Townsville Hospital and Health Service

Antimicrobial Resistance and Stewardship

Principles in Practice

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Queensland Government

LEARNING OBJECTIVES

Principles of Antimicrobial Stewardship in Practice

- Understand the basic AMS Principles
- Discuss the impact of AMR
- Review **MINDME**
- Highlight AMS in practice initiatives for Infection Control practitioners

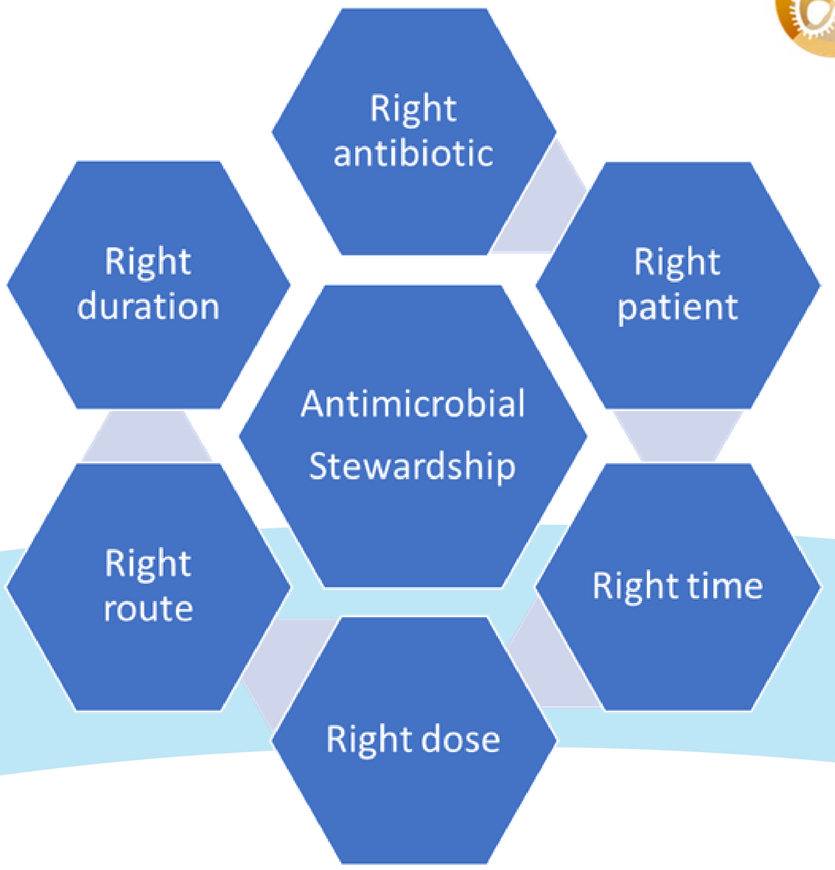
What is AMS?

Why is it important?

Antimicrobial Stewardship

A systematic approach to optimising selection, dosage, route and duration of antimicrobial treatment to:

- Reduce inappropriate antimicrobial use
- Improve patient outcomes
- Reduce adverse consequences of antimicrobial use
- Reduce development of multi-resistant organisms



Inappropriate prescribing is associated with increased adverse effects including:

- Antimicrobial allergy
- Treatment failure
- Toxicity (e.g. ototoxicity)
- *Clostridioides difficile* (formerly called *Clostridium difficile)*
- Increased health care costs (i.e. length of stay)
- AMR (current and future patients)

Antimicrobial Resistance and Stewardship – in practice

Why is AMS important?

- Antibiotic use contributes to the development of antibiotic resistance
  - Resistance developed from exposure to an antibiotic may affect the patient, but also affects future patients and the wider community

- Modern medicine, especially surgery and cancer treatments, depends on effective antibiotics to minimise the risk of infection
  - Currently, antibiotics reduce post-operative infection rates to below 2%
  - Without effective antibiotics, this could increase to around 40% to 50%. Up to 30% of these patients could die from resistant bacterial infections
  - The risk of mortality without access to effective antibiotics may make some treatments and surgical procedures too risky to continue

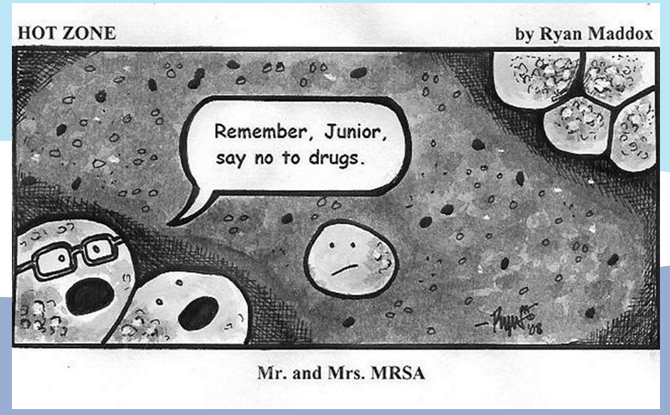
- Antimicrobial resistance results in substantial financial cost for patients and healthcare systems

https://www.safetyandquality.gov.au/publications-and-resources/resource-library/antibiotic-awareness-week-2019-powerpoint-presentation

Examples of AMR

- Resistance to an antibiotic means **the drug is no longer effective against the infecting bacteria**
  - *intrinsic or acquired → selective pressure*

- Examples:
  - Methicillin-resistant *Staphylococcus aureus* (MRSA) cannot be treated with flucloxacillin
  - Vancomycin-resistant enterococci (VRE) cannot be treated with vancomycin
  - Carbapenem-resistant Enterobacteriaceae (CRE) cannot be treated with meropenem or other carbapenems



Antimicrobial Resistance and Stewardship – in practice

Townsville Hospital and Health Service

Antimicrobial Resistance

"AMR is an increasingly serious threat to global public health that requires action across all government sectors and society"

https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance

Queensland Government

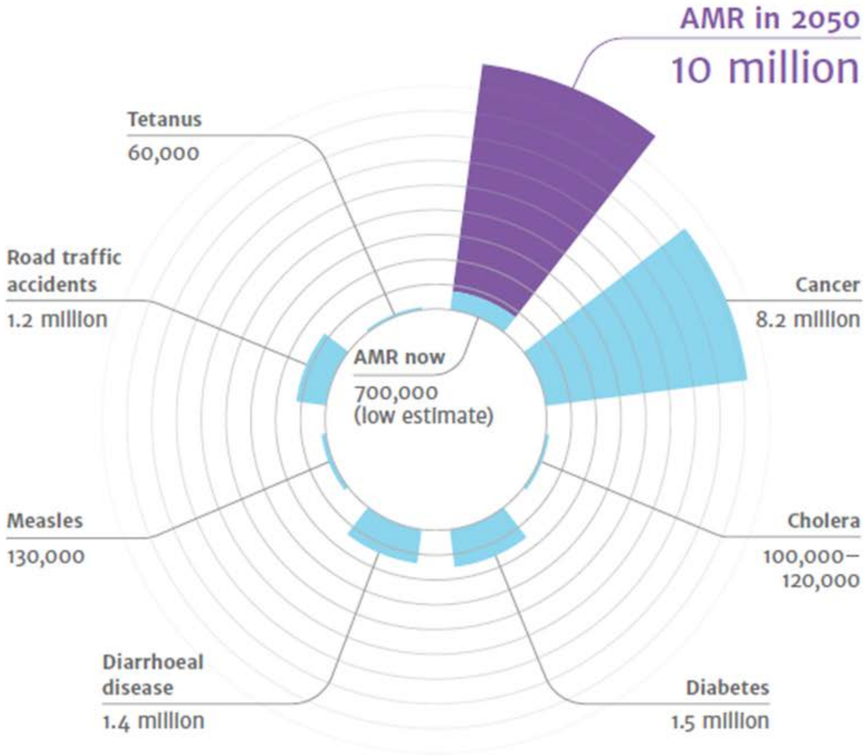
Antimicrobial Resistance and Stewardship – in practice

AMR - Background

- **UK's "O'Neill Report" – May 2016**
  - 1st international report examining the **ECONOMIC** consequences of AMR
  - Gross domestic product would decrease due to AMR → translate to a reduction in global economic output worth US$60 - US$100 trillion

- **Main recommendations**
  1. **Reduce antimicrobial demand** by:
     - Massive global awareness campaign
     - Improve hygiene
     - Reduce unnecessary use of antimicrobials in agriculture and their dissemination into the environment
     - Improve global surveillance of drug resistance and antimicrobial consumption in humans and animals
     - Promote new, rapid diagnostics to cut unnecessary use of antibiotics
     - Promote the development and use of vaccines
  2. **Increase the number of effective antimicrobials**
  3. **Build a global coalition for action on antimicrobial resistance**

https://www.amr.gov.au/about-amr/amr-australia



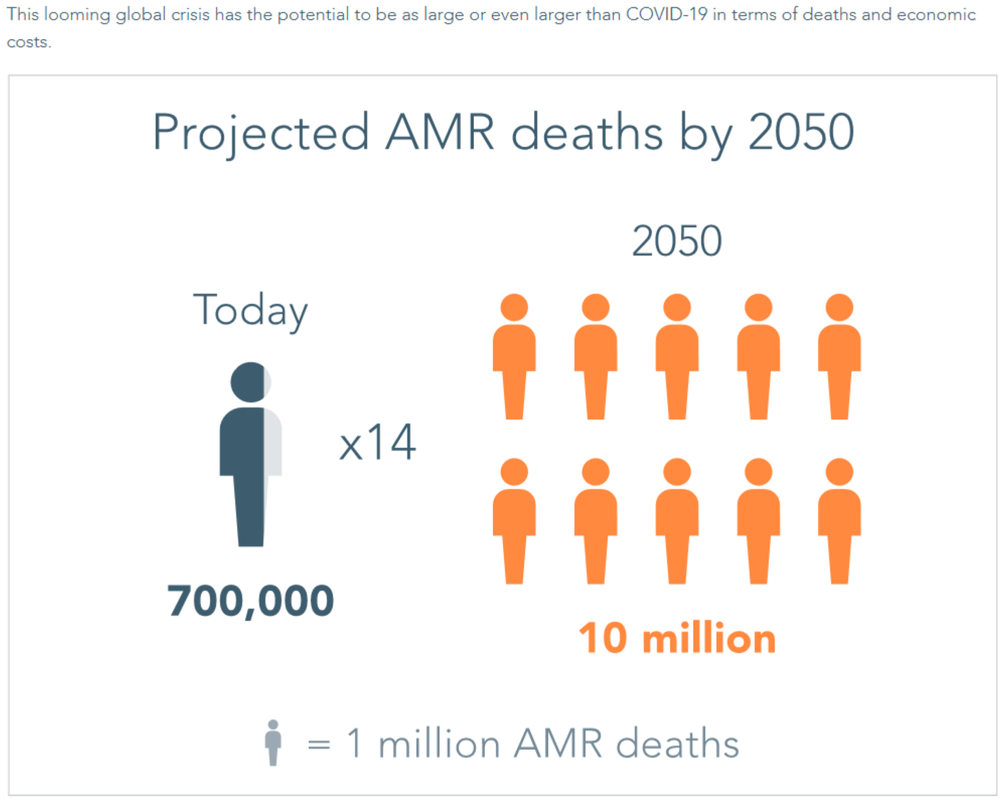
Antimicrobial Resistance and Stewardship – in practice

In “COVID” Context

- Though AMR is a long-established and slow-moving threat, it is no less dangerous than the COVID-19 pandemic impacting the world today.

- As we’ve seen with COVID-19, we are all still vulnerable to infectious diseases – and, as we scramble to find treatments and vaccines for COVID-19, we see the huge economic and public health costs from a lack of preparedness.
  - Ultimately, being prepared is more cost-effective in the long run.

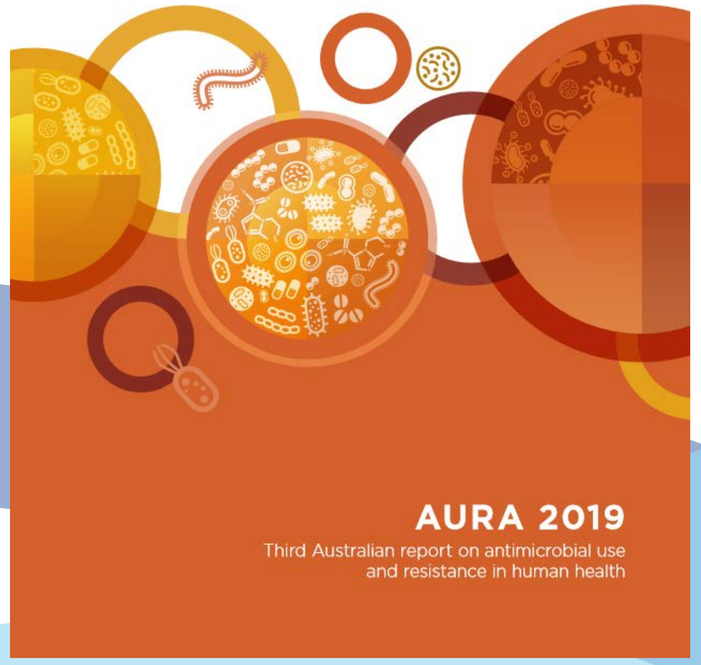
- Whereas the new coronavirus was not known until early January 2020, AMR is a threat we know.
  - It is here now and only increasing.
  - We know the priority pathogens for which there is an urgent need for new treatments, and AMR has been on the political agenda for years

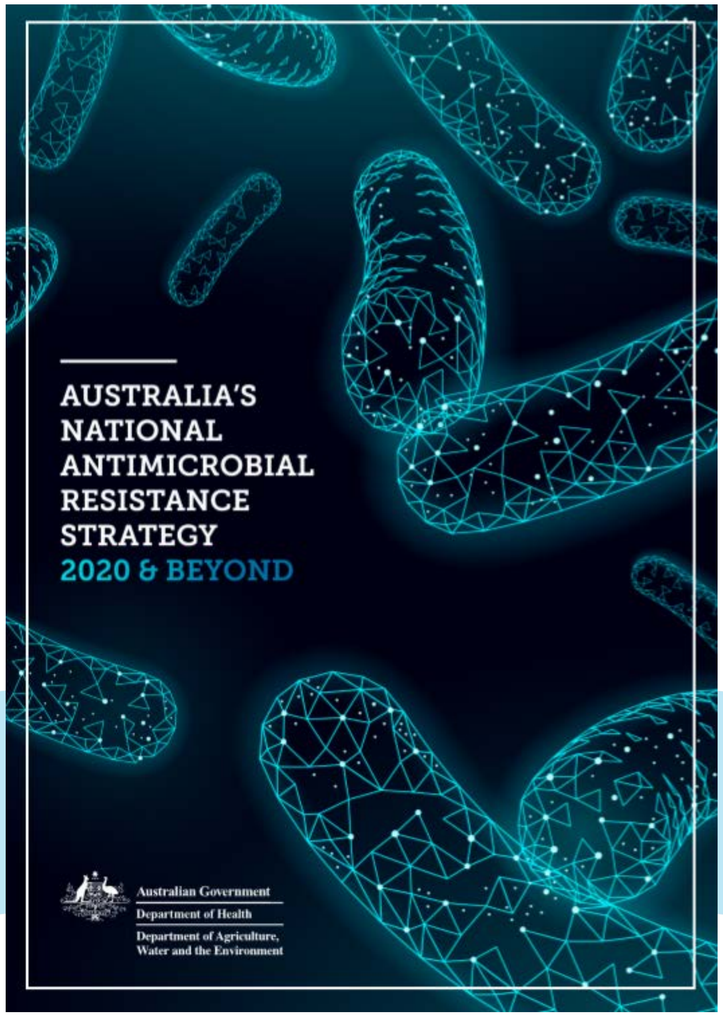


https://www.amractionfund.com/amr-innovation-challenge/#page-section-1

Antimicrobial Resistance and Stewardship – in practice

Australia's response to antimicrobial resistance





https://www.safetyandquality.gov.au/publications-and-resources/resource-library/antibiotic-awareness-week-2019-powerpoint-presentation

Antimicrobial Resistance and Stewardship – in practice

Australia's National Antimicrobial Resistance Strategy - 2020 and Beyond

- Today, we take them for granted, but before 1941, an infection from even a small cut to the skin could kill.

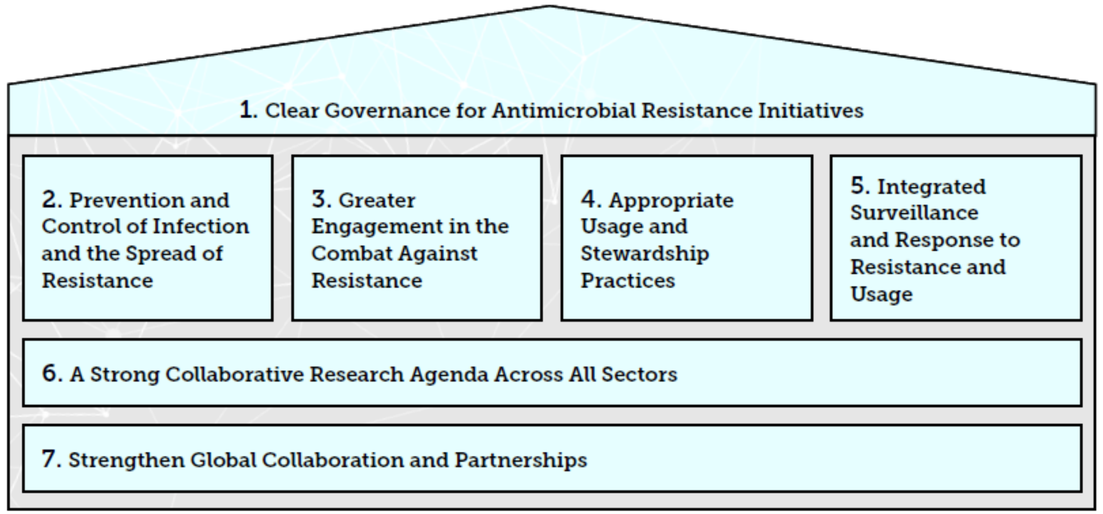
- The first patient treated with penicillin was a 43-year-old English policeman who scratched his face on a rose thorn.
  - Within a month, the infection spread, his head was covered in abscesses and one eye had to be removed.
  - But after just 24 hours of the first treatment with the experimental drug, his temperature dropped, his appetite returned, and the infection began to heal.
  - On the fifth day, the supply of penicillin ran out; the man relapsed and died a month later.

OUR VISION

A society in which antimicrobials are recognised and managed as a valuable shared resource; and their efficacy is maintained so that the health of humans, animals and the environment is protected now and into the future.

OUR GOAL

Minimise the development and spread of antimicrobial resistance and ensure the continued availability of effective antimicrobials.



https://www.amr.gov.au/resources/australias-national-antimicrobial-resistance-strategy-2020-and-beyond

Antimicrobial Resistance and Stewardship – in practice

Antimicrobial Use and Resistance (AURA)

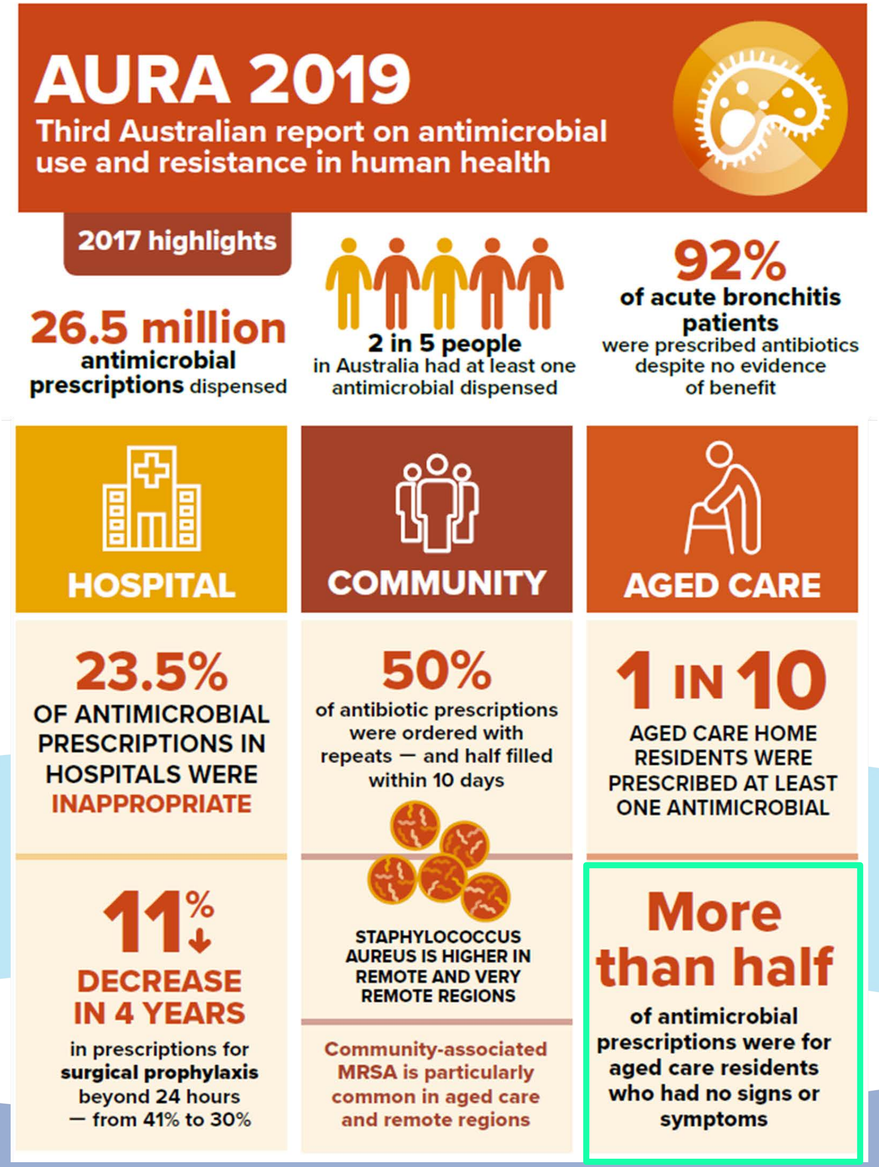
- The Organisation for Economic Co-operation and Development (OECD) has estimated that an average of 290 people die each year in Australia due to infections from eight resistant bacteria.
  - Between 2015 and 2050, it is estimated that 10,430 people will die as a result of AMR.

- The rate of antibiotic dispensing under the PBS declined in 2017, following steady increases between 2013 and 2015. This is the first downward trend in community antibiotic dispensing since the late 1990s.

- In 2017, 41.5% (n = 10,215,109) of the Australian population had at least one systemic antibiotic dispensed under the PBS/RPBS.

- Australia remains in the top 25% of countries with the highest community antimicrobial use (compared with European countries and Canada).

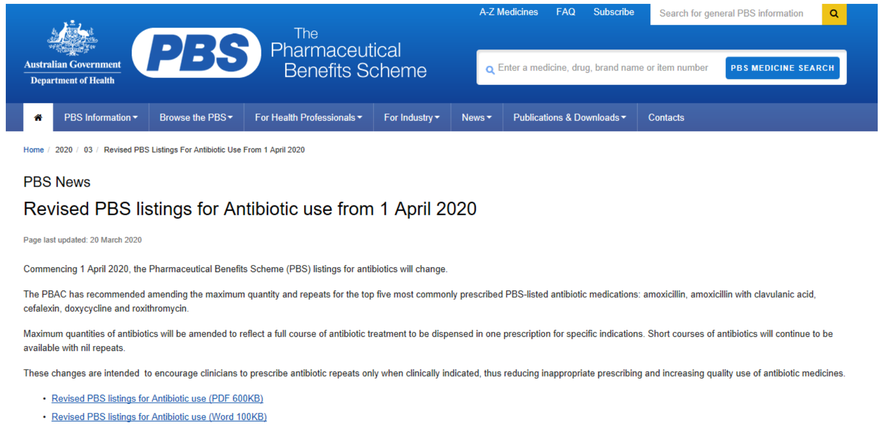
- The most commonly dispensed antibiotics under the PBS/RPBS continue to be cefalexin, amoxicillin and amoxicillin–clavulanic acid.



https://www.safetyandquality.gov.au/antimicrobial-use-and-resistance-in-australia/aura-2019/

Antimicrobial Resistance and Stewardship – in practice

Antimicrobial Use and Resistance (AURA)



AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

AURA

- April 2020: The PBAC amended the maximum quantity and repeats for the top five most commonly prescribed PBS-listed antibiotic medications: amoxicillin, amoxicillin with clavulanic acid, cefalexin, doxycycline and roxithromycin.

- Maximum quantities were amended to reflect a full course of antibiotic treatment to be dispensed in one prescription for specific indications. Short courses of antibiotics will continue to be available with nil repeats.

- These changes are intended to encourage clinicians to prescribe antibiotic repeats only when clinically indicated, thus reducing inappropriate prescribing and increasing quality use of antibiotic medicines.

https://www.safetyandquality.gov.au/publications-and-resources/resource-library/aura-2017-second-australian-report-antimicrobial-use-and-resistance-human-health

Principles of Antimicrobial Therapy

Hospital NAPS 2018

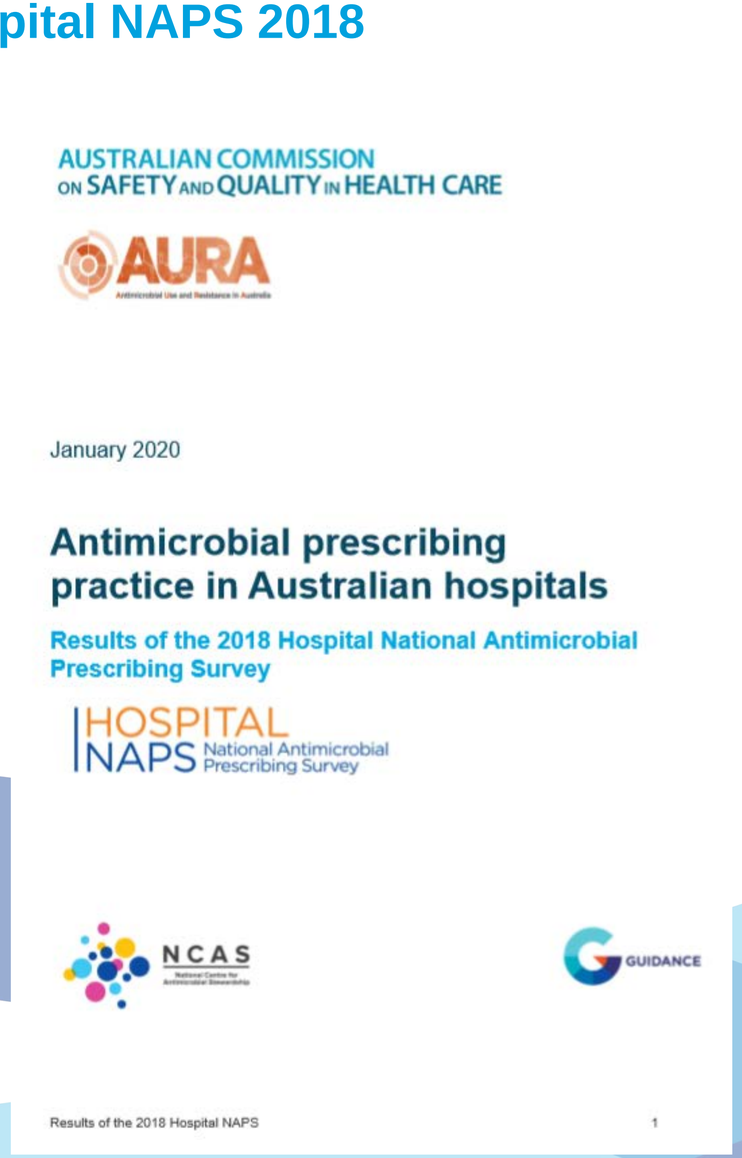


Figure 4: Hospital NAPS key indicators for comparator prescriptions by percentage, 2013–2018

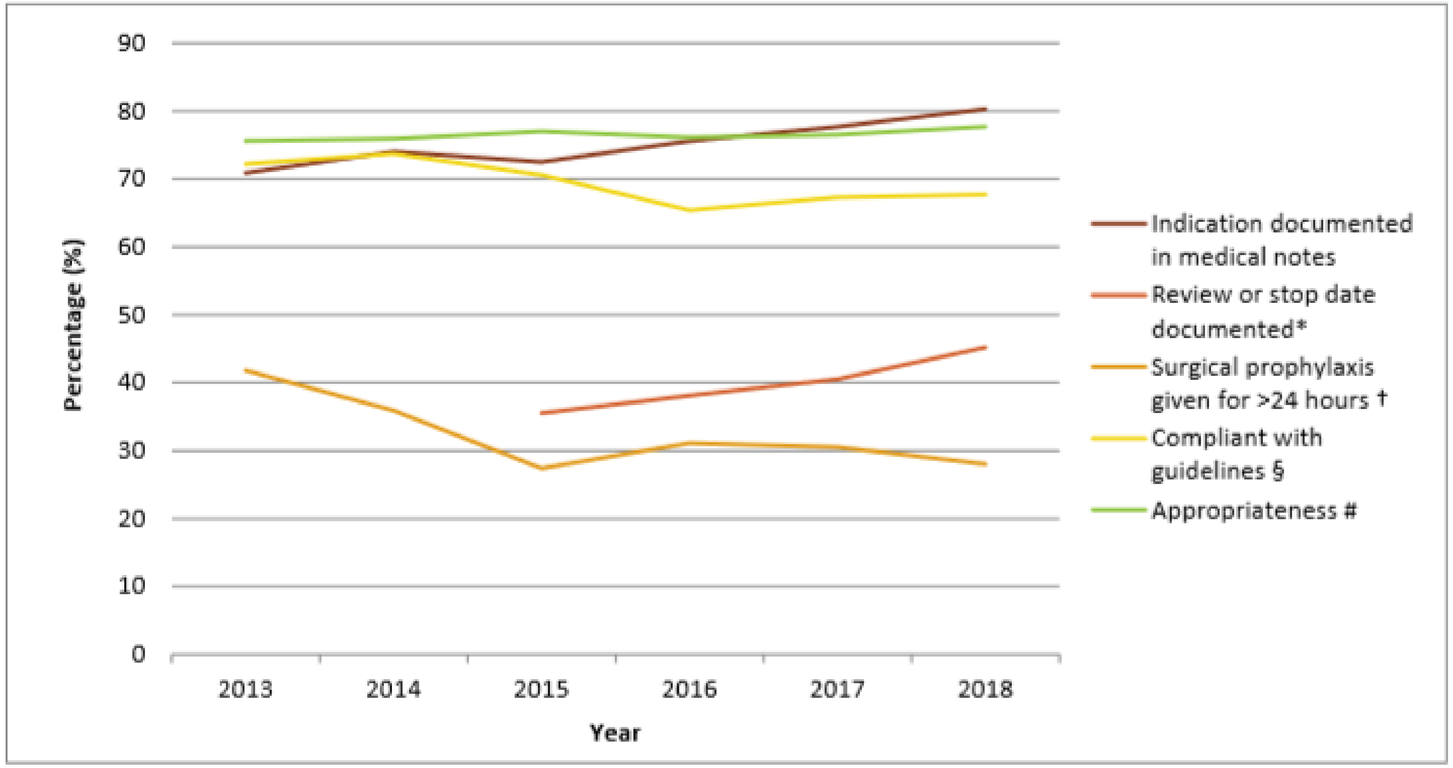


Table 7: Reasons for a prescription being assessed as inappropriate, Hospital NAPS contributors, 2018

Reason	Yes	No	Not specified
Spectrum too broad	23.7%	40.4%	36.0%
Incorrect dose or frequency	20.3%	45.7%	34.0%
Incorrect duration	20.0%	47.6%	32.4%
Antimicrobial not required	16.6%	50.9%	32.5%
Spectrum too narrow	8.0%	52.3%	39.7%
Incorrect route	4.0%	55.2%	47.8%

n=4,773

https://irp-cdn.multiscreensite.com/d820f98f/files/uploaded/Hospital%20NAPS%20Public%20Report%20-%202018.pdf

Antimicrobial Resistance and Stewardship – in practice

Hospital NAPS 2018

Figure 5: The 20 most common antimicrobials prescribed by Hospital NAPS contributors, by percentage, 2013–2018

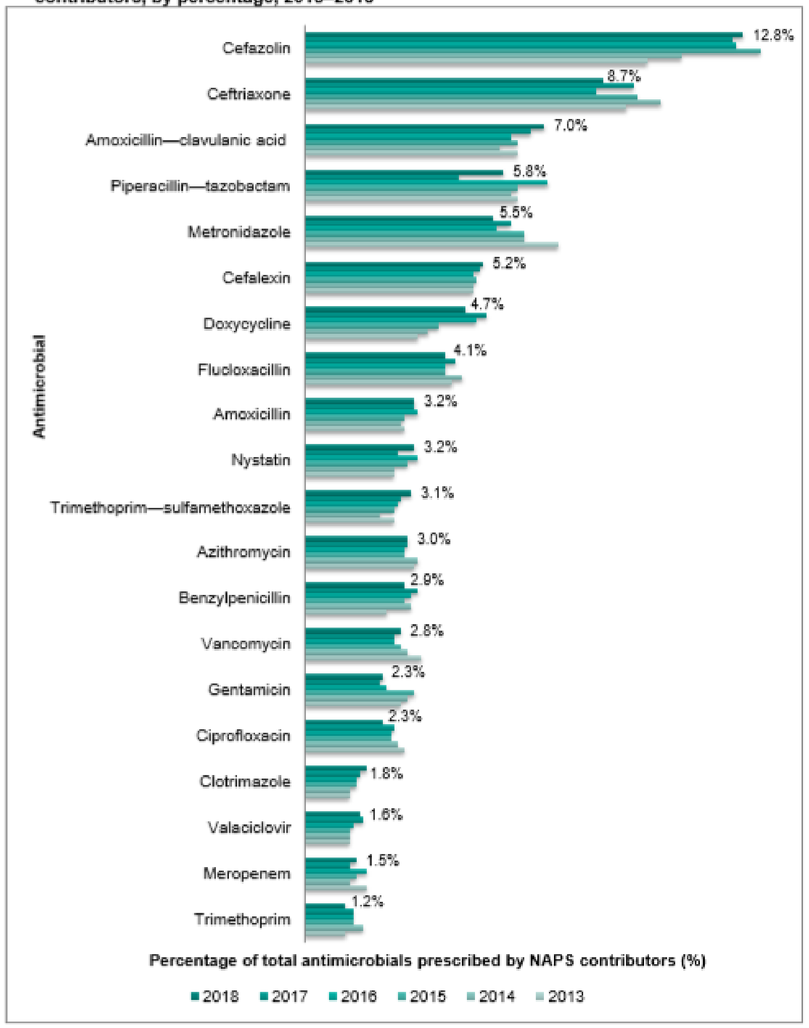
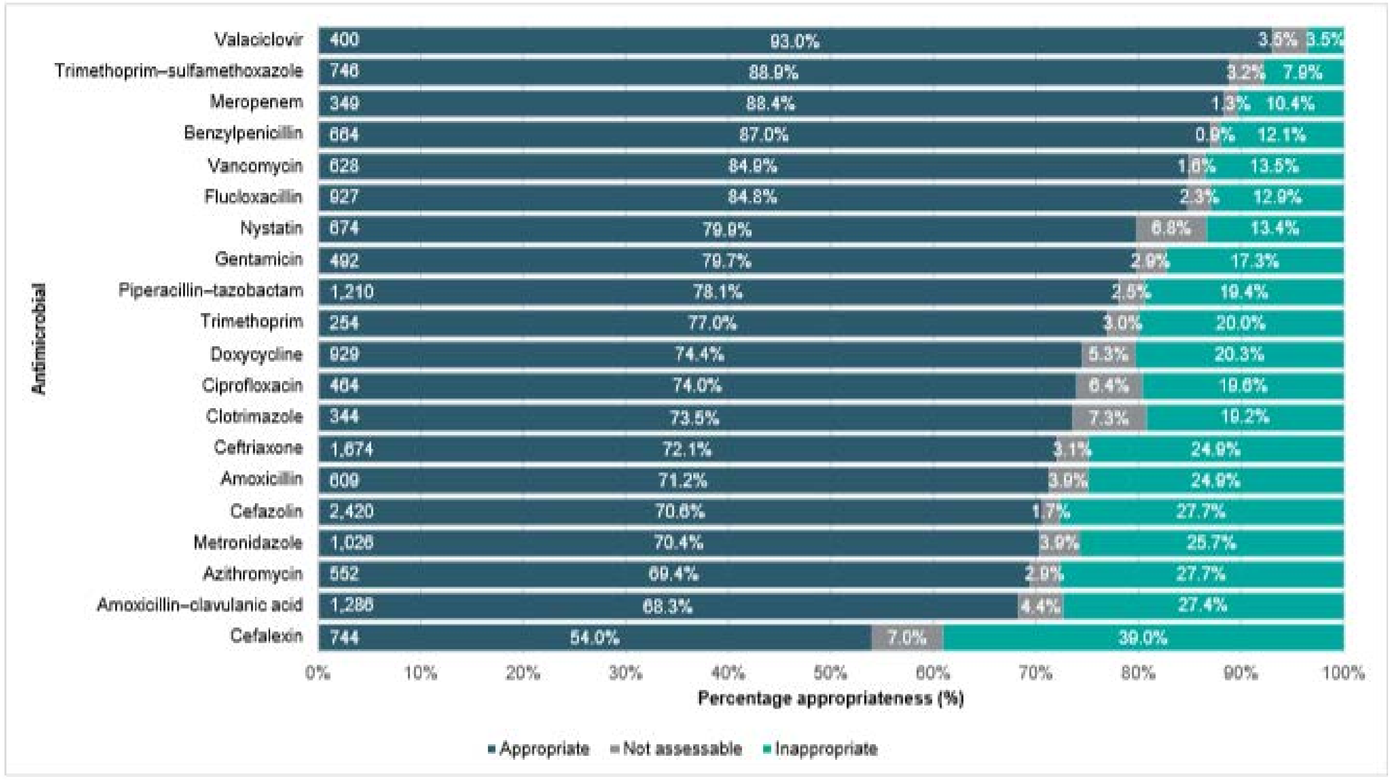


Figure 6: Appropriateness for the most commonly prescribed antimicrobials in Hospital NAPS contributor hospitals, 2018



https://irp-cdn.multiscreensite.com/d820f98f/files/uploaded/Hospital%20NAPS%20Public%20Report%20-%202018.pdf

Antimicrobial Resistance and Stewardship – in practice

Hospital NAPS 2018

Figure 9: The 20 most common indications for prescribing antimicrobials in Hospital NAPS contributors, 2013–2018

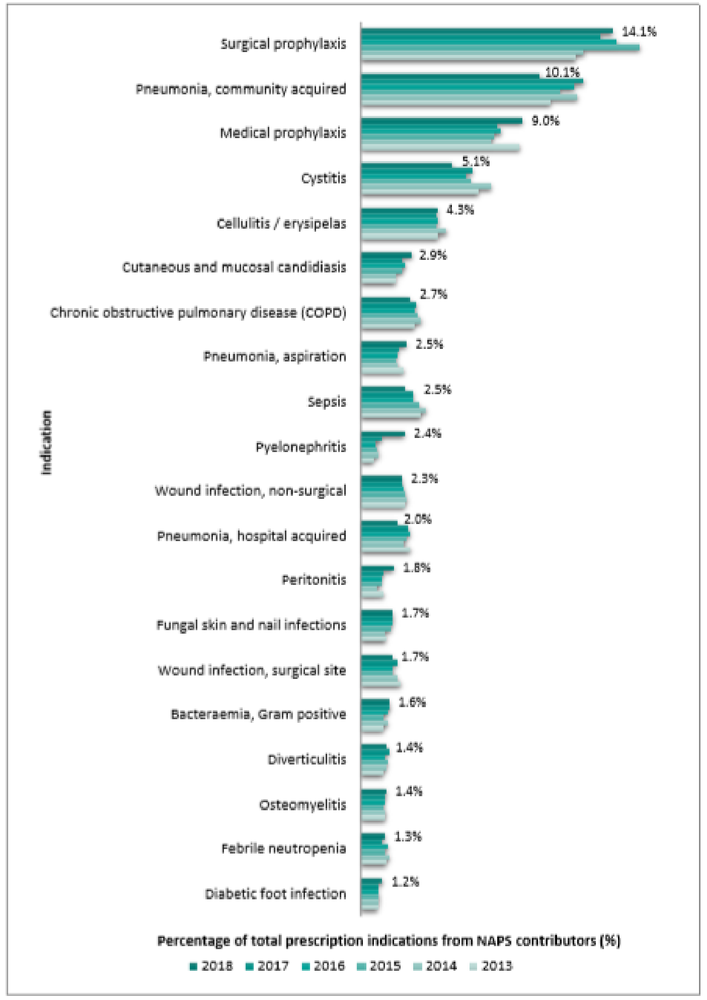
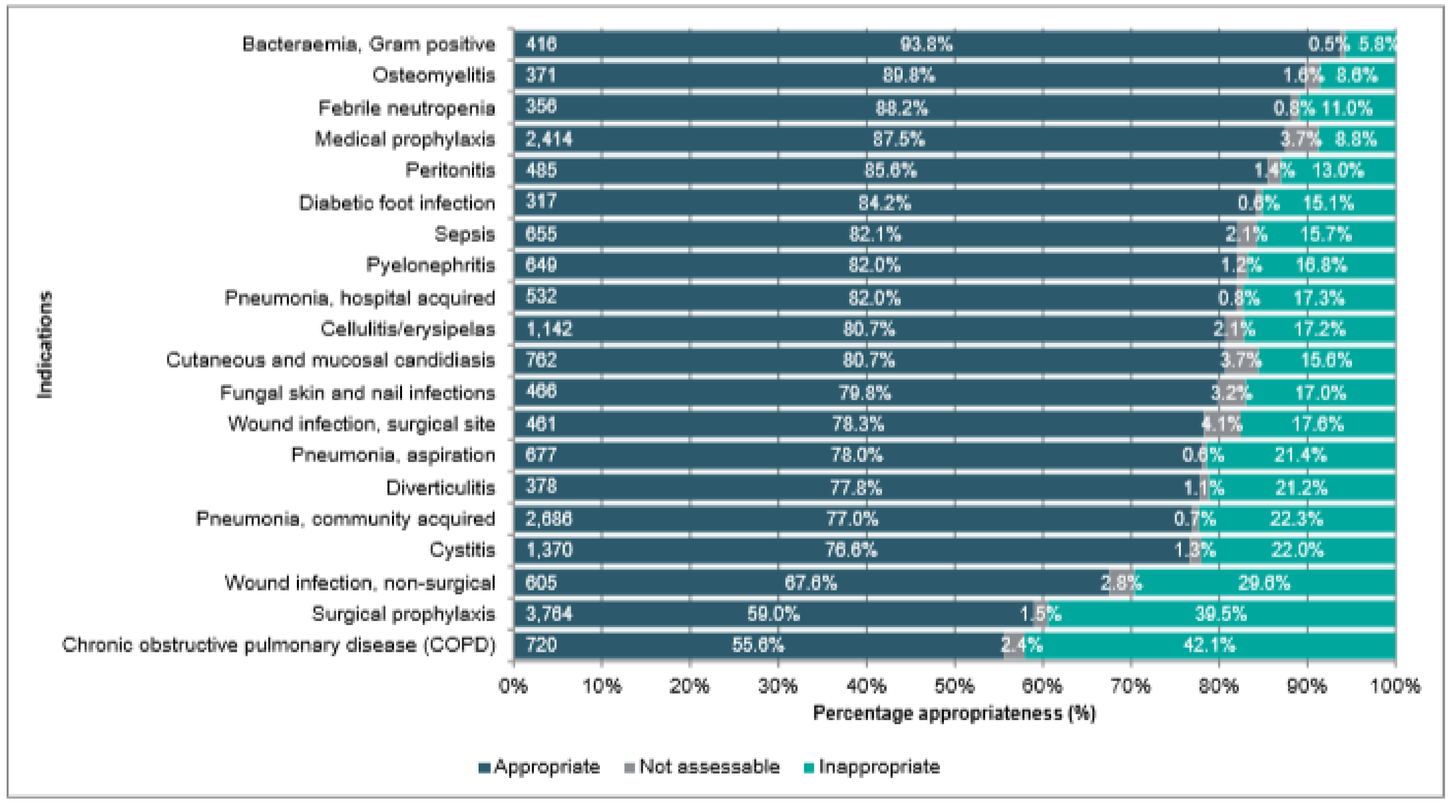
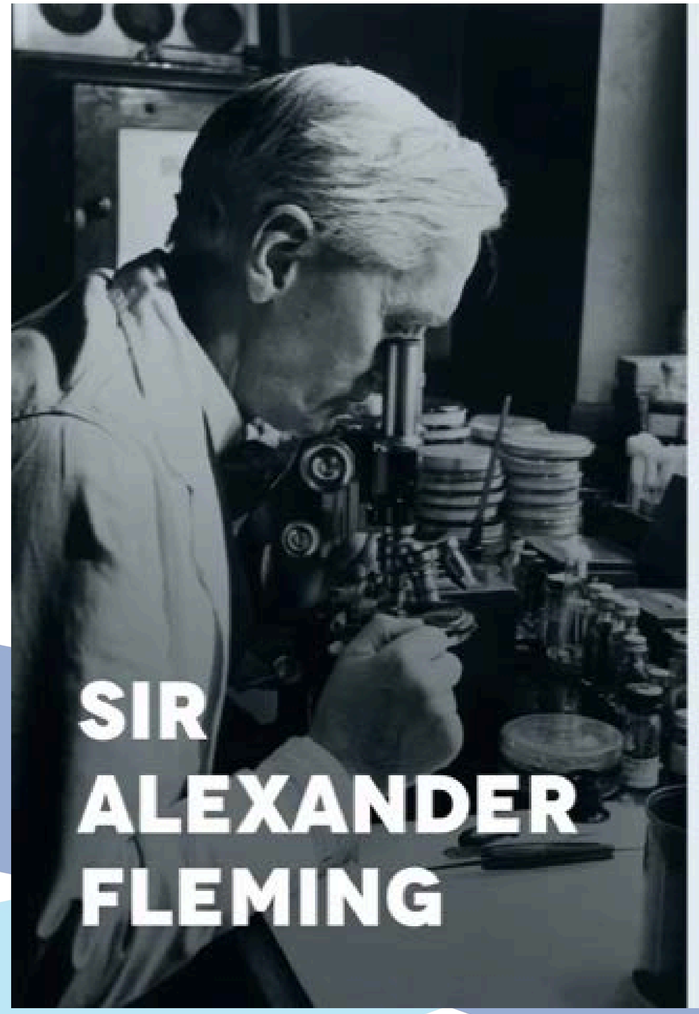


Figure 10: Appropriateness of prescribing for the 20 most common indications in the Hospital NAPS contributors, 2018



https://irp-cdn.multiscreensite.com/d820f98f/files/uploaded/Hospital%20NAPS%20Public%20Report%20-%202018.pdf

AMR – a New Issue?

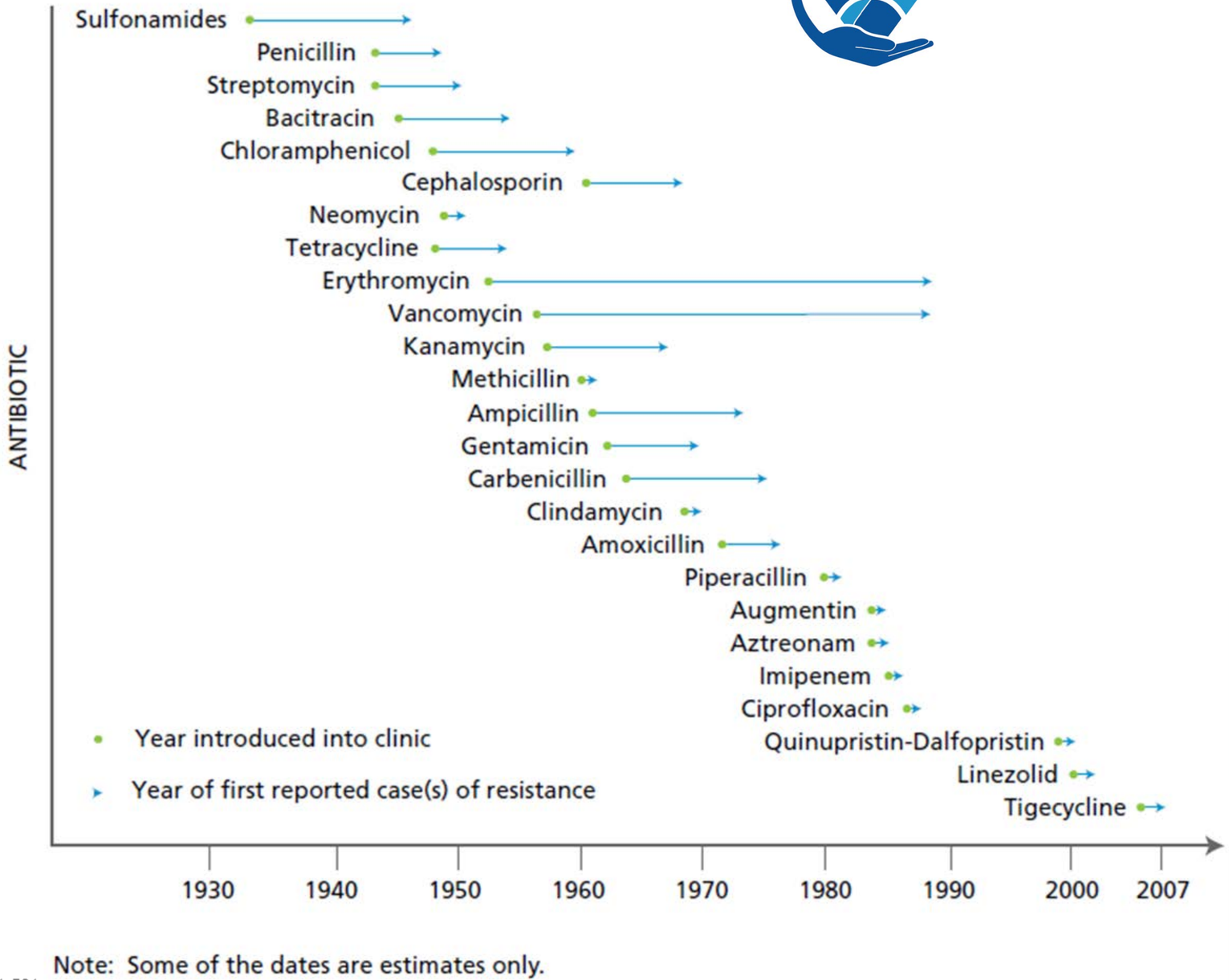


The thoughtless person playing with penicillin treatment is morally responsible for the death of the man who succumbs to infection with the penicillin-resistant organism.

Antimicrobial Resistance and Stewardship – in practice

Why AMS is important

- Very few antibiotics have been developed in the last 20 years
  - Financial incentive
- Most ‘new’ antibiotics are variations of existing antibiotics
- Only 5 novel classes have been developed in the last 20 years.



Note: Some of the dates are estimates only.

Butler M, Blaskovich M, Cooper M. Antibiotics in the clinical pipeline in 2013. J. Antibiot 2013;66: 571-591

Antimicrobial Resistance and Stewardship – in practice

WHO –AMR Action FUND

- In July 2020, more than 20 leading biopharmaceutical companies announced the AMR Action Fund that will invest in developing innovative antibacterial treatments.
  - The Fund aims to bring 2-4 new treatments to patients by 2030.

- Recent bankruptcies have shown how small antibiotics companies struggle to survive in the current market environment.
  - The process of getting new drugs to market is cost intensive as new antibacterial treatments have to be underpinned with rigorous data that are derived from a series of complex and costly clinical trials to demonstrate their advantages over existing treatment regimens.

- The AMR Action Fund will invest, through equity or debt, in small companies developing innovative antibacterial treatments that target existing public health priorities.

- The WHO review of the clinical antibiotic pipeline identifies a number of potential investment candidates.
  - Currently, there are only 32 antibacterial treatments, in clinical development, targeting the WHO's list of priority pathogens and of these, only 6 fulfil at least one of the innovation criteria as defined by WHO.

- The latest WHO review of the preclinical pipeline revealed that new and innovative approaches are emerging in the development of antibacterial agents; of the 252 antibacterial agents that were in preclinical development, over one-third were non-traditional products.
  - The next WHO clinical pipeline review will expand to include non-traditional products such as phages and other new innovative approaches to overcome antibacterial resistance.

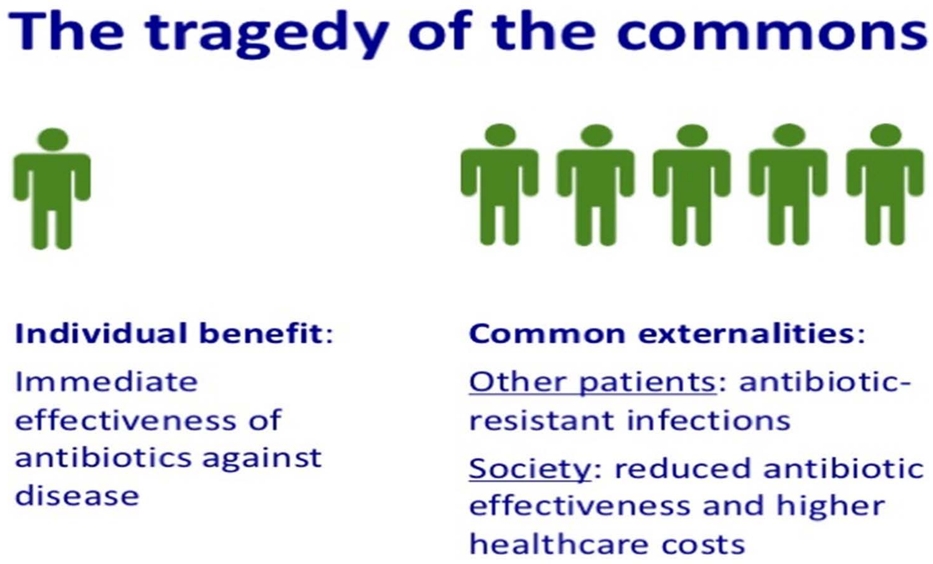
https://www.who.int/news-room/detail/09-07-2020-addressing-the-crisis-in-antibiotic-development

Antimicrobial Resistance and Stewardship – in practice

Antimicrobials are Unique

- In general, the impact or consequences of medications are limited to the patient taking them
  - Adverse Effects individual specific

- Antimicrobials are different!
  - Use of antimicrobials has an impact not just for the patient using them but the global community as well



Australian Commission on Safety and Quality. (2019). Antibiotic Awareness Week 2019 - PowerPoint Presentation. Retrieved from https://www.safetyandquality.gov.au/publications-and-resources/resource-library/antibiotic-awareness-week-2019-powerpoint-presentation

Antimicrobial Resistance and Stewardship – in practice

Risk vs Benefit

- Consider benefits versus harms of antimicrobial therapy

  - **Direct Adverse Effects:**
    - Non–immune-mediated, pharmacologically predictable reactions e.g. diarrhoea, nausea
    - Immune-mediated non-severe delayed reactions e.g. rash
    - Severe or life threatening immune-mediated hypersensitivity reactions e.g. anaphylaxis, SCAR

      Always check if a patient has a history of antimicrobial hypersensitivity

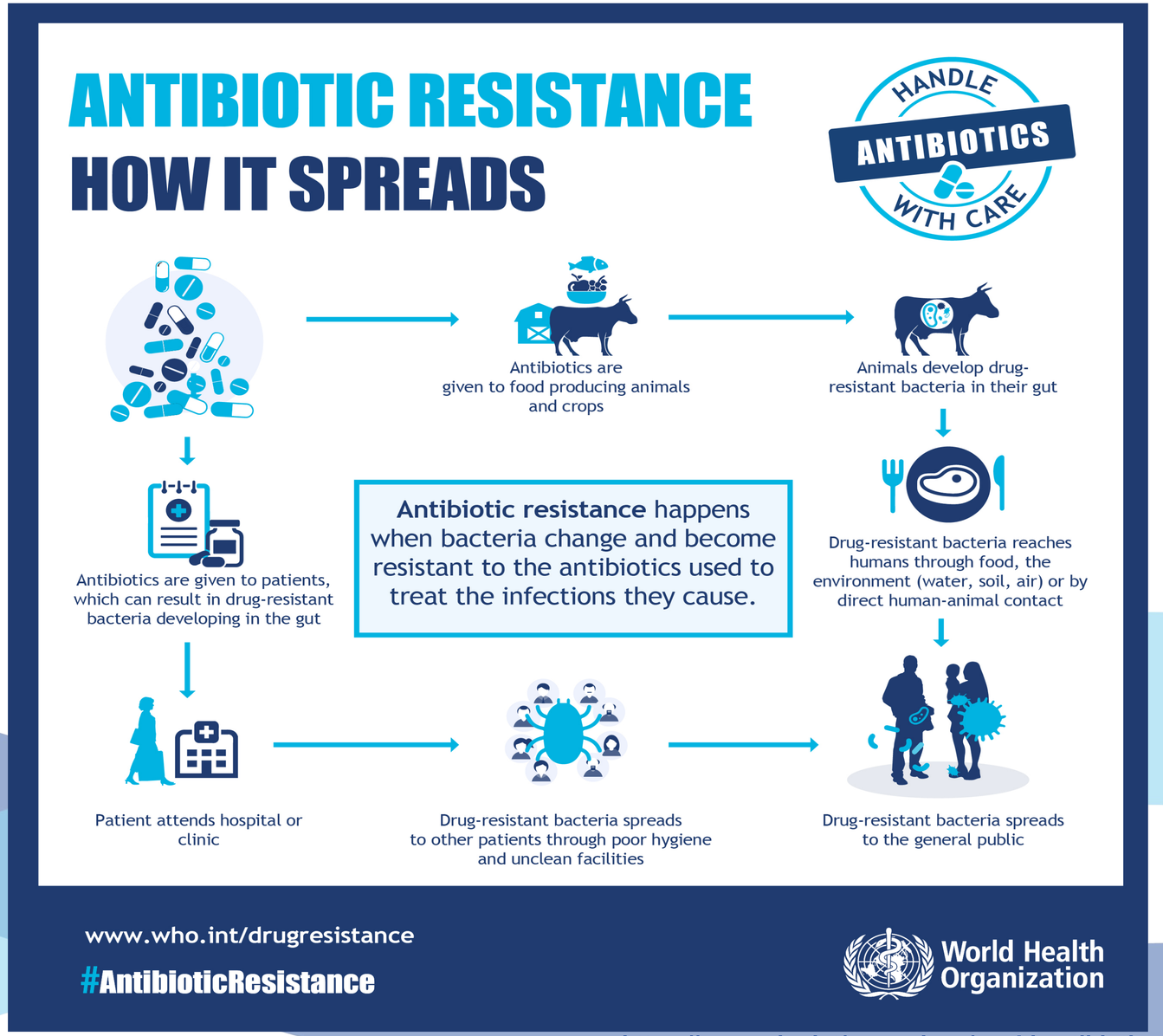
  - **Indirect Adverse Effects:**
    - Effects on both commensal and environmental flora
    - Antibiotics disrupt the microbiome

      → problems ranging from mild yeast infections (eg thrush) through to more serious infections (e.g. *Clostridium difficile*).
    - Antibiotics can lead to the development of resistance

      → increased risk of colonisation or infection with a drug-resistant pathogen

Antimicrobial Resistance and Stewardship – in practice

“ONE HEALTH”



https://www.who.int/campaigns/world-antibiotic-awareness-week/infographics/en/

Antimicrobial Resistance and Stewardship – in practice

AMS in Australia

Antimicrobial Stewardship isn't about "not using antimicrobials" but rather "identify that small group of patients who really need antibiotic treatment and then explain, reassure and educate the large group of patients who don't"

- Stewardship means to protect something
- AMS is a systematic approach to optimising the use of antimicrobials
- Goals of AMS are to:
  - improve patient outcomes / patient safety
  - reduce antimicrobial resistance
  - reduce costs.
- AMS works hand-in-hand with infection prevention and control, and environmental cleaning strategies

https://www.safetyandquality.gov.au/our-work/clinical-care-standards/antimicrobial-stewardship-clinical-care-standard/

Antimicrobial Resistance and Stewardship – in practice

Antimicrobial Stewardship in Australian Health Care

- In hospitals, the incidence of MRO has been correlated with the use of broad-spectrum antimicrobials.
  - Third-generation cephalosporins and the prevalence of ESBL-producing organisms

- Association at the individual level
  - longstanding changes to an individual's microorganisms (microbiome)

- Persistence of antimicrobial resistance
  - Once resistant organisms have been introduced into a particular setting, they may persist even if the selective pressure of inappropriate antimicrobial use is removed.
  - This can make it difficult to prove that a reduction in the use of antimicrobials will result in a concomitant decrease in AMR, and reflects the complexity of resistance emergence, transmission and persistence.
  - Additionally, even if antimicrobial use at one institution is effectively managed, frequent movement of patients between institutions, and lapses in infection prevention and control practices, can reintroduce resistant organisms.
  - This highlights the importance of a multifaceted approach to minimising AMR, including robust infection control management and AMS activities.

https://www.safetyandquality.gov.au/sites/default/files/migrated/AMSAH-Book-WEB-COMPLETE.pdf

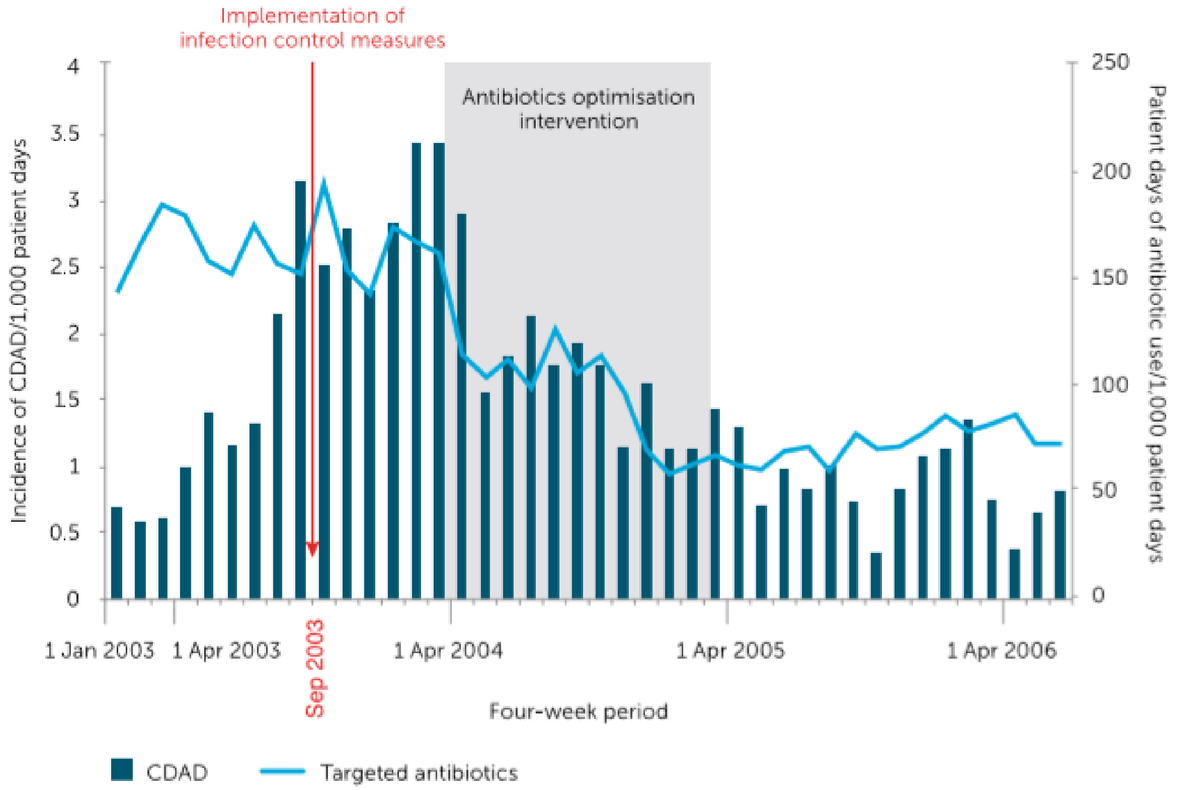
Antimicrobial Resistance and Stewardship – in practice

Antimicrobial Stewardship in Australian Health Care

- In a meta-analysis - AMS activities in hospitalised patients:
  - Reduced AMR rates by 34% (incidence rate ratio [IRR] 0.66; 95% confidence interval [CI] 0.47, 0.93; P = 0.02)
  - Reduced C. difficile colonisation by 62% (IRR 0.38; 95% CI 0.23, 0.65; P < 0.001)
  - Were more effective in reducing AMR among gram-positive bacteria (43% reduction) than gram-negative bacteria (28% reduction);
    - MRSA (49% reduction; IRR 0.51; 95% CI 0.33, 0.80)
    - carbapenem-resistant gram-negative bacteria (48% reduction; IRR 0.52; 95% CI 0.32, 0.84)
  - Did not appear to be effective in reducing vancomycin-resistant enterococci rates.

- Studies have demonstrated that reducing the overall use of antimicrobials, combined with improved infection control precautions, reduces the incidence of nosocomial *C. difficile* infection.
  - Restricting use of antibiotics deemed high risk for *C. difficile* infection has been associated with significant reductions in targeted antibiotics and *C. difficile* infection rates.
  - The 2017 Cochrane review of interventions to improve antimicrobial prescribing in hospitalised patients reported an association of planned AMS interventions with a consistent reduction in C. difficile infection (median –48.6%; interquartile range –80.7% to –19.2%).

Figure 1.3: Targeted antibiotic consumption and nosocomial *Clostridium difficile*–associated disease (CDAD) incidence per 1,000 patient days of hospitalisation



Source: Valiquette et al.[77]

https://www.safetyandquality.gov.au/sites/default/files/migrated/AMSAH-Book-WEB-COMPLETE.pdf

Antimicrobial Resistance and Stewardship – in practice

Antimicrobial Stewardship in Australian Health Care

- It is important to consider the drivers behind behaviour, and to target interventions and messages accordingly
- Organisational culture
  - Different cultural factors, encompassing how the organisation operates and communicates, may influence the success of an AMS program.
- Cultural factors that may support successful AMS include
  - Management and workforce
    - endorsement and recognition from management
    - engagement of clinical leaders
    - institutional buy-in
    - awareness of, or practical access to, antimicrobial prescribing guidelines and resources
  - Communication – collaborative styles of communication
  - Relationships – respectful and trusting – collegial and collaborative – multidisciplinary engagement
  - Conflict management – leadership support – direct communication with those who resist change.

Table 2.4: Determinants of antimicrobial prescribing behaviour and actions to influence them

Determinants of antimicrobial prescribing behaviour[45-50]	Practical steps for antimicrobial stewardship teams to influence prescribing among hospital clinicians[46]
Decision-making autonomy – clinicians may rely on professional judgement rather than evidence-based guidelines	• Engage senior clinicians in guideline development, with regular microbiological review, to support adherence • Work with senior clinicians to align the evidence base, local guidelines and consultant preferences, considering local resistance patterns • Use effective clinical leadership to influence practice
Limitations of local evidence-based policies – clinicians may deem local policies to be not always applicable to the individual patient	
Etiquette – clinicians may be reluctant to scrutinise and criticise other clinicians' prescribing practices	
Culture of hierarchy – junior clinicians' prescribing decisions are influenced by senior workforce members	• Make guidelines readily available to junior clinicians • Focus on adherence to guidelines and when to deviate when teaching clinicians
Antimicrobial resistance awareness – clinicians may not consider antimicrobial resistance to be relevant to their clinical decisions	• Provide training to all clinicians, including those trained overseas, that increases their awareness about antimicrobial resistance and overuse, the need to prescribe judiciously and current antimicrobial information • Promote prescribing guidelines
Knowledge about antimicrobials, including antimicrobial spectrum and appropriate clinical use – clinicians may not be aware of current antimicrobial information	
Diagnostic uncertainty – clinicians may be afraid of clinical failure or of overlooking something that is of more concern than downstream complications of antimicrobial resistance	• Educate clinicians to perform appropriate diagnostic work-ups before starting treatment – especially the correct use of microbiology and imaging
Expectations of patients, families and carers – clinicians may be influenced by patients' expectations for antimicrobials (perceived and actual)	• Engage with consumers, and use patient information about antimicrobial resistance and shared decision-making tools to change both patients' and clinicians' expectations

https://www.safetyandquality.gov.au/sites/default/files/migrated/AMSAH-Book-WEB-COMPLETE.pdf

Prescribing Behaviour - Barriers

Clinical Excellence Commission

Recommendation 3: *Focus on interventions which* ***build relationships of inter- and intra-disciplinary support****, and which* ***break down cultural, social and political barriers*** *to appropriate antibiotic prescribing.*

- The vast majority of antimicrobial prescriptions in hospitals are written by junior doctors, however it is the senior-level clinicians who are providing either direct instruction or bearing indirect influence over antimicrobial decision-making.
- Due to a strong perception of disempowerment amongst junior prescribers, the engagement of senior clinicians is absolutely critical in attempting to change antimicrobial prescribing practice.

HARC Scholarship report – Modifying antibiotic prescribing behaviours: exploring innovative antimicrobial stewardship interventions and the science behind their success, Kate Callaghan CEC April 2016

Prescribing Behaviour - Barriers

Emotional, cognitive and social factors of antimicrobial prescribing: can antimicrobial stewardship intervention be effective without addressing psycho-social factors?

V. Donisi[1,2], M. Sibani[2], E. Carrara[2], L. Del Piccolo[1], M. Rimondini[1], F. Mazzaferri[2], C. Bovo[3] and E. Tacconelli[2,4]*

[1]Clinical Psychology, Department of Neurosciences, Biomedicine and Movement Sciences, University of Verona, Verona, Italy; [2]Infectious Disease, Department of Diagnostics and Public Health, University of Verona, Verona, Italy; [3]Medical Direction, University Hospital of Verona, Verona, Italy; [4]Infectious Diseases,

*Corresponding

There is increasing evidence that psycho-soci
tals and the community, and represent
Clinicians are conditioned both by emotional
perception and cognitive bias, and by inter
doctor–patient communication. However, a g

J Antimicrob Chemother 2016; **71**: 2295–2299
doi:10.1093/jac/dkw129 Advance Access publication 27 April 2016

Journal of Antimicrobial Chemotherapy

What prevents the intravenous to oral antibiotic switch? A qualitative study of hospital doctors' accounts of what influences their clinical practice

Jennifer Broom[1,2], Alex Broom[3], Kate Adams[4] and Stefanie Plage[3]*

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Antimicrobial Resistance and Stewardship – in practice

Prescribing Behaviour - Enablers

Clinical Infectious Diseases

MAJOR ARTICLE

Sustainability of Handshake Stewardship: Extending a Hand Is Effective Years Later

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Clinical Infectious Diseases

EDITORIAL COMMENTARY

Can the Perfect Handshake Hold the Key to Success and Sustainability of Antimicrobial Stewardship Programs?

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Antimicrobial Resistance and Stewardship – in practice

Prescribing Behaviour - Enablers

Sartelli *et al. World Journal of Emergency Surgery* (2018) 13:37
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World Journal of Emergency Surgery

COMMENTARY

Knowledge, awareness, and attitude towards infection prevention and management among surgeons: identifying the surgeon champion

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Jan Ulrych[54], András G. Vereczkei[55], Francesco M. Labricciosa[56] and Fausto Catena[57]

Abstract

Despite evidence supporting the effectiveness of best practices of infection prevention and manag
surgeons worldwide fail to implement them. Evidence-based practices tend to be underused in ro
Surgeons with knowledge in surgical infections should provide feedback to prescribers and integra
among surgeons and implement changes within their team. Identifying a local opinion leader to s
champion within the surgical department may be important. The "surgeon champion" can integrate best clinical practices of infection prevention and management, drive behavior change in their colleagues, and interact with both infection control teams in promoting antimicrobial stewardship.

Keywords: Surgeon, Infection, Prevention, Antibiotic therapy

Original article

How can collective leadership influence the implementation of change in health care?

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ABSTRACT

Aim: This study focuses on how a collective leadership style could influence the implementation of change in health care.
Methods: Kotter's 8-step process and leadership can guide the implementation of change. Collective leadership can highlight all levels of staff engagement, establish an organizational culture of learning and trust, and create continuous improvement. At the same time, it can formulate a well-designed plan; develop efficient strategies; communicate and empower the staff; assess the performance; and integrate the improvement.
Results: Collective leadership can establish vision and trust, highlight all levels of staff engagement, establish an organizational culture of learning and trust, create continuous improvement, communicate and empower the staff and integrate the improvement.
Conclusions: Collective leadership can be a powerful way to overcome the barrier and create an effective environment of adaptation of changes by analyzing Kotter's eight stage process.

Antimicrobial Resistance and Stewardship – in practice

AMS in Australia

National Safety and Quality Health Service Standards

→*Standard 3: Preventing and Controlling Healthcare-Associated Infections*

→*The number of hospitals with AMS increased from 36% in 2010 to 98% in 2015*

→*Formularies restricting use of broad-spectrum antimicrobials increased from 41% to 86%*

→*Inappropriate use of antimicrobials decreased by 12.6%*

Antimicrobial stewardship

The health service organisation implements systems for the safe and appropriate prescribing and use of antimicrobials as part of an antimicrobial stewardship program.

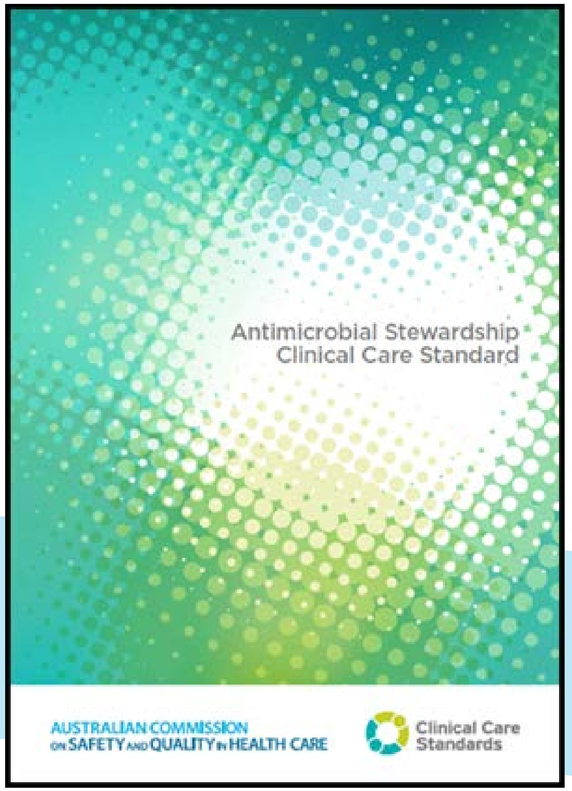
Item	Action
Antimicrobial stewardship	3.15 The health service organisation has an antimicrobial stewardship program that: a. Includes an antimicrobial stewardship policy b. Provides access to, and promotes the use of, current evidence-based Australian therapeutic guidelines and resources on antimicrobial prescribing c. Has an antimicrobial formulary that includes restriction rules and approval processes d. Incorporates core elements, recommendations and principles from the current Antimicrobial Stewardship Clinical Care Standard[20]
	3.16 The antimicrobial stewardship program will: a. Review antimicrobial prescribing and use b. Use surveillance data on antimicrobial resistance and use to support appropriate prescribing c. Evaluate performance of the program, identify areas for improvement, and take action to improve the appropriateness of antimicrobial prescribing and use d. Report to clinicians and the governing body regarding • compliance with the antimicrobial stewardship policy • antimicrobial use and resistance • appropriateness of prescribing and compliance with current evidence-based Australian therapeutic guidelines or resources on antimicrobial prescribing

Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. 2nd ed. Sydney: ACSQHC; 2017

AMS in Australia

Antimicrobial Stewardship Clinical Care Standard

- Describes best-practice in antibiotic prescribing:
    1. Urgent treatment of severe infection
    2. Appropriate investigations collected (preferably before antibiotics)
    3. Information given to patient about diagnosis
    4. Prescribing as per Therapeutic Guidelines: Antibiotic (or other local guidelines)
    5. Information given to patient about treatment
    6. Documentation of treatment plan in the record
    7. Narrowing of broad-spectrum empiric treatment when appropriate
    8. Investigations reviewed in a timely way
    9. Surgical prophylaxis in accordance with guidelines



https://www.safetyandquality.gov.au/our-work/clinical-care-standards/antimicrobial-stewardship-clinical-care-standard/

Antimicrobial Resistance and Stewardship – in practice

Essential strategies for AMS Programs

Pre-prescription	Post-prescription
Formulary management	Direct patient input e.g. AMS Round
Restriction System	Audit and Feedback
Guidelines	Monitor appropriateness – National Antimicrobial Prescribing Survey (NAPS)
Education	Monitor utilisation – National Antimicrobial Utilisation Surveillance Program (NAUSP)
Antibiograms (susceptibility of microogranisms to antimicrobials)	Education
Selective reporting of susceptibility testing	Electronic solutions - eMeds – automatic stops
Confirming patient's allergy status	IV to Oral switch

https://www.safetyandquality.gov.au/our-work/clinical-care-standards/antimicrobial-stewardship-clinical-care-standard/

Antimicrobial Stewardship – not just for hospitals

- In the community
  - *General Practice*
    - Not prescribing antibiotics for colds and flu
    - Delayed prescribing
    - Shared decision making
    - Public declarations in the practice about conserving antibiotics

  - *Pharmacies*
    - Offering symptomatic support for cold and flu

- *In the home*
  - Not taking antibiotics that haven't been prescribed for you
  - Discarding old antibiotic medicines appropriately

- *In industry*
  - Investing in research and development for antimicrobials

https://www.safetyandquality.gov.au/our-work/clinical-care-standards/antimicrobial-stewardship-clinical-care-standard/

AMS in Australia

Antimicrobial Stewardship – not just for hospitals

Antimicrobial stewardship strategies for general practice (Table 2.64)

Component of general practice	Strategies for antimicrobial stewardship (AMS)
Primary Health Networks	Promote Antibiotic Awareness Week. Establish a local antimicrobial stewardship advisory group. Promote antimicrobial stewardship through education, information resources and tools for schools, childcare centres and community groups.
General practice owners	Promote the *Antimicrobial Stewardship Clinical Care Standard* [NB1]. Provide staff with access to *Therapeutic Guidelines: Antibiotic*. Encourage participation in audit and feedback on antimicrobial prescribing at a practice level.
General practitioners	Participate in online learning modules on antimicrobial stewardship. Demonstrate commitment to antimicrobial stewardship using a 'commitment poster'. Prescribe according to *Therapeutic Guidelines: Antibiotic*. Configure clinical software to default to zero repeats for antimicrobials. Specify the duration of antimicrobial therapy on the prescription. Use shared decision making with consumers for antimicrobial decisions, when appropriate. Use delayed antimicrobial prescriptions in selective situations for management of upper respiratory tract infections. Participate in audit and feedback activities for prescribing of antimicrobials. Discuss vaccination to minimise need for antibiotics.
General practice staff	Implement infection control and prevention strategies according to national guidelines. Provide displays (eg posters, videos, information pamphlets) for consumers. Promote up-to-date immunisation.

NB1: See the Australian Commission on Safety and Quality in Health Care website.

Antimicrobial Resistance and Stewardship – in practice

AMS in Australia

Therapeutic Guidelines

Celebrating Antibiotic Guidelines 40 years 1978-2018

Antibiotic prescribing in primary care: Therapeutic Guidelines summary table 2019

This table summarises information in ***eTG complete*** about the management of common conditions in primary care. For detailed and up-to-date information, including **second-line treatment options** and management of **special patient groups** (eg penicillin hypersensitivity, renal impairment), see *eTG complete*.
This table should be used in conjunction with **clinical judgment**. Prescribers should consider the **harm–benefit profile** of a drug in each patient (eg consider potential drug interactions).
Antibiotics that are **overused** in primary care include **amoxicillin+clavulanate, cefalexin, cefaclor, roxithromycin** and **erythromycin**.

Indication	First-line therapy	Notes
acute rhinosinusitis	symptomatic treatment	Antibiotic treatment is required rarely—most cases are viral. See *eTG complete* for more information and resources to support discussion with the patient or carer.
acute otitis media	symptomatic treatment for most cases	80% of cases spontaneously resolve without antibiotic treatment. Advise the carer to return if symptoms do not improve within 72 hours. Consider a delayed prescription for antibiotic therapy. **Treat the following groups**: infants younger than 6 months; children younger than 2 years with bilateral infection; children who are systemically unwell (eg lethargic, pale; fever alone is not sufficient); children who have otorrhoea; Aboriginal or Torres Strait Islander children; children at risk of complications (eg immunocompromised children). See *eTG complete* for the dose of **amoxicillin**. See *eTG complete* for resources to support discussion with the patient or carer.
acute pharyngitis/tonsillitis	symptomatic treatment for most cases	Most cases are viral. Even if infection is bacterial, antibiotic treatment is not required unless the patient is **at increased risk of rheumatic fever** (eg Aboriginal and Torres Strait Islander Australians, patients with scarlet fever)—see *eTG complete* for the dose of **phenoxymethylpenicillin**. See *eTG complete* for resources to support discussion with the patient or carer.
acute bronchitis	symptomatic treatment	Antibiotic treatment is **not** indicated—over 90% of cases are viral. See *eTG complete* for resources to support discussion with the patient or carer.
mild infective exacerbation of COPD	**amoxicillin** 500 mg orally, 8-hourly for 5 days	Antibiotic treatment has **little benefit** for patients managed in the community with less severe COPD: for every 100 patients treated with antibiotics, only 8 patients will be better by 4 weeks because they took antibiotics. Consider a delayed prescription for antibiotic therapy. See *eTG complete* for more information and resources to support discussion with the patient or carer.
community-acquired pneumonia in adults: low-severity (mild)	**amoxicillin** 1 g orally, 8-hourly. If the patient has significantly improved after 2 to 3 days, treat for 5 days. If the clinical response is slow, treat for 7 days	Assess the patient's pneumonia severity, comorbidities and social circumstances to decide whether to admit the patient to hospital; see *eTG complete*. See *eTG complete* for risk factors for infection caused by atypical bacteria. **Patient review** within 48 hours is essential. If patient follow-up within 48 hours may not occur, consider using initial combination therapy with doxycycline instead; see *eTG complete*. If the patient is not improving after 48 hours of monotherapy, see *eTG complete*.
pneumonia in residents of aged-care facilities: oral therapy	**amoxicillin** 1 g orally, 8-hourly. If the patient has significantly improved after 2 to 3 days, treat for 5 days. If the clinical response is slow, treat for 7 days	Consider whether a viral infection could be the cause of symptoms. See *eTG complete* for indications for parenteral therapy. If infection caused by atypical bacteria (eg *Legionella* species) is suspected, see *eTG complete*. **Patient review** within 48 hours is essential; see *eTG complete* if the patient is not improving.
localised odontogenic infection	dental treatment	Prescribe analgesia and **refer** the patient to the dentist. Explain that antibiotic treatment without dental intervention will not be effective. If dental treatment will be delayed or the infection is spreading, see *eTG complete*.

https://www.tg.org.au/news/antibiotic-summary-table/

Antimicrobial Resistance and Stewardship – in practice

AMS – Endorsed Recommendations

Choosing Wisely Australia
An initiative of NPS MedicineWise

The Thoracic Society of Australia and New Zealand

Visit page

Recommendations

1. Do not prescribe antibiotics for exacerbation of asthma.

The Royal Australian College of General Practitioners

Visit page

Recommendations

1. Don't treat otitis media (middle ear infection) with antibiotics, in non-Indigenous children aged 2-12 years, where reassessment is a reasonable option.

Royal Australasian College of Surgeons

Visit page

Recommendations

1. Don't prescribe oral antibiotics for uncomplicated acute discharge from grommets.
2. Don't prescribe oral antibiotics for uncomplicated acute otitis externa.

Australian and New Zealand Society for Geriatric Medicine

Visit page

Recommendations

1. Do not use antimicrobials to treat bacteriuria in older adults where specific urinary tract symptoms are not present.

RACP Paediatrics & Child Health Division

Visit page

Recommendations

1. Do not routinely prescribe oral antibiotics to children with fever without an identified bacterial infection

Internal Medicine Society of Australia and New Zealand

Visit page

Recommendations

1. Once patients have become afebrile (non-feverish) and are clinically improving, don't continue prescribing intravenous antibiotics to those with uncomplicated infections and no high-risk features if they are tolerant of oral antibiotics.

College of Intensive Care Medicine of Australia and New Zealand

Visit page

Recommendations

1. Consider antibiotic de-escalation daily.

Australian and New Zealand Intensive Care Society

Visit page

Recommendations

1. Consider antibiotic de-escalation daily.

The Australasian College of Dermatologists

Visit page

Recommendations

1. Monotherapy for acne with either topical or systemic antibiotics should be avoided.
2. Do not routinely prescribe antibiotics for inflamed epidermoid cysts (formerly called sebaceous cysts) of the skin.
3. Do not assume that bilateral redness and swelling of both lower legs is due to infection unless there is clinical evidence of sepsis such as malaise, fever and neutrophilia, plus an expanding area of redness or swelling over a period of hours to days.

The Society of Hospital Pharmacists of Australia

Visit page

Recommendations

1. Don't initiate an antibiotic without an identified indication and a predetermined length of treatment or review date.

Australasian Society for Infectious Diseases

Visit page

Recommendations

1. Do not take a swab or use antibiotics for the management of a leg ulcer without clinical infection.
2. Avoid prescribing antibiotics for upper respiratory tract infection.
3. Do not use antibiotics in asymptomatic bacteriuria.

https://www.choosingwisely.org.au/recommendations?q=&organisation=&medicineBranch=&medicalTest=&medicineTreatment=2854&conditionSymptom=

Antimicrobial Resistance and Stewardship – in practice

AMS in Australia

- There are often high rates of antibiotic use in **residential aged-care facilities**.
- Care providers can implement organisation-wide antimicrobial stewardship activities to promote safe and effective use of antimicrobials for residents.
- These activities should complement good infection prevention and control strategies, and support the efforts of general practitioners who care for residents.
- Examples of antimicrobial stewardship activities in residential aged-care facilities include:
  - educating staff about antibiotic resistance and antimicrobial stewardship, viral versus bacterial infections, and recognition of suspected infection
  - providing information for residents and families about infection prevention and antibiotic use
  - participating in audit activities such as the Aged Care National Antimicrobial Prescribing Survey

AMS in a nutshell – a balance

- **Antimicrobial Stewardship**

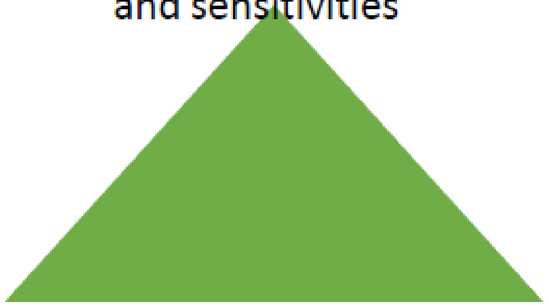
MIND ME

Identify source of infection
to narrow empiric treatment

Importance of appropriate
empiric therapy

Mortality increase when
initial therapy is inappropriate

De-escalation of empiric
therapy with cultures
and sensitivities



Increase in resistance with broad
spectrum antimicrobial use

Cost increase with broad spectrum
antimicrobials

Risk of toxicity and adverse drug
reactions

- The Antimicrobial Creed - MINDME
  - **M**icrobiology guides therapy (wherever possible)
  - **I**ndications should be evidence-based
  - **N**arrowest spectrum therapy required
  - **D**osage individualised to the patient and appropriate to the site and type of infections
  - **M**inimise duration of therapy
  - **E**nsure monotherapy where appropriate

Antimicrobial Resistance and Stewardship – in practice

Appropriate Prescribing

Box **Best-practice antimicrobial prescribing in general practice**

Do:

- consider microbiological testing to direct therapy (e.g. urinary tract infection, abscess), especially when the causative organism is difficult to predict (e.g. recurrent or unresponsive infection, or overseas travel)
- use the current version of Therapeutic Guidelines: Antibiotic, or available local guidelines
- know *why* you are prescribing the antibiotic (document indication and duration in the medical record)
- prescribe the shortest duration of therapy (or total number of tablets), even if this means the pharmacist breaking the pack.

Don't:

- culture every infection, or potential infection (especially urine in residential aged-care facilities)
- prescribe an antimicrobial without an appropriate indication
- routinely provide a repeat prescription.

Table **Recommended antibiotic prescribing for common bacterial infections** *

Diagnosis	Indications for antibiotic therapy	First-line antimicrobial (if indicated)	Duration	Tablets (for maximum adult dose)
Acute tonsillopharyngitis	2–25 years, high risk of acute rheumatic fever, or rheumatic heart disease, or scarlet fever	Phenoxymethylpenicillin 12-hourly	10 days †	20 x 500 mg
Acute rhinosinusitis	Symptoms >7 days, or high fever >3 days, or biphasic illness	Amoxicillin 8-hourly	5 days †	15 x 500 mg
Acute otitis media	<6 months old, or systemic symptoms, or indigenous community	Non-indigenous: amoxicillin 12-hourly	5 days †	20 x 500 mg
		Indigenous: amoxicillin 12-hourly	7 days †	28 x 500 mg
Community-acquired pneumonia (mild, can review progress in 48 hours)		Adults: amoxicillin 8-hourly, or doxycycline 12-hourly	5–7 days#	30 x 500 mg / 10 x 100 mg
		Children:		
		• 1 month to <3 months: azithromycin daily ‡	3–5 days	–
		• 3 months to <5 years: amoxicillin 8-hourly	3–5 days †	–
		• 5 years or older: amoxicillin 8-hourly §	3–5 days †	–
Uncomplicated urinary tract infection		Non-pregnant women: trimethoprim daily	3 days	3 x 300 mg
		Pregnant women: cefalexin or nitrofurantoin 12-hourly	5 days	10 x 500 mg / 10 x 100 mg
		Men: trimethoprim daily	7 days	7 x 300 mg
		Children ≥1 month: trimethoprim/sulfamethoxazole 12-hourly	3–5 days ¶	–
Cellulitis (mild, low risk for methicillin-resistant *Staphylococcus aureus*)		Dicloxacillin or flucloxacillin 6-hourly, or	5 days ††	20 x 500 mg
		phenoxymethylpenicillin 6-hourly **	5 days †, ††	20 x 500 mg
Impetigo		Non-remote setting:		
		• Localised lesion: topical mupirocin	7 days	–
		• Multiple lesions/recurrent: dicloxacillin or flucloxacillin 6-hourly	3–10 days ‡‡	40 x 500 mg
		Remote setting:		
		• trimethoprim/sulfamethoxazole 12-hourly, or	5 days	10 x 160/800 mg
		• benzathine penicillin intramuscular	single dose	–
Abscess (low risk for methicillin-resistant *Staphylococcus aureus*)	Spreading cellulitis, or systemic symptoms, or large lesion/critical area	Dicloxacillin or flucloxacillin 6-hourly, as an adjunct to incision and drainage	5 days	20 x 500 mg

Wilson, H. L., Daveson, K., & Mar, C. B. (2019). Optimal antimicrobial duration for common bacterial infections. *Australian Prescriber, 42*(1), 5. doi:10.18773/austprescr.2019.001

Antimicrobial Resistance and Stewardship – in practice

Appropriate Prescribing – Pharmacy perspective

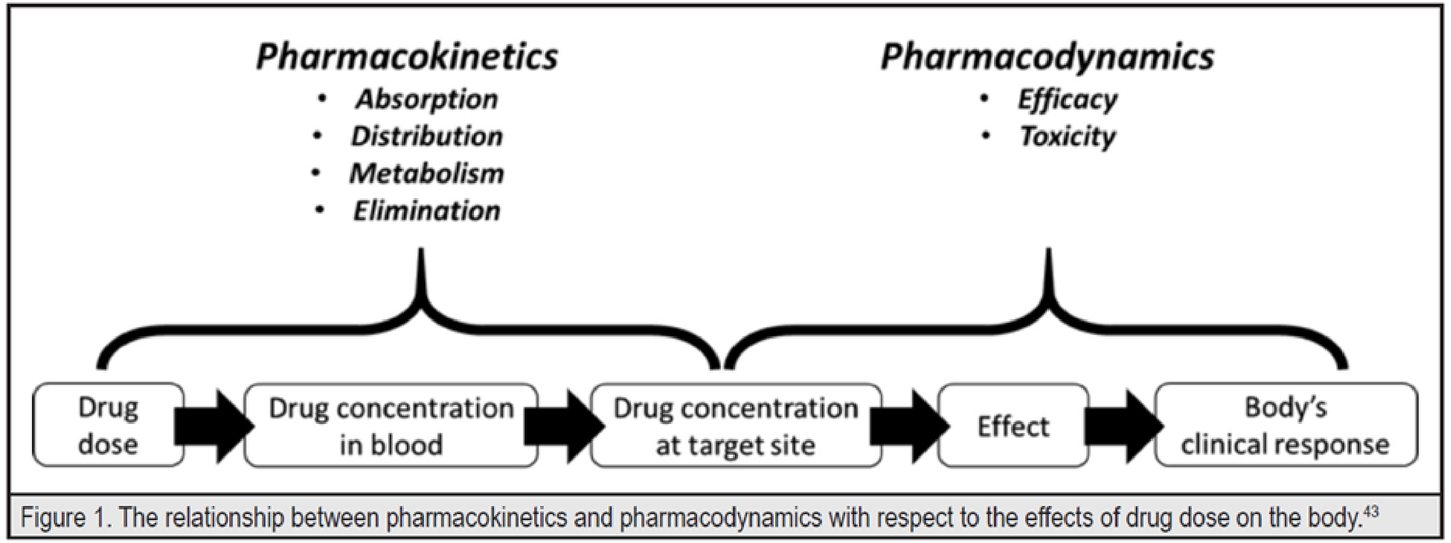


Figure 1. The relationship between pharmacokinetics and pharmacodynamics with respect to the effects of drug dose on the body.[43]

Deliver the correct DRUG for the BUG

At the correct CONCENTRATION

To the SITE of infection

Cherie Chu, PharmD, Louis Lteif, PharmD, and Nicole Young, PharmD. The Daniel K. Inouye College of Pharmacy Scripts Obesity: The Drug Dose Debate. Hawaii J Med Public Health. 2017 Jun; 76(6): 162–165.

Antimicrobial Resistance and Stewardship – in practice

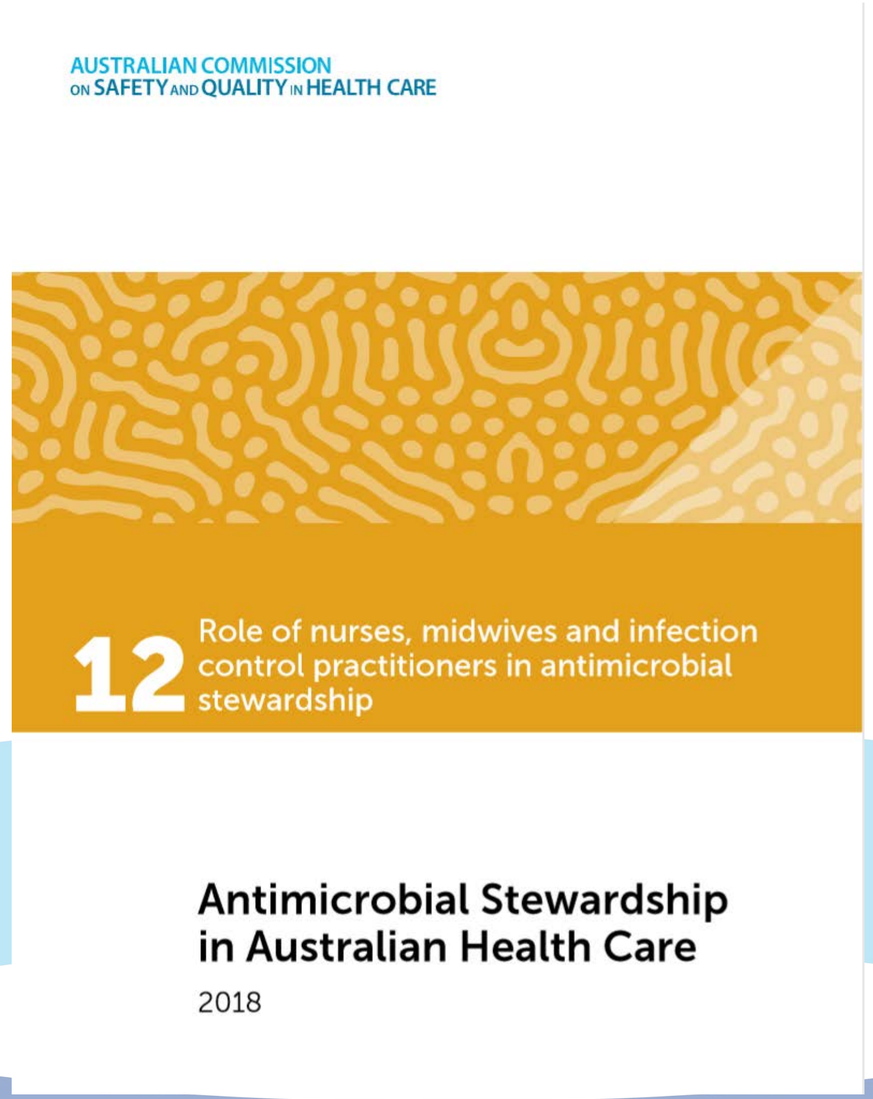
Nurses - Under-utilised AMS Resource

- Nurses and midwives make up more than half of the Australian health workforce and are involved in all aspects of patient care.

- Nurses are a constant in the patient journey and advocate for patients, and their contribution to patient safety and quality of care is acknowledged

- Examples include:
  - recognising signs of sepsis
  - assessing infection risk and making decisions about precautions to be put in place
  - implementing standard and transmission based precautions and practices to prevent infections associated with invasive medical devices
  - administering antimicrobials safely
  - monitoring patient responses
  - educating patients and their carers about safe and appropriate medication use.

Nurses and midwives can play a significant role in AMS by embedding AMS principles into routine practice



Antimicrobial Stewardship

Nurses: Under-utilised AMS Resource

ACIPC
Australasian College for Infection Prevention and Control

Position Statement
The Role of the ICP in Antimicrobial Stewardship

ACIPC Recommends

Infection control practitioners bring specific expertise and should be part of a multidisciplinary antimicrobial stewardship program that is supported by clinicians with professional expertise in antimicrobial use (infectious diseases physicians, pharmacists and microbiologists). This expertise may be provided onsite, or as part of a network or group arrangement.

Infection control practitioners can participate in AMS through:

- advising on appropriate governance structures for AMS.
- a patient-centric approach to managing risk.
- making current endorsed therapeutic guidelines on antimicrobial prescribing readily available.
- participating in multidisciplinary antimicrobial stewardship committees that include infectious diseases physicians, general practitioners, pharmacists, microbiologists, and nurses.
- educating healthcare workers on infection prevention and control strategies to minimise risk and transmission of antimicrobial resistance, including safe and appropriate antibiotic use.
- advising healthcare workers on appropriate specimen collection procedures, different types of microbes and infections, and local resistance patterns.
- undertaking surveillance of antimicrobial-resistant organisms, healthcare-associated infections, and in some circumstances, surveillance of antimicrobial usage and appropriateness.
- reporting and providing feedback to teams on surveillance data.

https://www.acipc.org.au/wp-content/uploads/2017/07/20170622_ACIPC_Position_Statement-_AMS_-Final.pdf

Table 12.4: Areas of influence for infection control practitioners

Participating roles	Leading roles, in collaboration with other experts (on site or remote)
• Promoting compliance with standard and transmission-based precautions, including hand hygiene • Educating and providing information to clinicians, students, consumers and others • Undertaking surveillance and providing information to incorporate feedback on – local infection patterns – local pathogen antimicrobial resistance patterns – local infection patterns – local antimicrobial prescribing patterns • Translating information about patient outcomes into educational opportunities • Facilitating the implementation of clinical care bundles to reduce infection in high-risk situations (e.g. CAUTI, CLABSI, PIVC, VAP) • Providing expert advice to clinicians, patients and carers • Promoting uptake of, and compliance with, national standards for AMS • Participating in AMS committees or AMS team rounds • Supporting nurses and midwives in resolving disagreements about adherence to antimicrobial prescribing guidelines	• Triaging patients for post-prescription review at 48–72 hours • Coordinating Antibiotic Awareness Week activities • Informing senior management and relevant committees about the AMS program • Coordinating, or actively participating in, AMS ward rounds • Implementing intravenous-to-oral switching programs • Auditing, evaluating and reporting on antimicrobial use, including quality indicators • Conducting AMS research

AMS = antimicrobial stewardship; CAUTI = catheter-associated urinary tract infection; CLABSI = central line–associated bloodstream infection; PIVC = peripheral intravenous cannula; VAP = ventilator-associated pneumonia
Source: Nagel et al.[54]

https://www.safetyandquality.gov.au/sites/default/files/migrated/AMSAH-Book-WEB-COMPLETE.pdf

Antimicrobial Stewardship

Nurses:
Under-utilised AMS Resource

Table 1. Overlap of Nursing Activities With Function Attribution in Current Antimicrobial Stewardship Models

	Nursing	Microbiology	Case Management	Pharmacy	Infectious Diseases	Infection Control	Inpatient Physician	Administration
Patient admission								
Triage and appropriate isolation	•					•		
Accurate allergy history	•			•	•		•	
Early and appropriate cultures	•				•		•	
Timely antibiotic initiation	•				•		•	•
Medication reconciliation	•			•			•	
Daily(24 h) clinical progress monitoring								
Progress monitor and report	•		•		•		•	
Preliminary micro results and antibiotic adjustment	•	•		•	•		•	
Antibiotic dosing and de-escalation	•			•	•		•	
Patient safety & quality monitoring								
Adverse events	•			•	•		•	
Change in patient condition	•				•		•	
Final culture report and antibiotic adjustment	•	•		•	•	•	•	
Antibiotic resistance identification	•	•			•	•	•	
Clinical progress/patient education/discharge								
IV to PO antibiotic, outpatient antibiotic therapy	•		•	•	•		•	
Patient education	•				•	•	•	
Length of stay	•		•		•		•	•
Outpatient management, long-term care, readmission	•		•		•	•		•

Abbreviations: IV, intravenous; PO, per os [oral].

Olans RN, Olans RD, DeMaria A, Jr. The Critical Role of the Staff Nurse in Antimicrobial Stewardship--Unrecognized, but Already There. Clin Infect Dis. 2016;62(1):84-9.

Antimicrobial Stewardship

Antibiotic Allergy 4 MYTHS

- ***Antimicrobial allergy is lifelong***
  - Antimicrobial allergy is likely to wane over time and many people who report an allergic reaction in childhood are able to tolerate the drug as an adult.

- ***All childhood rashes associated with beta-lactam antibiotics are due to allergy***
  - Childhood rashes are commonly caused by a viral infection or a drug–virus interaction rather than drug allergy, and are often not reproducible upon a supervised challenge when the patient is well.

- ***Documented antimicrobial allergies are always true allergies***
  - In an Australian review of antimicrobial prescribing, up to 20% of documented ‘allergies’ were pharmacologically predictable non–immune-mediated adverse reactions (e.g. gastrointestinal intolerance).

- ***Cephalosporin cross-reactivity in patients allergic to penicillin is around 10%***
  - Recent reviews have found that overall, only 1 to 2% of patients with a confirmed penicillin allergy have a cephalosporin allergy
  - Cefazolin has no common side-chains with other beta lactams so is often tolerated in penicillin or cephalosporin allergy*.

https://tgldcdp.tg.org.au/viewTopic?topicfile=antimicrobial-hypersensitivity#toc_d1e47

Antimicrobial Stewardship and Antimicrobial Resistance

Team Work is Essential!

- **At a Patient Level:**
  - Optimising antimicrobial therapy by recommending an appropriate antimicrobial, dosage and duration
  - Recommending IV to PO switch
  - Therapeutic Drug Monitoring (TDM)
  - Counseling patients and families on appropriate antimicrobial use

- **At a System Level:**
  - Planning and implementing AMS programs
  - Initiatives e.g. Policies, Procedures, Education
  - AMS Ward Rounds (in hospital)

COMMUNICATION AND COLLABORATION

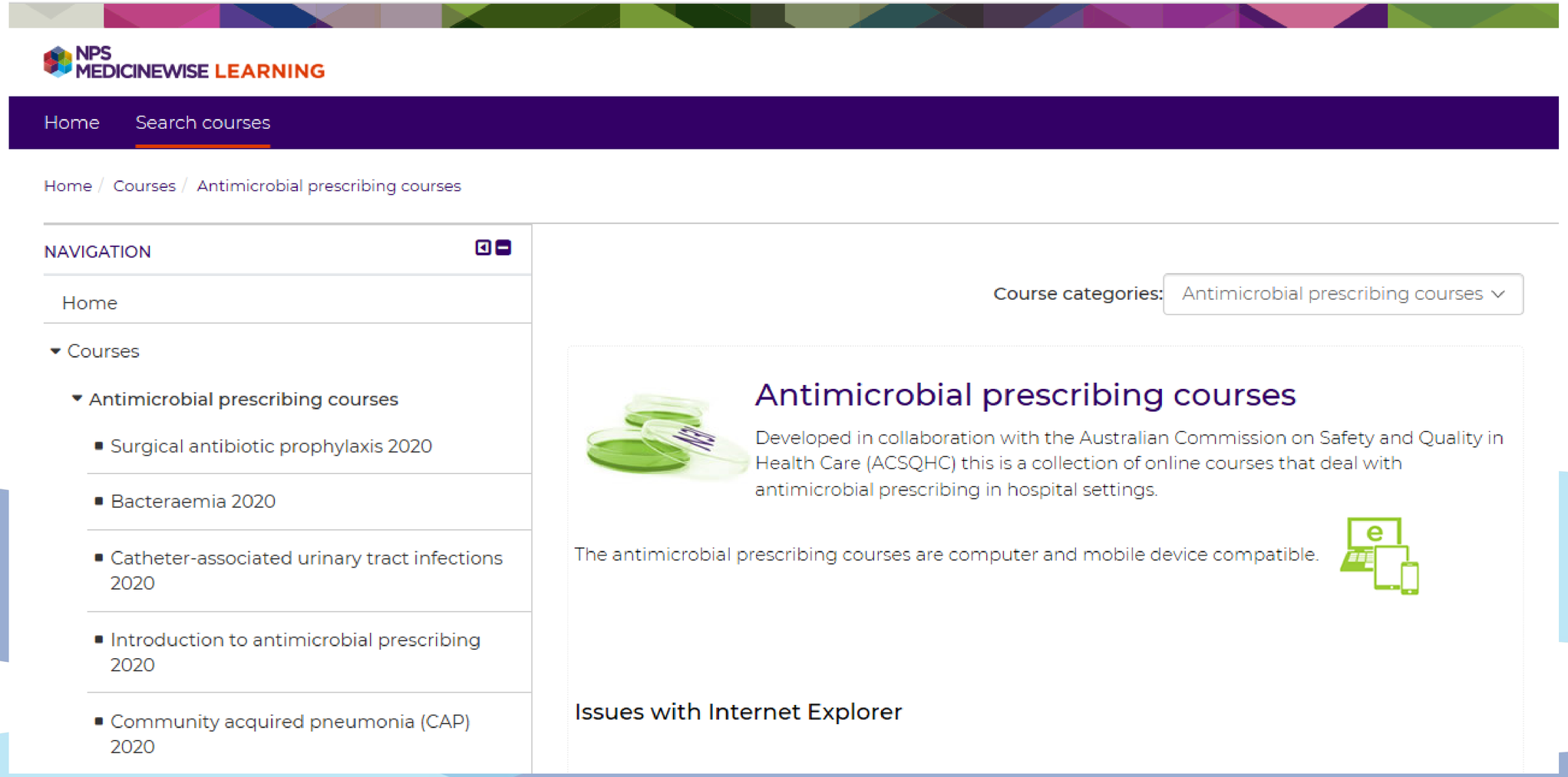
ENGAGE, EDUCATE, EMPOWER

- **Discussions with patients should outline:**
  - **The reason** for receiving antibiotic therapy
  - **The name** of antibiotic
  - **How** it should be taken and **how long** it needs to be taken for
  - Possible **side effects** of antibiotic and what to do if these occur
  - Address concerns about antibiotic resistance or interactions with the patient's other medications
  - Arrange an interpreter if needed

- **An ongoing effort that aims to optimise antimicrobial use, in order to**:
  - Improve patient outcomes
  - Ensure cost-effective therapy
  - Minimise the risk of adverse consequences (including side effects and antibiotic resistance

Antimicrobial Resistance and Stewardship – in practice

NPS Antimicrobial Prescribing Courses



https://learn.nps.org.au/course/index.php?categoryid=79

Antimicrobial Resistance and Stewardship – i

Partnering with Consumers

Clinical Care Standards

Consumer Fact Sheet:

Antimicrobial Stewardship

Antimicrobial stewardship involves making sure antibiotics are used wisely. Bacteria can develop resistance to specific antibiotics, meaning that the antibiotic is no longer effective against the same bacteria.

To help prevent the development of current and future bacterial resistance, it is important to prescribe antibiotics according to the principles of antimicrobial stewardship, such as prescribing antibiotics only when needed (and not for mild infections such as colds, earache or sore throats).

This Clinical Care Standard tells you what care may be offered if you have an infection that needs antibiotics. You can use this information to help you and/or your carer make informed decisions, in partnership with your health professional.

UNDER THIS CLINICAL CARE STANDARD

A patient with a life-threatening condition due to a suspected bacterial infection receives prompt antibiotic treatment without waiting for the results of investigations.	**What this means for you** If you are extremely unwell with a suspected bacterial infection, you are given antibiotics as soon as possible.
A patient with a suspected bacterial infection has samples taken for microbiology testing as clinically indicated, preferably before starting antibiotic treatment.	**What this means for you** Before you are prescribed antibiotics, samples may be taken to try to work out which antibiotic is the best to treat the infection. The samples may include blood tests, urine samples or wound swabs.
A patient with a suspected infection, and/or their carer, receives information on their health condition and treatment options in a format and language that they can understand.	**What this means for you** If you are thought to have a bacterial infection, your doctor or nurse discusses treatment options with you and/or your carer, which may or may not include giving you antibiotics.
When a patient is prescribed antibiotics, whether empirical or directed, this is done in accordance with the current version of the *Therapeutic Guidelines* (or local antibiotic formulary). This is also guided by the patient's clinical condition and/or the results of microbiology testing.	**What this means for you** If you are prescribed an antibiotic, your doctor or nurse chooses which one, based on national or local recommendations. They should take into account any allergies and other health conditions you may have.
When a patient is prescribed antibiotics, information about when, how and for how long to take them, as well as potential side effects and a review plan, is discussed with the patient and/or their carer.	**What this means for you** If you are prescribed antibiotics, your doctor or nurse discusses with you and/or your carer about when and how to take your antibiotics, how long to take them and any potential side effects. You may need to be seen again to review your progress.
When a patient is prescribed antibiotics, the reason, drug name, dose, route of administration, intended duration and review plan is documented in the patient's health record.	**What this means for you** Your health record contains the details of your antibiotic treatment. This includes information on why you were prescribed antibiotics, the medicine name, the dose, how you take them (i.e. as tablets or an injection), how long to take them and any plans to review your treatment.
A patient who is treated with broad-spectrum antibiotics has the treatment reviewed and, if indicated, switched to treatment with a narrow-spectrum antibiotic. This is guided by the patient's clinical condition and the results of microbiology tests.	**What this means for you** If it is unclear which bacteria may be causing your infection, you may be prescribed an antibiotic that works against a wide range of bacteria (i.e. a broad-spectrum antibiotic). In this case, your doctor or nurse may order tests to review your progress and, on seeing the results, your treatment may change to a more specific antibiotic (i.e. a narrow-spectrum antibiotic).
vestigations are conducted for spected bacterial infection, the onsible clinician reviews these s in a timely manner (within urs of results being available) and tic therapy is adjusted taking into t the patient's clinical condition stigation results.	**What this means for you** If tests have been done to identify a suspected bacterial infection, your doctor or nurse reviews these results as soon as they are available (usually within 24 hours of being available). These results may lead to your antibiotic treatment changing or stopping.
t having surgery requires ic antibiotics, the prescription accordance with the current Guidelines (or local antibiotic nd takes into consideration clinical condition.	**What this means for you** Antibiotics may be given to you before surgery to reduce the risk of an infection after surgery. The prescription is also based on national or local recommendations.

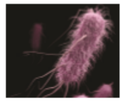
e Standards program is available from the Australian Commission on Safety and Quality **tyandquality.gov.au/ccs.**

AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE | Antimicrobial Stewardship Clinical Care Standard Consumer Fact Sheet, 2014

Antimicrobial resistance in key bacteria in the community

Some infections, if left untreated or if treated with an ineffective antibiotic, can become life-threating. Consequences can include blood poisoning (also known as septicaemia or sepsis), which if not treated quickly by medical professionals can result in death.

Enterobacteriaceae

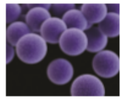


This is a large family of bacteria, all related to *E.coli*, that commonly causes urinary tract infections and may cause infections after surgery or blood poisoning.

Resistance in these bacteria is increasing. Resistant infections may need to be treated in hospital because of a lack of effective antibiotics that can be taken as tablets outside hospital.

Bacteria from this family are resistant to many antibiotics, including to a group of antibiotics known as carbapenems. These 'superbugs' are now found in Australia – in hospitals, but also in the community as well.

Staphylococcus aureus



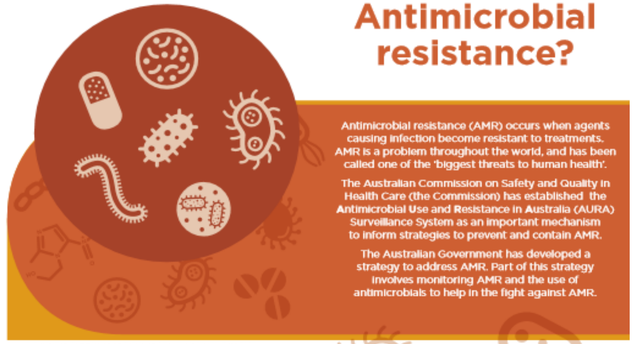
This is a common germ which lives on the skin of many people. Also known as 'Golden Staph', it causes a wide range of infections, such as boils, impetigo (school sores), wound infections, bone and joint infections, and blood poisoning (septicaemia). Resistance to 'Golden Staph' is reducing in hospitals but increasing in the community.

Accessing information about your medication

If you would like further information about an antibiotic you have been prescribed, you can either talk to your doctor or your local pharmacist.

AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

What is Antimicrobial resistance?



Antimicrobial resistance (AMR) occurs when agents causing infection become resistant to treatments. AMR is a problem throughout the world, and has been called one of the 'biggest threats to human health'.

The Australian Commission on Safety and Quality in Health Care (the Commission) has established the Antimicrobial Use and Resistance in Australia (AURA) Surveillance System as an important mechanism to inform strategies to prevent and contain AMR.

The Australian Government has developed a strategy to address AMR. Part of this strategy involves monitoring AMR and the use of antimicrobials to help in the fight against AMR.

AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE
Australian Commission on Safety and Quality in Health Care
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email: AURA@safetyandquality.gov.au

AURA
Antimicrobial Use and Resistance in Australia

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Home ▸ Medicines ▸ Infections & infestations ▸ Antibiotics ▸ How do I take my antibiotics?

Medicine subcategory
Antibiotics

- What are antibiotics & how do they work?
- **How do I take my antibiotics?**
- ▸ Alcohol & antibiotics
- ▸ Contraceptives & antibiotics
- Side effects of antibiotics
- Antibiotics don't kill viruses
- What is antibiotic resistance?
- Types of antibiotics
- Antibiotics for RTIs
- Join the fight
- Translated antibiotics information

Health professional information on
Antibiotics

- Antibiotic resistance — a problem for everyone
- How you can help contain antibiotic

How do I take my antibiotics?

If you are prescribed antibiotics, it is important that you follow your doctor's advice on when, how, and for how long to take them.

Only take the antibiotic at the time and doses that your doctor has prescribed. These instructions should also be on the label that the pharmacist puts on your medicine.

The consumer medicine information (CMI) for your medicine also lists other useful information including:

- how to take your antibiotic (e.g. with food)
- what to do if you miss a dose
- the side effects of your medicines
- interactions with other medicines.

The CMI for your antibiotic will list the usual dose, but sometimes your doctor will prescribe a different dose that is more suitable for you.

Always finish the prescribed course of antibiotics

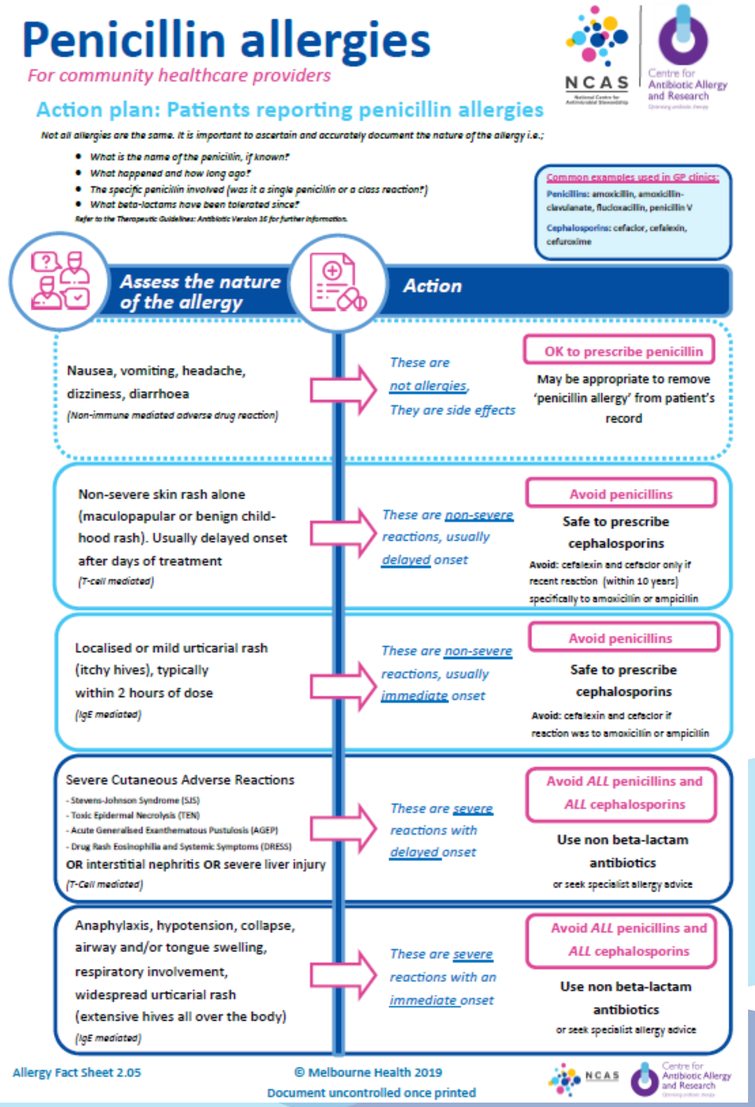
You should take your antibiotics for as long your health professional has told you to take them.

Sometimes the medicine box may contain more antibiotic pills than you will need. Don't take more than the dose your doctor has prescribed. If you're not sure, check with your doctor or pharmacist.

If you don't finish the full course of your antibiotics, the bacteria causing your infection that are not killed can become resistant to that antibiotic, meaning that the bacteria will continue to live, multiply and cause infection, and the antibiotic will no longer be effective against it.

Antimicrobial Resistance and Stewardship – in practice

Partnering with Consumers



Penicillin allergies

For community healthcare providers

NCAS | Centre for Antibiotic Allergy and Research

Action plan: Patients reporting penicillin allergies

Not all allergies are the same. It is important to ascertain and accurately document the nature of the allergy i.e.;

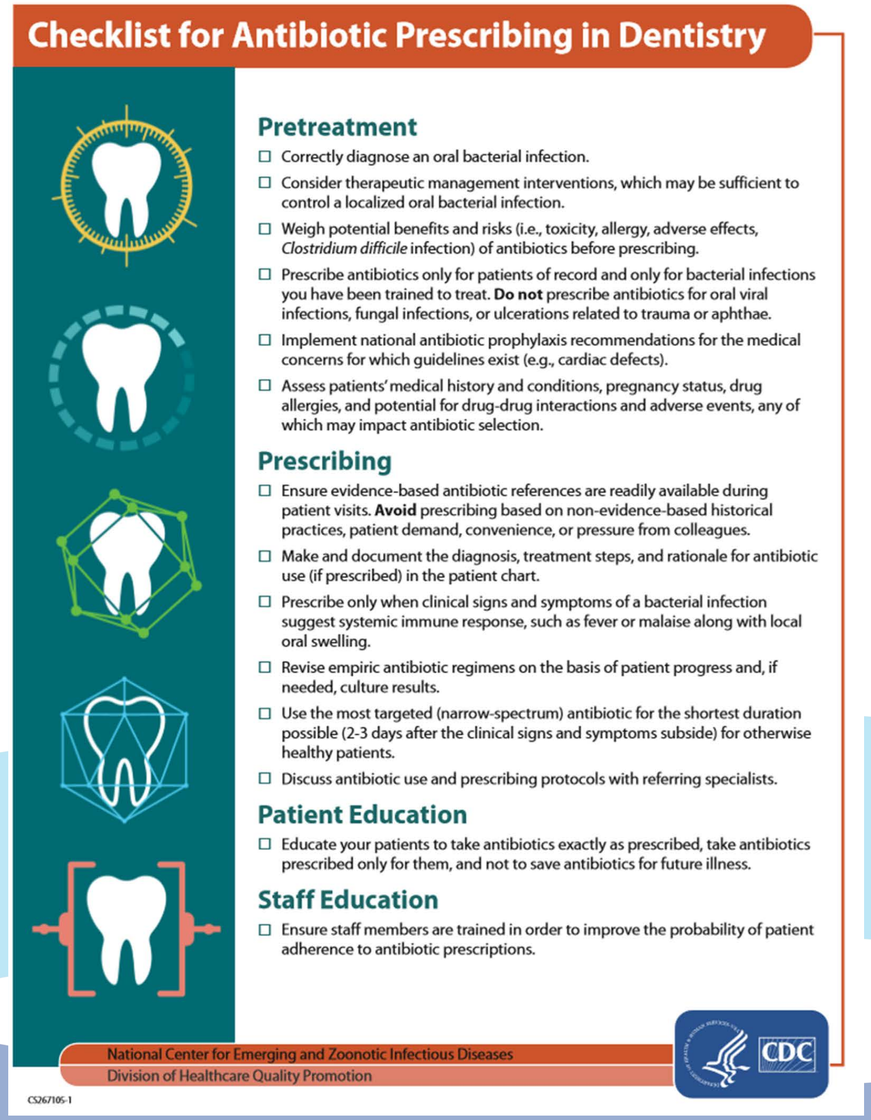
- *What is the name of the penicillin, if known?*
- *What happened and how long ago?*
- *The specific penicillin involved (was it a single penicillin or a class reaction?)*
- *What beta-lactams have been tolerated since?*

Refer to the Therapeutic Guidelines: Antibiotic Version 16 for further information.

Common examples used in GP clinics:
Penicillins: amoxicillin, amoxicillin-clavulanate, flucloxacillin, penicillin V
Cephalosporins: cefaclor, cefalexin, cefuroxime

Assess the nature of the allergy		Action
Nausea, vomiting, headache, dizziness, diarrhoea *(Non-immune mediated adverse drug reaction)*	*These are not allergies, They are side effects*	OK to prescribe penicillin: May be appropriate to remove 'penicillin allergy' from patient's record
Non-severe skin rash alone (maculopapular or benign child-hood rash). Usually delayed onset after days of treatment *(T-cell mediated)*	*These are non-severe reactions, usually delayed onset*	Avoid penicillins; Safe to prescribe cephalosporins. Avoid: cefalexin and cefaclor only if recent reaction (within 10 years) specifically to amoxicillin or ampicillin
Localised or mild urticarial rash (itchy hives), typically within 2 hours of dose *(IgE mediated)*	*These are non-severe reactions, usually immediate onset*	Avoid penicillins; Safe to prescribe cephalosporins. Avoid: cefalexin and cefaclor if reaction was to amoxicillin or ampicillin
Severe Cutaneous Adverse Reactions - Stevens-Johnson Syndrome (SJS) - Toxic Epidermal Necrolysis (TEN) - Acute Generalised Exanthematous Pustulosis (AGEP) - Drug Rash Eosinophilia and Systemic Symptoms (DRESS) OR interstitial nephritis OR severe liver injury *(T-Cell mediated)*	*These are severe reactions with delayed onset*	Avoid *ALL* penicillins and *ALL* cephalosporins; Use non beta-lactam antibiotics or seek specialist allergy advice
Anaphylaxis, hypotension, collapse, airway and/or tongue swelling, respiratory involvement, widespread urticarial rash (extensive hives all over the body) *(IgE mediated)*	*These are severe reactions with an immediate onset*	Avoid *ALL* penicillins and *ALL* cephalosporins; Use non beta-lactam antibiotics or seek specialist allergy advice

Allergy Fact Sheet 2.05 © Melbourne Health 2019 Document uncontrolled once printed NCAS Centre for Antibiotic Allergy and Research



Checklist for Antibiotic Prescribing in Dentistry

Pretreatment

- ☐ Correctly diagnose an oral bacterial infection.
- ☐ Consider therapeutic management interventions, which may be sufficient to control a localized oral bacterial infection.
- ☐ Weigh potential benefits and risks (i.e., toxicity, allergy, adverse effects, *Clostridium difficile* infection) of antibiotics before prescribing.
- ☐ Prescribe antibiotics only for patients of record and only for bacterial infections you have been trained to treat. **Do not** prescribe antibiotics for oral viral infections, fungal infections, or ulcerations related to trauma or aphthae.
- ☐ Implement national antibiotic prophylaxis recommendations for the medical concerns for which guidelines exist (e.g., cardiac defects).
- ☐ Assess patients' medical history and conditions, pregnancy status, drug allergies, and potential for drug-drug interactions and adverse events, any of which may impact antibiotic selection.

Prescribing

- ☐ Ensure evidence-based antibiotic references are readily available during patient visits. **Avoid** prescribing based on non-evidence-based historical practices, patient demand, convenience, or pressure from colleagues.
- ☐ Make and document the diagnosis, treatment steps, and rationale for antibiotic use (if prescribed) in the patient chart.
- ☐ Prescribe only when clinical signs and symptoms of a bacterial infection suggest systemic immune response, such as fever or malaise along with local oral swelling.
- ☐ Revise empiric antibiotic regimens on the basis of patient progress and, if needed, culture results.
- ☐ Use the most targeted (narrow-spectrum) antibiotic for the shortest duration possible (2-3 days after the clinical signs and symptoms subside) for otherwise healthy patients.
- ☐ Discuss antibiotic use and prescribing protocols with referring specialists.

Patient Education

- ☐ Educate your patients to take antibiotics exactly as prescribed, take antibiotics prescribed only for them, and not to save antibiotics for future illness.

Staff Education

- ☐ Ensure staff members are trained in order to improve the probability of patient adherence to antibiotic prescriptions.

National Center for Emerging and Zoonotic Infectious Diseases
Division of Healthcare Quality Promotion
CDC
CS267105-1

Antimicrobial Resistance and Stewardship – in practice

World Antibiotic Awareness Week 2020

- World Antimicrobial Awareness Week (WAAW) 18-24 November every year
  - Increase awareness of global antimicrobial resistance (AMR) and to encourage best practices among the general public, health workers and policy makers to avoid the further emergence and spread of drug-resistant infections.

- Following a stakeholder's consultation meeting in May 2020 organized by the Tripartite Organizations (the Food and Agriculture Organization of the United Nations (FAO), the World Organisation for Animal Health (OIE) and WHO) the scope of WAAW was expanded, changing its focus from "antibiotics" to the more encompassing and inclusive term "antimicrobials".

- Expanding the scope of the campaign to all antimicrobials will facilitate a more inclusive global response to antimicrobial resistance and support a multisectoral One Health Approach with increased stakeholder engagement.

- The slogan for 2020 will be "**Antimicrobials: handle with care**" applicable to all sectors.
  - The theme for the human health sector for WAAW 2020 is "**United to preserve antimicrobials**".

https://www.who.int/news-room/events/detail/2020/11/18/default-calendar/world-antimicrobial-awareness-week-2020

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