

# General practice antibiotic prescribing for management of otitis media in children

Joan Henderson, Lisa Valenti, Graeme C Miller



Otitis media (OM) is one of the most common infections in children. The cause can be viral, but is most often bacterial.<sup>1</sup> It remains one of the most common reasons for antibiotic prescribing for children.<sup>2</sup> Many episodes of acute OM are self-limiting and resolve without treatment, but antibiotics are often prescribed because these infections can develop into serious, sometimes life-threatening complications.<sup>1</sup>

Recently, given increasing concerns about antibiotic resistance and the potential for adverse effects, a 'wait and see' approach was recommended.<sup>1</sup> This advises observation and analgesia for the initial 24–48 hours, with an antibiotic prescription given to fill if symptoms worsen or do not improve over that time<sup>1</sup> – a practice shown to significantly reduce antibiotic use.<sup>3</sup>

In this study we investigated the management rate of OM in children (<15 years) attending Australian general practice, the prescribing rate of antibiotics for OM, and changes in these rates over the 12 years to March 2015.

## Method

We analysed general practitioner (GP)–patient encounters with patients aged <15 years, recorded in the Bettering the Evaluation and Care of Health (BEACH) program from April 2003 to March 2015 (detailed methods described elsewhere).<sup>4</sup> Encounters with patients with a diagnosis/problem label of 'otitis media' were included to estimate management rates and rates of antibiotic prescribing per 100 OM problems. Changes over time were examined using three data periods: April 2003 to March 2007; April 2007 to March 2011; and April 2011 to March 2015. National estimates of OM encounters were extrapolated from Medicare Benefits Schedule (MBS) claims data (full methods described elsewhere).<sup>5</sup> Population estimates were calculated

using Australian Bureau of Statistics demographic data.<sup>6,7</sup> Rates are reported with robust 95% confidence intervals. Antibiotics include antibacterial agents (excluding anti-mycobacterial agents) commonly given orally or parenterally for systemic use.

BEACH is approved by the Human Research Ethics Committee of the University of Sydney (Ref:2012/130, valid to 31/3/18).

## Results

Recorded were 135,226 encounters with patients aged <15 years. Encounters with patients in this age group made up similar proportions of all encounters in each of the time periods. The proportion of encounters with patients aged <15 years in which OM was managed decreased from 6.98% (95% CI: 6.68–7.28) in 2003–07 to 6.37% (95% CI: 6.08–6.67) in 2011–15 (Table 1).

For patients aged <15 years, the rate of antibiotic prescribing for OM decreased significantly between April 2003 and March 2015, from 83.7 per 100 OM problems to 79.7 per 100 (Table 1). A decreasing trend was noted in prescribing rates for all younger age groups, but the only statistically significant change occurred for patients aged 1–4 years, decreasing from 84.0 to 79.4 per 100 OM problems. Extrapolated national estimates show an increase of 10.3% in OM management, and an increase of 5.6% in total antibiotic prescriptions for OM in children aged <15 years (Table 1).

## Discussion

The management rate of OM in children aged <15 years decreased slightly over the 12 years of this study. The change was small (detected at two decimal places) and although statistically significant, may not have any significant public health impact.

For children aged <15 years, antibiotics were prescribed on four out of five OM management occasions, and the prescribing

rate decreased, influenced mainly by a fall in prescribing rate for children aged 1–4 years.

In the longer term, however, there appears to have been no real change over the past 25 years. The 2011–15 result did not differ significantly from the antibiotic prescribing rate for OM (77.6; 95% CI: 74.9–80.2) reported in the Australian Morbidity and Treatment Survey (AMTS) 1990–1991<sup>8</sup> (method comparable to BEACH), or from the BEACH result for 1998–2000 of 77.5 (75.6–79.4).<sup>9</sup> The 2003–07 rate was higher than the rates for these earlier time points but again, although statistically significant, does not appear to have had any real impact in the long term.

Potentially of public health significance is the estimated 5.6% increase in actual numbers of prescriptions for antibiotics for the management of OM. Over the study period the proportion of children aged <15 years in the Australian population decreased by one percentage point but in terms of actual persons, increased by approximately 350,000.<sup>6,7</sup> An associated increase in the GP

attendance rate led to an increase in GP consultations. While the management rate of OM decreased slightly, the number of encounters where OM was managed, and the number of antibiotics prescribed, increased. Per 100 children in the population, however, the estimated rate of OM managed with an antibiotic did not change over the study period.

The provision of antibiotics for OM may be patient/parent driven and for a variety of reasons – children in pain,<sup>2</sup> parental expectation and belief that pain management alone is insufficient.<sup>10</sup> Information and education about the implications of antibiotic use can alter some of these behaviours and expectations. A German study found that antibiotics for children with OM are prescribed about three times more often than expected by their parents.<sup>11</sup> In older international studies, the ‘wait and see’ scenario resulted in a reduction of actual antibiotic use (24%<sup>12</sup> and 44%<sup>13</sup> of patients/parents provided prescriptions).

**Table 1. Management of otitis media (OM) and antibiotic prescribing (95% CIs) for OM in patients <15 years 2003–07 to 2011–15**

	Apr 2003 – Mar 2007	Apr 2007 – Mar 2011	Apr 2011 – Mar 2015
Number of encounters with children in BEACH	45,283	45,295	44,648
Proportion of BEACH encounters where OM was managed	6.98% (6.68–7.28) <sup>§</sup>	6.56% (6.28–6.85)	6.37% (6.08–6.67) <sup>§</sup>
Annual number of MBS encounters with children	13,902,035	15,739,162	16,820,448
*Estimated annual number of times OM managed in children in Australia	970,000 (930,000–1,010,000) <sup>§</sup>	1,030,000 (990,000–1,080,000)	1,070,000 (1,025,000–1,120,000) <sup>§</sup>
Number of children <15 years in Australian population (ABS)	(June 2005) 4,023,372	(June 2009) 4,184,639	(June 2013) 4,370,858
†Estimated annual management rate of OM per 100 children in Australian population	24.1 (23.1–25.2)	24.7 (23.6–25.8)	24.5 (23.4–25.7)
Number of BEACH encounters with OM managed for children with 1+ prescribed antibiotic	3,160	2,973	2,845
Proportion of BEACH encounters with OM managed for children with 1+ prescribed antibiotic <15 years	83.7 (82.2–85.1) <sup>§</sup>	81.8 (80.2–83.3)	79.7 (78.0–81.4) <sup>§</sup>
<1 year	79.5 (75.1–83.9)	80.1 (75.7–84.4)	75.3 (70.4–80.3)
1–4 years	84.0 (82.1–86.0) <sup>§</sup>	80.4 (78.4–82.5)	79.4 (77.2–81.5) <sup>§</sup>
5–14 years	84.4 (82.3–86.6)	84.6 (82.3–87.0)	81.9 (79.3–84.5)
*Estimated annual OM encounters with children where antibiotic prescribed for OM <sup>‡</sup>	810,000 (800,000–825,000) <sup>§</sup>	845,000 (830,000–860,000)	855,000 (835,000–870,000) <sup>§</sup>
†Estimated annual rate of OM being managed with an antibiotic per 100 children in population	20.2 (19.8–20.5)	20.2 (19.8–20.6)	19.5 (19.1–20.0)

\*Estimated using Medicare Benefits Schedule statistics for the third year of each four-year period

†Estimated using Australian Bureau of Statistics Australian demographic statistics

‡Rounded to the nearest 5000

§Statistically significant difference (non-overlapping 95% CIs)

BEACH, Bettering the Evaluation and Care of Health; CI, confidence interval; MBS, Medicare Benefits Schedule

The strength of representative BEACH data is the direct link between the problem label and the specific management, a benefit lacking in most other data sources. However, a limitation is that we are unable to determine the proportion of these prescriptions that were provided on the 'wait and see' basis, or the proportion that were filled.

Currently in Australia, there are no answers to these questions, as Pharmaceutical Benefits Scheme and pharmacy data do not have access to the reason for (any) prescription when it is dispensed, and can provide no information about antibiotic prescriptions that were not filled. Most patient electronic health records neither link prescriptions with managed problems, nor record whether a prescription was filled.

Our results show that Australian GPs prefer to prescribe antibiotics for children with OM – perhaps because OM is most commonly bacterial in cause, the potential complications are often serious,<sup>1</sup> complications where antibiotics were not prescribed may result in litigation,<sup>14</sup> and antibiotics may provide more immediate symptom relief.<sup>3</sup> An element of parent expectation is also likely, and many of these prescriptions may well be provided on a 'wait and see' basis.

For the past 25 years, the 'normal' behaviour of Australian GPs has been to prescribe antibiotics for the management of OM in children. Presumably, GPs perceive a patient benefit that outweighs the risk and cost associated with antibiotic therapy. It appears a more convincing argument is required to shift the 'normal' GP therapeutic approach to OM.

### Authors

Joan Henderson BAppSc (HIM) (Hons 1), PhD, Senior Research Fellow, BEACH program, Family Medicine Research Centre, Sydney School of Public Health, Sydney Medical School, University of Sydney, Parramatta, NSW.  
joan.henderson@sydney.edu.au

Lisa Valenti BEc, MMedStat, Senior Research Analyst, BEACH program, Family Medicine Research Centre, Sydney School of Public Health, Sydney Medical School, University of Sydney, Parramatta, NSW

Graeme C Miller MBBS, PhD, FRACGP, Associate Professor and Medical Director, Family Medicine Research Centre, Sydney School of Public Health, Sydney Medical School, University of Sydney, Parramatta, NSW

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correspondence [afp@racgp.org.au](mailto:afp@racgp.org.au)