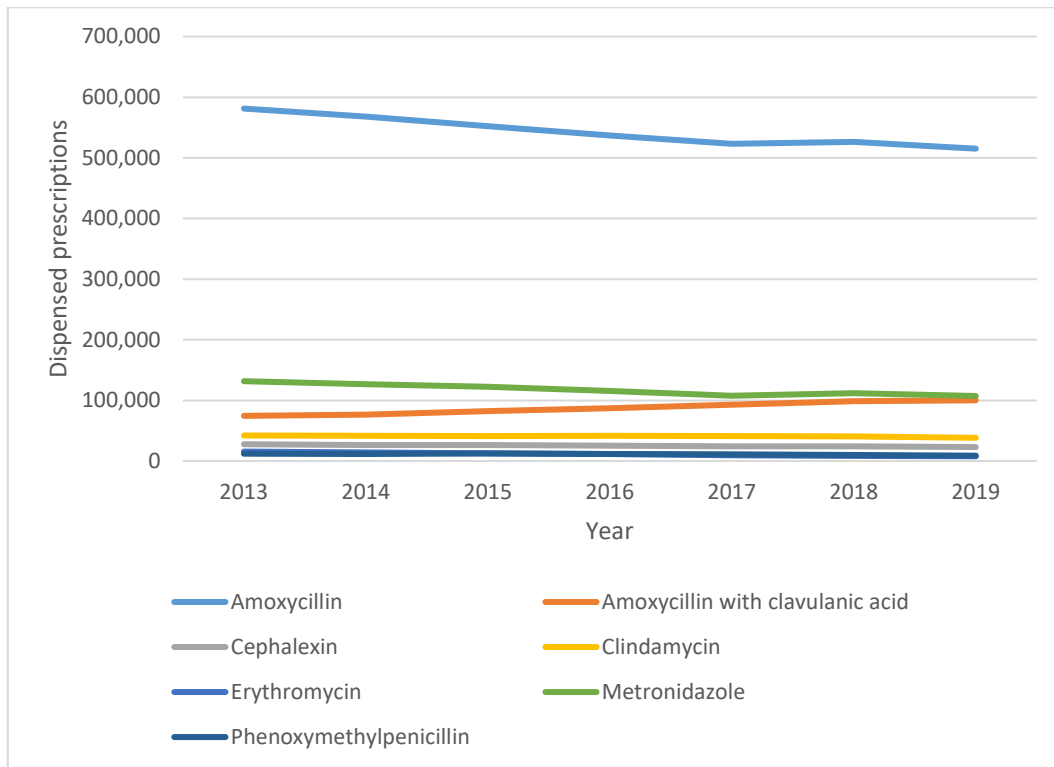
AMS programs were originally focussed on hospital use of antimicrobials, yet the primary care setting accounts for most of the antibiotic use in the Australian population. Antimicrobial prescribing by dentists is a large contributor to the overall use of antimicrobials in health care globally, accounting for up to 11% of all antimicrobial prescriptions worldwide, although antimicrobial prescription rates are generally lower in Australia.^{2 3}

Dentists in Australia prescribe a limited range of medicines under the Pharmaceutical Benefits Scheme (PBS) and Repatriation Pharmaceutical Benefits Scheme (RPBS). Every year over 1 million dental prescriptions are dispensed in Australia, and three out of four medicines most frequently prescribed by dentists are antimicrobials.⁴

The medicines most frequently prescribed, through the PBS, by dentists are amoxicillin (which accounts for 49% of all dental prescriptions), followed by paracetamol and codeine (19.8%), metronidazole (10.1%) and amoxicillin–clavulanic acid (9.5%).⁵

The number of dental antimicrobial prescriptions dispensed under the PBS each year has decreased over time, from approximately 885,000 prescriptions in 2013 to 801,000 prescriptions in 2019.⁴ Most of this decrease was in prescriptions for amoxicillin, which decreased from 581,000 to 515,000 prescriptions between 2013 and 2019. Excluding amoxicillin, prescriptions for all antimicrobials except amoxicillin–clavulanic acid have decreased over time (Figure 18.1).⁵

Figure 18.1. Dispensed dental prescriptions for antimicrobials, 2013 to 2019⁵



18.2.1 Indications for prescribing of antimicrobials in dental practice

Antimicrobials are prescribed in dental practice for surgical prophylaxis, endocarditis prophylaxis, or as an adjunct to managing oral and dental infection.^{5 6}

Indications for antimicrobial prescribing in dental practice are described in Australian guidelines: *Therapeutic Guidelines Oral and Dental*.⁷ First published in 2007, these guidelines include all common disorders encountered in general dentistry practice and provide indications and recommendations for the management and prescription of antibiotics, both therapeutically and prophylactically, and the use of antifungals and antiviral medicines. The most recent third edition was published in 2019 and distributed to all Australian Dental Association (ADA) members in early 2020.⁸

As in other areas of healthcare, dental practices vary considerably in the nature of their work, patients treated, and the complexity of dental care provided. These factors may influence the amount and type of antimicrobials prescribed by individual practitioners.⁹

Surgical and endocarditis prophylaxis

Prophylactic use of antimicrobials in dentistry is intended to prevent local (i.e., oral) and systemic (e.g., infective endocarditis) spread of infection.^{8 9}

Current guidelines recommend prophylaxis less often than in the past.⁹ The scientific rationale for prophylaxis was to eliminate or reduce transient bacteraemia caused by invasive dental procedures. However, more recent evidence indicates that transient bacteraemia can be caused by simple oral hygiene procedures in addition to dental treatments for which prophylaxis has traditionally been recommended. Such oral hygiene procedures include, tooth brushing, flossing, pulsating water irrigation and interdental woodsticks.⁹

Prophylactic antimicrobials are indicated before a dental procedure if there is a clear indication for their use (see Box 1). Surgical antimicrobial prophylaxis is rarely indicated, including in patients with pre-existing joint prostheses or breast implants.^{2 8 10} (See *Therapeutic Guidelines: Antibiotic* for detailed recommendations about when surgical antimicrobial prophylaxis is indicated).¹¹

Antimicrobial prophylaxis is indicated for the prevention of endocarditis in patients with specific cardiac conditions who are undergoing dental procedures involving manipulation of the gingival or periapical tissue or perforation of the oral mucosa.^{8 10} ¹¹ Guidance issued by Rheumatic Heart Disease (RHD) Australia should also be considered in relation to management of patients with acute rheumatic fever and rheumatic heart disease (see Resources section for link to current version).¹²

Box 1. Cardiac conditions for which endocarditis prophylaxis is recommended^{8 11}

Prosthetic cardiac valve, including transcatheter-implanted prosthesis or homograft

Prosthetic material used for cardiac valve repair, such as annuloplasty rings and chords

Previous infective endocarditis

Congenital heart disease if it involves unrepaired cyanotic defects, including palliative shunts and conduits, or repaired defects with residual defects or adjacent to the site of a prosthetic patch or device

Rheumatic heart disease as per [RHD Australia guidelines](#)

The role of surgical antimicrobial prophylaxis in patients with profound immune compromise who are undergoing invasive dental procedures is uncertain and should be discussed with the patient's treating specialists.^{8 11}

In modern dentistry, placement of dental implants to replace missing teeth has become a common procedure with a long history of antimicrobials being used as surgical prophylaxis. However, evidence shows antimicrobial prophylaxis is generally unnecessary in healthy patients receiving dental implants.¹³

Managing dental infections

Acute odontogenic (tooth-related) infections are common and can affect the dental pulp, periodontal tissues, or periapical tissues. If ignored, or inappropriately treated, acute odontogenic infection can progress to a localised abscess or spread to the soft tissues of the face or neck.¹⁴

Rare but serious complications of odontogenic infection include Ludwig angina, airway compromise, sepsis, osteomyelitis, or spread to brain, neck, or mediastinum.¹⁴ Spread of infection can be rapid in patients with immune compromise.

Acute odontogenic infection is managed with prompt dental treatment, including surgical intervention, to address the source of the infection.¹⁵

Antimicrobial therapy is not a substitute for dental treatment. The use of antimicrobials for dental procedures is likely to be as an adjunct to surgical interventions or other treatment modalities.^{8 15} In spite of this, over 70% of antimicrobials are prescribed for odontogenic infections without the provision of active dental treatment.¹⁶

Dental prescribing is usually empirical i.e., based on the likely pathogens identified in the published literature rather than on the microbiological investigation of the patient.¹⁷ The oral flora

comprises a wide range of microbes including up to 500 species of bacteria, fungi, and protozoa.¹⁶

Odontogenic infections are polymicrobial and involve commensal and opportunistic organisms. However, gram-positive aerobic cocci and anaerobic bacteria are predominantly isolated from dentoalveolar infections.^{16 18}

Penicillins, especially amoxicillin, are the main antimicrobial class used to manage odontogenic infection. However, bacteria commonly isolated from odontogenic infections are increasingly resistant to benzylpenicillin, penicillin V and amoxicillin, at a frequency between 5% and 20%.¹⁶

The findings from retrospective audits on penicillin resistance from severe odontogenic infections requiring hospitalisation in Australia have shown 10.8% of isolates are resistant to penicillin and suggest poorer clinical outcomes for patients with resistant infections.¹⁹

Some studies have shown that the presence of penicillin resistance does not affect the outcome of treatment with penicillin and suggested antibiotic therapy may not be required if adequate drainage is achieved.²⁰

The literature is unclear regarding the ideal choice, regimen, and spectrum of antibiotics for management of localised dentoalveolar infections or infections involving a primary space. To prevent AMR, studies suggest that a broad-spectrum combination as first-line, empirical therapy for localised or primary space odontogenic infections is unnecessary where drainage has been established.²⁰

18.2.2 Overuse of antimicrobials in managing odontogenic complaints

The ability of bacteria to develop resistance is a natural biological consequence of antimicrobial use. AMR is therefore a consequence of antibiotic usage in the population. Broad spectrum antimicrobials are more likely to contribute to AMR than narrow spectrum antimicrobials.²¹

Antimicrobials continue to be used unnecessarily and inappropriately in dental practice in Australia and internationally. Overuse of antimicrobials in dental practice has been widely reported in the UK, where an estimated 80% of antimicrobial prescriptions for acute dental conditions are unnecessary²² and in the US, where an estimated 80% of prophylactic antimicrobial prescriptions are unnecessary.²³ In Australia, survey data estimated at least 55% of antibiotics prescribed by general dentists were unnecessary.²⁴

Antimicrobial prescribing is also associated with other serious adverse effects, including allergy or anaphylaxis, candida overgrowth/superinfection, and

antibiotic-related colitis or *Clostridioides difficile* infection (CDI).²⁵ Dental prescribing has been associated with community-associated CDI infections.²⁶

There is evidence that dentists approach prescribing of antimicrobial prophylaxis quite differently from medical practitioners. Compared with cardiologists, orthopaedic surgeons, and primary care physicians, dentists are more likely to prescribe prophylactic antimicrobials before dental procedures for patients with poorly controlled diabetes mellitus (26% vs 3%), chronic kidney disease (8% vs 0%), cardiac transplant and valvopathy (61% vs 40%) and previous endocarditis (85% vs 65%).²⁷

Compared with oral and maxillofacial surgeons, general dentists are less likely to prescribe prophylactic antimicrobials for surgical removal of third molars (23.5% vs 61.1%) and implant procedures (62.1% vs 72.2%).¹⁴ However, maxillofacial specialists manage more complex patients in hospital settings, many of whom may be more at risk of infection, which may account for some differences in antimicrobial prescribing practices.²⁸

Reasons for the wide differences in prescribing practice between health professions are poorly understood.²⁹

18.2.3 Factors that influence antimicrobial prescribing in dental practice

The main factors that influence decisions by dentists to prescribe antimicrobials for individual patients can be broadly categorised as patient factors, clinician factors and contextual factors. These are described at Table 18.1.^{3, 14, 16, 26, 29}

The healthcare setting where the patient is treated, and health care provider type contributes to decisions to prescribe antimicrobials.

Prescribing rates may be higher in Aboriginal and Torres Strait Islander populations because of differences in the epidemiology of odontogenic infections and higher prevalence of underlying cardiac conditions for which infective endocarditis prophylaxis is indicated.³⁰

Antimicrobial prescribing for dental conditions can occur outside dental practice settings. Patients can present to emergency departments, general medical practice, and hospital outpatient settings with an acute dental problem such as severe toothache and be prescribed an antimicrobial.³¹ However, the cause of the patient's odontogenic pain may not be an acute infection. For example, pain may be due to exposed sensitive roots or a cracked tooth, dental caries (tooth decay) or adult periodontitis (gum disease). None of these are indications for antimicrobial treatment, but antimicrobials are often prescribed.²

Table 18.1. Factors influencing decisions in primary health care to prescribe antimicrobials

Patient factors	Clinician factors	Contextual factors
Patient/parent/carer demand and expectations Patient unwillingness or inability to receive definitive dental treatment Perceived impact of antimicrobial refusal on patient satisfaction Patient beliefs about positive impacts of antimicrobials on acute odontogenic pain Accessibility and cost of dental care	Lack of knowledge about antimicrobial prescribing guidelines Diagnostic uncertainty about whether antimicrobials are indicated Workload contributing to lack of time to provide definitive dental treatment Concerns about medico-legal consequences of failure to prescribe Prescribing habits Pressure from other clinicians (e.g., orthopaedic surgeons) to prescribe prophylactic antimicrobials when not clinically indicated Concern about running late and impacts on patients who are waiting	Prescribing practices of peers and colleagues Incentives Health care context

18.3 Antimicrobial stewardship strategies in dental practice

AMS supports the delivery of safe, high quality health care. AMS is a core component of health service safety and quality standards in Australia.

The NSQHS Standards provide a quality assurance mechanism for Australian health care, and accreditation against the standards is an important driver for safety and quality improvement. National accreditation against the standards commenced in January 2013, when accreditation became mandatory for the majority of public dental services and voluntary for private dental practices. The *NSQHS Standards Guide for Dental Practices and Services* is included in the resources section of this chapter.

In addition, the Primary and Community Healthcare Standards, which were released in October 2021, include AMS actions relevant to dental practices.

Dental practices currently implementing the first edition of the NSQHS Standards will transition to the Primary and Community Healthcare Standards, and dental practices that are not accredited will find them the most relevant.

Public dental clinics linked to local health networks are accredited to the second edition of the NSQHS Standards. Transition to accreditation to the Primary and Community Healthcare Standards is a matter for the relevant state/territory regulator.

The goals of AMS strategies include improving patient safety; reducing unnecessary prescribing of antimicrobials; use of antimicrobials for incorrect indications; inappropriate dosing; duration; and / or, route of administration.^{2 17} When effective, AMS initiatives can lead to reductions in the total number of antimicrobial prescriptions and in increases in the appropriateness of prescriptions.³²

Australian surveillance data from the Antimicrobial Use and Resistance in Australia (AURA) surveillance system and data from surveillance systems internationally show that a reduction in antimicrobial use correlates with a decrease in AMR, supporting the effectiveness of AMS at the population level.^{18 21 33}

For AMS to be effective, all healthcare prescribers need to adopt effective antimicrobial prescribing practices, based on appropriate use of evidence-based guidelines. Chapter 10 of this book contains general information about AMS prescribing principles for prescribers.

18.3.1 Understanding the context and identifying priorities

Assessing current antimicrobial prescribing practices and reviewing available information about local microbiology can assist practices to select AMS interventions.

A suggested approach to initial assessment is to:²⁶

- Review antimicrobial prescribing within the dental practice
- Compare prescribing practice and any existing practice policies and protocols for antimicrobial prescribing with *Therapeutic Guidelines (oral and dental; and antibiotic)* (e.g., drug, dose, duration)
- Review pathology results that describe local microbiology and resistance (described further in Chapter 2 of this book).

Relevant information may be obtained by reviewing electronic patient records and by discussing prescribing practices and local microbiology and resistance with dentists in the practice and the practice's pathology providers.³⁴

Understanding specific factors that influence prescribing decisions within the dental practice is also important. Table 18.1 highlights that prescribing decisions are influenced by many factors. These factors should, ideally, be discussed with clinicians in the practice to identify which factors affect prescribing within the practice and may be amenable to AMS interventions.

18.3.2 Interventions to support antimicrobial stewardship

There are few trials reported in the literature that assess the effectiveness of dental AMS interventions. Interventions with some evidence for effectiveness include:^{32 35 36}

- Professional education for dentists
- Increased use of prescribing guidelines in dental practice
- Audit and individual clinician feedback on prescribing practices
- Engaging with consumers about antimicrobial use.

Implementing multiple interventions appears to be more effective than implementing a single AMS intervention.^{32 37}

When selecting AMS interventions to implement within the practice, consider compatibility with the practice workflows and professional responsibilities of individual staff within the practice.^{32 34} Also

consider the intent of proposed AMS interventions and how outcomes can be measured to demonstrate success.

The US Centres for Disease Control and Prevention (CDC) formulated guidance on AMS in outpatient settings, describing the following core elements of outpatient antibiotic stewardship:³⁸

- Making a commitment to optimising antimicrobial prescribing
- Implementing at least one policy or action to improve practice
- Monitoring antibiotic prescribing practices and offering feedback to clinicians
- Providing education and expertise.

AMS interventions in dental practice based on the CDC core elements have been shown to produce significant reduction in antimicrobial prescribing in dental practice and may be a useful framework for the practice to use when planning AMS interventions.³⁹

There are important resource considerations when implementing AMS interventions. Successful AMS interventions require clinician leadership and dedicated clinician time for participating in AMS activities, at a minimum. Dental practices may have limited resources available to allocate to AMS. Identify any available human and financial resources that are available within the practice to support AMS activities as this may influence the scope of AMS interventions.

Chapter 2 of this book provides further information about determining priority areas for AMS activities, resourcing AMS activities and defining measurable goals and outcomes.

Professional education for dentists

Clinician education is an essential component of any AMS program. Clinicians can access education on AMS through webinars, online training modules, video lectures, written materials and educational events organised by professional organisations.

AMS education includes information about indications for prescribing of antimicrobials, current guidelines for prescribing, including dosing, duration and / or route of administration.²⁸

Key topics may include:

- Antimicrobial resistance and stewardship
- Managing the source of the infection using active local treatment and antimicrobials only as an adjunct if needed
- Prescribing according to guidelines and for the correct indications, selecting the correct

antimicrobial with the narrowest spectrum at the correct dose, frequency, and duration

- The need to counsel patients on how to take the antimicrobial and for how long, medication side-effects and how to manage these.

Clinician education may also include how to inform and counsel patients to address patient demand and expectations when antimicrobials are not indicated.⁴⁰

Education resources may include information about specifying the time frame on prescriptions, as completing the PBS-specified packet size of antimicrobials may mean the patient is taking antimicrobials for longer than guidelines indicate is necessary. Studies have shown that for dentoalveolar infections, shorter courses [e.g., 3 days] are effective, provided that drainage of the source of infection has been performed.¹⁷

The resources section of this chapter includes useful educational materials which can support practices in implementing change. Chapter 5 of this book describes antimicrobial stewardship education resources for clinicians.

Increased use of prescribing guidelines in dental practice

Indications for antimicrobial prescribing in dental practice are described in *Therapeutic Guidelines Oral and Dental*.⁸ Ensure guidelines are available to dentists within the practice.²⁷

The MINDME tool may be useful to reinforce evidence-based prescribing decisions.⁴¹

Box 2. MINDME

M	Microbiology guides therapy wherever possible
I	Indications should be evidence-based
N	Narrowest spectrum required
D	Dosage appropriate to the site and type of infection
M	Minimise duration of therapy
E	Ensure monotherapy in most situations

Practices may wish to consider options for implementation of national prescribing recommendations within dental software; this has been shown to improve the accessibility of guidelines in practice.⁴²

Practices may also wish to develop practice policies or protocols to reinforce evidence-based antimicrobial prescribing decisions. Pathology testing should be considered as a topic for practice policies and protocols, to minimise inappropriate use of antimicrobials.

It is important to note that, whilst pathology testing is widely used for other infections, oral flora are difficult to culture and have a greater bacterial diversity than identified using culture technique when viewed by PCR based assays. Even when bacterial species are commonly identified in samples taken from areas of infection, their presence may not necessarily be related to the cause of disease, as in the case of *Enterococcus faecalis* in post-endodontic treatment disease.²⁰ Although microbiology may have limited value in some settings, pathology testing may be of value for management of unresolved infections or where drainage cannot be achieved.¹⁷

Application of guidelines for antibiotic prophylaxis, in patients undergoing invasive dental procedures, may vary between dentists, primary care providers and medical and surgical specialists.¹⁰ Access to current guidelines can support dentists to address advice inconsistent with guidelines that is given to patients by other health professionals and can provide a resource for dentists to discuss these differences with other clinicians.¹⁰

Audit and individual clinician feedback on prescribing practices

Clinical audit and individual clinician feedback enable prescribers to monitor and review their antimicrobial prescribing on an ongoing basis.

Clinical audit contributes to significant improvements in alignment of prescribing practices with guidelines and reductions in the total volume of antimicrobials prescribed.^{34 35 43}

Current antimicrobial prescribing clinical audit and feedback tools are oriented towards hospital prescribing practice. Audit and feedback in dental practice is generally conducted through self-audit activities and peer-based review and feedback.⁴⁴

The Australian Antimicrobial Stewardship Clinical Care Standard aims to support optimal delivery of treatment to patients with infection. Elements of the standard that are relevant to dentists and that practices may review as part of their audit activities include:

- When a patient is prescribed antimicrobials, the following information should be discussed with the patient and/or their carer: when; how to take these medicines and for how long; the potential side effects; and a review plan.
- When a patient is prescribed antimicrobials, the reason, drug name, dose, route of administration, intended duration and review plan are documented in the patient's health record.

The Clinical Care Standard is included in the resources section of this chapter.

Engaging with consumers about antimicrobial use

Consumer expectations play an important role in antimicrobial prescribing decisions in dental practice. Demonstrating the practice's commitment to AMS is an important strategy for responding to consumer expectations. Resources such as posters, leaflets and videos in waiting room on antimicrobials, AMR and AMS can raise awareness and prepare consumers to discuss AMS with their dentist.

Engaging consumers in conversations about the risks of antimicrobials, rather than provision of information alone, is important to respond to patient demand and expectations for antimicrobial prescription.⁴⁵

Chapter 7 of this book provides detailed information and advice about involving consumers in antimicrobial stewardship. NPS MedicineWise has useful resources for consumers (see resources section of this chapter). The UK dental AMS toolkit, introduced in 2016, also provides information and resources dental practices may wish to use with patients about the appropriate use of antimicrobials.⁴⁶

18.3.3 Monitoring the outcomes of antimicrobial stewardship activities

Being able to measure the outcomes of AMS interventions helps demonstrate the effectiveness of actions taken within the dental practice. The practice may track measures over time such as the quantity of antimicrobials prescribed, appropriateness of prescriptions according to guidelines, the type of antimicrobial prescribed, and patient-related outcomes, such as adverse effects and hospitalisations.²⁶

18.4 Clinical governance and leadership

Leadership is an important enabler for successful AMS interventions. Leadership occurs at different levels within healthcare.

National leadership

The Australian Commission on Safety and Quality in Health Care (the Commission) provides national leadership in AMS. The aim of the Commission's work is to improve the safe and appropriate use of antimicrobials, reduce patient harm and decrease the incidence of AMR in Australia.

The resources section of this chapter provides resources for dentists and other health professionals to support AMS including:

- The Preventing and Controlling Infections Standard
- The Antimicrobial Stewardship in Australian Health Care publication (this book)
- Antimicrobial prescribing e-learning modules and videos for clinicians
- Surveillance of antimicrobial use through the AURA surveillance system and National Antimicrobial Utilisation Surveillance Program
- Support for the National Antimicrobial Prescribing Survey (NAPS)
- The Commission's web page on AMS in primary care
- The [AMS Clinical Care Standard indicator tool](#).

Professional leadership

The Australian Dental Association (ADA), a voluntary member organisation, is the peak national body for dentists. The ADA advocates for the judicious use of antimicrobials in dental practice. The ADA provides its members with resources and access to guidelines for antibiotic prescribing and a pharmaceutical advice line where dentists can seek information and advice on appropriate use of antimicrobials generally and in relation to specific case-related circumstances.⁴⁷

Practice leadership

Within dental practice, dentists are essential for promoting and implementing AMS strategies that will help their practice workforce to reduce unnecessary use of antimicrobials. AMS practice leadership can:

- Encourage dentists within the practice to be accountable for the appropriate use of antimicrobials.
- Coordinate efforts to identify opportunities for improved stewardship of antimicrobials.
- Monitor antimicrobial use over time.

Chapter 2 of this book has more information about approaches to leadership of AMS activities within clinical practice.

18.5 Conclusions

Antimicrobial prescriptions by dentists are a significant contributor to the overall volume of antimicrobials dispensed in the Australian community each year.

This chapter provides an overview of the current evidence on antimicrobial prescribing by dentists, including the many factors that may influence it.

Dentists have an essential role in AMS to reduce antimicrobial use and AMR in the community.

AMS in dental practice settings is in early stages of development. However, lessons learned from implementation of AMS in other healthcare settings can inform AMS in dental practice.

Suggested AMS interventions of relevance to dental practice are described. Core components of AMS in dental practice include:

- Professional education for dentists
- Increased use of prescribing guidelines in dental practice
- Audit and individual clinician feedback on prescribing practices
- Engaging with consumers about antimicrobial use.

Not all dental practice is uniform in the type of patients treated or the complexity of dental care provided. Understanding the local practice context for antimicrobial prescribing and resistance is important for the selection of AMS practice interventions.

Monitoring the impact of AMS activities on patient outcomes, together with qualitative prescribing and quantitative measures of antimicrobial use, ensures AMS efforts are effective.

Leadership for AMS within dental practice occurs at the national, state and territory, professional and practice level. Each is important for a nationally coordinated, effective response to AMR.

Resources

- Australian Commission on Safety and Quality in Health Care.
 - a. NSQHS Standards Guide for Dental Practices and Services. November 2015. Available at: <https://www.safetyandquality.gov.au/publications-and-resources/resource-library/nsqhs-standards-guide-dental-practices-and-services>
 - b. AMS Clinical Care Standard. Available at: <https://www.safetyandquality.gov.au/our-work/clinical-care-standards/antimicrobial-stewardship-clinical-care-standard>
 - c. AMS Clinical Care Standard Indicator Monitoring Tool. Available at: <https://www.safetyandquality.gov.au/our-work/clinical-care-standards/antimicrobial-stewardship-clinical-care-standard/indicator-monitoring-tool>
 - d. Consumer brochure: Do I really need antibiotics? Available at: <https://www.safetyandquality.gov.au/publications-and-resources/resource-library/aura-2021-consumer-trifold-do-i-really-need-antibiotics>
 - e. Antimicrobial stewardship in primary care web page: <https://www.safetyandquality.gov.au/our-work/antimicrobial-stewardship/antimicrobial-stewardship-primary-care>
- Australian Government Department of Health.
 - a. Quality Use of Medicines (QUM). Available at: <https://www.health.gov.au/internet/main/publishing.nsf/Content/nmp-quality.htm>
- National Centre for Antimicrobial Stewardship (NCAS).
 - a. Website <https://www.naps.org.au/Default.aspx>
 - b. Microbiology fact sheets. Available at: <https://www.ncas-australia.org/education>
- National Health and Medical Research Council. Australian Guidelines for the Prevention and Control of Infection in Healthcare. (2019). Canberra. Available at: <https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019>
 - a. NPS MedicineWise / Commission Antimicrobial prescribing modules. Available at: <https://learn.nps.org.au/mod/page/view.php?id=4282>
- Pharmaceutical Society of Australia. Guidelines for Quality Use of Medicines (QUM) services. March 2020. Available at: <https://my.psa.org.au/s/article/guidelines-for-qum-services>
- Therapeutic Guidelines. Therapeutic guidelines: oral and dental, version 3; and antibiotic, version 16. Melbourne: eTG; 2019. (Includes summary table for the antibiotic management of common conditions in primary care). Available at: https://www.safetyandquality.gov.au/sites/default/files/2020-11/therapeutic_guidelines_-_antibiotic_prescribing_in_primary_care_free_table.pdf
- The 2020 Australian guideline for prevention, diagnosis and management of acute rheumatic fever and rheumatic heart disease (3rd edition). Available at: https://www.rhdaustralia.org.au/system/files/file/uploads/arf_rhd_guidelines_3rd_edition_web_updated.pdf

References

- 1 Australian Government, Department of Health. Australia's National Antimicrobial Resistance Strategy – 2020 and Beyond. Publication Number 12589 [Internet]. Canberra: Department of Health; 2020. <https://www.amr.gov.au/resources/australias-national-antimicrobial-resistance-strategy-2020-and-beyond>
- 2 Marra F, George D, Chong M et al. Antibiotic prescribing by dentists has increased: Why? *J. Am. Dent. Assoc.* 2016; 147: 320–327.
- 3 Thornhill M, Dayer M, Durkin M et al. Oral antibiotic prescribing by NHS dentists in England 2010–2017. *British Dental Journal* 2019; 227: 1044–50.
- 4 Australian Institute of Health and Welfare. Oral health and dental care in Australia. Cat DEN231. March 2021.
- 5 Ford P, Saladine C, Zhang K et al. Prescribing patterns of dental practitioners in Australia from 2001 to 2012. *Antimicrobials. Aust. Dent. J.* 2017; 62: 52–57.
- 6 Walsh L, Ford P, McGuire T et al. Trends in Australian dental prescribing of antibiotics: 2005–2016. *Australian dental journal.* 2021. Online version. Available from: <https://onlinelibrary.wiley.com/doi/abs/10.1111/adj.12846>
- 7 Therapeutic Guidelines. Therapeutic guidelines: oral and dental, version 3. Melbourne: eTG; 2019.
- 8 Therapeutic Guidelines. Therapeutic guidelines: oral and dental, version 3. Melbourne: eTG; 2019.
- 9 Daly C. Antibiotic prophylaxis for dental procedures. *Australian Prescriber* 2017; 40: 184–8.
- 10 Goff D, Mangino J, Glassman A et al. Review of guidelines for dental antibiotic prophylaxis for prevention of endocarditis and prosthetic joint infections and need for dental stewardship. *Clinical Infectious Diseases* 2020; 71:455.
- 11 Therapeutic Guidelines. Therapeutic guidelines: antibiotic, version 16. Melbourne: eTG; 2019.
- 12 The 2020 Australian guideline for prevention, diagnosis and management of acute rheumatic fever and rheumatic heart disease (3rd edition).
- 13 Park J, Tennant M, Walsh L et al. Is there a consensus on antibiotic usage for dental implant placement in healthy patients? *Aust. Dent. J.* 2018, 63, 25–33.
- 14 Thompson W, Williams D, Pulcini C et al. FDI World Dental Federation. White paper: The essential role of the dental team in reducing antibiotic resistance. FDI 2020.
- 15 Chen C, Gilpin N, Walsh L. Discrepancy in therapeutic and prophylactic antibiotic prescribing in general dentists and maxillofacial specialists in Australia. *Antibiotics* 2020; 1–14.
- 16 Cope A, Francis N, Wood F et al. Antibiotic prescribing in UK general dental practice. *Community Dental and Oral Epidemiology* 2016; 44: 145–53.
- 17 Teoh L, Stewart K, Marino R et al. Antibiotic resistance and relevance to general dental practice in Australia. *Australian Dental Journal* 2018; 63: 414–21.
- 18 Kuriyama T, Karasawa T, Nakagawa K et al. Bacteriologic features and antimicrobial susceptibility in isolates from orofacial odontogenic infections. *Oral Surg* 2000; 90: 600–8.
- 19 Liao I, Han J, Bayetto K et al. Antibiotic resistance in severe odontogenic infections of the South Australian population. *Australian Dental Journal* 2018; 63: 187–92.
- 20 Teoh L, Cheung M, James R, McCullough. Oral antibiotic for empirical management of acute dentoalveolar infections- a systematic review. *Antibiotics MDPI.* 28 February 2021. doi.org/10.3390/antibiotics10030240.
- 21 ACSQHC. AURA 2021. Fourth Australian report on antimicrobial use and resistance in human health. Available from: <https://www.safetyandquality.gov.au/our-work/antimicrobial-resistance/antimicrobial-use-and-resistance-australia-surveillance-system/aura-2021>
- 22 English Surveillance Programme for Antimicrobial Utilisation and Resistance, 2018.
- 23 National Institute for Healthcare and Excellence, 2018. Antimicrobial stewardship: systems and processes for effective antimicrobial medicine use.
- 24 Teoh L, Marino R, Stewart K et al. A survey of prescribing practices by general dentists in Australia. *BMC Oral Health* 2019; 19: 193.

-
- 25 Thornhill M, Dayer M, Durkin M et al. Risk of adverse reactions to oral antibiotics prescribed by dentists. *J Dental Research* 2019; 98: 1081-7.
- 26 Teoh L, Thompson W, Suda K. Antimicrobial stewardship in dental practice. *JADA* 2020; 151: 589-95.
- 27 McCarthy M, Banach D, Andrews R. A cross-disciplinary educational approach: antibiotic prescribing practices and the use of prophylactic antibiotics prior to dental procedures. *OFID* 2018; s (S1). Poster abstract.
- 28 Chen C, Gilpin N, Walsh L. Discrepancy in therapeutic and prophylactic antibiotic prescribing in general dentists and maxillofacial specialists in Australia. *Antibiotics* 2020; 1-14.
- 29 Thompson W, Tonkin-Crine S, Pavitt S et al. Factors associated with antibiotic prescribing for adults with acute conditions. *Journal of Antimicrobial Chemotherapy* 2019; 74: 2139-52.
- 30 Cunningham W, McVernon J, Lydeamore M et al. High burden of infectious disease and antibiotic use in early life in Australian Aboriginal communities. *Australian and New Zealand Journal of Public Health* 2019; 43: 149-55.
- 31 Timmerman A, Parashos P. Management of dental pain in primary care. *Australian Prescriber* 2020; 43: 39-44.
- 32 Loffler C, Bohmer F. The effect of interventions aiming to optimize the prescription of antibiotics in dental care: a systematic review. *PLoS One* 2017; 12: e0188061.
- 33 Seppala H, Klaukka T, Vuopio-Varkila J et al. The effect of changes in the consumption of macrolide antibiotics on erythromycin resistance in group A streptococci in Finland. *NEJM* 1997; 337: 441-6.
- 34 Teoh L. Dental therapeutic guideline adherence in Australia. Thesis. Melbourne Dental School, February 2021.
- 35 Eloufakoui P, Young L, Newlands R et al. Translation Research in a Dental Setting (TRiADS) Research Methodology Group. An audit and feedback intervention for reducing antibiotic prescribing in general dental practice. *PLoS Med* 2016; 13: e1002115.
- 36 Chopra R, Merali R, Paolinelis G et al. An audit of antimicrobial prescribing in an acute dental care department. *Primary Dental Journal* 2014; 3: 24-9.
- 37 Seager J, Howell-Jones R, Dunstan F et al. A randomized controlled trial of clinical outreach education to rationalize antibiotic prescribing for acute dental pain in the primary care setting. *Br Dent J* 2006; 201: 217-22.
- 38 Centers for Disease Control and Prevention. Core elements of outpatient antibiotic stewardship. Available from: <https://www.cdc.gov/antibiotic-use/core-elements/outpatient.html>
- 39 Gross A, Hanna D, Rowan S et al. Successful implementation of an antibiotic stewardship program in an academic dental practice. *Open Forum Infectious Diseases* 2019; 6: ofz067.
- 40 Thompson W, Sandoe J, McEachan R et al. Antimicrobial stewardship in dentistry: an arts-based approach to intervention development. *Lancet* 2019; 394: 10.
- 41 Oral and Dental Expert Group. Therapeutic guidelines: oral and dental. 2019.
- 42 Fluent M, Jacobsen P, Hicks L. Considerations for responsible antibiotic use in dentistry. *JADA* 2016; 147: 683-6.
- 43 Teoh L, Stewart K, Marino RJ, McCullough MJ. Improvement of dental prescribing practices using education and a prescribing tool: a pilot intervention study. *Br J Clin Pharmacol.* 2020 May 20. doi: 10.1111/bcp.14373
- 44 Sturrock A, Landes D, Robson T et al. An audit of antimicrobial prescribing by dental practitioners in the north east of England and Cumbria. *BMC Oral Health* 2018; 206.
- 45 Thompson W, Sandoe J, McEachan R et al. Antimicrobial stewardship in dentistry: an arts-based approach to intervention development. *Lancet* 2019; 394: 10.
- 46 Public Health England. Dental antimicrobial stewardship toolkit. Available from: <https://www.gov.uk/guidance/dental-antimicrobial-stewardship-toolkit>
- 47 Australian Dental Association. Antibiotic Awareness Week – Be Part of the Solution. Available from: <https://www.ada.org.au/News-Media/News-and-Release/Media-Releases/Antibiotic-Awareness-Week-Be-part-of-the-Solutio>