NPS NEWS
National Prescribing Service Newsletter

50 2007

ISSN 1441-7421 February 2007

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# Back to the future: a world without effective antibiotics …

A decline in the discovery of new antibiotics and increasing bacterial resistance to those available mean we face the possibility of a future without effective antibiotics. This would fundamentally change the way medicine is practised. This *NPS News* explores how we can participate in the global effort towards ensuring a world with effective antibiotics for our children and grandchildren.

## How are we creating this world?

While the discovery and development of novel antibiotics has slowed significantly[1,2], bacterial resistance to available antibiotics is increasing, primarily through inappropriate antibiotic use.[1,3] A study in 26 European countries assessed the association between outpatient antibiotic use and resistance over a 6-year period. As the number of antibiotic prescriptions rose, so did the rate of antibiotic resistance.[4] Closer to home, community-acquired methicillin-resistant *Staphylococcus aureus* continues to spread throughout Australia.[5]

Some antibiotics used in animal husbandry, agriculture and veterinary practice (to promote growth, suppress infection and reduce stock loss) belong to the same classes as those used in humans. However, these make a lesser contribution to antibiotic resistance than overuse in humans.[6]

Antibiotic resistance is slow to reverse and in some cases is irreversible.[1] Minimising resistance by rational antibiotic use is a collective responsibility.

## How we can make a difference …

Judicious prescribing reduces the selection pressure on bacteria and so slows down the emergence of resistance.[1,7]

Some principles for rational antibiotic use include:

- being aware of the antibiotic issues for each disease state (refer to *Therapeutic Guidelines: Antibiotic*[3] for advice)
- evaluating your use of antibiotics in specific clinical situations (see the upcoming NPS clinical audit on the targeted use of antibiotics)
- following the 'antibiotic creed' (see Box 1)
- educating patients about why we avoid using antibiotics in self-limiting illness (educational tools may be downloaded from www.nps.org.au/healthpro — choose 'topics and resources' then 'patient materials').

Every little bit counts towards maintaining a world with effective antibiotics — see inside for more…

**Box 1: The 'antibiotic creed'[3]**

| | |
|---|---|
| **M** | microbiology guides therapy whenever possible |
| **I** | indications should be evidence based |
| **N** | narrowest-spectrum antibiotic required |
| **D** | dosage appropriate to the site and type of infection |
| **M** | minimise duration |
| **E** | ensure monotherapy in most situations |

NPS is an independent, non-profit organisation for Quality Use of Medicines, funded by the Australian Government Department of Health and Ageing.

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# To prescribe, or not … how to decide

Consider whether an antibiotic is required and ask "is it necessary for **this** patient?"[3]

## When to prescribe

Rational antibiotic treatment can be prophylactic, presumptive, empirical or directed.

**Prophylactic** antibiotics prevent serious infection in specific situations (e.g. preventing the spread of meningococcal disease).[7]

**Presumptive** antibiotic therapy is indicated in some circumstances (e.g. a human bite to the hand[8]).

Use **empirical** antibiotic therapy — which is aimed at the likely causative organism — to manage an infection until microbiological culture and susceptibility results are known (e.g. suspected community-acquired methicillin-resistant *S. aureus* — refer to *Therapeutic Guidelines: Antibiotic* for updated information). Change the antibiotic if resistance is demonstrated by culture, or if there has been allergy or intolerance of the initial antibiotic. Stop the antibiotic if no bacterial pathogens have been detected.[3,7]

When the cause of an infection is confirmed, **directed** therapy is aimed at the specific pathogen.[7] For example, *Candida* species are commonly present in urine (candiduria), particularly in asymptomatic patients with indwelling urinary catheters, yet antifungal therapy is not usually indicated. For a **symptomatic** patient with a urinary tract infection caused by *Candida albicans* (or other susceptible species), *Therapeutic Guidelines: Antibiotic* now recommends **directed** therapy with fluconazole.[3]

## 'Wait-and-see' prescribing

'Wait-and-see' (delayed) prescribing allows time for the natural resolution of an infection (if this is likely to occur) and requires instructing the patient to fill the antibiotic prescription only if symptoms persist or deteriorate after a specified time. This strategy is frequently used in acute otitis media (AOM).

Most cases of AOM resolve spontaneously — 80% of children recover in around 3 days without antibiotics.[9] Antibiotics may provide a small benefit (about 15 children must be treated with antibiotics to prevent one child still having some pain two days after presentation) but this may be outweighed by adverse effects such as diarrhoea or nausea.[10] Two recent studies randomised patients with AOM to either immediate antibiotic treatment or to delayed treatment after 48–72 hours if the infection either had not improved or had worsened.[11,12] Both studies found no difference in the clinical course between immediate and delayed treatment groups. Patients in the delayed group were less likely to start antibiotic treatment and were not at higher risk of serious illness or other adverse longer-term outcomes.[13]

Provide advice about analgesia and the limited role of antibiotics in AOM.[10] Reassure parents that complications of AOM are rare.[9] When appropriate, provide a wait-and-see prescription for use if symptoms persist or deteriorate after:

- 24 hours for children aged 6 months – 2 years
- 48 hours for children aged > 2 years.[3,14]

*Therapeutic Guidelines: Antibiotic* has a new section to assist with accurate diagnosis of AOM.[3]

## When not to prescribe

Most viral or minor bacterial diseases — such as sore throat[15], sinusitis[16], uncomplicated bronchitis[17] and the common cold[18] — are self-limiting.[3,14] Antibiotics are ineffective in viral infections and frequently cause adverse effects.[18]

Not prescribing takes no more (or less) time. A recent American study in primary care showed visit time was similar whether or not an antibiotic was prescribed for paediatric viral respiratory tract infections.[19]

Health professionals and consumers have responded favourably to campaigns to reduce the unnecessary use of antibiotics in the common cold. The NPS *Common colds need common sense* campaign was first conducted in 2000 and has been repeated yearly since. The campaign has achieved consistent positive changes in consumer awareness, beliefs, attitudes and behaviours for treating the common cold.[20] These positive changes need to be reinforced — this winter's campaign will focus on parents and carers of children aged 2–9 years and women aged under 35 years.

**Clarification: *NPS News 48***

We have received feedback that the sentence discussing the squeeze test for rheumatoid arthritis ("Determine the total number of affected hand and foot joints by a 'squeeze test', involving gentle palpation of individual joints") was not sufficiently clear.

To be more accurate this should read: "Check for involvement of metacarpophalangeal and metatarsophalangeal joints by a 'squeeze test' (Figure 1), and determine the total number of affected joints by gentle palpation of individual joints."

We apologise for any confusion.

# Navigating the antibiotic selection maze

*Therapeutic Guidelines: Antibiotic*[3] provides advice on antibiotic selection. Choose an antibiotic with proven efficacy and the narrowest spectrum possible. Then consider the adverse-effect profile and cost–effectiveness.[14] When practical, take a specimen or swab for culture and sensitivity before starting antibiotic therapy.

*Therapeutic Guidelines: Antibiotic*[3] has recently updated the recommendations for treating bites and community-acquired pneumonia

## Managing animal and human bites

Animal and human bites are common injuries in adults and children.[21] Dog bites are most common, followed by cat and human bites.[22] Initial management of all bites and clenched-fist injuries includes cleaning, debriding (when necessary), irrigation, elevation and immobilisation. These wounds, particularly cat bites, often become infected (see Box 2).[21] In all cases, check that the patient's tetanus immunisation is current.[3,21,22]

### Box 2: Common infecting organisms[3,22]

| | |
|---|---|
| Human bites<br>Clenched-fist injuries | *Staphylococcus aureus, Streptococcus* spp, *Eikenella corrodens,* beta-lactamase anaerobes |
| Animal bites | *Pasteurella* spp, *S. aureus*, *Streptococcus* spp, anaerobes, *Capnocytophaga canimorsus* |

### Low-risk wounds

Wounds not involving tendons or joints that are seen within 8 hours may not need antibiotics.

### High-risk wounds

High-risk wounds include those:

- with delayed presentation (≥ 8 hours)
- puncture wounds that cannot be adequately debrided
- on hands, feet or face
- with underlying structures involved (e.g, bones, joints, tendons)
- in the immunocompromised patient.

In high-risk wounds *without evidence of infection*, treat presumptively with amoxycillin+clavulanic acid 875+125 mg (child: 22.5+3.2 mg/kg up to 875+125 mg) orally every 12 hours for 5 days.[3,21,22] Refer to *Therapeutic Guidelines: Antibiotic*[3] for advice on treating penicillin-hypersensitive patients.

Management of wounds with established infection has been recently updated in *Therapeutic Guidelines: Antibiotic*.[3] If the infection is severe and/or the wound penetrating, intravenous antibiotics to cover causative organisms are required. The total treatment duration (IV followed by oral) is 14 days (longer if treating injuries involving bones, joints or tendons). Take a wound swab before starting treatment and change antibiotic according to results (if the infecting pathogen remains uncertain, use **amoxycillin+clavulanic acid** as described above for presumptive treatment).[3]

**This month's case study (also available online at casestudy.nps.org.au) focusses on antibiotic therapy in animal bites**


## Community-acquired pneumonia — treatment update

Appropriate antibiotic selection for the treatment of community-acquired pneumonia (CAP) is an issue both in primary care and hospitals. *NPS News 40* provided information on treating CAP in primary care.[23] *Therapeutic Guidelines: Antibiotic* has since expanded the section on diagnosing CAP.[3] An interactive Pneumonia Severity Index (PSI) calculator with links to treatment recommendations is also available in *eTG complete* (visit www.tg.com.au to order this). Another online PSI calculator is freely available at www.debug.net.au/pharmacy/calculator.html.

Thirty-seven Australian hospital emergency departments participated in the *Community-acquired pneumonia: towards improving outcomes nationally* (CAPTION) project, completed in December 2005. The project aimed to optimise antibiotic prescribing and improve patient outcomes by implementing use of the PSI and guideline-compliant antibiotic prescribing. Compared with baseline, results showed a 3–4-fold increase in the rate of documented PSI use and a 1.5-fold increase in rate of guideline-compliant antibiotic prescribing.[24]

# The DFD nitty-gritty

Product information documents may not include specific information about the **d**ose, **f**requency and **d**uration of antibiotic therapy. Refer to *Therapeutic Guidelines: Antibiotic*[3] for guidance. Discuss therapy with your patient — directions (for **d**ose, **f**requency and **d**uration) recorded on the prescription enable the pharmacist to reinforce these at the time of dispensing.

## Dose ... how much is enough?

Antibiotic doses need to be high enough to be effective while minimising the risk of resistance selection, but low enough to reduce the possibility of adverse effects.[3,14] Dose children up to 12 years by weight rather than age; from 12 years, use adult doses. When the calculated dose using mg/kg exceeds the adult dose, use the recommended adult dose instead.[14] A large Scottish study showed that about 2 in 10 children aged 5–11 years were underdosed[25], while a smaller Australian study suggested that about 1 in 10 children aged 5–9 years were underdosed.[26]

## Frequency ... how many times a day?

Some antibiotics require more frequent dosing than others (e.g. acute cystitis in non-pregnant women may be treated with any one of trimethoprim once a day, cephalexin or amoxycillin+clavulanic acid twice a day, or nitrofurantoin four times a day[3]). When possible, choose an antibiotic with a dosage regimen that fits into the patient's routine.

## Duration ... how many days?

The duration of antibiotic therapy should be guided by the nature and severity of infection and the clinical state of the person.[3,14] If clinical response is slower than expected, review the initial diagnosis and/or treatment choice.[14]

Repeat prescriptions are required to supply the recommended duration of therapy for more complex indications (e.g. acute cystitis in pregnancy) but are not necessary for other indications (e.g. acute cystitis in non-pregnant women). An Australian study found that computer-generated prescriptions for antibiotics were more likely than handwritten prescriptions to contain repeats.[27] Check your prescribing software user options to see if changes can be made to systems defaults. For detailed information on user options, changing defaults and the number of repeats in your prescribing software, refer to www.nps.org.au/healthpro — select the 'topics and resources' menu, followed by 'products', then choose 'prescribing software guides'.


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### References


1. World Health Organization. WHO global strategy for containment of antimicrobial resistance. Geneva: WHO, 2001. http://www.who.int/csr/resources/publications/drugresist/WHO_CDS_CSR_DRS_2001_2_EN/en/ (accessed 31 October 2006).
2. Kaplan W, Liang, R. Priority medicines for Europe and the world. Geneva: World Health Organization, 2004. http://whqlibdoc.who.int/hq/2004/WHO_EDM_PAR_2004.7.pdf (accessed 17 October 2006).
3. Therapeutic Guidelines: Antibiotic. Version 13, 2006.
4. Goossens H, et al. Lancet 2005;365:579–87.
5. Nimmo GR, et al. Med J Aust 2006;184:384–8.
6. Turnidge J. Australian Prescriber 2001;24:26–7.
7. Ferguson J. Australian Prescriber 2004;27:39–42.
8. Medeiros I, et al. Cochrane Database Syst Rev 2001;(2):CD001738.
9. National Prescribing Centre. Acute otitis media. MeReC Bulletin. Liverpool: National Prescribing Centre, 2006. http://www.npc.co.uk/MeReC_Bulletins/MeReC_Bulletin_Vol17_No3_Intro.htm (accessed 12 December 2006).
10. Glasziou PP, et al. Cochrane Database Syst Rev.2004;(1):CD000219.
11. Little P, et al. BMJ 2001;322:336–42.
12. Spiro DM. JAMA 2006;296:1235–41.
13. Little P, et al. Br J Gen Pract 2006;56:176–82.
14. Australian Medicines Handbook 2006.
15. Del Mar CB, et al. Cochrane Database Syst Rev 2006;(4):CD000023.
16. Williams Jr JW, et al. Cochrane Database Syst Rev 2003;(2):CD000243.
17. Fahey T, et al. Cochrane Database Syst Rev 2004;(4):CD000245.
18. Arroll B, et al. Cochrane Database Syst Rev 2005;(3):CD000247.
19. Hare ME, et al. Ambul Pediatr 2006;6:152–6.
20. Wutzke SE, et al. Health Promot Int 2006:doi:10.1093/heapro/dal034.
21. Myers JP. Curr Infect Dis Rep 2003;5:416–25.
22. Broom J, Woods ML. Australian Prescriber 2006;29:6–7.
23. National Prescribing Service. NPS News 40. Sydney: National Prescribing Service http://www.nps.org.au/site.php?content=/html/news.php&news=/resources/NPS_News/news40 (accessed 17 November 2006).
24. Wai A, et al. National quality improvement initiatives – CAPTION and beyond. 4th Australasian Conference on Safety and Quality in Health Care, 21–23 August 2006.
25. Ekins-Daukes S, et al. Br J Clin Pharm 2003;56:92–5.
26. Bayram C, et al. Underdosing in antibiotic prescribing for children. National Medicines Symposium, 7–9 June 2006. http://www.icms.com.au/nms2006/abstract/88.htm (accessed 7 November 2006).
27. Newby DA, et al. Med J Aust 2003;178:210–3.


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