Byte from BEACH. No: 2012;2

The real story, GP prescribing of antibiotics for respiratory tract infections—from BEACH

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Introduction

In the most recent Byte from BEACH we clearly demonstrated that the recently published Productivity Commission report on antibiotics prescribed by GPs, dispensed and claimed for by Pharmaceutical Benefits card holders, was not a valid or reliable measure of antibiotic prescribing rates by GPs for the management of upper respiratory tract infection(s).

In this paper we provide historical data from the BEACH program to demonstrate changes in GP prescribing for acute URTI, and for ‘other RTIs’. Further, we investigate the extent to which the overall number of GPs prescriptions for antibiotics has changed over 13 years, from 1998–99 to 2010-11 in terms of the total number nationally, and in terms of the number per 100 people in the population.

Methods

An analysis (with SAS Version 9.1.3) of BEACH data collected between April 2000 and March 2011 on prescribing of systemic antibiotics, and particularly prescribing for acute URTI and ‘other RTIs’ by participating GPs. The 13 years of data reported here draws from 12,831 GP participants who provided information for 1,283,000 BEACH patient encounters. The BEACH methods are described in detail elsewhere. In summary BEACH is a paper based data collection system in which an ever-changing random sample of about 1,000 GPs each records details of 100 consecutive GP-patient encounters, on structured paper encounter forms. This results in a sample of about 100,000 per year. Data are secondarily coded and classified electronically by trained data entry staff. The encounters are weighted according to each individual GP participant’s Medicare claims activity for the year. The final weighted sample sizes are provided in Box 1.

In BEACH, all medications prescribed or supplied direct to the patient are linked to the problem being managed (the ‘indication’). Problems managed at encounter are classified to the International Classification of Primary Care – Version 2. In this paper acute URTI is defined as all problems classified as ICPC-2 code R74, and ‘other RTIs’ include those classified as ICPC-2 codes: R72, R75, R76, R77, R80 or R83.

Pharmaceutical data are classified at generic level according to the World Health Organisation’s Anatomic Therapeutic Chemical (ATC) classification. Systemic antibiotics are defined as those classified in ATC in group J01 (Antibacterials for systemic use).

National estimates of total prescriptions are extrapolated from the sample’ prescribing rate per 100 encounters to all general practice professional services claimed from Medicare Australian (numbers shown in Box 1). The prescribing rate per 1,000 population is calculated as: (estimated number of prescriptions nationally/the population) X 1000. The population of Australia in the December of each year is also provided in Box 1, and for reader interest we have added the average attendance rate per 1,000 population.
Box 1: BEACH encounter sample size; Medicare claims for GP services; population and attendance rates by year.

<table>
<thead>
<tr>
<th>Year</th>
<th>No. sampled encounters (weighted) (a)</th>
<th>No. GP MBS items (b) (millions)</th>
<th>Population (millions) (c)</th>
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(a) Published BEACH reports
(b) Medicare statistics
(c) Australian Bureau of Statistics

Note: *—Medicare data for the 2010–11 year included data from the April 2010 to March 2011 quarters because the 2010–11 financial year data were not available at the time of the analysis conducted for this paper.

**Results**

The prescribing rate of antibiotics for respiratory tract infections is to some degree dependent on the management rate of these problems – how often people present with them to their GP.

Figure 1 demonstrates that:

- The management rate of acute URTI began to decrease in 2000–01 from its highest rate (7.2 per 100 encounters, 95% CI: 6.6–7.7) in 1999–00, to the significantly lower rate of 5.5 (95% CI: 5.0–5.8) per 100 encounters in 2003–04. There has been no statistically significant change in the management rate of acute URTI since then.

- The management rate of ‘other RTIs’ was also at its peak in 1999–00 (11.6, 95% CI: 11.1–12.2 per 100 encounters), but decreased by about 23% to a management rate of 8.6 (95% CI: 8.1–9.0) per 100 encounters in 2004–05. Since then no further decrease has occurred, the management rate of these conditions being 8.9 per 100 encounters in 2010–11.
GPs prescribing rates for acute URTI and ‘other RTIs’

Figure 2 shows that between 1998–99 and 2010–11:

- the proportion of acute URTI problems for which the GP prescribed an antibiotic decreased significantly from 42.0% (95% CI: 39.0–45.1) of URTI contacts in 1998–99 to 32.3% (95% CI: 29.2–34.8) in 2003–04. It then remained steady through to 2010–11 (32.0 per 100) with two exceptions—2004–05 and 2008–09. The 2008–09 rise may have been related to concern regarding H1N1 influenza during 2009.

- the proportion of ‘other RTIs’ that were managed with a prescription for antibiotics did not differ in 2010–11 (70.3%, 95% CI: 67.2–73.4) from that of 1998–99 (71.6%, 95% CI: 69.4–73.7), though there was a significant drop in 2009-10, that did not carry forward into 2010–11.

![Figure 2: Proportion of each problem type for which an antibiotic was prescribed, 1998-99 to 2010-11, with 95% confidence intervals](image)

National estimated number of antibiotic prescriptions for acute URTI and ‘other RTIs’ 1998-99 to 2010-11

For each year 1998–99 to 2010–11, Figure 3 shows the national estimated number of antibiotics prescribed by GPs (not counting repeats if given), for URTI and for ‘other RTIs’.

This calculation considers for each year:

- the number of GP–patients encounters nationally — from Box 1
- the rate the problem was managed per 100 encounters (Figure 1) and
- the rate at which systemic antibiotics were prescribed for the problem (Figure 2)

The number of antibiotics prescribed by GPs for acute URTI:

- decreased between 1998–99 and 2003–04 by about 40% (about 1.25 million fewer antibiotic prescriptions in 2003–04 than in 1998–99). This decrease resulted from a significantly lower management rate (Figure 1) combined with a significantly lower prescription rate (Figure 2) and with a decrease in the national number of patient encounters over this period (i.e. the decreasing attendance rate) (Box 1).

- then increased to peak in 2008-09, at a level close to that of 1998–2001
then dropped again, to reach an estimated 2.06 million in 2010–11—0.4 million more than the lowest point in 2003-04, but 0.9 million fewer than the highest point in 1998–99.

The number of antibiotics prescribed for ‘other RTIs’ showed a slower and less extreme decrease (of 30.5%) from 1998–99 (3.21 million) to 2004-05 (2.23 million). This was not due to any change in GP management style (Figure 2), but resulted from a large drop in the management rate of ‘other RTIs’ (Figure 1) combined with the decrease in total GP–patient encounters nationally.

Since 2004–05 there has been a gradual but consistent increase to earlier levels, so that in 2010–11 the estimated 2.89 million prescriptions were getting close to the higher levels recorded in 1998–99 (3.21 million) and 1999–00 (2.97 million). This was not caused by any change in prescribing rate (Figure 2) but by a slight increase in management rate in the later half of the decade (compared with its low point in 2004–05) (Figure 1) together with the very large increase in number of national attendances rates (Box 1) over this later period.

Estimated national number of GP prescriptions of systemic antibiotics for URTI, for ‘other RTIs’, and other problems, over time

The estimated total number of GP prescriptions for systemic antibiotics in Australia for each year of the study is shown in Figure 4. You can see the decline in overall prescriptions from near 18 million in 1998–99, down to about 14 million in 2002–2005. followed by an increase, so that in 2010–11 the overall estimated number of 17.4 million was almost as high as in the first year (17.7 million).

The more recent increase has clearly been due to the number of antibiotics being prescribed for ‘other problems’, helped by the smaller increase in prescribing for ‘other RTIs’.

When the sudden peak in prescription rate of antibiotics for URTI in 2004-05 reported above, combined with the very low number of visits to GPs that year, and the low management rate of URTI that year, the increased prescription rate had very little effect on the total estimated number of antibiotics prescribed.

In contrast the 2008–09 peak in prescribing rate of antibiotics for URTI combined with increased prescribing for ‘other RTIs’ and for other problems, so the overall estimated number of antibiotics prescribed nationally rose by almost 1.5 million that year.
Estimated number of GP prescriptions of systemic antibiotics per head of population

When the increase in the size of the Australian population is considered, the results suggest that the number of systemic antibiotics prescribed in Australia by GPs per 100 people decreased from 94 scripts per 100 in 1998–99, to a low of about 70 per 100 in 2002–03, 2003–04 and 2004–05. Since then it has reverted somewhat (being 77.8 per 100 people in 2010–11), but remained 17% lower than the estimated number in 1998–99. We estimate there were 9.2 antibiotics prescribed for URTI per 100 people in Australia in 2010–11, a decrease of about 6 scripts per 100 people (or 38%). We estimate that in 2010–11 there were 12.9 prescriptions per 100 people for ‘other RTIs’, about 4 scripts fewer per 100 people than in 1998–99. The high proportion of the whole accounted for by ‘other problems’ is again clear in this Figure. In 2010–11 GPs prescribed about 55 antibiotics per 100 people in Australia for ‘other problems’.
Discussion
The decrease in management rate of acute URTI and of ‘other RTIs’, began in 2000 and lasted until 2003-04 for URTI and for 2004-05 for ‘other RTIs’. Two factor may have contributed to these decreases: — the first was the 2000 launch by the NPS of its annual ‘common colds community campaign’¹⁰, and the second was the 2001 start of decreasing attendance rates (assumed due to decreased bulk billing rates) which reached their lowest point in 2004-05.

In February 2012, the NPS launched a five year campaign to help combat antibiotic resistance. This year NPS facilitators will visit health professionals to encourage them to ‘adhere more closely to therapeutic guidelines when prescribing antibiotics for respiratory tract infections. …’¹¹. Yet, the evidence base for the contribution of community based prescribing to the emergence of bacterial resistance is very limited.

In a Comment made to ‘6 minutes’ last week, one of Australia’s foremost experts on use of antibiotics for infections Professor Syd Bell, pointed out that in earlier published research had found that “URTI due to viral causes could not be distinguished from streptococcal infection on clinical grounds”. He added that about 20–25% of all sore throats in children were due to Streptococcus pyogenes, for which treatment with antibiotics was indicated.¹²

This raised two questions in our minds.

What prescribing rate of antibiotics for acute URTI are we trying to reach?
In 2010–11 GPs prescribed antibiotics for 32% of acute URTI problems managed. Professor Bell suggests that 20–25% of acute URTIs are likely to need antibiotics. Some of the problems labelled by GPs as ‘acute URTI’ may in fact (as Professor Bell suggests) be streptococcal infections, so excessive reduction of antibiotics prescribing for URTI may be counterproductive. Further, reduction in the prescription rate of antibiotics for acute URTI would have little impact on the total estimated GP prescriptions for antibiotics, of 17.4 million.
Dr Bell’s suggests that we should explore the use of Near Patient Testing for streptococcal infection for respiratory problem, which would give the GP a rapid result on which to base a decision as to whether or not to prescribed antibiotics. There may be many barriers to this proposal, but it would assist in ensuring that the antibiotics prescribed went to those in whom they will be effective.

**Why are we still concentrating on antibiotic prescribing for RTIs?**

Our results demonstrate that the vast majority of systemic antibiotics prescribed in general practice are for problems other than respiratory tract infections. The NPS plans parallel action in providing education to patients and health care providers regarding the growing problem of antibiotic resistance. Whether or not this will have any impact on the prescribing rate of antibiotics for all the ‘other problems’ remains to be seen. Perhaps we should investigate the distribution of the antibiotics across the ‘other problems’ for which they are being prescribed to assist in targeting morbidities for which a reduction in prescribing rates would appear beneficial.

**Conclusion**

We have shown that over the last 13 years GPs in Australia have decreased their level of prescribing of antibiotics for acute URTI and to a lesser degree, for ‘other RTIs’. Our research further demonstrates that the number of antibiotic prescriptions given for any indication by GPs nationally (at its peak in 1998–99), decreased over 6–7 years but has now reverted to near the 1998-99 level. The recent increase has largely been due to increased prescribing for problems other than respiratory infections. However, taking into consideration the increasing size of the Australian population we estimate that total GP scripts for antibiotics per head of population have remained reasonably constant since 2004–05, being 77.6 per 100 people in 2010–11, some 17% lower than it was in 1998–99.

**Suggested citation**


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**References**


