National Prescribing Service Limited

Drug Utilisation Briefing

for

Enhanced Divisional Quality Use of Medicine Program

May 2006

Target drug group: **Antibiotics:**
Focus on oral antibiotics for the management of upper respiratory tract infections and acute bronchitis

NPS related program: **Management of Upper Respiratory Tract Infections (URTIs) and Acute Bronchitis (ongoing since 1999)**

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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The information contained in this material is derived from a critical analysis of a wide range of authoritative evidence. Any treatment decisions based on this information should be made in the context of the individual clinical circumstances of each patient.

1. Clinical practice guidelines

- *Therapeutic Guidelines: Antibiotic*. Version 12, 2003 & 2006 (Update).
- *Australian Medicines Handbook*. 2006, 7th edition.
- Summaries provided in NPS resources (see below).

2. NPS resources available

(Available via the NPS website at www.nps.org.au. Print copies available on request).

Health professionals-related resources

- *Antibiotic Programs background material
  - Management of URTIs and acute bronchitis in general practice (2003)
  - Antibiotics for URTI and acute bronchitis (2001)
  - Antibiotics for URTI and acute bronchitis (1999)
- Case studies including results and expert commentaries
  - CS37 – Antibiotic use in urinary tract infection (2005)
  - CS26 – Management of sore throat (2003)
  - CS20 – Managing bronchitis (2002)
  - CS14 – Management of sinusitis (2001)
  - CS2 – Otitis media (1999)
- Clinical audits
  - Antibiotic use in urinary tract infection (2005)
  - Antibiotic use in the management of uncomplicated URTIs and bronchitis (2003)
  - Antibiotic use in the management of uncomplicated URTIs and bronchitis (2002)
- Complementary medicines and the common cold
- NPS News
  - 40 (June 2005)
  - 27 (April 2003)
  - 21 (April 2002)
  - 15 (April 2001)
  - 10 (June 2000)
- Indicators of quality prescribing manual (2006)
- *PBS prescribing data feedback entitled Antibiotics – comparison of prescribing data (June 2005)
- Prescribing Practice Review PBS data feedback last sent to general practitioners and other medical professionals June 2005 with PPR 30 (sent directly by Medicare Australia)

- Prescribing Practice Review
  - 30 (June 2005)
  - 21 (May 2003)
  - 18 (May 2002)
  - 12 (June 2001)
  - 9 (August 2000)
- *Practice visits detailing card for the *Management of URTIs and acute bronchitis in general practice* (2003) program contains summary of current guidelines
- Prescribing software guides
  - Review prescribing of antibiotics for acute otitis media in children (2006)
  - Review prescribing of antibiotics for non-specific upper respiratory tract infection, otitis media, sinusitis, sore throat and tonsillitis (2005)
  - Repeats and defaults for antibiotic prescribing (2003)

** Only available to divisions of general practice with NPS facilitators for use within their NPS Program and, therefore, not available from the NPS website.*

Patient-related resources

- Common colds campaign websites
  http://www.nps.org.au/site.php?page=2&content=/resources/ccncs/gp.htm
  http://www.nps.org.au/site.php?page=2&content=/resources/content/ccncs_home.html
- Patient education materials
  - I've got a sore throat: will an antibiotic make me better?
  - I've got a troublesome cough: will an antibiotic make me better?
  - My child has a middle ear infection
  - Common colds in children need common sense
- Symptomatic management pad - acute URTIs and acute bronchitis

3. What's what? Oral antibiotics used in upper respiratory tract infections and acute bronchitis

The antibiotics listed below are those that are known to be prescribed for upper respiratory tract infections (URTIs), although not all are recommended for such use in the Therapeutic Guidelines: Antibiotic.

Table 1: Antibiotics known to be prescribed for upper respiratory tract infections

	Generic	Brand name	PBS codes
Tetracyclines	doxycycline	Doryx, Doxsig, Doxy-50, Doxy-100, Doxyhexal, Doxylin, Vibramycin, Vibra-Tabs	2709N, 2708M *2711Q, 2707L, 2702F, 2703G, 2714W, 2715X*
	minocycline	Akamin 100, Akamin 50, Minomycin-50	3037W, *1616C*
Penicillins	amoxycillin	Alphamox, Amohexal, Amoxil, Bgramin, Cilamox, Moxacin	1883D, 1884E, 1889K, 1878W, 1888J, 1886G, 1887H, 8705E, *8581P*
	ampicillin	Alphacin 250, Alphacin 500	1048E, 2671N
	amoxicillin + clavulanic acid	Augmentin, Augmentin Duo, Augmentin Duo forte, Clamoxyl, Clamoxyl Duo, Clamoxyl Duo forte, Clavulin, Clavulin Duo, Clavulin Duo Forte	1891M, 8254K, 1892N, 8319W
	phenoxymethyl-penicillin	Abbocillin-V, Abbocillin-VK Filmtab, Cilicaine V, Cilicaine VK, Cilopen VK, LPV, Penhexal VK	1787C, 3028J, 1789E, 2965C, 2356B, 2354X, 1703P, 1705R
Cephalosporins	cephalexin	Cilex, Ibilex, Keflex, Sporahexal	3058Y, 3119E, 3094W, 3095X
	cefaclor	Ceclor, Ceclor CD, Cefkor CD, Keflor, Keflor CD	1169M, 2460L, 2461M
	cefuroxime	Zinnat	8292K
Macrolides	erythromycin	E.E.S, E-Mycin, Eryc, Erythrocin	1404X, 2750R, 2424N, 2428T
	roxithromycin	Biaxsig, Roxar, Roximycin, Rulide, Rulide D	8129W, 1760P, 8016X
	clarithromycin	Clarac, Clarihexal, Kalixocin, Klacid	8318T
Combination of sulfonamides and trimethoprim	trimethoprim + sulfamethoxazole (co-trimoxazole)	Bactrim, Bactrim DS, Cosig Forte, Resprim, Resprim Forte, Septrin, Septrin Forte	2949F, 2951H, 3103H

* PBS codes in italics - restricted benefit for indication other than management of URTI and acute bronchitis.

Refer to the 'Schedule of Pharmaceutical Benefits for Approved Pharmacists and Medical Practitioners' for PBS Authority requirements and restricted benefit listings http://www.health.gov.au/pbs/general/schedule.htm

4. What do we currently know about prescribing of oral antibiotics for management of URTIs and acute bronchitis?

For further information see Appendix 1 and PPR 30 — Antibiotics in primary care.
Sections 4a and 4b will be updated after data for the period October 2004 – September 2005 have been analysed.

4a. Data suggest that there is still potential for a reduction in the total use of oral antibiotics for URTIs

- The 2001 BEACH survey found that for 49% of encounters in general practice, where the reason for presenting was upper respiratory tract infection problems, an antibiotic was prescribed. The percentage had not decreased since 1999.[1]
- The rate of antibiotic prescribing for generalised URTI (common cold, acute rhinitis, pharyngitis etc) was found to be just over 30%, a reduction from 37% in 1999. However the rate of antibiotic use for sore throat, acute otitis media and sinusitis had remained high (88%, 77% and 76% respectively). [1]
- The PBS dataset shows an annual trend in the volume of antibiotics prescribed with a peak over the winter period. This peak is associated with the use of antibiotics for URTIs and is still present although it has been slowly reducing year on year suggesting a small reduction in the use of antibiotics for self-limiting URTIs. [2]

4b. The choice of antibiotics in URTI is improving; however first-line drugs were still used in less than half of the encounters when antibiotics were used [1]

- Amoxycillin is the recommended first line agent for acute otitis media. Between 1999 and 2001, its use for this indication increased from 33% of presentations where an antibiotic was prescribed to 44% of presentations. [1]
- Amoxycillin is also the first line agent for acute sinusitis. Whilst its use for this condition has increased from 15% of presentations to 21% between 1999 and 2001, it is still used in only 1 in 5 presentations. [1]
- Phenoxymethylpenicillin is the first line agent for tonsillitis / streptococcal sore throat. Use increased from 32% of presentations where an antibiotic was prescribed to 41% of presentations between 1999 and 2001. [1]
- Cephalexin was used in 4% of URTIs despite it not providing cover for the most common infecting organisms. [1]

4c. Repeat prescriptions

- Repeat prescriptions for antibiotics should only be issued when they are required to supply the recommended duration of therapy. However, some software systems default to maximum repeats for all prescriptions. A NSW study found that 63% of patients who received repeats for antibiotics had filled their repeats and repeats were more likely where a script was computer generated. [3]

4d. Consumer attitudes and behaviour regarding the appropriate use of antibiotics for URTIs

The Cold and Flu Study – Wave VI (August 2005) showed that: [4]

- 27% of all Australians visited a GP last time they had cold/flu (2001: 19%).
- 54% of those who went to a GP for their cold/flu symptoms received an antibiotic prescription. (1999 / 2000: 46%; 2001: 52%).

A national consumer survey (August 2005) covering the period July 2005[5] showed that:

- 32% of respondents reported having a cough, cold or sore throat at that time. This was the same level as in 2003.
- 13% reported having flu (2003: 11%; 2004: 9%).
- 48% visited a pharmacist and 38% visited a general practitioner during July 2005. This was the same level as in 2003 and 2004.
- 15% of respondents took antibiotics in July 2005 (2003 /2004: 12%).

5. Principles of quality prescribing — antibiotics in the management of URTIs and acute bronchitis

Judicious selection of management options

- Antibiotics provide no benefit for viral infections. Uncomplicated URTIs seen in general practice are most often caused by viruses. [6,7]
- In an immunocompetent adult or child, acute bronchitis is most often viral and does not require antibiotic therapy. [6]
- Most URTI bacterial infections are self-limiting. Antibiotics are only of benefit in particular subsets of patients with bacterial infections.[6,7]
- The rate of antibiotic prescribing for self-limiting URTIs should be as low as possible and it is thought that the antibiotic prescribing rate of 50% for people who present with an URTI is too high.[8] The management of symptoms is the main focus of treatment for URTIs and should be made explicit to the patient and /or parent.

Appropriate choice of medicines, where a medicine is considered necessary

Refer to the latest edition of the Therapeutic Guidelines: Antibiotic,[6] and the Australian Medicines Handbook (AMH)[7] for up-to-date recommendations on antibiotic use, doses and durations.

- If an antibiotic is indicated:
  - amoxycillin remains the first line agent for the treatment of acute otitis media and acute sinusitis (unless the patient is hypersensitive to penicillin).[6,7]
  - phenoxymethylpenicillin (penicillin V) is the first-line agent for the treatment of tonsillitis/streptococcal sore throat (unless the patient is hypersensitive to penicillin).[6,7]

- Prescribing rates of non first-line agents for URTIs, e.g. amoxycillin + clavulanic acid, cefaclor, clarithromycin, roxithromycin, cefuroxime and ciprofloxacin, should be low. [6]
- Co-trimoxazole (trimethoprim + sulphamethoxazole) has no place in the management of URTIs due to its association with significant serious adverse effects. [6]
- Cephalexin has no place in the management of URTIs as it does not provide cover for the common infecting organisms. [9]
- Therapeutic Guidelines : Antibiotic or AMH dosage recommendations should be used to ensure efficacy and minimise the risk of selection for resistance and dose-related toxicity.[6,7]
- The generic prescribing of antibiotics or allowing brand substitution will generally reduce the cost of some antibiotics to the patient, as there will be no brand premium applicable. [10]

Safe and effective use

- All beta-lactam antibiotics (including penicillins and cephalosporins) are contraindicated in patients with a history of a type I hypersensitivity reaction (anaphylaxis) to any penicillin, cephalosporin or other beta-lactam antibiotic.[1,2] Thus a careful history of drug allergies must be obtained from the patient/carer.
- Antibiotics for URTIs should be prescribed only when the expected benefits outweigh the risks. The risks of antibiotic therapy include increasing resistance in the individual patient and the community as a whole, adverse drug reactions (e.g. diarrhoea in general, hepatic reactions with trimethoprim + sulphamethoxazole, serum-sickness reaction with cefaclor), and drug interactions with current medication (e.g. antibiotics with the contraceptive pill and macrolides with warfarin, carbamazepine or theophylline).[6,7]
- When antibiotics are indicated for bacterial sore throat the recommended twice daily dosage of phenoxymethylpenicillin should be prescribed as this dosage regimen is effective and is associated with better compliance than a four times daily regimen.[6,7]
- Therapeutic Guidelines: Antibiotics or AMH recommendations on duration of therapy should be followed, e.g. 10 days antibiotic treatment is recommended for eradication of *Streptococcus pyogenes* in acute sore throat in specified high risk groups.[6,7]
- Tetracyclines (doxycycline, tetracycline, oxytetracycline and minocycline) are contra-indicated in pregnant or breast feeding women and children under 8 years old as they cause discoloration of teeth and enamel dysplasia.[6,7]
- Quinolones (ciprofloxacin, norfloxacin, ofloxacin, gatifloxacin and moxifloxacin) are not recommended for use in children and adolescents, pregnant or breastfeeding women as they have been shown to damage the joints of immature animals.[6,7]
- The risk of clinically significant drug interactions should be considered between regular medication and antibiotics especially in the elderly, the critically ill, those with impaired liver and renal function and those taking multiple medications.
- Repeat prescriptions for antibiotics should only be prescribed if they are required to supply the recommended duration of therapy for the indication.

6. Assisting prescribers to identify 'Quality Prescribing' questions

Evidence suggests that:

- a proportion of current antibiotic use for URTIs and acute bronchitis is unnecessary
- when antibiotics are indicated, there is potential to increase the use of first-line agents relative to other agents
- agents that offer no advantage over first-line agents should have a limited role.

NPS indicators of quality prescribing have been developed for use by individual general practitioners using their own patient data. They have been developed as tools for prescribers to gain insight into their own prescribing and to facilitate quality improvement. Using these indicators will assist GPs to review aspects of their prescribing and their practices against best practice standards. Of the 21 indicators, indicators number 1, 9, 10 and 11 are related to antibiotics and are included in Table 2.

Decision-making steps

Step 1: What are the core principles of Quality Prescribing?
Is current prescribing judicious, appropriate, safe and effective?

Step 2: What are the related Quality Prescribing questions?

Step 3: What are the related data questions?
How do we measure and assess current usage against the Quality Prescribing questions?

Table 2: Putting decision-making steps into practice

Quality Prescribing principles	Quality Prescribing questions	Data questions
Is current prescribing judicious?	• Is the rate of prescribing of antibiotics for self-limiting URTIs too high?	• INDICATOR 9: ANTIBIOTICS (NON-SPECIFIC URTI) Percentage of patients prescribed an antibiotic for a non-specific upper respiratory tract infection • INDICATOR 10: ANTIBIOTICS (ACUTE OTITIS MEDIA) Percentage of children prescribed an antibiotic for acute otitis media
	• Do doctors educate patients about the inappropriate use of antibiotics for self- limiting URTIs? (e.g. using patient education materials, symptomatic management pads).	• No routine data source currently.
Is current prescribing appropriate?	• When antibiotics are indicated for URTIs, are first-line agents prescribed (unless contraindicated)?	• Rate of amoxycillin prescribing for URTIs / acute otitis media / acute sinusitis. • Rate of phenoxymethylpenicillin prescribing for sore throat / tonsillitis.
	• Is the prescribing of second-line agents for URTIs (e.g. amoxycillin + clavulanic acid, cefaclor, roxithromycin, clarithromycin and ciprofloxacin) or inappropriate agents (e.g. cephalexin) limited?	• INDICATOR 11: ANTIBIOTICS (CEPHALEXIN) Percentage of prescriptions for cephalexin for which the indication was non-specific URTI, pharyngitis, tonsillitis, acute otitis media, sinusitis or acute bronchitis. • Rate of ciprofloxacin prescribing for URTIs. • Rate of clarithromycin prescribing for URTIs. • Rate of amoxycillin + clavulanic acid prescribing for URTIs. • Rate of cefaclor prescribing for URTIs. • Rate of roxithromycin prescribing for URTIs.

Quality Prescribing principles	Quality Prescribing questions	Data questions
Is current prescribing safe and effective?	• Are penicillins or cephalosporins prescribed to patients with a history of type I hypersensitivity reaction to these drugs?	• Percentage of patients whose type I hypersensitivity reaction status is not recorded. • Rate of penicillin or cephalosporin use in patients with type I hypersensitivity reaction recorded.
	• Is the prescribed dosing regimen and duration of therapy in accordance with Therapeutic Guidelines: Antibiotics / Australian Medicines Handbook recommendations?	• INDICATOR 1: ANTIBIOTIC GUIDELINES Do you have access to a copy of *Therapeutic Guidelines: Antibiotic* that is 3 years old or less? • Percentage of phenoxymethylpenicillin prescriptions for sore throat which are NOT a twice a day dosage for 10 days (NB. Standard phenoxymethylpenicillin PBS quantity is 50 tablets- need to check dosing directions not just quantity prescribed).
	• Are repeat antibiotic prescriptions issued when they are not needed for the required duration of therapy?	• Percentage of antibiotic prescriptions for amoxycillin, phenoxymethylpenicillin, roxithromycin, cefaclor which are issued with a repeat.

7. Limitations of PBS data as a data source to review antibiotic prescribing

- Indication for prescribing cannot be determined from the PBS dataset.
- The PBS dataset represents only 50% of total community use of antibiotics.
- Most antibiotics, including the recommended first-line agents for URTIs are below the general patient co-payment, therefore, the pattern of prescribing for URTIs and the full impact of any changes to antibiotic prescribing for URTIs will not be evident from PBS dataset.
- Knowledge of drug prices relative to the level of co-payment over time is required to interpret the PBS dataset. If the level of co-payment is increased, drugs for general patients that were previously captured by the PBS dataset, may fall below the level of co-payment and, therefore, no longer be captured for general patients.
- Most oral antibiotics are below the general patient co-payment. Items above the general patient co-payment for 2004-2005 include azithromycin, ciprofloxacin, fusidic acid, moxifloxacin, and rifampicin.
- Care must be taken in interpreting the PBS dataset for antibiotics for which there are several indications, e.g. amoxycillin + clavulanic acid is not a first-line agent for URTIs but is increasingly used for urinary tract infections and this is within the current Therapeutic Guideline: Antibiotics recommendations. It is also used (inappropriately) for acute bronchitis. Therefore an increase in usage of amoxycillin + clavulanic acid may relate to an increased use for conditions other than URTIs.
- Consider the effects of hospital-related prescribing. e.g. injectable antibiotics (ceftriaxone) are unlikely to have been prescribed by a GP.

8. Potential changes in prescribing if principles of good prescribing are followed

- There will be a reduction in the volume of antibiotic prescriptions written by GPs for respiratory tract infections (especially among high prescribers and during the winter months).
- There will be a reduction in the incidence of resistance of Streptococcus pneumoniae to beta-lactamase antibiotics.
- There will be an improvement in the selection of antibiotics when an antibiotic is required. Specifically:
  - the proportion of amoxycillin and phenoxymethylpenicillin use relative to all antibiotic prescriptions will be increased
  - the proportion of macrolide antibiotics and amoxicillin + clavulanic acid use relative to all antibiotic prescriptions will be reduced
  - the proportion of cefaclor and cefuroxime use relative to all antibiotic prescriptions will remain stable.

9. References

1. BEACH data, Australian General Practice Statistics and Classification Centre, a collaborating unit of the Family Medicine Research Centre, University of Sydney and the Australian Institute of Health and Welfare. January-December 2001.
2. Medicare Australia (Health Insurance Commission), PBS claims database.
3. Newby D, Fryer J, Henry D, Prior F. Automatic repeats: a possible negative impact on antibiotic use. Final Report to the National Prescribing Service Ltd. Newcastle: University of Newcastle, October 2001.
4. Newspoll Market Research. Cold and Flu Study – Wave VI. August 2005.
5. Roy Morgan Research. Quality Use of Medicines Annual Consumer Survey 2005. September 2005.
6. Therapeutic Guidelines Antibiotic Version 12, 2003 and 2006 Update. North Melbourne: Therapeutic Guidelines Ltd 2003 (electronic version available to subscribers via http://etg.hcn.net.au/).
7. Australian Medicines Handbook, 2006, 7th edition. Adelaide, Australian Medicines Handbook Pty Ltd, 2006.
8. Turnidge J, Responsible prescribing for URTIs. Curr Ther, July 2002 50-59.
9. Australian Medicines Handbook, 2000. 2nd edition. Adelaide, Australian Medicines Handbook Pty Ltd, 2000.
10. Schedule of Pharmaceutical Benefits for Approved Pharmacists and Medical Practitioners. 1 April 2006, Commonwealth Department of Health and Ageing.

Appendix 1

Patterns of oral antibiotic prescribing for URTIs in the BEACH Survey

(Appendix 1 will be updated after data for the period October 2004 – September 2005 have been analysed).

- **Rate of antibiotic prescribing for URTIs**

The overall prescribing rate for antibiotics seen in the BEACH survey of 2001 remains the same as found in 1999. In 2001 an antibiotic was prescribed for 49% of patient encounters for URTIs, the same as the rate of 50% seen in 1999 (Table 1).

Table 1: Rate of antibiotic prescribing

Upper respiratory tract infection problems	Rate of antibiotic prescribing % 1999	Rate of antibiotic prescribing % 2001
Generalised URTI (common cold, acute rhinitis, pharyngitis, etc.)	37.0	31.5
Laryngitis / tracheitis	30.7	33.6
Acute tonsillitis/streptococcal sore throat	88.6	88.7
Acute otitis media	72.9	76.6
Sinusitis (acute and chronic)	70.8	76.4
Other	26.0	22.3
Total	**50.3**	**49.0**

- **Appropriate selection of antibiotics when an antibiotic is required**

There are indications that GPs are more often prescribing first-line agents in URTIs.

- o Overall amoxycillin is the most commonly prescribed antibiotic in URTI (Table 2).
- o In 4% of encounters for URTI in 2001 cephalexin was used even when it does not provide cover for the common infecting organisms.

Table 2: Selection of antibiotics in URTI overall

Most commonly prescribed antibiotics	1999 %	2001 %
Amoxycillin	28.7	32.5
Cefaclor	15.8	13.4
Roxithromycin	13.4	11.6
Amoxycillin + clavulanic acid	11.2	12.5
Phenoxymethylpenicillin	7.6	10.6

Tables 3–7 Selection of antibiotics by condition

See shaded areas for first line therapy

= First line therapy when antibiotic indicated

= Indicates alternatives in the patient who is hypersensitive to penicillin

Table 3: Selection of antibiotics for acute otitis media

Most commonly prescribed antibiotics	1999 %	2001 %	Comment
Amoxycillin	32.8	43.9	Antibiotics may not be required for all patients Amoxycillin is first-line therapy in these patients
Cefaclor	32.1	25	
Amoxycillin + clavulanic acid	18.2	17.8	
Co-trimoxazole	6.2	2.6	
Cephalexin	3.3	4.5	
Erythromycin	3.2	2.6	
Roxithromycin	2.9	2.1	

Table 4: Selection of antibiotics for sinusitis — acute and chronic

Most commonly prescribed antibiotics	1999 %	2001 %	Comment
Amoxycillin	15.0	20.8	Antibiotics recommended for severe cases only Amoxycillin is first line therapy in these patients
Amoxycillin + clavulanic acid	16.2	20.7	
Roxithromycin	21.2	18.3	
Doxycycline	16.6	13.2	
Cefaclor	14.5	11.5	
Clarithromycin	1.5	4.0	
Cephalexin	4.6	3.8	
Co-trimoxazole	2.3	2.7	
Erythromycin	2.4	1.5	
Cefuroxime	4.5	1.2	

Table 5: Selection of antibiotics for tonsillitis and streptococcal sore throat

Most commonly prescribed antibiotics	1999 %	2001 %	Comment
Phenoxymethypenicillin	31.7	40.4	Antibiotics recommended for severe tonsillitis and selected patients at risk of rheumatic fever only Phenoxymethypenicillin is first-line therapy in these patients.
Amoxycillin	29.5	29.6	
Amoxycillin + clavulanic acid	5.8	7.3	
Roxithromycin	4.4	2.7	
Procaine penicillin	3.5	2.7	
Cefaclor	6.4	5.6	
Cephalexin	4.8	3.0	
Co-trimoxazole	1.4	0.8	
Erythromycin	5.5	5.0	
Other	7.0	2.9	

Table 6: Selection of antibiotics for laryngitis/tracheitis

Most commonly prescribed antibiotics	1999 %	2001 %	Comment
Amoxycillin	28.9	36.1	Most cases are viral illnesses
Roxithromycin	21.9	19.6	
Amoxycillin + clavulanic acid	10.5	12.4	
Cefaclor	11.4	8.3	
Erythromycin	3.5	7.2	
Doxycycline	11.4	4.1	
Cephalexin	3.5	2.0	
Cefuroxime	4.4	2.0	
Phenoxymethypenicillin	1.8	2.0	
Clarithromycin	0.9	2.0	
Co-trimoxazole	1.8	0	

Table 7: Selection of antibiotics for acute bronchitis/bronchiolitis/chronic bronchitis

Most commonly prescribed antibiotics	1999 (data not available)	2001 %	Comment
Amoxycillin		24.4	Acute bronchitis is most often viral and does not require antibiotic therapy.
Roxithromycin		23	
Amoxycillin + clavulanic acid		14.5	
Cefaclor		10.3	
Doxycycline		8.1	
Erythromycin		7.0	
Cephalexin		5.5	
Clarithromycin		3.6	

Reference

University of Sydney. Data provided by the AIHW General Practice Statistics and Classification Unit, Family Medicine Research Centre, University of Sydney, from the BEACH program. January–December 1999 and January–December 2001.

Appendix 2

Pharmaceutical Benefits Pricing Authority. Therapeutic Relativity Sheets. ATC J01-Antibacterials for systemic use.

(available online at http://www.health.gov.au/internet/wcms/publishing.nsf/Content/health-pbs-general-pricing-therelativity.htm)

Relativity Sheets show specific relativities and pricing comparisons between drugs within a therapeutic group. The relativities are usually based on PBAC advice but may also be historically based.

ATC J01 - ANTIBACTERIALS FOR SYSTEMIC USE	**Effective Date:** 07/03	PAGE **1** OF **2**

1. Doxycycline and minocycline are similar tetracyclines and when used for acute infection, may be considered clinically equivalent (in appropriate dosages).
2. In relation to the use of minocycline in acne the PBAC has accepted that it has similar efficacy to other tetracyclines. However, listing of the 50mg tablet was accepted at a price relative to the 100mg minocycline capsule.
3. Phenoxymethylpenicillin was the first widely used oral penicillin and was, historically, the cheapest of the penicillins. However, since October 1995 the pricing has been allowed to increase to the same level as amoxycillin.
4. Ampicillin has a wider antimicrobial activity than phenoxymethylpenicillin and until the PBPA meeting in October 1995 enjoyed a premium over that drug. Prior to the minimum pricing policy it was priced under the amoxycillin price (see 5 below).
5. Amoxycillin is similar in activity to ampicillin but is better absorbed orally and was initially listed with a premium over ampicillin (i.e. until the generic pricing policy and the Minimum Pricing Policy).
6. Amoxycillin with clavulanic acid was accepted by the PBAC as being a 'significant advance' over amoxycillin and thus has always attracted a 'significant' premium over plain amoxycillin.
7. Amoxycillin powder for paediatric drops has been compared relative to amoxycillin powder for syrup 125mg per 5ml.
8. Cephalexin is a first generation cephalosporin. It has a different spectrum of activity to amoxycillin but, as far as the PBAC is concerned, as used in general clinical practice, it is used in the same way and for pricing purposes should be considered as clinically equivalent to amoxycillin.
9. The PBAC has accepted that, in general, cefaclor capsule 750mg daily has similar efficacy to amoxycillin 750mg in combination with clavulanic acid daily. However, in relation to a specific use, in lower respiratory tract infection, the PBAC has accepted that cefaclor capsule 750mg is approximately clinically equivalent to amoxycillin 1.5g in combination with clavulanic acid daily.
10. Since listing, ceftriaxone has been accepted as being approximately 3 times the potency of cefotaxime. This ratio was confirmed by the PBAC in 1991.
11. Cefotetan was initially accepted for listing by the PBAC with the advice that it had similar clinical use to ceftriaxone (at 2 g cefotetan daily = 1 g ceftriaxone daily). At the PBAC meeting in June 2003, the Committee accepted that ceftriaxone was no longer the appropriate comparator. Cost effectiveness was accepted based on the prices applying at that time.

12. For pricing purposes trimethoprim with sulphamethoxazole tablet 160mg - 800mg has generally been compared with amoxycillin 250mg. (Both used as first line antibiotics).
13. Eryc 250mg has been accepted as being clinically equivalent to erythromycin ethyl succinate 400mg.
14. Roxithromycin was recommended for listing by the PBAC with the advice that 150mg roxithromycin twice daily offers a small advantage compared to erythromycin 500mg four times daily.
15. Dicloxacillin was accepted for listing on the basis of cost minimisation (same price) compared to flucloxacillin.
16. Cefuroxime was listed on the basis of cost minimisation compared to cefaclor with pricing based on 14 x 250 mg tablets being the same as 10 x 375 mg cefaclor.
17. Clarithromycin tablet 250mg was recommended for listing as an unrestricted benefit on the basis of pack per pack compared to roxithromycin tablet 150mg ie. five days of roxithromycin (at 150mg twice daily) = seven days of clarithromycin (at 250mg twice daily). The actual price is based on a weighting between use as an unrestricted benefit and use for the treatment of MAC (Section 100).
18. Cefepime was initially listed on the basis that it deserved a small premium over ceftriaxone (at 4 g cefepime daily = 2 g ceftriaxone daily). At the PBAC meeting in June 2003, the Committee accepted that ceftriaxone was no longer the appropriate comparator. Cost effectiveness was accepted based on the prices applying at that time.
19. Amoxycillin tablet 1g was recommended for listing on the basis that 1g twice daily provides similar safety and efficacy to 500mg three times daily
20. Moxifloxacin was recommended for listing on the basis of cost minimisation versus IV ceftriaxone plus IV erythromycin plus oral roxithromycin where 20% of therapy was administered in an ICU setting and 80% in a hospital ward setting.