Evaluation of a national programme to reduce inappropriate use of antibiotics for upper respiratory tract infections: effects on consumer awareness, beliefs, attitudes and behaviour in Australia

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SUMMARY
The over-use of antibiotics, in particular, inappropriate use to treat upper respiratory tract infections (URTIs), is a global public health concern. In an attempt to reduce inappropriate use of antibiotics for URTIs, and, in particular, to modify patient misconceptions about the effectiveness of antibiotics for URTIs, Australia's National Prescribing Service Ltd (NPS) has undertaken a comprehensive, multistrategic programme for health professionals and the community.

Targeted strategies for the community, via the NPS common colds community campaign, commenced in 2000 and have been repeated annually during the winter months. Community strategies were closely integrated, using the same tagline, key messages and visual images, and were delivered in numerous settings including general practice, community pharmacy, child-care centres and community groups. Strategies included written information via newsletters and brochures, mass media activity using billboards, television, radio and magazines and small grants to promote local community education. The evaluation used multiple methods and data sources to measure process, impact and outcomes.

Consistent with intervention messages, the integrated nationwide prescriber and consumer programme is associated with modest but consistent positive changes in consumer awareness, beliefs, attitudes and behaviour to the appropriate use of antibiotics for URTIs. These positive changes among the community are corroborated by a national decline in total antibiotic prescriptions dispensed in the community (from 23.08 million prescriptions in 1998–99 to 21.44 million in 2001–02) and, specifically, by a decline among the nine antibiotics commonly used for URTI such that by 2003 nationally 216 000 fewer prescriptions for URTI are written each year by general practitioners.

Key words: antibiotics; community campaign; behaviour change

INTRODUCTION
The inappropriate use of antibiotics is a significant global public health problem. The unnecessary use of antibiotics exposes the community to unwarranted medication use and contributes to the development of antimicrobial resistance (JETACAR, 1999).

The use of antibiotics as a treatment option for upper respiratory tract infections (URTIs) is frequently inappropriate. Most URTIs are viral in origin, are self-limiting and resolve in the same amount of time whether or not an antibiotic is prescribed (Arroll and Kenealy, 2004; Del Mar et al., 2004). Despite this, in 1994 in Australia, 57% of urban and 73% of rural patients with a new episode of URTI or pharyngitis received an antibiotic prescription (McManus et al., 1997). Further, in 1998–1999, 42.1% of Australian general practice patients...
with non-specific URTI were prescribed an antibiotic (Britt et al., 2001).

Many clinical and non-clinical factors contribute to inappropriate or unnecessary use of antibiotics. These include doctor and consumer knowledge, perceived patient demand, pressure of promotion, fear of poor clinical outcomes, peer norms and local medical culture and supply mechanisms (Belongia and Schwartz, 1998; Radyowijati and Haak, 2003). The workload of general practitioners (GPs) and impact of health-care structures have also been noted as influences (Davey et al., 2002).

Perceived patient pressure is also a particularly strong predictor of the decision to prescribe in general practice (Britten and Ukoumunne, 1997; Cockburn and Pit, 1997; Dosh et al., 2000). Although doctors may feel uncomfortable prescribing antibiotics for URTIs, they may make a decision to prescribe to nurture good relationships with patients (Butler et al., 1998; Davey et al., 2002).

In addition to influence of patient pressure on prescribing decisions, common beliefs in the community, in particular, beliefs that antibiotics hasten recovery from URTIs and prevent more serious illness (Vanden Eng et al., 2003), inappropriately drive antibiotic use for other reasons. Whether or not they desire antibiotics, adults report that they visit a doctor due to anxiety about the diagnosis and severity of symptoms and seriousness (Brody and Miller, 1986; Braun and Fowles, 2000). Surveys report that nearly half of the adults generally expected an antibiotic once they go to the doctor (Branthwaite and Pechere, 1996; Braun and Fowles, 2000; Vanden Eng et al., 2003).

In an attempt to address this complex patient–clinician relationship, like other countries, Australia’s National Prescribing Service Ltd (NPS) (Weekes et al., 2005) embarked on a comprehensive programme with both health professionals and the general community to reduce inappropriate prescribing for URTIs. The NPS common colds community campaign, reported here, commenced in 2000 following 2 years of activities for health professionals, initially GPs and then community pharmacists (Patterson et al., 2003; Weekes et al., 2005). The overall goal of NPS educational activities for antibiotics has been to reduce inappropriate use of antibiotics for URTIs. The objective specific to the consumer arm was to improve the beliefs, attitudes and actions in the community that reflect best practice URTI management, that is, there is no benefit of antibiotics for viral illnesses; therefore, symptom management should be adopted. This paper reports on the evaluation of the NPS common colds community campaign.

**METHODS**

**Participants**

The Australian community was the audience for the campaign—in different settings and using local activities combined with a national media campaign. Settings included the general practice waiting rooms, community pharmacies, childcare centres and community groups.

**Interventions**

The interventions were two-fold, interventions for consumers and interventions for health professionals (both GPs and pharmacists), and these were implemented concurrently during the winter season. In 2000, a small-scale, media-based community awareness campaign achieved free editorial coverage in 30 radio and television interviews and over 30 newspaper articles. Following the success of this small campaign, larger-scale interventions for consumers were implemented during the winter months (June to August) in 2001, 2002, 2003 and 2004. Each year, the strategies were closely integrated, using the same tagline and key messages (Figure 1) and visual images. A full description of the strategies in place each year is provided in Table 1 and included the following.

- A tagline was created, ‘Common colds need common sense’. The persuasive message reinforces an already accepted belief and increases the salience of a person’s positive attitude towards the belief (Donovan and Henley, 2003). The belief was also linked to positive actions that replace the practice of taking antibiotics. In 2004, the tagline was modified to link the desired belief (they don’t need antibiotics) to the already accepted belief to become ‘Common colds need common sense: they don’t need antibiotics’.
- Various printed and electronic resources were distributed including an information brochure for adults as well as posters for
general practice, pharmacies, schools and community centres which detailed the causes of the common cold, influenza and coughs and encouraged symptomatic management. Stickers and badges with the campaign tagline and logo were also distributed. Prescription pads for symptomatic management as well as patient information leaflets on sore throat and cough were distributed to GPs and included in some prescribing software.

Table 1: Strategies in the NPS programme for antibiotics

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Advertising in</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Billboards</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>TV</td>
<td>1187 in seven regions over 3/12</td>
<td>110 in five cities over 3/12 Bonus 110</td>
<td>75 each in Sydney and Melbourne over 4/52</td>
<td>20 in five states 1/52</td>
</tr>
<tr>
<td>Radio</td>
<td>Not available</td>
<td>66</td>
<td>26</td>
<td>21</td>
</tr>
<tr>
<td>Magazines</td>
<td>✓</td>
<td>✓</td>
<td></td>
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</table>

**Editorial coverage achieved**

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
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<tbody>
<tr>
<td>Newspaper/print</td>
<td>Not available</td>
<td>24</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>publication</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National/metropolitan</td>
<td>46</td>
<td>11</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Regional</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV</td>
<td>1</td>
<td>15</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>National/metropolitan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radio</td>
<td>Not available</td>
<td>124 grants provided; &gt;6000 participants × &gt;1,000 participants</td>
<td>57 grants provided; &gt;6000 participants</td>
<td></td>
</tr>
<tr>
<td>Community-based</td>
<td>73 grants provided; &gt;6000 participants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resources</td>
<td>All years of the consumer campaign included endorsement from national organizations; general campaign communication to GPs and pharmacists; printed campaign resources (brochures, posters for GP surgeries and/or child-care centres), badges, stickers; information on the NPS website and symptomatic management pads for GPs to use with their patients</td>
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*Small-scale, media editorial campaign implemented in 2000.
The consumer strategies were complemented by interventions for GPs and pharmacists in 1999–2003.*
Information about the campaign and key messages were mailed to all general practices and community pharmacies across the country as well as health professional trade press and other key stakeholders. Regional divisions of general practice were also given detail on the campaign and were supported to achieve editorial coverage in local newsletters and newspapers.

Each year, the campaign included a formal launch to attract media attention. Media releases and images were also available on a website dedicated to the campaign.

A variety of mass media strategies were undertaken including advertising using billboards, television, radio and magazines. The advertising purchased each year was dependent on the available budget. Media releases, media kits and community service announcements were also distributed annually.

Small grants of approximately $AUD600 were also provided to community groups to implement community-based education sessions in 2001 and 2002. Similarly, in 2004, grants of $AUD300–500 were given to a small number of child-care groups in three States.

Interventions that inform best practice prescribing and that support health professionals manage patient expectations began in 1999 so that by 2004 these strategies for health professionals had been repeated in the winter months for 6 years. These interventions aimed to reach all GPs across Australia and included newsletters, prescribing feedback, educational visiting, clinical audit with feedback and case studies (paper and peer group discussion).

### Outcome measures

We report on changes in awareness, beliefs, attitudes and behaviour among the general community. The evaluation (Figure 2) uses triangulated data from several sources including cross-sectional surveys and drug utilization data. We measured process, impact and outcomes across five main evaluation domains:

- campaign awareness and message recall;
- perceived value and quality of the campaign among health professionals;
- changes in consumer knowledge and attitudes to self-management;
- changes in consumer-reported use of antibiotics for colds and flu in July each year;
- changes in antibiotic prescribing.

### Data sources

The evaluation of the programme was responsive to change in content, complexity and scope of programme delivery over time. As such, a variety of different strategies were used each year to assess the impact of the campaign.

![Fig. 2: Evaluation of the NPS common colds need common sense programme.](https://academic.oup.com/heapro/article-abstract/22/1/53/627239)
against the campaign objectives. The specific data sources and methods to help inform the evaluation included the following.

**National annual surveys of consumers**

Independent market research companies were commissioned to undertake national telephone surveys of consumers in August 1999 \( (n = 1614) \), August 2000 \( (n = 1603) \), August 2001 \( (n = 1800) \), August 2003 \( (n = 1200) \) and August 2004 \( (n = 1200) \). In each year, just over 11,000 phone numbers were used to achieve the set quota of responses. These surveys obtained national, randomized samples of the Australian population aged 15 years and over, stratified by age, gender and region and used computer assisted telephone interview (CATI) technology for data collection. Phone numbers were obtained from national electronic records. Results were post-weighted for age and gender using relevant census data from the Australian Bureau of Statistics (ABS). For comparison across independent samples with power set at 0.80, the existing samples of 1200 would allow detection of differences in percentages from 2.8 to 5.7 percentage points. Questions included a mix of open and closed-ended responses as well as fixed point rating scales. One of the main purposes of these surveys has been to identify and monitor consumer behaviour when they last had a cold or flu and to monitor consumer attitudes towards the use of antibiotics for cold and flu (Figure 3).

**National omnibus surveys of consumers**

Questions were included in the NewsPoll omnibus survey pre and post the 2002 programme and then again post the 2003 and 2004 programmes. Each national random sample consisted of 1200 people aged 18 years or over, stratified by postcode area, age and gender. Interviews were conducted by telephone (CATI). A call-back and appointment system was used to include people not often at home. Results were post-weighted to ABS census data on age, gender, highest level of schooling and area. Questions included closed-ended responses and fixed point rating scales and focused on knowledge and attitudes about the best way to treat colds and flu, awareness of the national advertising campaign and

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**Fig. 3:** Questions asked in the national evaluation surveys.
messages and behaviour when last suffered from a cold or flu.

National surveys of health professionals

National, paper-based mail surveys of GPs were undertaken in March 2000 (n = 1310), April 2001 (n = 941), April 2002 (n = 963) and April 2004 (n = 815). Similar national surveys of pharmacists were undertaken in August 2002 (n = 712) and April 2004 (n = 1017). Response rates for these surveys ranged from 41 to 58% for the GP surveys and from 46 to 53% for pharmacists. In addition to collecting data on awareness and participation in NPS activities and general attitudes regarding the value of NPS, these surveys also collected data on GP and pharmacist awareness and perceived usefulness of the NPS common colds community campaign. Questions included both open and closed-ended responses and fixed point rating scales.

Drug utilization data

To inform the current evaluation, NPS has access to prescription data from Medicare Australia (formerly the Health Insurance Commission) for the period July 1996 to June 2003 [containing ~56% of antibiotic prescriptions (Medicare Australia, personal communication) dispensed nationally that the Australian Government subsidised on the Pharmaceutical Benefits Scheme (PBS)]; the Drug Utilization Sub-Committee (DUSC) of the Pharmaceutical Benefits Advisory Committee (PBAC) for the period 1998–2002 (containing data from an annual survey of community pharmacies to estimate overall community prescription drug usage in Australia) (DUSC, 2003) and Bettering the Evaluation and Care of Health (BEACH, 2003) for the period 1999–2002 (data from a random sample of approximately 1000 GPs per annum nationwide that describes 100 consecutive patient encounters, including any prescriptions provided).

Data analysis

For all consumer surveys, frequency distributions of weighted data were calculated for all variables. Changes in percentages over time between the independent samples were tested for statistical significance by calculating 95% confidence intervals for the difference scores.

For health professional surveys, quantitative data were analysed in the SAS©, version 8.215. Descriptive statistics were calculated for all variables. Summary statistics (mean and standard deviation) were produced for continuous variables.

Medicare Australia claims that the database was analysed to measure changes in drug utilization among nine antibiotics commonly used for URTIs: amoxicillin, amoxicillin with clavulanic acid, cefaclor, cefuroxime, clarithromycin, doxycycline (100 mg only), erythromycin, phenoxymethyl penicillin, and roxithromycin. The analysis involved augmented regression (Donnelly et al., 2000), which included seasonality (as first- and higher-order harmonic terms as required), autocorrelated error terms and one point in the regression model to indicate the timing of the first intervention in 1999.

RESULTS

Campaign awareness and message recall

According to the omnibus survey data, awareness of the NPS common colds community campaign has increased significantly from 9.2% in 2002 (pre-campaign) to 16.8% in 2002 (post-campaign), 12.7% in 2003 and 21.5% in 2004 (percentage point change = 12.3; 95% CI: 9.5–15.1).

In addition, recall of the specific media message that ‘antibiotics don’t work in treating colds and flu’ initially increased seven-fold from 1.9% pre 2002 to 13.7% post the 2002 programme, but dropped back to 4.1% in 2003 and 2.1% post the 2004 campaign.

Awareness of the campaign among 815 GPs (response rate of 41.3% of those mailed the survey) and 1017 pharmacists (response rate of 46.3%) randomly surveyed in 2004 was high, just under 80% of GPs and close to 87% of pharmacists. Awareness among GPs has remained stable since 2002 when 77.5% of GPs were aware. Awareness of the campaign among pharmacists has fallen from 2002 when 95% of pharmacists had heard of it.

Perceived value and quality of the campaign among health professionals

In 2004, 82.6% of GPs aware of the campaign felt the campaign assisted them in promoting the message to patients that antibiotics were inappropriate for common colds. Similarly, of the pharmacists who recalled the campaign in 2004, 89.6% agreed that the campaign had
supported them in educating patients to manage their symptoms.

**Changes in consumer knowledge and attitudes to self-management**

Omnibus data have shown that, over time, an increasing proportion of surveyed individuals aged 18 years and over endorse symptomatic management of cold and flu symptoms. This coincides with a significant decline in those who believe taking antibiotics for cold and flu is appropriate, from 28.7% pre-programme in 2002 to 21.7% in 2004 (Table 2) (percentage point change = 7.0; 95% CI: 3.5–10.5).

**Changes in consumer-reported use of antibiotics for colds and flu**

Comparison of successive yearly consumer surveys revealed a significant decrease in self-reported use of antibiotics to treat cough, cold or flu, from 10.8% in 1999 down to 7.4% in 2004 (Table 3) (percentage point change = 3.4; 95% CI: 1.3–5.5). In addition, the use of non-prescription medicines for symptomatic relief has increased slightly, but not significantly, over time (from 67.5% in 1999 to 70.1% in 2004), as has resting at home (56.8% in 1999 to 57.5% in 2004).

**Changes in antibiotic prescribing**

Drug utilization data show a continued decline in the total volume of prescribing of antibiotics at a national level in the community. Prescriptions for antibiotics have fallen nationally from 23.08 million in 1998–99 to 21.44 million in 2001–02 (DUSC, 2003). Similarly, the proportion of URTI presentations in general practice where an antibiotic was prescribed decreased from 51.1% (95% CI: 49.5–52.7) in 1999 to 49.3% (95% CI: 47.5–51.0) in 2002 (BEACH, 2003).

Our own analysis also supports these figures. After the rollout of the first health professional educational programme, the median number of original antibiotic prescriptions for nine antibiotics commonly used for URTI was decreasing at a rate of 0.18 prescriptions per 1000 consultations per GP per month ($P < 0.0001$). This equates to a decrease of 10.8 original antibiotic prescriptions per GP per year or 216 000 fewer PBS subsidised antibiotic prescriptions per year [given the approximate 20 000 GPs in Australia provide an average of 6000 consultations per year (Commonwealth of Australia, 2000)] (Figure 4) (Mackson, 2004).

**DISCUSSION**

The NPS common colds community campaign, in synergy with interventions for health professionals, has communicated clear, consistent, positive and persuasive messages via multifaceted media and strong branding repeated over 5 years. The current analysis demonstrates modest but consistent changes in consumer beliefs, attitudes and behaviour that reflect best practice URTI management corroborated by a national decline in total antibiotic prescriptions and, more specifically, by a decline among the nine antibiotics commonly used for URTI.

Awareness of the campaign significantly improved through repetition to reach a high of 21.5% awareness among the general population of adults surveyed, a net increase of 12.3 percentage points since first measured prior the 2002 campaign. It is challenging to compare these levels of awareness with other campaign as the media channels used by NPS have varied enormously from year to year and television advertising was not used in consecutive years.

<table>
<thead>
<tr>
<th>Management</th>
<th>Pre 2002 % appropriate</th>
<th>Post 2002 % appropriate (change)</th>
<th>Post 2003 % appropriate (change)</th>
<th>Post 2004 % appropriate (change)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get some rest</td>
<td>89.4</td>
<td>89.7 (↑ 0.3)</td>
<td>90.8 (↑ 1.4)</td>
<td>91.1 (↑ 1.7)</td>
</tr>
<tr>
<td>Drink lots of fluids</td>
<td>96.4</td>
<td>97.8 (↑ 1.4)</td>
<td>97.3 (↑ 0.9)</td>
<td>97.3 (↑ 0.9)</td>
</tr>
<tr>
<td>Take antibiotics</td>
<td>28.7</td>
<td>24.9 (↓ 3.8)</td>
<td>26.1 (↓ 2.6)</td>
<td>21.7 (↓ 7.0)</td>
</tr>
</tbody>
</table>

*Percentage point change relative to 2002; bStatistically significant change at $P < 0.05$ level.

Source: National omnibus survey data.
The Australian National Asthma Campaign, as one example, ran during 1991, 1992 and 1993 following television advertising in each campaign. This campaign achieved no change in awareness in the first year (with 22 television iterations), then a 21.4% net increase in 1992 (following 185 iterations of a different television advertisement) and in 1993, reached a net increase of 18.9%, relative to the 1991 baseline, after 24 iterations (Comino et al., 1997).

We have the most to learn from the repeated sun protection campaigns in Australia reported by Smith et al. (Smith et al., 2002) in which a targeted audience had high awareness of the campaign over the 3 years. This campaign also featured television advertising over a
subsequent 3-year period and a very specific target audience. Increases in awareness of the campaign by the target audience, relative to baseline, resulted in a net increase of 19.8% in the first year and 17.9 and 17.7% in the two subsequent years, achieving ~50% of the target audience each year (Smith et al., 2002).

Recall of the specific campaign messages, however, was lower, reaching a high of 13.7% following campaign activities in 2002. Interestingly, recall of the specific campaign messages varied each year of implementation (4.1% in 2003 and 2.1% in 2004), consistently reflecting changes in the campaign budget and the subsequent frequency and type of media editorial coverage received across Australia. It is, of course, also possible that the timing of the national omnibus surveys relative to the media activity may have influenced recall of such explicit campaign detail, and this will be considered in further evaluations.

Awareness of the campaign among GPs and pharmacists is also high. While survey response rates are modest, pre-testing of surveys among the target audiences suggests that our surveys are, in fact, more likely to be completed by those with less favourable views of NPS and less likely to participate in our activities.

Notably, following the series of multifaceted interventions, the high proportion of the community who endorse symptomatic management of cold and flu (for example, use of non-prescription medicines and resting at home) has remained stable over time while simultaneously significantly fewer adults endorse taking antibiotics. Consistent with these positive attitudes and in response to repeated programme messages, self-reported levels of symptomatic management when last faced with cold or flu have remained consistent. In contrast, self-reported use of antibiotics has progressively decreased over time, with a significant net reduction of 3.4 percentage points between 1999 and 2004.

These positive changes in attitudes and self-reported behaviours among the community are corroborated by a national decline in total antibiotic prescriptions (from 23.08 million prescriptions in 1998–99 to 21.44 million in 2001–02) and, specifically, by a decline among the nine antibiotics commonly used for URTI such that by 2003 nationally 216 000 fewer subsidised prescriptions for URTI are written each year by GPs.

The positive outcomes of the current campaign build on previous initiatives undertaken in Australia. The National Wise Use of Medicines Campaign, for example, disseminated messages on the ‘Wise use of antibiotics’ in 1996, 1997 and 1998 (Keys Young, 2000). In contrast to the NPS consumer campaigns, however, this initiative was short, limited to 1 week each year and the messages were not specific to the inappropriate use of antibiotics for URTIs. Another small community-based intervention involving 25 GPs and five community pharmacies was also conducted in South Australia in winter of 2001. This intervention showed a reduction in dispensing of selected antibiotics for URTIs (Dollman et al., 2005). However, this study did not look at changes in consumer attitudes, beliefs and practice, as we have done here.

Previous initiatives in the USA, Canada, Belgium (Finch et al., 2004), New Zealand and the UK (Parsons et al., 2004) have also been identified as taking regional, state or national approaches to controlling antibiotic use and minimizing or preventing antibiotic resistance. Each has taken a slightly different approach to their messages and campaign execution, although few countries have published an evaluation of the campaign effectiveness. In the USA, studies using materials from the national Centres for Disease Control and Prevention included intervention and control communities and the intervention targeted both parents and prescribers (Trepka et al., 2001; Perez et al., 2002). In the intervention community, the 4-month intervention achieved a 53% exposure to at least two interventions (reach), a net increase of 14.3% in awareness of the messages (95% CI: 6.6–22.0), and a significant increase in parents’ understanding that antibiotics are not needed for colds in both intervention (28%, $P < 0.001$) and control groups (19.4%, $P < 0.001$) (Trepka et al., 2001). The UK study, in the first winter season of the Campaign on Antibiotic Treatment in primary care and the National Advice to the Public (Parsons et al., 2004), observed in a local area of high prescribing a 4% reduction in attitudes supporting the use of antibiotics for colds in adults and a 2% reduction in attitudes that children should be prescribed antibiotics for colds. This study did not report on reach or awareness of the national campaign.

Several patient-directed strategies have also been implemented within general practice in an attempt to reduce inappropriate use of antibiotics for URTIs and, in particular, to modify
patient misconceptions about the effectiveness of antibiotics for URTIs. Strategies such as delayed prescriptions (Couchman et al., 2000; Arroll et al., 2002), patient information leaflets (Macfarlane et al., 2002), prescribing symptomatic management and patient feedback on the probability of bacterial infection (Macnamara et al., 2000) have been used to varying extent. However, unlike the comprehensive campaign undertaken by NPS, these approaches targeted the clinician and did not directly address the general public’s ‘culture of expectation’ (JETACAR, 1999). Nor did they address the GP’s perception of patient pressure for antibiotics.

Over 5 consecutive years, NPS repeatedly addressed inappropriate use of antibiotics for URTIs among the general population. The success of our programme and the key learning points that we will transfer to others who aim to influence behaviour change at a national level include the following:

- The programme design was comprehensive and repeated over consecutive years.
- The interventions were practical and relevant to the target audiences.
- The messages were positive and delivered via multiple media with specific actions to replace antibiotic use.
- What was learned during programme design and implementation about health professional and consumer acceptance of messages was applied in each subsequent rollout.
- The consumer initiatives were implemented in synergy with a complex and sophisticated array of interventions for health professionals that encompassed both prescriber and patient influences.
- We addressed patients’ attitudes and beliefs and provided them with the knowledge and skills to appropriately manage cold and flu symptoms without antibiotics.
- In turn, this helped to alleviate GP’s perceived patient pressure for antibiotics.

Limitations in the evaluation reported here arise due to the multifaceted nature of a national public health intervention. That is, NPS is the national implementation arm of Australia’s quality use of medicines policy and as such has an obligation to facilitate attitude and behaviour change throughout the entire community. There was no control group or pilot programme to demonstrate the potential effect of the interventions in an experimental fashion. Rather, the focus for the evaluation has been on triangulating measures of attitudes and beliefs, self-reported behaviour and an objective measure of drug utilization to draw a comprehensive picture of the direction of effect.

Further work in this area is needed, including:

- evaluations of other national programmes working towards reducing bacterial resistance in the community;
- routine monitoring of antimicrobial resistance rates in the Australian community to objectively determine the benefit of our interventions;
- monitoring of adverse patient outcomes to ensure reduced prescribing is not having negative health outcomes.

**CONCLUSION**

An integrated nationwide prescriber and consumer programme addressing influencing factors and barriers to change was effective in positively influencing consumer awareness, beliefs, attitudes and behaviour to the appropriate use of antibiotics for URTIs. Concurrently, the volume of oral antibiotic use in general practice has reduced.

**ACKNOWLEDGEMENTS**

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