NPS MEDICINEWISE

CELEBRATING 20 YEARS 1998–2018

2017–18 ANNUAL EVALUATION REPORT

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Contents

FOREWORD

I am proud to present this 21st NPS MedicineWise Annual Evaluation Report to you. We continue to measure the impact of our work to inform our programs and funders. Evaluation has informed innovation, quality improvement, new product development and program refinement throughout our history. Our topic areas continue to reflect national health priorities, consistent with our goal of ensuring that we work where we can make the most difference and where there are practice gaps.

This year we include the evaluation of the 5-year Reducing Antibiotic Resistance Program which ran from 2012 to 2017. I am excited to see the initial findings from the randomised controlled trial of the New Medicine Support Service and we expect to provide updated findings in 2019. This intervention involves pharmacists following up patients who have received a new medicine and indications are that it has improved patients' adherence to these new medicines.

We continue to explore ways to measure our savings and economic impacts, including Bayesian techniques and the use of MedicineInsight data. Isolating the impact of NPS MedicineWise programs from other environmental factors is challenging but, wherever possible and known, we recognise potential confounders in our analyses so that changes can be attributed with confidence. Our evaluation methods have recently been reviewed by an expert panel and they have provided positive feedback and useful suggestions.

We continue to seek feedback from health professionals and consumers who use our products so that we can ensure these meet their needs and remain relevant and useful. This report includes the findings from the National Consumer Survey and the National GP Survey.

Evaluation of the Choosing Wisely Australia initiative continues in collaboration with professional bodies and we are pleased to see how well this is progressing.

As always, this Evaluation Report will inform our continuous improvement and innovation at NPS MedicineWise. I recommend the report to you.

Steve Morris
Chief Executive Officer

EXECUTIVE SUMMARY

Overall impact of NPS MedicineWise on the quality use of medicines and medical tests in Australia

- Our economic evaluations confirm the value of NPS MedicineWise programs, with cost savings to the PBS and MBS and positive cost benefits to the government.
- We found improved general practitioner (GP) knowledge and behaviour after delivering educational programs on antibiotic resistance, diabetes, and ankle and knee injuries.
- Health outcomes measures are challenging but we have explored the outcomes for people with osteoporosis using the 45 and Up Study.
- We have provided important and valued services to consumers with our Medicines Line, the New Medicine Support Service and the Reducing Antibiotic Resistance and Be Medicinewise campaigns.
- Choosing Wisely uptake continues with positive evaluation findings from both GPs and consumers.

Financial impact

PBS savings

- Pharmaceutical Benefits Scheme (PBS) expenditure was estimated to have been reduced by $71.62 million by NPS MedicineWise programs in the 2016–17 financial year, based on time series analysis of PBS subsidy data provided by Department of Human Services (DHS).
- The expenditure savings came from the activities of seven programs implemented between 2012 and 2016. The programs aimed to improve the use of medicines in the treatment of respiratory tract infections, hypertension, chronic pain, type 2 diabetes, depression, asthma and gastro-oesophageal reflux. Each program reduced expenditure on PBS subsidies by preventing the unnecessary or excessive prescribing of medicines that are typically used to treat these diseases.

MBS savings

- The NPS MedicineWise program that aimed to reduce the inappropriate use of computer-tomography (CT) scans and ultrasounds in the investigation of non-specific abdominal pain reduced MBS expenditure by $14.44 million in 2017, as estimated from time series analysis of MBS data provided by the DHS.

Cost-benefit of the Proton Pump Inhibitor Program

- The 2015 proton pump inhibitor (PPI) program produced a positive cost–benefit due to the decrease in dispensed prescriptions for high-strength PPIs. The intervention resulted in a total decrease of 843,748 dispensed prescriptions of high-strength PPIs in the period between April 2015 and June 2017.
- With the average cost of a PPI prescription valued at $15.33 and the cost of conducting the 2015 program valued at $425,764, a net monetary benefit of $11,383,311 (adjusted and discounted) was produced. There was no evidence that the reduction in high-strength PPIs increased the prescribing of low-strength PPIs. For every dollar spent on the NPS MedicineWise PPI program to improve appropriate prescribing of high strength PPIs in general practice, $28 in monetary benefit was gained by the Australian Government Department of Health.

Reducing antibiotic resistance

- Antibiotic prescribing in Australia decreased during implementation of the 5-year Reducing Antibiotic Resistance program. The target to reduce antibiotic usage from 24 to 19 defined daily doses (DDD) per thousand inhabitants per day was achieved.

  Analysis using PBS data from 2012 to 2017 that included both concessional and under co-payment information detected an estimated reduction of 18.4% in the rate of dispensing of J01 class antibiotics, from 23.3 DDDs in 2012 to 19.0 DDDs in 2017.

  Analysis of concessional PBS data estimated an overall reduction in the number of antibiotic prescriptions dispensed to concessional beneficiaries of 24.8% compared to the volume that would have been expected without the NPS MedicineWise program.

- A greater proportion of GPs who participated in the program compared to those who did not indicated that they consider antibiotic resistance when prescribing antibiotics (+13%), and that they discuss it with their patients who present with an upper respiratory tract infection (URTI) (+14%).
- The proportion of people who believe antibiotic resistance is affecting their family now increased significantly from 11% in 2015 to 25% in 2017 and the proportion who believe it will affect their family in 10 years decreased by a corresponding amount.

Impacts on GP practice

GP participation

The National GP Survey 2018 confirms that the health professional education, quality of information and practice feedback provided by NPS MedicineWise is valued by GPs, with 78% participating in an NPS MedicineWise continuing professional development (CPD) activity in the last 2 years.

Diabetes program

GPs had a clearer plan for stepping up type 2 diabetes medicines immediately following their educational visits, with 42% of GPs reporting an improvement in applying a stepwise approach to the initiation of medicines using the Australian Blood Glucose Treatment Algorithm for type 2 diabetes when considering management.

Clinical audit indicators showed a 50% improvement in the proportion of GPs who achieved recommended target HbA_{1c} and who measured HbA_{1c} in the previous 3 to 6 months. Evaluation feedback showed that 46% of the GPs had changed their practice or intended to change their practice by increasing their consideration of each patient's individualised HbA_{1c} target.

Chronic Obstructive Pulmonary Disease program

After educational visits, GP knowledge was significantly increased about limiting the use of fixed dose combination inhalers to patients with either uncontrolled symptoms or moderate to severe COPD with frequent exacerbations, and about using spirometry before stepping patients up to a fixed dose combination inhaler.

Ankle and knee injuries program

Educational visits in this program increased GPs' confidence about using physical examination to diagnose the cause of acute knee pain, communicating to patients that imaging results will not change management when imaging is not clinically indicated, and performing physical tests to diagnose acute ankle and knee injuries.

The visits also improved practice in the diagnosis and management of acute ankle and knee injuries with significant increases in consideration of the risk of radiation when deciding whether to send a patient for an X-ray, the use of physical examination and history, and application of the Ottawa ankle and knee rules. GPs

reported a decrease in referrals for X-rays, MRIs and ultrasounds for patients with an acute knee or ankle injury after participating in the program.

Choosing Wisely

The third year of the initiative demonstrated positive changes in GP practice associated with particular Choosing Wisely Australia recommendations.

Improving consumer use of medicines and medical tests

Consumer awareness of NPS MedicineWise

Most consumers who are aware of NPS MedicineWise trust our organisation, which has a ‘good’ to ‘very good’ trustworthiness rating from 62% of consumers.

The NPS MedicineWise website is rated highly on: trustworthiness; being up-to-date; easy to understand; and evidence-based. Areas for improvement include: health professional recommendations, navigation and providing short and concise content.

NPS MedicineWise Medicines Line

The most common enquiries received by NPS MedicineWise Medicines Line were about antidepressants and the effects of medicines. The mean age of participants who contact Medicines Line has decreased since 2011, partly due to the increase in young mothers seeking information about the effects of medicines on their children or babies.

Participants who sought advice from the NPS MedicineWise Medicines Line service were likely to follow the advice provided, as well as follow-up with health professionals where recommended. The service was perceived by participants to be trustworthy, efficient and convenient, and useful as a reporting system for monitoring medicines use and adverse events which may help others to stay safe from medicine-related harm. Medicines Line pharmacists were perceived as having highly specialised medicine knowledge. The service was also perceived to be a useful alternative to GP and specialist consultations when patients had non-urgent enquiries about medicines.

New Medicine Support Service

Evaluation of the New Medicine Support Service, a pharmacist follow-up intervention for patients prescribed a medicine for the first time, found that adherence was higher in the intervention group at 2, 3 and 6 months after receiving a new medicine compared to the control group although these results are not statistically significant. At 3 months, the adjusted odds of adherence were 38% higher for patients receiving the intervention from pharmacists compared to the control group.

Medical Tests

Findings from the consumer survey indicate that nine out of ten consumers feel confident asking their doctor questions about medical tests and discussing any concerns they may have. However, it is evident that education about the risks of unnecessary tests is still needed to increase consumer knowledge and prompt positive changes in behaviours associated with medical tests, treatments and procedures.

REDUCING ANTIBIOTIC RESISTANCE

The NPS MedicineWise *Reducing Antibiotic Resistance* (RAR) program ran from 2012 to 2017 and included interventions for health professionals and consumers. Gaps were identified in both consumer and health professional knowledge which were contributing to the development of antimicrobial resistance in the community and primary care settings. A major visiting program took place in 2012–13, and other health professional and consumer activities took place across the 5-year period.

Program goal

The overarching goal of the program was to reduce inappropriate prescribing of antibiotics by addressing both health professional and consumer audiences. The overall target of the five-year initiative was to reduce antibiotic usage by 25% over 5 years (from 24 to 19 defined daily doses [DDDs] per 1000 inhabitants per day based on 5% per annum) to achieve concordance with international best practice and Australian Commission on Safety and Quality in Health Care (ACSQHC) recommended benchmarks.

The aim of our work with consumers is to raise the profile of antibiotic resistance and to reduce unnecessary demand for antibiotics for upper respiratory tract infections (URTI), including the cold and flu viruses, by addressing knowledge and beliefs.

The evaluation sought to assess whether the program made an impact on GPs and consumers during its 5-year implementation period, and whether it contributed to its key objective of reducing inappropriate antibiotic prescribing in Australia.

Key evaluation questions

The key evaluation questions over the 5-year program were:

- Was the program successful in significantly reducing antibiotics prescribing in Australia?
- Did the program change GP knowledge, attitudes, and practice related to prescribing antibiotics for URTIs?
- Did the program change consumer knowledge, awareness, and attitudes to use of antibiotics?
- Did the program change consumer knowledge of antibiotic resistance?
- Was uptake of program elements as expected, or did some products perform better/worse than expected?
- Did products developed for the RAR program achieve their respective participation and/or download targets?

Program activities

Table 1 provides a summary of products offered to GPs as part of the 5-year program. A national educational visiting program was conducted in 2012. Some MedicineInsight practices had small group discussions in 2016.

In addition to the products aimed at GPs and other health professionals, two national campaigns were implemented in each year of the RAR program: the NPS MedicineWise Winter Campaign and the Australian activities for World Antibiotic Awareness Week. These campaigns were designed to reach both consumers and health professionals.

Annual winter campaigns, timed to coincide with higher levels of demand for antibiotics for URTIs, have been the mainstay of communications targeting consumers. While campaigns have been run each year of the 5-year program, there were two major advertising bursts, at the start of the program in 2012 and in 2015.

Table 1: Overview of RAR 2012–17 GP activities

Program/product (Launch date)	Activity	GPs
Antibiotic resistance and respiratory tract infections 2012–13 (Feb 2012)	Case study	1,127
	Clinical audit	1,440
	Interactive workshop	31
	One-to-one visit	5,118
	Small group case-based meeting	4,081
	Webinar	75
	All activities	*13,744*
PBS feedback: Antibiotic prescribing for URTIs (Feb 2012)	PBS feedback	≈25,000
Antibiotics – Reducing antibiotic resistance (2014–15)	Case study	842
	Clinical audit	1,901
	eLearning	256
	All activities	*2,999*
PBS feedback: Antibiotic prescribing for URTIs (Apr 2015)	PBS feedback	24,222
PBS feedback: General antibiotic prescribing (Nov 2015)	PBS feedback	28,526
MedicineInsight visit: Antibiotics practice report (2016)	Small group case-based meeting	255
Antibiotics resource kit (Aug 2016)	Educational materials	1,680 practices
Respiratory tract infection action plan (Mar 2016)	Action plan/management pad	-
National Case Study: Otitis media (2016)	Case study	304
Antibiotics resource kit (July 2016)	Educational materials	635 practices
MBS practice review: Testing in older people: urine MCS testing (May 2017)	MBS feedback	29,943
Educational materials distributed with Chief Medical Officer's letter (Jun–Dec 2017)	Distributed with Behavioural Economics and Research Team (BERT) letter	2,630

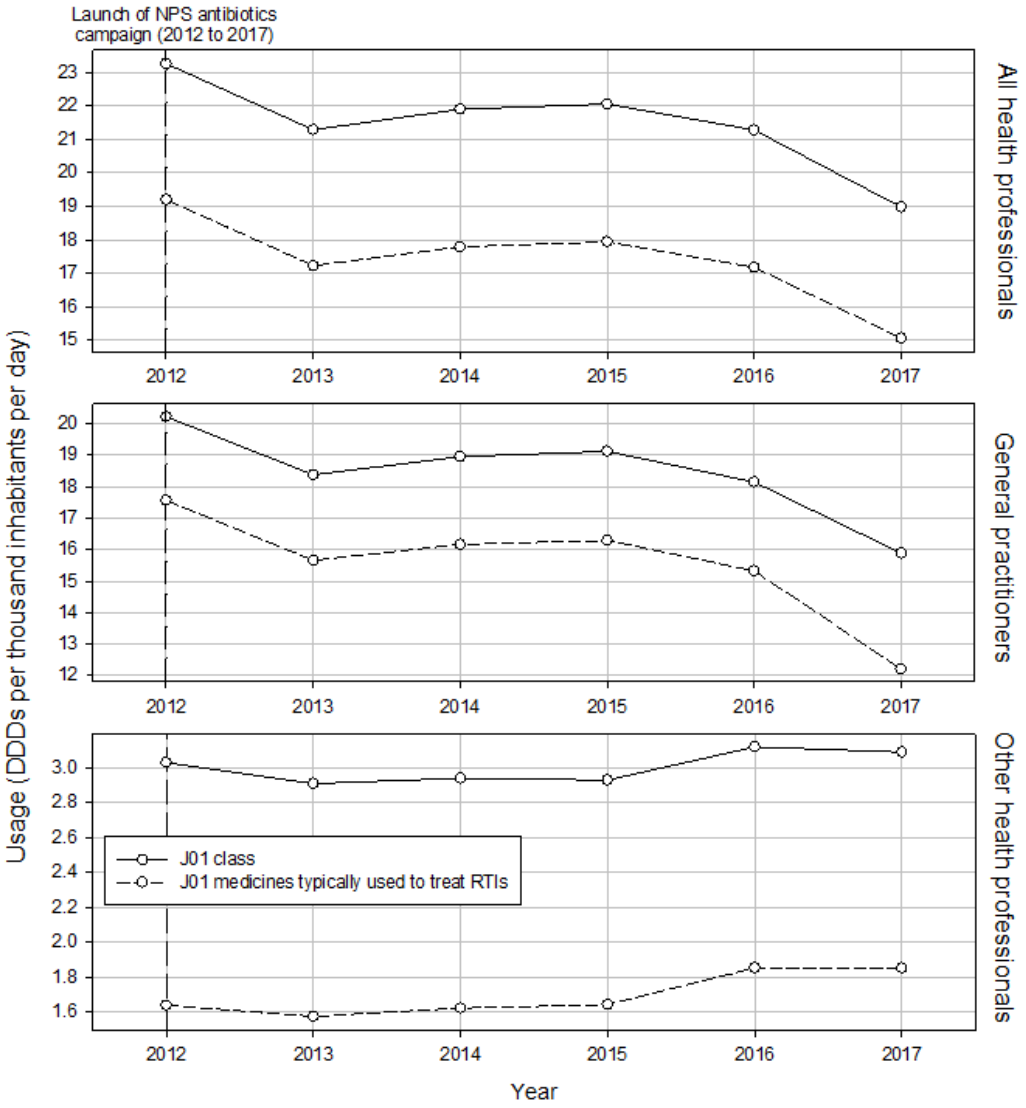
Results

Antibiotic prescribing in Australia was reduced between 2012 to 2017

The program was successful in reducing antibiotic prescribing in Australia between 2012 and 2017, based on analysis of Pharmaceutical Benefits Scheme (PBS) data, as well as the Organisation for Economic Cooperation and Development (OECD) data. PBS data was used to assess changes in prescribing of J01 class antibiotics, as well as a subclass of those commonly prescribed for URTI. Prescribing patterns using PBS data were analysed separately for GPs and other health professionals. Between 2012 and 2017, an estimated reduction of 18.4% in DDDs per 1000 inhabitants per day was found for all antibiotics prescribed

by GPs and dispensed under the PBS, confirming that most of the decline in overall usage of antibiotics was driven by a decline in usage arising from GP prescribing (Figure 1).

Figure 1: Antimicrobial usage (DDD per 1000 inhabitants per day) in Australia (upper panel), comparison between GPs (middle panel) and other health professionals (lower panel) and between all antimicrobials in the J01 class (solid lines) and antimicrobials typically used to treat respiratory tract infections (dashed lines). The vertical dashed line indicates the launch of the 2012 NPS MedicineWise antibiotics program.



Volume changes in antibiotics commonly prescribed for URTIs

An analysis of PBS concessional data for dispensed prescriptions for antibiotics commonly prescribed by GPs for URTIs between 2012 and 2017, using Bayesian hierarchical time series analysis, calculated the relative change in dispensing when the program was implemented compared to what would have been expected if the program was not run. By June 2017, the estimated overall reduction since 2012 in the number of selected antibiotic GP prescriptions dispensed to concessional beneficiaries on the PBS was 24.8%**.**

During the 2016–17 financial year, there were three months where an average reduction in prescribing greater than 25% was achieved (Figure 2). The reductions were achieved in July 2016 (26.9%), February 2017 (25.1%) and April 2017 (28.5%). It is estimated that the sustained effort of NPS MedicineWise to combat antibiotic resistance via various programs has reduced expenditure on antibiotics by $70.2 million for the period July 2012–June 2017.

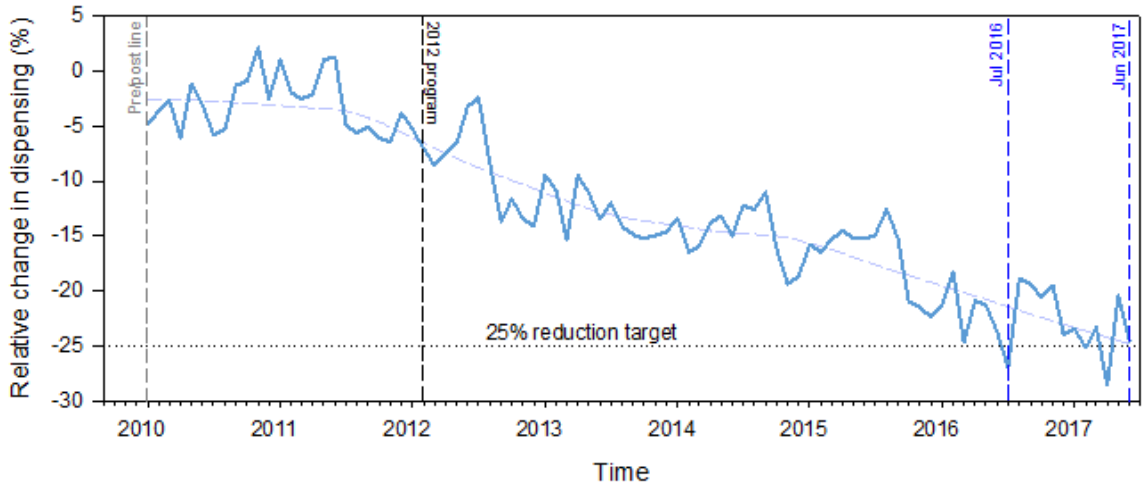


Figure 2: Volume of antibiotics dispensed by month relative to estimated dispensed without NPS MedicineWise intervention, January 2010 to June 2017. Grey vertical line indicated the start of the NPS MedicineWise program

Changes in GP knowledge, attitudes and practice

Surveys were conducted to assess GP knowledge and attitudes to antibiotic resistance and found that they had improved in 2017 compared to 2011 with 14% more GPs aware that resistance can occur after single use of an antibiotic (46% vs 32%, $p < 0.001$) and 3% more GPs recognising that prescribing an antibiotic that is unlikely to benefit the patient can increase resistance (97% vs 94%, $p = 0.042$) (Table 2).

Table 2: Percentage of GPs selecting desired responses to statements about antibiotic resistance

Statement (desired response)	GPs selecting desired response		
	2011 % (n)	2017 % (n)	Significant difference
Prescribing an antibiotic that is unlikely to benefit the patient (Factor selected)	94 (625)	97 (475)	+3%, p = 0.042
Antibiotic resistance, lasting up to 12 months, may occur after single use of antibiotic (Agree/Strongly agree)	32 (210)	46 (232)	+14%, p < 0.001
Antibiotic resistance is a problem in the community served by my practice (Agree/Strongly agree)	55 (364)	61 (312)	+6%, p = 0.027

Positive changes occurred in the ways GPs approach consultations with patients and discuss antibiotic resistance. The proportion of GPs in the sample who indicate that they 'always' consider antibiotic resistance when prescribing antibiotics for URTIs increased from 33% in 2011 to 70% in 2017 ($p < 0.05$) (Figure 3).

In 2017, 64% of GPs reported 'always' or 'often' discussing the issue of antibiotic resistance with patients presenting with URTIs compared to 50% in 2011 ($p < 0.001$). This is a positive finding, as discussing the risks versus the benefits of antibiotics is likely to reduce antibiotic prescribing as part of a shared decision-making approach.

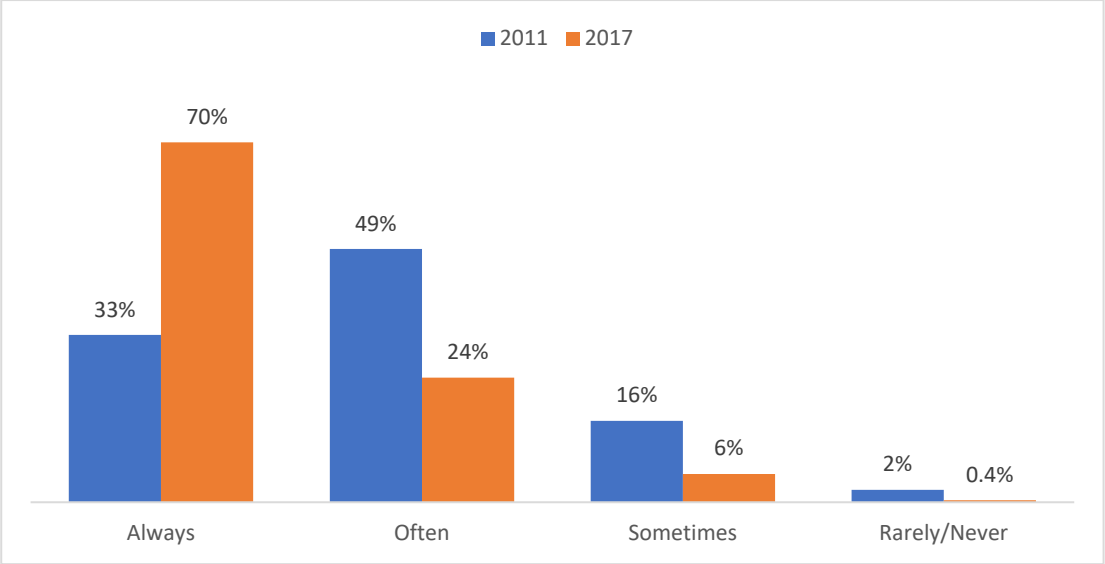


Figure 3: Percentage of GPs who considered the issues of antibiotics resistance when prescribing, 2011 and 2017

In 2017 GPs were also more likely to indicate that they rarely or never prescribe antibiotics to meet patient expectations than in 2011 (78% vs 62%, $p < 0.001$) (Table 3).

Table 3: Percentage of GPs selected desired response for consultations with patients presenting with URTIs, 2011 and 2017

Situation (desired response)	GPs selecting desired response		
	2011 % (n)	2017 % (n)	Significant difference
You consider the issue of antibiotic resistance when prescribing (Always/Often)	82% (543)	95% (475)	+13%, $p < 0.001$
You prescribe antibiotics in order to meet your patient's expectations (Rarely/Never)	62% (410)	78% (389)	+16%, $p < 0.001$
You recommend symptomatic management alone (Always/Often)	90% (602)	93% (471)	None
You prescribe a narrow spectrum antibiotic when required and available (Always/Often)	72% (465)	59% (296)	–13%, $p < 0.001$

Consumer awareness of antibiotic resistance has increased

Gains were made in consumer knowledge of antibiotics. An ongoing process of research and evaluation has identified insights about consumer knowledge and attitudes, and our increased understanding has influenced an evolving communications strategy.

Based on consumer surveys, the launch of the program coincided with a significant improvement in the number of people who understood that bacteria are becoming resistant to antibiotics, from 50% in 2011 to 72% in 2013. Over time, consumer surveys have found an increase in the proportion of people who understand that antibiotics kill bacteria – from 70% in 2014 to 74% in 2017. The proportion of consumers who indicated they had heard of the term 'antibiotic resistance' increased from 70% in 2014 to 74% in 2017 ($p < 0.05$), indicating that consumer awareness of the term has increased during the RAR program.

More consumers believe that antibiotic resistance is affecting them now, from 11% in 2015 to 25% in 2017 (Figure 4). Consumers who reported being unsure remained consistent across the two time periods, with nearly half of respondents in both time periods (46% in 2017 and 47% in 2015) indicating that they were unsure when antibiotic resistance would pose a problem to them and/or their family now.

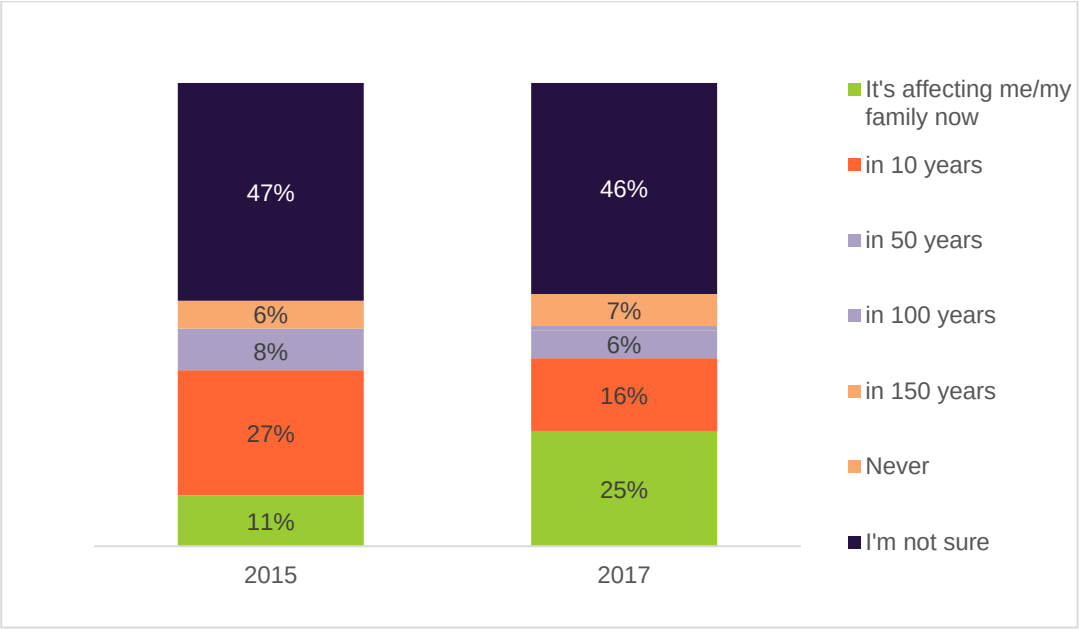


Figure 4: Percentage of consumers by when they believed antibiotic resistance will affect them, 2015 and 2017

Discussion

Changing consumer attitudes and beliefs and ongoing campaign work are contributing factors to reducing unnecessary demand for antibiotics and need to be conducted in parallel with GP education programs. Changes in antibiotic prescribing, GP knowledge, attitudes and practice, and consumer knowledge and beliefs have been detected across the course of the 5-year program.

The program has successfully reduced antibiotic prescribing in Australia

Antibiotic prescribing in Australia decreased during implementation of the RAR program. The target to reduce antibiotic usage from 24 to 19 DDDs per thousand inhabitants per day has been achieved.

Analysis of concessional PBS data estimated an overall reduction of 24.8% in the number of antibiotic prescriptions dispensed to concessional beneficiaries compared to the volume that would have been expected without the NPS MedicineWise program.

Another analysis, using data from 2012 to 2017 that included both concessional and under co-payment information, detected an estimated reduction of 18.4% in the rate of dispensing of J01 class antibiotics, from 23.3 DDDs in 2012 to 19.0 DDDs in 2017. Compared to overall figures, the drop-in prescribing among GPs was more pronounced, with a decrease of 21.5%, from 20.2 DDDs in 2012 to 15.9 DDDs in 2017. This allowed us to identify that most of the decline in overall usage of antibiotics was driven by a decline in prescribing by GPs. The decrease in prescribing seen among GPs is not evident among other types of health professionals.

GP knowledge, attitudes, and practice related to URTIs and antibiotic resistance have changed during the RAR program

Overall, the survey findings indicate that there were positive changes in GP knowledge, attitudes, and practice from 2011 to 2017. A greater proportion of GPs indicated that they consider antibiotic resistance when prescribing and that they discuss it with their patients who present with URTIs. This shows GPs are more aware of antibiotic resistance as a public health issue.

Consumer knowledge of antibiotics and antibiotic resistance remains a challenge, but some gains have been made.

From 2015 to 2017, a statistically significant proportion of people who believe antibiotic resistance is affecting their own family increased from 11% to 25%.

COST–BENEFIT ANALYSIS OF THE 2015 PROTON PUMP INHIBITOR PROGRAM

About the program

NPS MedicineWise launched the '*Proton pump inhibitors*' program in April 2015 and it was active for approximately 12 months. The aim of the program was to provide an opportunity for GPs to reflect on their current practice and prescribing patterns for PPIs. The goal of the program was to reduce GPs' inappropriate prescribing of PPIs, particularly high-strength PPIs, for patients managed in primary care.

The key messages for the program included:

- Review all existing patients taking PPIs.
- Confirm whether the indication for treatment remains and whether the dose of PPI can be reduced or stopped.
- Encourage lifestyle modifications and review use of drugs that exacerbate dyspepsia symptoms.
- Decrease PPI use to low doses or intermittent, symptom-driven therapy once symptoms are controlled.
- Always discuss the expected duration of treatment and have a plan for stepping down or stopping treatment when patients are started on PPIs.

There were four GP-focussed objectives developed for the PPI program:

- Increase the proportion of GPs who select patients to benefit from a review of their PPI therapy.
- Increase the proportion of GPs who differentiate the duration of PPI therapy required at high and low doses.
- Increase the proportion of GPs who implement the appropriate step-down PPI therapy.
- Increase the proportion of GPs who initiate PPIs as a trial and undertake a review at 4–8 weeks.

The 2015 PPIs program's interventions delivered to GPs included: a national case study, clinical audit, PBS feedback, MedicineWise News, NPS Direct, a Choosing Wisely recommendation, online videos, web pages, and a symptomatic management pad. GP participation in these interventions is presented in Table 4.

Table 4: GP participation in the interactive components of the 'Proton pump inhibitors: too much of a good thing' program

Activity	GPs
Clinical audit	687
Case study	397
PBS feedback	≈24,000

Method

Cost–benefit analysis was used to compare the costs and effects of the PPIs program, expressed in monetary terms. The measures used in this analysis are:

- The **costs** of the resources required to deliver the PPIs program. Program cost data was collected from NPS MedicineWise organisational timesheet data, invoice records and budget data.
- The **benefits** of the program expressed as the monetary value of the effects generated by the program. The benefits are restricted to the direct savings associated with the reduction in PBS benefits paid.

The cost–benefit was calculated from the program net benefit and the benefit–cost ratio. The *net benefit* is calculated as the difference between the benefits and the costs. Values higher than zero indicate that monetary benefits exceed monetary costs, while the *benefit–cost ratio* is calculated as the ratio of benefits to costs. Values higher than one indicate that the benefits exceed the costs.

Provider-level dispensing and reimbursement data for PPIs listed on the PBS (Table 5) were obtained from the Department of Human Services (DHS). The data covered the period from 1 January 2006 to 30 June 2017 and was supplied in aggregate form at the GP level. The PBS data comprises the number of subsidised scripts dispensed, both original and repeats, with a breakdown by general and concessional beneficiary entitlement levels. Repatriation Pharmaceutical Benefits Scheme (RPBS) data were not included.

Costs and benefits were adjusted to 2017–18 financial year equivalent value, using Australian CPI values published by the Australian Bureau of Statistics (ABS) and discounted at a rate of 5% per year after the first year (2014–15). The cost–benefit summary is presented in Table 8.

The benefits are restricted to the direct savings associated with the reduction in PBS benefits paid. Time series analysis was used to quantify the impact of the PPIs program on GP prescribing of high-strength PPIs. Based on actual PBS prescribing volumes, statistical models were developed to estimate the volume of PBS prescribing for these medicines. Prescribing volumes were estimated with and without the NPS MedicineWise intervention.

Table 5: PBS item codes used in the analysis of the 2015 PPI Program

Medicine	PBS item numbers	Dose, form and strength
Esomeprazole	8601Q	40 mg tablet (30)
Lansoprazole	2240X, 2241Y, 8528W, 8529X, 8949B, 8950C,	30 mg tablet (28)
Omeprazole	1326T, 1327W, 8331L, 8333N, 8776X, 8777Y,	20 mg capsule (30)
Pantoprazole	8007K, 8008L, 9423Y, 9424B	40 mg tablet (30)
Rabeprazole	8508T, 8509W	20 mg capsule (30)

The PBS data comprises the number of subsidised scripts dispensed, both original and repeats, with a breakdown by general and concessional beneficiary entitlement levels. Repatriation Pharmaceutical Benefits Scheme (RPBS) data were not included.

Program costs incurred by NPS MedicineWise to conduct the interventions were used to calculate the cost of the program. Program cost data were collected from NPS MedicineWise organisational timesheet data, invoice records and budget data.

Results

The PPI program was associated with a decrease in dispensing of high-strength PPIs (esomeprazole, lansoprazole, omeprazole, pantoprazole and rabeprazole) but not low-strength PPIs. For the period April 2015 to June 2017, the average estimated reduction in PBS dispensing volume of high-strength PPIs associated with the PPI program was 843,748 concessional prescriptions. This represents a relative decrease of 4% in the modelled PBS volume. The average cost to the PBS per dispensed medicine was $15.33 for the period April 2015 to June 2017, giving a gross cost decrease attributable to the program of $12,560,951.

In Figure 5, the shaded area between the estimated volume with (red trend line) and without (represented by a green trend line) the PPIs program represents the impact of the program in decreasing the volume of high-strength PPIs dispensed.

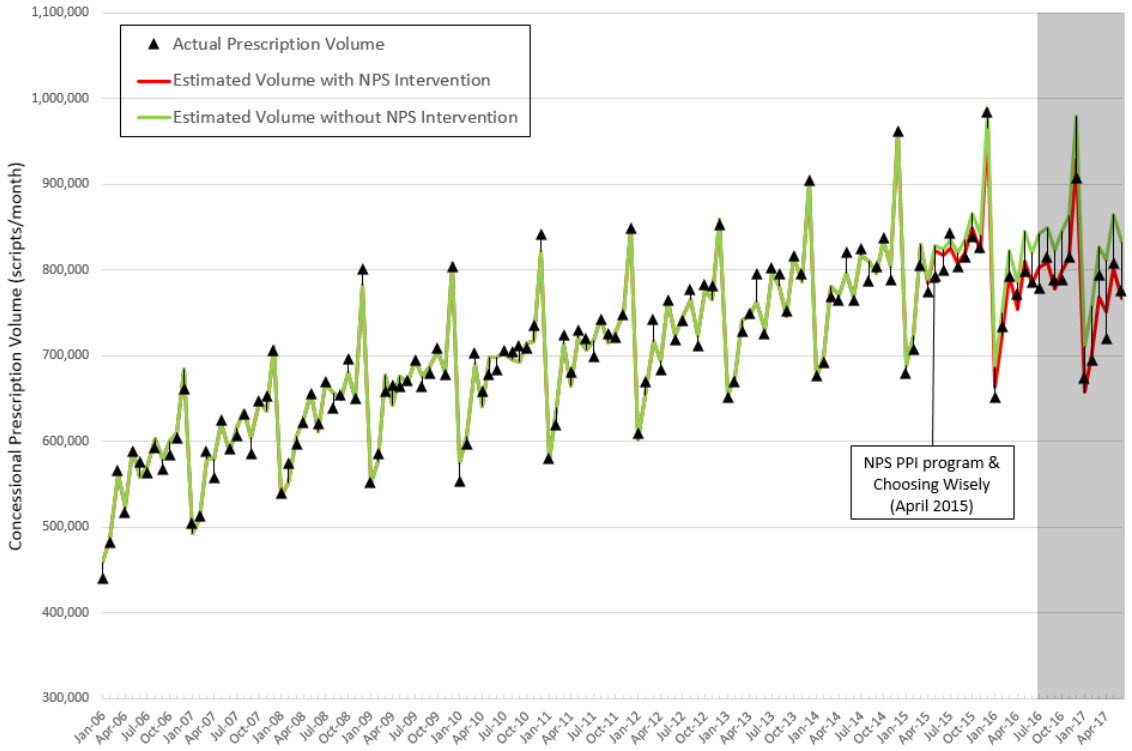


Figure 5: Time series analysis of PBS dispensing of high-strength PPIs

All costs were adjusted to the 2017–18 financial year equivalent value using Australian CPI values published by the ABS. Program costs and savings to the PBS after the first year (2014–15) were discounted at a rate of 5% per year.

Table 6: PBS expenditure change associated with NPS MedicineWise PPI program

Type PPI	2014–15	2015–16	2016–17	Total (Unadjusted)	Total (adjusted to 2017 equivalent)	Total (adjusted & discounted 5% annually)
High-strength PPIs	↓ $220,246	↓ 4,403,385	↓ $7,937,320	↓ $12,560,951	↓ $12,820,935	↓ $11,809,075

Table 7: NPS MedicineWise PPI program costs

	Unadjusted	Adjusted to 2017 equivalent	Adjusted and discounted (5% annually)	2014–15	2015–16	2016–17	Source
Invoiced	$90,937	$95,087	$95,087	$90,937	$0	$0	Invoices from PPIs program
Staff costs	$255,520	$267,071	$266,675	$247,909	$7,546	$64	Timesheet and human resources data for PPIs program
Infrastructure/ support services	$61,325	$64,097	$64,002	$59,498	$1,811	$15	
Total program costs	$407,781	$426,255	$425,764	$398,345	$9,357	$79	

Table 8: Cost benefit summary of the PPI program

	Discounted (5% annually) and adjusted to 2017 equivalent
Total program costs (cost)	$425,764
Total change in PBS cost (benefit)	$11,809,075
Net benefit of program	$11,383,311
Benefit to cost ratio	28

The net benefit of the program is the sum of the change in PBS costs minus the costs of the NPS MedicineWise program: $11,809,075 – $425,764 = **$11,383,311**. This represents a monetary gain as a result of the program. The benefit to cost ratio is calculated by dividing the estimated cost of changing prescribing patterns by the cost of the NPS MedicineWise program.

Benefit to cost ratio: 11,809,075/425,764 = **27.73**

Values higher than one indicate that the benefits exceed the costs. The value of 27.73 indicates that for every dollar spent on the program, approximately $28 in monetary benefit was gained.

PBS AND MBS SAVINGS

PBS savings

NPS MedicineWise receives funding from the Department of Health (DoH) to deliver quality-use-of-medicines programs (QUM) that reduce government expenditure on PBS subsidies. Under the latest funding agreement, NPS MedicineWise programs were expected to reduce expenditure by $70 million over the 2016–17 financial year. Based on an analysis of PBS subsidy data provided by Department of Human Services (DHS), expenditure was estimated to have been reduced by $71.62 million in the 2016–17 financial year, $1.62 million more than the amount expected.

The expenditure savings arise from the activities of seven programs implemented between 2012 and 2016. The programs aimed to improve the use of medicines in the treatment of respiratory tract infections, hypertension, chronic pain, type 2 diabetes, depression, asthma and gastro-oesophageal reflux. Each program reduced expenditure on PBS subsidies by preventing unnecessary or excessive prescribing of medicines that are typically used to treat these diseases.

The savings were estimated using a statistical method known as time series analysis. The method analyses historical trends in pharmaceutical dispensing and makes a projection of what these trends would have been had the programs not taken place. It then compares the two to estimate the expenditure savings. The programs, the medicines they were expected to impact, and the estimated savings from each one are summarised in Table 9.

Table 9: PBS savings over the 2016–17 financial year arising from QUM programs launched between 2012 and 2016

		Expenditure savings
Program	Medicines	2016–17 FY
Reducing antibiotic resistance (2012–17)	Antibiotics	$21.37 M
Blood pressure: Measure, manage and monitor (2015)	Fixed-dose combination (FDC) antihypertensives	$2.71 M
Chronic pain: Opioids and beyond (2015)	Opioids alkaloids and fentanyl	$10.45 M
Type 2 diabetes: What's next after metformin (2016)?	FDC oral glucose-lowering agents	$9.05 M
	Sodium-glucose transporters -SGLT-2 inhibitors	$1.60 M
Depression: Challenges in primary care (2012) & Re-examining the options (2016)	Serotonin and norepinephrine reuptake inhibitors (SNRIs)	$7.55 M
Asthma: Exploring inhaled medicines use and asthma control (2014)	Inhaled corticosteroids and long acting beta 2 agonists (ICS/LABA) inhalers	$10.46 M
Proton pump inhibitors: Too much of a good thing? (2015)	Proton pump inhibitors (PPIs)	$8.43 M
	TOTAL PBS EXPENDITURE SAVINGS	$71.62 M

Programs were included on the following basis:

- The impact on PBS prescribing of the programs could be detected using established time series analysis methods
- A primary aim of the program was to reduce inappropriate medicines prescribing, rather to than primarily address other quality issues. These programs lend themselves to analysis for direct cost savings to the PBS
- Sufficient data were available to quantify the impact of the program. Typically, this requires 12 or more months to have elapsed from program launch to the end of the modelled savings assessment period

- The annual cost to the PBS for the target medicines of the program was substantial enough to warrant investigation

Data sources

The data used in this report were sourced from the:

- NPS MedicineWise internal database
- Department of Human Services with PBS data until June 2017 provided to NPS MedicineWise in April 2018

The NPS MedicineWise internal database was used to retrieve data on GP program participation numbers and other program information (e.g. key messages and start and end dates).

The DHS supplied the PBS data in aggregate form at the GP level. The PBS data comprises the number of subsidised scripts prescribed, both original and repeats, with a breakdown by general and concessional beneficiary entitlement levels. Repatriation Pharmaceutical Benefits Scheme (RPBS) data were not included.

The PBS data were supplied according to the following specifications:

- Vocationally Registered General Practitioners (VRGPs) and Other Medical Practitioners (OMPs)
- PBS prescribing by scrambled provider number
- 1 July 1996 to 30 June 2017 time period
- Date of prescribing and date of supply of medicine
- Price and net benefit of scripts by PBS medication item code

Notably, GP program participation and PBS prescribing are not linked datasets. Consequently aggregate analyses are used in the time series modelling.

Time series analysis

Time series analysis was used to quantify the impact of NPS MedicineWise programs on PBS medicines prescribing by GPs. Based on actual PBS prescribing volumes, statistical models were developed to estimate the volume of PBS prescribing, for the medicine/s investigated. Prescribing volumes were estimated in the *presence* and *absence* of the NPS MedicineWise intervention being investigated.

A Bayesian hierarchical time series approach was applied to the time series analysis for the antibitoic resistance programs. Using this approach, PBS data for both GPs and other non-GP prescribers were used to forecast GP prescribing trends. Cumulative levels of GP participation for a specific program were not used in this analysis. This approach was used for detecting cumulative impacts that occurred as the result of a continuity of NPS MedicineWise programs in a particular area, rather than the result of a stand-alone program.

Variables in the time series model

- Trend – the trend term was sequentially coded as 1 through to the highest value associated with the final month in the modelled series, assuming a linear increase in drug utilisation in the analyses
- Seasonality – PBS data are subject to seasonaility due to the effect of the Safety Net. For most medicines PBS volume/expenditure characteristically peaks during December. Adjusting for seasonality is essential for correctly specifying the regression model parameter estimates.
- Major external events – a change-in-level and/or change-in-trend term was included in the time series model to account for major external events as necessary. Major events include but are not limited to: co-payment status changes; substantial co-payment and safety net threshold increases; relevant new or removed PBS item listings; pack size changes; authority listing changes; PBS reforms; national and international adverse event warnings.

Intervention terms:

- **‘Cumulative GP’** denotes the primary intervention term used in all but the Bayesian hierarchical time series model in this report. It represents the cumulative number of unique GP participants in the

active components of a specific NPS MedicineWise program. Active program components included educational visiting, clinical audits, interactive workshops, group discussions and case studies.

- **'Cumulative GP * Trend'** denotes the interaction term between the underlying trend and the cumulative number of unique GP participants in the active components of a specific NPS MedicineWise program. It is derived from multiplying the value of 'Cumulative GP' with the 'Trend' term. 'Cumulative GP * Trend' was used, in addition to 'Cumulative GP'.

Note, non-visiting programs do not include educational visiting/academic detailing with GPs. They do however include activities, such as GP PBS prescribing feedback, which can be effective in influencing prescribing behaviour. The impact of non-visiting programs is estimated by including a step function in the mode, therefore GP participation rates are not included.

Modelling – PBS prescription volume vs expenditure

A reduction in PBS prescription **volume** model is a precondition for assessing whether the NPS MedicineWise intervention has had an effect upon expenditure. If there is *no* reduction in volume of prescribing by GPs, the intervention is considered *not* to be cost saving. If there is a reduction in volume of prescribing by GPs, further analyses are conducted to determine whether there are cost savings. These analyses estimate cost savings either: 1) directly, via modelling **PBS expenditure** over time; or 2) indirectly, by using the **PBS volume** model to calculate average monthly pricing. Cost savings were estimated directly in this report, except when there were market price changes for the medicine/s investigated or when analyses had to be restricted to concessional beneficiaries.

Estimating changes in PBS volume or expenditure, for specific medicine/s, over the study period entailed estimating the adjusted effect(s) of the intervention term(s) for each of the reported months of the time series and then summing across these months.

Decay vs non-decay model

PBS expenditure savings were modelled both with and without the decay variable. The best fitting model selected was based on the statistical model selection critera. Where the decay and the no-decay models were similar – within two AIC points – the mid-point of these two models was used to provide a more conservative estimate of the PBS savings. That is, the savings estimates from both models were averaged.

Limitations

Caveats to note when reading this report:

- The PBS claims data used in this report does not contain information about individual patients or clinical information such as the indication for which their medicine is being prescribed
- Analysis was restricted to concessional entitlement beneficiaries when the DPMQ was less than the general co-payment
- Models may not account for all variation in prescribing patterns due to concurrent and unidentified external factors
- Models may not adequately separate the effects of an NPS MedicineWise intervention versus an external event, if the two events occur too closely in time
- The linear time trend assumption may be invalid for some of the medication groups being analysed

MBS savings

NPS MedicineWise receives funding from DoH to deliver programs that improve the ways diagnostic medical tests are used, particularly in domains of primary care where the use of these tests may be out of line with evidence-based guidelines. The goal of these 'quality use of diagnostics' (QUD) programs is to reduce unnecessary harm or health care expenditures that may arise from these practices.

Under the latest funding agreement with DoH, NPS MedicineWise's programs were expected to reduce government expenditure on MBS subsidies by $13 million in 2017. An analysis of data provided by DHS estimated that a single NPS MedicineWise program reduced MBS expenditure by $14.44 million in 2017. This was $1.44 million more than the amount expected in 2017.

The estimated savings arise from the ongoing impact of a QUD program launched in early 2015. The program aimed to reduce the inappropriate use of computed tomography (CT) scans and ultrasounds in the investigation of non-specific abdominal pain. Under current guidelines, the use of either test is unwarranted for the investigation of such pain.

The program's impact was estimated using time series analysis. The method analyses historical trends in the use of government-subsidised ultrasound and CT scans and projects what the use of these services would have been had the program not taken place. It then compares this with actual usage to estimate the number of scans averted by the program. The result was then multiplied by the average government subsidy for each type of scan to give an estimate of the amount of expenditure saved by the program. These expenditure savings are summarised in Table 10 and Figure 6.

Table 10: MBS savings in 2017 due to the 2015 Diagnostic imaging for abdominal pain program

Program	Service	January – December 2017
Diagnostic imaging for abdominal pain (2015)	Abdominal CT scans	$7.46 M
	Abdominal ultrasounds	$6.98 M
	Total	$14.44 M

Data Source

The provider level reimbursement data for all MBS items in Category 5 – Diagnostic imaging services, were obtained from DHS. The data provided by DHS to NPS MedicineWise in May 2018 covered the period from January 2012 to December 2017 (note: DHS only maintains 5 years' worth of data). The key variables in the datasets are:

- scrambled provider code
- date of service (year, month)
- patient sex and age group
- provider major speciality
- Medicare item number
- number of services
- amount of benefit paid by Medicare

Study design

The MBS data obtained for this analysis allowed for services referred by GPs to be distinguished from services referred by other health professionals (non-GP). This separation is valuable in evaluating the impact of the NPS MedicineWise interventions which targeted only GPs.

The implemented analysis used non-GP data as a control series to predict what would have occurred in the GP time series had the intervention not occurred. This prediction was calculated from the time series values of the GP group in the pre-intervention period, along with the time series values of the control group (non-GP) in the post intervention period.

The impact of the intervention program was derived by the subtraction of the predicted data from the observed data in the post intervention period.

The saving estimate is derived as the *sum of* the monthly reductions in referrals during the post-intervention period (comparing the counterfactual portion of the time series and the observed values) *multiplied by* the monthly average benefit paid (dividing total benefit paid by total number of services).

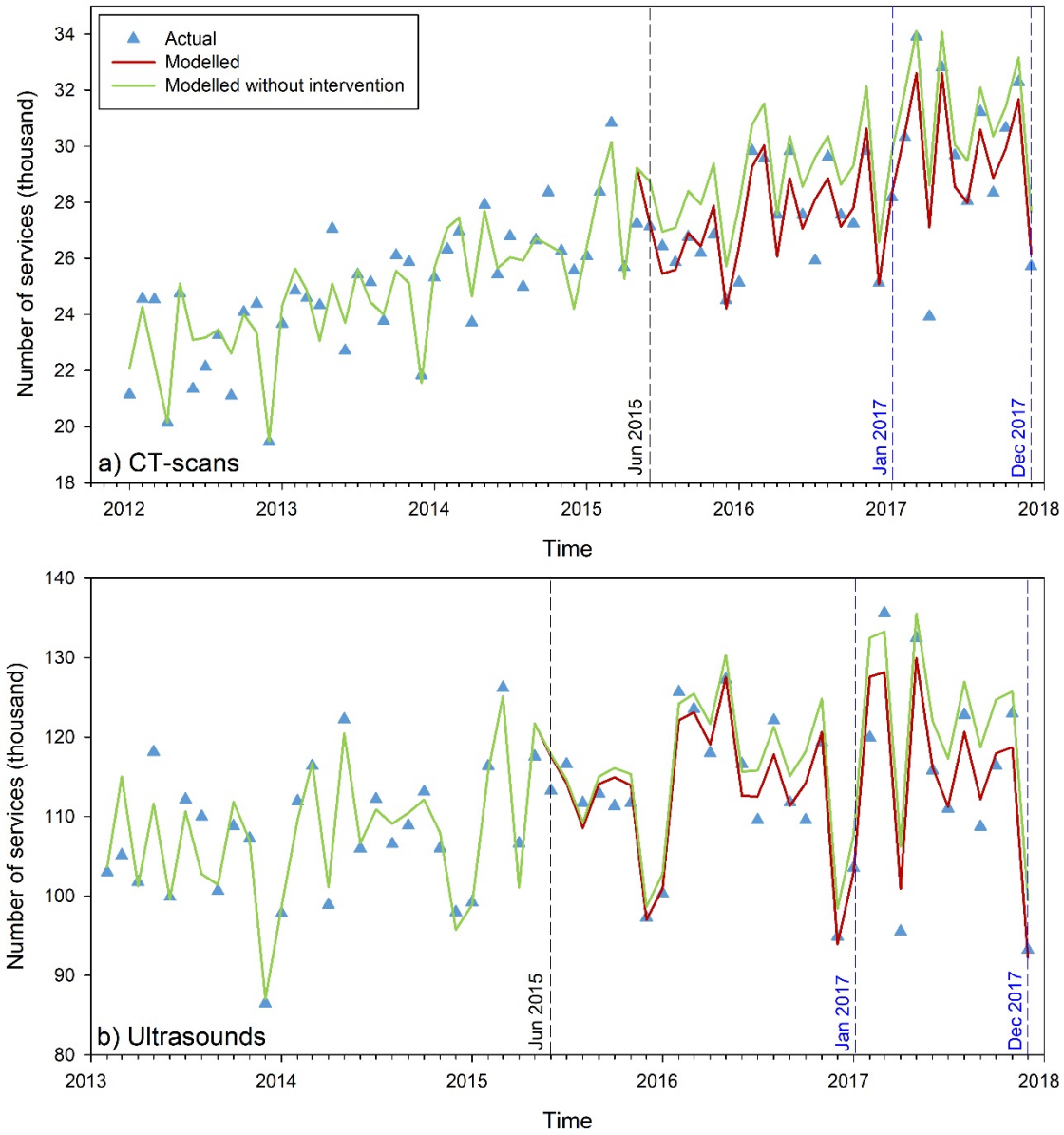


Figure 6: Time series analysis of abdominal CT scans (a) and abdominal ultrasounds (b). Blue triangles are actual data, red lines are the modelled data and green lines are the number of services expected had the program not taken place. Dashed vertical lines indicate the launch of the program in June 2015 and the calendar year over which savings were calculated (Jan to Dec 2017).

IMPACT ON GP KNOWLEDGE

Evaluation was conducted to assess changes in awareness, knowledge and practice among GPs following their participation in visiting programs during 2017-18. Programs evaluated included:

- **Type 2 diabetes; What's next after metformin**
- **COPD medicines and inhalers: Stepping through the options**
- **Ankle and Knee injuries: Your imaging choices**

GP surveys are the primary method used to measure short and intermediate-term program impact.

GP surveys

The GP surveys conducted during 2017-18 were either pre-post or retrospective pre-test (RPT) survey designs.

Surveyed GPs (approximately 2,000) are randomly selected from a sample of about 10,000 GPs in our database who have participated in previous NPS activities. The sample size is selected based on an estimate to be able to detect a 5-10% change in GP behaviour post intervention. A paper-based (or in some cases an online) self-completion questionnaire, containing questions related to program objectives and content within the educational visiting card, is developed with the assistance of the clinical leads. The questionnaires are pre-tested by approximately 5 GPs and reviewed by an NPS MedicineWise medical advisor. Feedback was incorporated and the questionnaires are distributed to selected GPs with two follow-up reminders. These surveys are typically in field for a period of 6 weeks and achieve an average response rate of 20-25% for paper-based surveys and 10-15% for online surveys.

GP samples (pre and post, or Now and Before for RPT surveys) are matched where possible using non-identifying codes. Survey data is analysed after the program to identify any changes in GP practice, attitudes and knowledge. The McNemar and Wilcoxon tests are used where applicable for related GP samples and chi-square and Mann-Whitney tests for analysing the data as independent samples. The data are analysed using SPSS version 23.

GP feedback about academic detailing and small group meetings

An online GP survey was used to collect feedback from GPs about the educational visiting programs. GPs were emailed a link to the online questionnaire within one week of participating in a one-to-one visit or small group case-based meeting. The questionnaire contained questions to assess GPs' practice, attitude, knowledge and satisfaction about the visit and the topic. The data were downloaded in an aggregated reporting format from Survey Gizmo, and further analysis was conducted via Excel or SPSS version 23.

TYPE 2 DIABETES: WHAT'S NEXT AFTER METFORMIN?

Introduction

Approximately 1.7 million Australians have diabetes, with type 2 diabetes accounting for 85% of cases. Medicines to treat diabetes are among the fastest growing PBS-subsidised medicines, both in volume and cost to government. Metformin and the sulfonylureas are the most commonly prescribed blood glucose-lowering medicines. While the number of scripts for metformin doubled from around 2.3 million in 2000 to around 5.0 million in 2013, the use of sulfonylureas has remained steady and may reflect a move away from these medicines in favour of newer and more costly blood glucose-lowering agents. GPs face a complexity of options for managing diabetes, including many new medicines, new local guidelines and emerging clinical outcome data.

In July 2016, NPS MedicineWise launched the 12-month visiting QUM program *Type 2 diabetes: What's next after metformin?* The goal of the program was to reduce the occurrence of diabetes-related complications for people with type 2 diabetes managed in primary care.

The main objectives of this program were:

- Increase by 5% the proportion of people with diabetes who adhere to metformin when it is initiated, 24 months after the start of the program.
- Increase by 10% GP prescribing of sulfonylureas as second line therapy in addition to metformin for people with diabetes, 18 months after the start of the program.
- Increase by 5% the proportion of people with diabetes who achieve their blood glucose targets (HbA_{1c} of 42-64 mmol/mol), 18 months after the start of the program.

The evaluation sought to determine the short and medium-term impact of the Type 2 diabetes visiting program on GP practice and prescribing behaviour achieved as a result of NPS MedicineWise interventions. Program reach against key performance indicator targets was assessed.

Key messages

Health professionals

- Adherence is a critical issue to address for patients prescribed metformin.
- Sulfonylureas are still recommended as the standard initial option for addition to metformin.
- Treatment algorithms reflect the complexity of treatment decisions but offer consistent guidance on a stepped/progressive approach to blood glucose control.

Consumers

- Learn more about your diabetes and diabetes medicines to help you manage your condition.
- Talk to your health professional about the ways they can help you manage your diabetes.

Program activities included educational visits, interactive case studies, clinical audits, pharmacy practice reviews, print publications, online resources and consumer-directed decision aids and fact sheets.

The diabetes program reached a large number of GPs nationwide, including 8,747 GPs who participated in one-to-one or small group meetings, 1,014 who took part in a MedicineInsight visit and 639 who undertook a clinical audit. The interactive case study was completed by 346 GPs, 1048 pharmacists and 817 nurses.

Methods

Process and impact evaluation was undertaken to measure reach and to assess the short and medium-term impact of the program. The data collection period was 17 months from 1 July 2016 to 1 December 2017.

Online GP survey

To measure short-term impact, GPs were invited to complete an online evaluation questionnaire approximately 1 week after their educational visit. The questionnaire assessed changes in GP practice, program satisfaction and net promoter score as a result of the visit. The data was downloaded in both Excel format for analysis of open-ended questions and in an aggregated reporting format from Survey Gizmo.

Retrospective pre/post GP survey

To measure medium-term impact, GPs participated in a retrospective pre/post online survey with a control group.

- Participant survey – a retrospective pre/post survey of a random sample of GPs who had participated in a one-to-one or small group visit.
- Control survey – a control sample of GPs who had not participated in any active intervention randomly selected for comparison from the NPS MedicineWise database.

Self-completion questionnaires were developed for the participant and control GP samples. The survey questions were developed to measure program objectives and key messages. The survey was conducted online using Survey Gizmo. GPs from participant and control email lists were sent an invitation to participate in the online survey with the survey link. The surveys were conducted in August 2017 approximately 12 months after program launch and were open for a period of 6 weeks. Two reminders were sent via email at 2-week intervals.

Matched and independent statistical comparisons were made between the groups using SPSS statistical software v.23. The McNemar test was used for the matched pre- and post-participant data and chi-squared test for participant and control group comparisons (95% CI; significant if $p \leq 0.05$).

Clinical audit

To assess changes in GP practice, clinical audit data was analysed against eight clinical indicators specified within the audit. GPs were asked to assess 10 patients. Data was collected at two time-points for each GP using the same patients. The analysis involved comparing review phase data with initial phase data for each participating GP. For each indicator, a generalised linear model with a Poisson distribution, log link function and an offset (logarithm of the number of patients) was used to estimate the percentage change in the number of patients satisfying the indicator. Data were excluded from analysis if there were no patients in the initial or review audit phases. The analysis was conducted using the GENMOD procedure in SAS v.9.3.

Results

Online GP survey – short-term impact

A total of 889 GPs completed the online survey, which was a response rate of 10%. When GPs were asked how the educational visit would affect their professional practice, 11% reported they had changed their practice and a further 33% said they intended to change their practice. GPs reported they would use sulfonylureas second line for most patients or use sulfonylureas more often. GPs reported having a clearer plan for stepping up diabetes medicines because of the visit.

Retrospective pre/post survey – medium-term impact

The largest positive change among visited GPs was in the proportion who said they applied a stepwise approach when initiating diabetes medicines, using the Australian Blood Glucose Treatment Algorithm for type 2 diabetes (+42%). This was followed by the group who reported considering PBS item criteria when prescribing a combination of medicines for diabetes management (+33%, Table 11). GPs also reported engaging in shared decision making with patients starting metformin and using individualised HbA_{1c} treatment targets to guide glucose control.

Table 11: GP considerations for the management of patients with type 2 diabetes before and after (now) the education visit, 1 July 2016 – 1 December 2017

Statement	Control N=160	Before N=136	Now N=136	Difference
Apply a stepwise approach to initiating diabetes medicines using the Australian Blood Glucose Treatment Algorithm for type 2 diabetes	87%	39%	81%	+42%*
Engage patients in shared decision making when initiating metformin	94%	69%	90%	+21%*
Use individualised HbA_{1c} treatment targets to guide glucose control	79%	60%	87%	+26%*
Adherence is critical to the success of metformin and should be reviewed regularly	93%	68%	92%	+24%*
Sulfonylureas are valuable initial second-line options if treatment with metformin has failed to adequately control blood glucose levels	88%	60%	85%	+25%*
PBS item criteria when prescribing a combination of medicines for the management of type 2 diabetes	**88%**	**54%**	**87%**	**+33%***

* $p \leq 0.000$

GPs were asked to rate their level of confidence in assessing the risks and benefits of prescribing a number of type 2 diabetes medicines. Self-reported confidence for all the listed medicines increased significantly after GPs participated in educational visiting.

The largest increase in confidence occurred for prescribing SGLT2 inhibitors (+38%), followed by gliptins (+32%) and GLP-1 analogues (+27%). Although 90% of GPs were already confident prescribing metformin, there was still a marked increase of 8% following the educational visiting for this first-line diabetes medicine (Figure 7). This increased confidence with metformin prescribing was not seen in the previous 2012 visiting program.

Participant GPs were more likely to intensify treatment for a patient adhering to metformin with a sulfonylurea or SGLT2. Participation was associated with improved knowledge about the benefits, efficacy and long-term safety of using sulfonylureas as a second-line option.

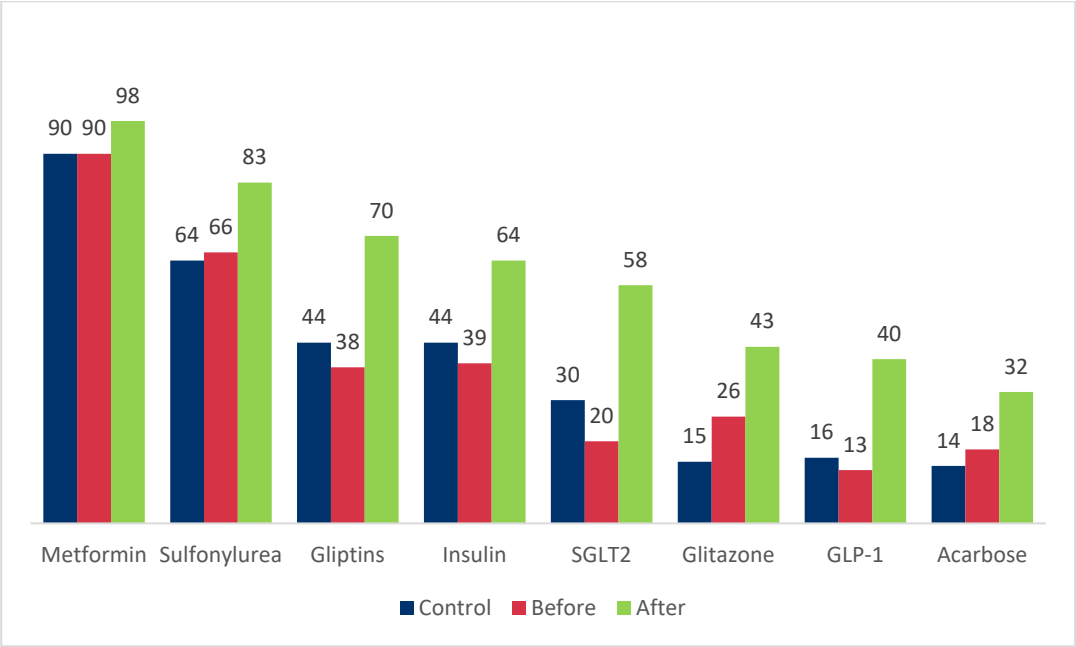


Figure 7: Percentage of GP confidence in assessing the risks and benefits of prescribing type 2 diabetes medicines before and after educational visiting, 1 July 2016 – 1 December 2017 Control N=160, Before-After N=136 (p < 0.000 for all)

GPs were asked what strategies they used to encourage patients to adhere to metformin (Figure 8). Improved metformin adherence for people starting metformin was a program objective. The greatest improvement seen among GPs after participating in an educational visit was in using shared decision-making tools such as the NPS MedicineWise patient decision aid to help patients make decisions about taking metformin (+58%). This was followed by prescribing once-daily extended release metformin formulations (+23%) and the promotion of dosing aids such as dossette boxes and Webster-paks (+23%). All strategies achieved statistically significant improvements except for addressing concerns about adverse events.

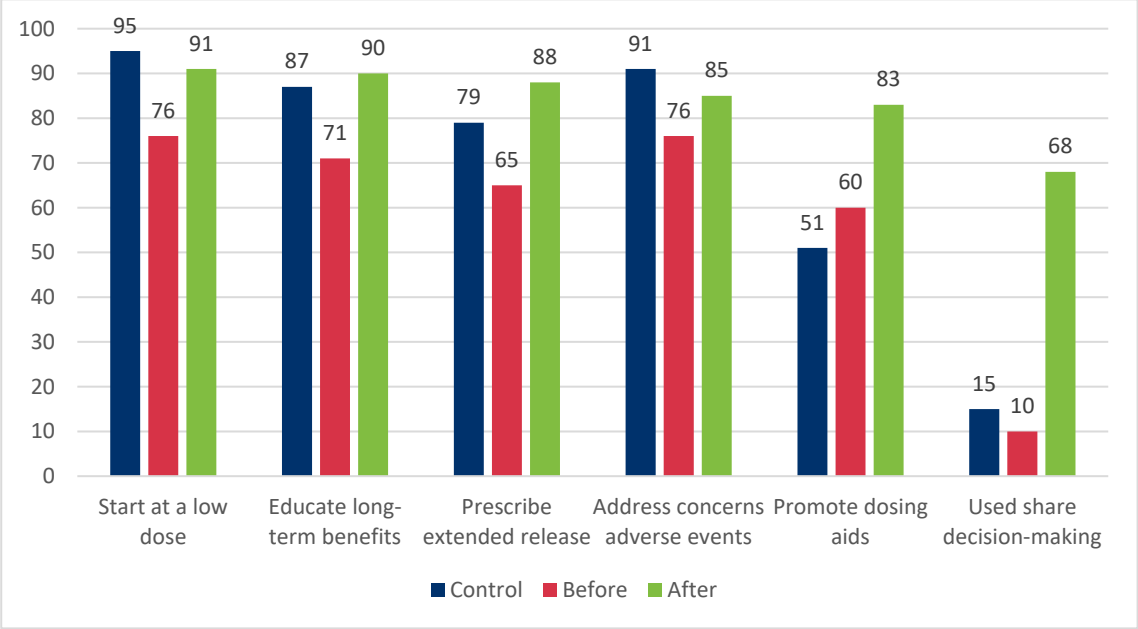


Figure 8: Strategies used by GPs to encourage patient adherence to metformin before the intervention and after, 1 July 2016 – 1 December 2017 (Control N=160, Before-After N=136)

Clinical Audit

A total of 647 GPs completed the initial and review phase of the clinical audit. Clinical indicators showed marked improvement in GP practice across several areas with the greatest changes observed in GPs whose patients successfully achieving recommended LDL cholesterol and HbA_{1c} targets (+51% and +50%, respectively). There were also positive changes for GPs' patients achieving blood pressure targets (+19%) and GPs measuring patients' HbA_{1c} in the last 3 to 6 months (+16%) (Table 12).

Table 12: Changes in clinical indicators by participating GPs, 1 July 2016 & 1 December 2017

Clinical indicator	GPs (initial/ review)	Patients (initial/ review)	Initial phase	Review phase	% change	p-value
Using metformin (excluding those with a contraindication or known allergy / intolerance)	704/ 647	6723/ 6177	99.0%	99.3%	0.3%	< 0.001
Implemented strategies to optimise adherence to blood glucose-lowering medicines	704/ 647	7039/ 6440	93.9%	99.5%	5.9%	< 0.001
Measured HbA_{1c} in the last 3 to 6 months	704/ 647	7039/ 6372	83.3%	96.5%	15.8%	< 0.001
Measured blood pressure in the last 3 to 6 months	704/ 647	7039/ 6429	95.8%	99.5%	3.8%	< 0.001
Measured lipid levels in the last 12 months	704/ 647	7039/ 6423	92.4%	97.7%	5.8%	< 0.001
Achieved recommended target HbA_{1c} and measured in last 3 to 6 months	704/ 647	6766/ 6036	50.8%	76.4%	50.3%	< 0.001
Achieved recommended target blood pressure and measured in last 3 to 6 months	704/ 647	7039/ 6361	78.6%	93.3%	18.6%	< 0.001
Achieved recommended target LDL-C and measured in last 12 months (< 2 mmol/L for primary prevention of CVD and < 1.8 mmol/L for secondary prevention)	704/ 647	7039/ 6301	50.5%	76.2%	50.7%	< 0.001

(N = 647)

Discussion

The evaluation showed that a larger proportion of visited GPs understood that adherence was critical to the success of metformin and should be reviewed regularly. These findings were further supported by review-phase clinical audit indicators that showed almost all GPs implemented strategies to optimise adherence to diabetes medicines.

To make a positive financial impact on the PBS, the program aimed to increase prescribing of sulfonylureas by reminding GPs that sulfonylureas were still the usual second-line option for addition to metformin for patients with type 2 diabetes. Both short- and medium-term impact evaluation suggests that the objective was achieved.

GPs said they had a clearer plan for stepping up diabetes medicines immediately following the educational visits. A greater proportion of GPs (42%) reported an improvement in applying a stepwise approach to the initiation of diabetes medicines using the Australian Blood Glucose Treatment Algorithm for type 2 diabetes when considering management.

Clinical audit indicators showed that there was a 50% improvement in the proportion of GPs whose patients achieved recommended target HbA_{1c} and who had measured HbA_{1c} in the previous 3 to 6 months. Evaluation feedback showed that 46% of the GPs had changed their practice or intended to change their practice by increasing their consideration of each patient's individualised HbA_{1c} target.

COPD MEDICINES AND INHALERS: STEPPING THROUGH THE OPTIONS

Introduction

COPD is a progressive disease affecting approximately half a million Australians. The disease is complex, debilitating and difficult to manage well, resulting in frequent consultation with GPs. Since 2010, many new COPD medicines and combinations have been added to the PBS, potentially causing confusion among health professionals and consumers.

In March 2017, NPS MedicineWise launched the visiting program *COPD medicines and inhalers: Stepping through the options*. The goal of the program was to improve quality of life of Australians with stable COPD through improved medicines management in primary care.

The main objectives of the program were:

- Increase the proportion of GPs who correctly diagnose COPD as per the Lung Foundation stepwise criteria.
- Decrease the proportion of COPD patients who are initiated on LAMA + LABA or ICS + LABA combination products.[1]
- Decrease GP prescribing of LABA and ICS + LABA, and LAMA and SAMA for patients with COPD.
- Increase the proportion of GPs and pharmacists who routinely monitor patient inhaler technique and adherence.

The evaluation sought to assess whether the COPD program had a measurable impact on GP knowledge and practice in line with its key objectives and messages.

Key messages were developed for health professionals and consumers and were incorporated into program activities.

Health professionals

- There are consequences to misclassifying COPD and not assessing its level of severity at regular intervals.
- Tailor your patient's medicines to the level and progression of COPD symptoms.
- Research suggests patients are sometimes prescribed incorrect COPD medicines.
- Adherence and inhaler technique are essential for optimal therapy because they will influence dosage and control of symptoms.

Consumers

- It is important to understand your diagnosis and the severity of your condition.
- Be actively involved in your COPD management.
- Ask your health professional to review your inhaled medicines whenever you are having difficulty or change your medicine.

The program activities included one-to-one educational visits, small group meetings, case study, pharmacy practice review, print publications and online resources.

[1] ICS: inhaled corticosteroid; LABA: long-acting beta2 agonist; SABA: short-acting beta2 agonist; LAMA: long-acting muscarinic agonist.

A total of 8,311 unique GPs participated in an activity for the COPD program; including 3,885 GPs who participated in a one-to-one educational visit, 3,303 in small group meetings and 374 in the case study. Other participating health professionals included pharmacists, nurses, medical specialists and medical students.

Methods

A pre/post survey of GPs was the primary method of impact evaluation for the COPD program. The survey was a self-completion, paper-based questionnaire of a random sample of GPs drawn from NPS MedicineWise records. This sample excluded GPs who had participated in surveys for programs run in the previous two years.

The survey questions related to the program objectives and key messages that were used in active program interventions such as the one-to-one and small group educational visits.

The pre-survey was conducted in January 2017 and the post-survey was conducted in November 2017, 9 months after the launch of the program. The surveys were open for 6 weeks, with two reminders sent at 2-week intervals. The response rates for the pre- and post-surveys were 19% and 13% respectively.

The survey data were analysed to identify any self-reported changes in GP knowledge or practice over time. A matched subset of the data (n = 170) was analysed to identify differences in response pre- and post-participation in a COPD educational activity, and data from a small sample of control GPs who had not participated in a COPD activity were also compared with that of participant GPs to identify any differences in response.

The data were cleaned and analysed using SPSS v.23. Chi-square (Pearson) was applied to the pre- and post-survey data (independent cross-sectional samples) and participant and control data to test for statistically significant differences (95% CI, significant if $p < 0.05$). The matched pre/post sample was identified and the McNemar test was applied to test for statistically significant differences for related samples.

Results

Improvement in GP knowledge

GP respondents were presented with knowledge statements about program key messages and asked to indicate their level of agreement or disagreement with each. The desired response for each of the knowledge statements was to ‘strongly agree’ or ‘agree’.

Significant increases in GP knowledge post the educational visit were observed with regard to limiting the use of fixed dose combination inhalers to patients with uncontrolled symptoms or moderate to severe COPD with frequent exacerbations and using spirometry before stepping up inhaler therapy to a fixed dose combination inhaler (Table 13).

Table 13: Percentage GP respondents who gave desired response to knowledge statements

	Pre GP respondent	Post GP respondent	Significant difference
Use of LABA + LAMA fixed dose combination should be limited to patients with uncontrolled symptoms despite long-acting bronchodilator monotherapy	69% (293)	77% (216)	+8% p = 0.011
Consideration of ICS + LABA fixed dose combination should be limited to patients with moderate to severe COPD and frequent exacerbations	74% (318)	85% (237)	+11% p = 0.001

	Pre GP respondent	Post GP respondent	Significant difference
Spirometry should be used before stepping up inhaler therapy to an ICS + LABA fixed dose combination to confirm FEV_1 < 50% predicted	50% (215)	64% (179)	+14% p < 0.001

GP respondents were asked to indicate the one situation from a selection of four options where they would consider prescribing an ICS + LABA fixed-dose combination for a patient with COPD and no asthma. The desired situation, as per COPD guidelines, was *when FEV_1 < 50% predicted and the patient has experienced two or more exacerbations in the previous year*.

The proportion of GP respondents who selected the desired situation significantly increased, from 52% to 62% (+10%, p = 0.015) after the educational visit (Figure 9).

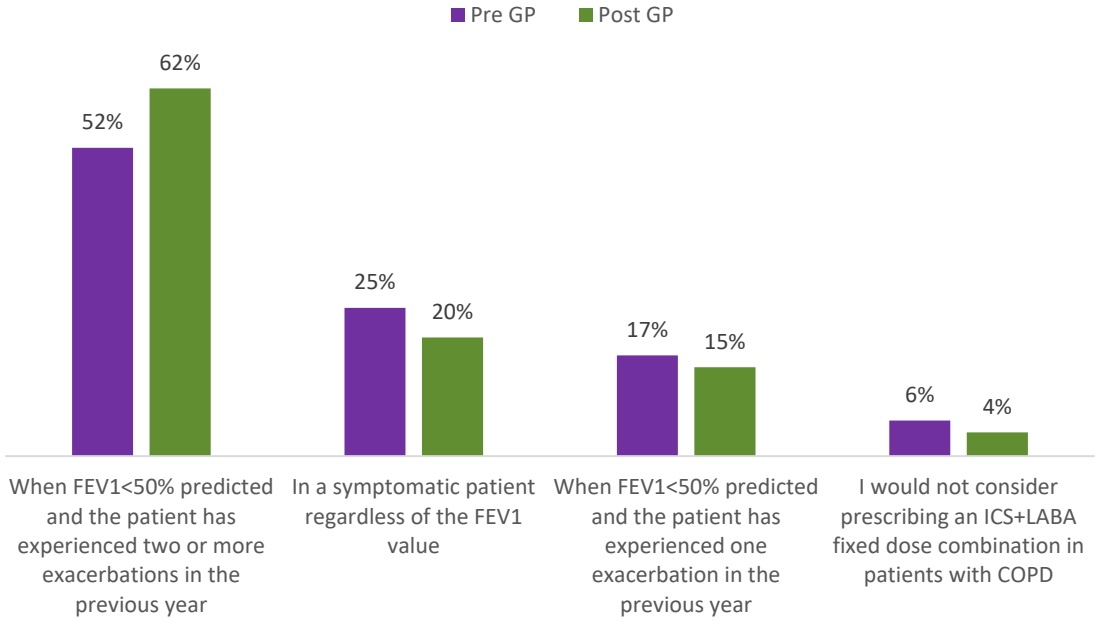


Figure 9: Comparison of pre- and post-visit GP (%) selection of a situation where they would prescribe an FDC

Improvement in GP practice

Case scenario question:

Marie is a 69-year-old patient who was diagnosed with mild COPD 4 years ago. She was prescribed a LAMA inhaler (aclidinium) to use daily and a SABA inhaler (salbutamol) when required. She is seeing you today because she has been feeling breathless and wheezy despite her inhalers. She has no history of exacerbations and demonstrates good device usage techniques. What would be your next step in controlling Marie's symptoms?

According to COPD guidelines the desired action to take in this situation would be to 'step up therapy to a combination LABA + LAMA' inhaled medicine.

The proportion of GP respondents selecting the desired action for the case scenario increased significantly from 67% before the educational visit to 78% after the visit.

This 11% increase in GP practice has met the program objective, which specified a 10% increase in the proportion of GPs who correctly diagnose and manage COPD as per Lung Foundation stepwise criteria. It suggests that the educational visits effectively delivered key messages about the stepwise approach to management (Figure 10).

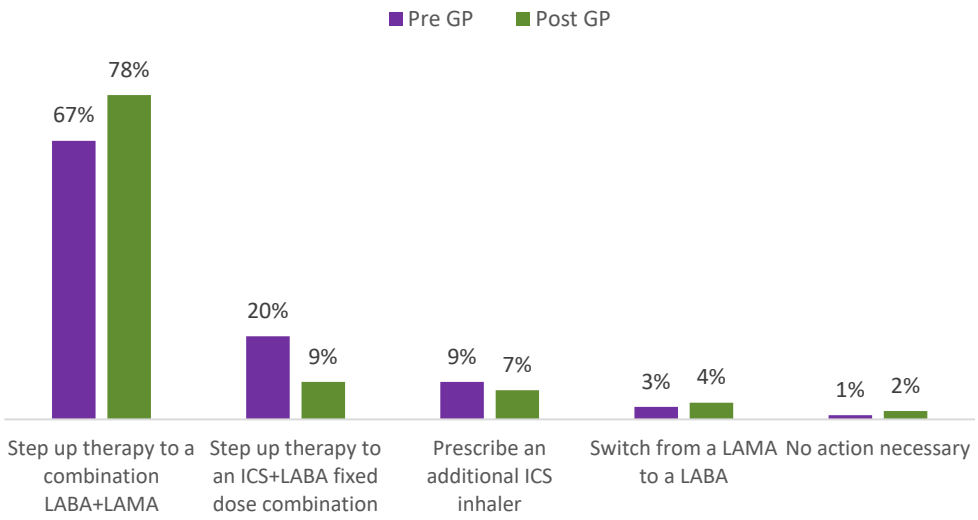


Figure 10: Comparison of GP respondent (%) actions about stepwise management of COPD

Discussion

The COPD program attracted over 8,000 GPs who were satisfied with the quality of the activity they participated in and believed it to be entirely relevant to their practice. The Clinical Services Specialists, who delivered the program to GPs, were praised for their knowledge of the topic and their communication skills.

Overall, GP participation in the program prompted significant improvements in knowledge and practice in key areas of COPD management.

In particular, the program was effective in delivering the key message on correctly diagnosing and managing COPD following the stepwise approach to management and provided a platform for GPs to improve their practice.

The program message on the use of spirometry in diagnosis and management of COPD resonated with GPs and better equipped them to use spirometry in their practice. The program was also successful in prompting a significant increase in the use of the Lung Foundation Australia Stepwise Management Chart.

Given the significant increases observed in GP knowledge and practice in the short to intermediate term, it is anticipated that the 2017 COPD program will contribute to a positive impact on longer term prescribing of combination inhaled medicines for COPD.

ANKLE AND KNEE INJURIES: YOUR IMAGING CHOICES

Introduction

Musculoskeletal conditions are among the top 10 areas of diagnostic imaging referral. Acute strains and sprains of the ankle and knee are common injuries, presenting in primary care at a rate of approximately 1.4 per 100 GP encounters. BEACH data indicated that just over one-third of patients with a new ankle sprain or strain were referred for X-ray. The data suggested that application of the Ottawa imaging decision rules could reduce investigations for fracture in sprains and strains, reducing the need for imaging. The data also showed that for new ankle sprains or strains, ultrasounds were requested in nearly 40% of cases, despite no Australian or international guidelines recommending this as routine. At the time of the BEACH study, GPs were able to order MRIs, but patients were not entitled to an MBS rebate. This has since changed, and data suggests that MRI for knee injuries has increased significantly.

Patients who undergo diagnostic imaging when it is not indicated could be at risk of unnecessary exposure to ionising radiation. Patients are also potentially at risk of overdiagnosis and incidentalomas.

To address these issues, *Ankle and knee injuries: your imaging choices* was developed as a visiting program to health professionals. The program was officially launched on 1 October 2016 and visiting took place between October 2016 and September 2017. This was the first therapeutic program that incorporated Choosing Wisely recommendations.

The main goal of the program was to reduce unnecessary imaging associated with acute ankle and knee injuries to people managed in primary care. Program objectives included:

- Reduce GP referrals for ultrasound by a) 5% for acute knee trauma and b) 7% for acute ankle trauma 18 months after the start of the program
- Reduce GP referrals for MRI by 7% for acute knee trauma 18 months after the start of the program
- Reduce GP referrals for X-rays by 4% for acute and ankle and knee trauma 18 months after the start of the program
- Increase by 10% the proportion of GPs who provide minimal required information on referrals for knee and ankle imaging immediately after the program.

Key messages

Health professionals:

- Imaging is not routinely required for most people who present with acute ankle and knee trauma
- Ultrasound has limited value for patients presenting with acute trauma of the ankle or knee
- MRI is not always required for the diagnosis of an anterior cruciate ligament or meniscal tear.

Consumers:

- Most routine cases of sprains and strains will get better with (P)RICE; a scan will not usually be required.

Program activities for health professionals included MBS feedback, one-to-one educational visits, small group case-based meetings, a national case study, health professional communications and online resources including physical test videos and a patient action plan.

A total of 7,457 *unique* GPs participated in ankle and knee injuries activities during the data collection period of October 2016 to September 2017; including 3,927 who participated in one-to-one educational visits, 3,202 who took part in small group meetings, and 323 who completed the case study. Other participating health professionals included pharmacists, nurses and medical specialists.

Method

The primary methods used to measure the impact of the program on GPs' knowledge, attitudes and practice in relation to the key messages were pre and post GP surveys distributed before and after the distribution of MBS feedback and a retrospective pre/post survey with GPs distributed following the educational visits delivered by CSSs.

GP MBS feedback pre and post survey

An online GP survey (using Survey Gizmo) was distributed in May 2016 to a random sample of 2,501 GPs across Australia (stratified by State and rurality) through the Australasian Medical Publishing Company (AMPCo). The cross-sectional survey sought to understand knowledge, attitudes and practice in relation to the ankle and knee imaging program before and after receiving the MBS feedback.

The pre-survey was in the field for 3 weeks with two reminders. A total of 298 GPs responded to the survey (14% response rate, following removal of GPs whose emails were undeliverable). The post-survey was in the field for 3 weeks with two reminders. A total of 248 GPs responded to the survey (12% response rate, as above).

GP retrospective pre/post survey

A paper-based retrospective pre-test (RPT) survey was the primary tool used to measure the impact of the program on GP knowledge, awareness, attitudes and practice. The aim of the survey was to understand the impact of the program in relation to the key messages detailed in the educational visiting card and delivered by NPS MedicineWise Clinical Services Specialists (CSSs).

Two random samples of GPs were selected:

- Participant GPs – participated in an ankle and knee imaging one-on-one educational visit and/or a small group meeting. Participant GPs (n = 1,200) were sent a retrospective pre-test paper-based questionnaire.
- Control GPs – did not participate in an active ankle and knee imaging activity but were known to NPS MedicineWise through participation in previous programs. Control GPs (N = 800) were sent a standard paper-based questionnaire for comparison.

The survey was in the field for s6ix weeks with two reminders and both surveys had a response rate of 20%.

The data were analysed using SPSS v.23. For questions with dichotomous outcomes, The McNemar test was the primary test used for related participant data (now and before), and the chi square was used to test for differences between participant and control group responses.

Results

GP respondents who completed the RPT or control survey were asked to identify their level of agreement or disagreement with several knowledge statements about the use of X-ray, ultrasound and MRI for ankle and knee injuries.

Table 14 shows the statements and the percentage of GPs who reported the desired response both before and after participating in a visit from a Clinical Services Specialist, as well as among the control group. The proportion of participant GPs selecting the desired response increased significantly for three of the four knowledge statements (Table 14).

Table 14: GP response to knowledge statements about ankle and knee injuries

Statements (desired response)	Before % (N)	Now % (N)	Control % (N)	Significance
An X-ray is typically indicated for acute knee or ankle pain resulting from injury (disagree or strongly disagree)	58 (124)	73 (157)	65 (99)	p< 0.0001 (before/now)
An ultrasound and X-ray of the ankle are a useful combination to assess acute ankle injury (disagree or strongly disagree)	49 (105)	59 (127)	57 (87)	-
History and physical examination can be as good as MRI for diagnosis of acute anterior cruciate ligament or meniscal tear (agree or strongly agree)	52 (113)	76 (165)	61 (93)	p < 0.0001 (before/now) p < 0.002 (control/now)
MRI should be reserved for cases with unclear diagnosis after history and physical examination and only if the results will change management (agree or strongly agree)	85 (183)	96 (206)	92 (141)	p < 0.0001 (before/now)

GP respondents were asked to identify their level of agreement or disagreement with statements about their confidence in using physical examinations for diagnosis and communicating with patients. Table 15shows the statements and the percentage of GPs who reported the desired response. Among participant GPs there was a significant increase in confidence after the educational visit with GPs who had participated in an educational visit significantly more confident in using physical examination to diagnose the cause of acute knee pain than control GPs.

The visits were also successful in prompting an increase in GP confidence in performing physical tests to diagnose acute ankle and knee injuries.

Table 15: GP response to confidence statements about ankle and knee injuries

Statements (desired response)	Before % (N)	Now % (N)	Control % (N)	Significance
I am confident using physical examination to diagnose the cause of acute knee pain (agree or strongly agree)	60 (131)	77 (167)	60 (93)	p < 0.0001 (before/now) p < 0.0001 (control/now)
When I believe imaging is not clinically indicated I am confident communicating to my patients that imaging results will not change management (agree or strongly agree)	73 (161)	90 (198)	87 (133)	p < 0.0001 (before/now)

In the MBS feedback post-survey, 68% (N = 167) agreed or strongly agreed that they were confident using physical examination to diagnose the cause of acute knee pain. GPs who were confident in using physical examination were significantly more likely to state that in most cases they would ‘always’ or ‘often’ rely on physical examination rather than imaging (p = 0.01). Additionally, a significantly greater proportion of GPs who had thoroughly read the MBS feedback were confident in using physical examination than GPs who did not recall receiving the feedback (p = 0.01).

Awareness of Choosing Wisely Australia was higher among GPs who participated in an educational visit (66%, N = 153) than the control group (48%, N = 72).

Most participant GPs (76%) and control GPs (65%) were aware of the Choosing Wisely recommendation; 'Do not request imaging for acute ankle injury unless indicated by the Ottawa Ankle Rules'. Of those who were aware of the recommendation, 91% were aware of Choosing Wisely Australia.

GPs who participated in an educational visit were significantly more aware than control GPs of both the Ottawa ankle rules (81% vs 31%) and the Ottawa knee rules (73% vs 52%) (see Table 16).

Table 16: GP awareness of Ottawa ankle and knee rules

		Aware % (N)	Not aware % (N)
Ottawa ankle rules	Participant	81% (191)	19% (44)
	Control	31% (47)	69% (107)
Ottawa knee rules	Participant	73% (172)	27% (63)
	Control	52% (80)	48% (74)

Among those who received the MBS feedback, there was also a significant increase in GPs who were aware of the Ottawa ankle rules (70% to 81%, $p = 0.003$) and the Ottawa knee rules (45% to 63%, $p \leq 0.001$) after the MBS feedback. This will support the Choosing Wisely messages on this topic.

After the educational visit, the proportion of participant GPs who agreed or strongly agreed that they consider the risk of radiation when deciding to send a patient for an X-ray for an acute knee or ankle injury significantly increased from 63% to 70%.

Most GPs who received the MBS feedback (both before and after) practice according to recommendations when considering the use of MRI for a suspected acute anterior cruciate ligament injury. However, there was a small increase in the proportion of GPs who stated they would 'always' refer a patient for an MRI (34% to 39%).

Several practice statements were used in the RPT and control surveys with the desired response of 'never'. There were no statistically significant differences for any of the four statements. The only statement with some change was referring a patient for an ultrasound of the ankle when an X-ray is unremarkable, with 13% of respondents in the control group selecting 'never' and 18% in the participating group following a visit with a Clinical Services Specialist.

The following two statements received very low proportions of the correct response ('never'):

- I would refer a patient for an MRI after diagnosing an acute anterior cruciate ligament injury following history and physical examination
- I would refer a patient for an MRI after diagnosing an acute meniscal tear following history and physical examination

The educational visiting cards used in the GP visits with a Clinical Services Specialist included the following statement based on guidance from the Royal Australian College of General Practitioners (RACGP):

- RACGP clinical guidance states MRI should be reserved for cases with unclear diagnosis after history/examination and only if results will change management.

Figure 11 shows other practice statements and the percentages of GPs who reported the desired response of 'always'. There were significant improvements for all four statements, demonstrating that GPs who participated in a visit with a Clinical Services Specialist have changed their practice in positive ways.

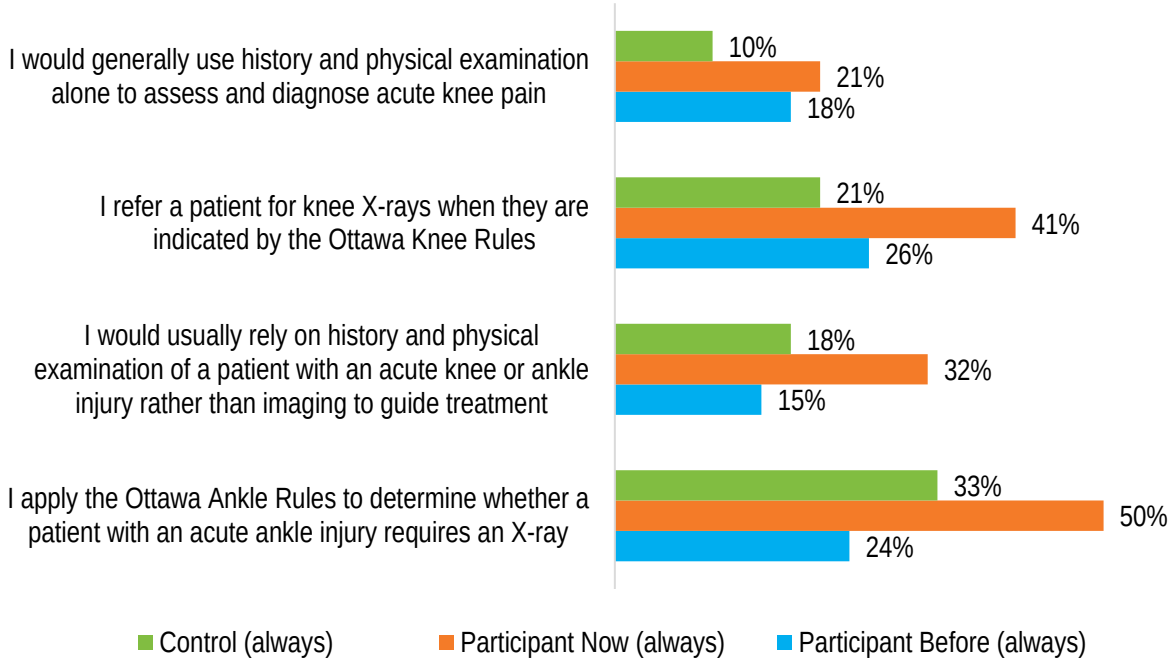


Figure 11: GP response to practice statements

Figure 12 shows statements where the desired response was to *increase* practice. Most respondents had increased practice in all desired areas or no change was necessary. The greatest change was reported in the application of the Ottawa ankle and knee rules when presented with acute ankle and knee injuries (74% increased or intended to increase).

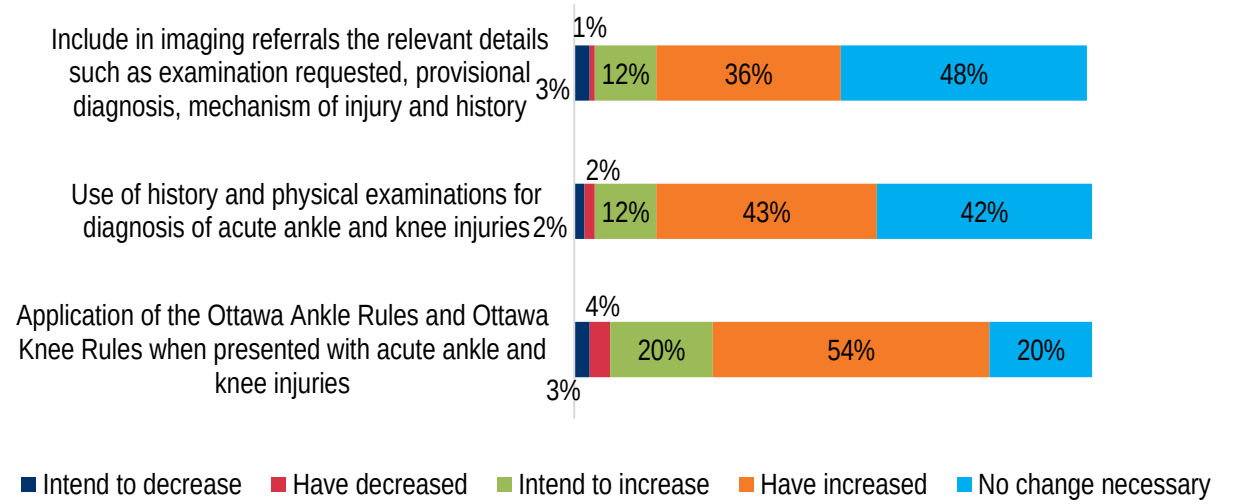


Figure 12: Percentage increase in change or intention to change practice

Figure 13 shows the statements with a desired response to *decrease* practice. Most respondents had decreased practice in all desired areas or no change was necessary. The greatest changes were reported in X-ray referrals for both acute ankle and acute knee injuries (59% for acute ankle injuries and 62% for acute knee injuries decreased or intended to decrease).

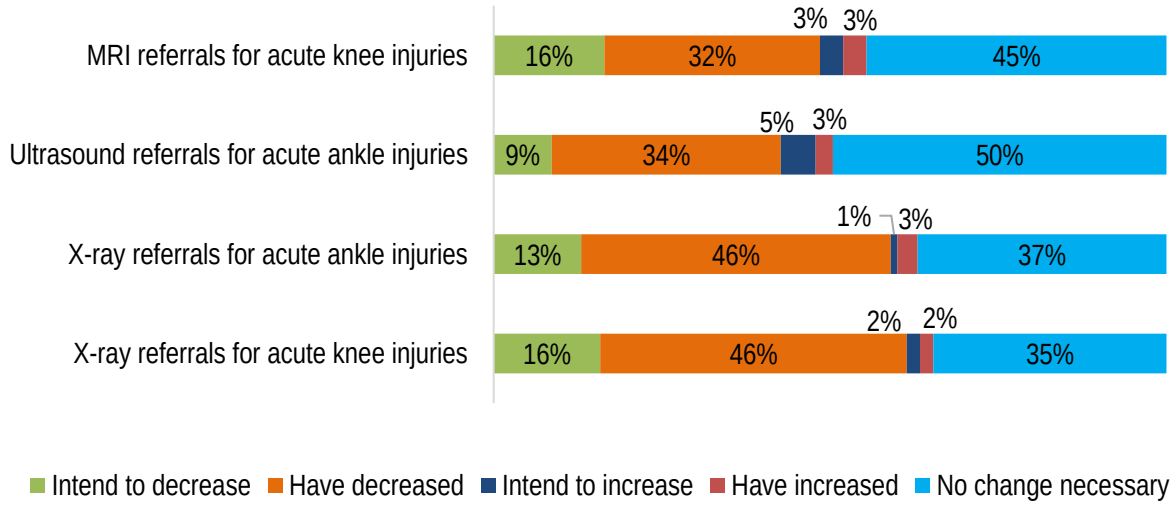


Figure 13: Decreases in change or intention to change practice

Discussion

A total of 8,786 unique health professionals participated in NPS MedicineWise ankle and knee injuries activities, including 7,457 GPs.

The educational visits increased GP confidence in using physical examination to diagnose the cause of acute knee pain, communicating to patients that imaging results will not change management when imaging is not clinically indicated, and performing physical tests to diagnose acute ankle and knee injuries.

The findings showed that the visits also improved practice in the diagnosis and management of acute ankle and knee injuries with significant increases in the consideration of the risk of radiation when deciding whether to send a patient for an X-ray, in the use of physical examination and history, application of the Ottawa ankle and knee rules (as per the Choosing Wisely Australia recommendation), and a decrease in referrals for X-rays, MRIs and ultrasounds for acute knee or ankle injuries.

NEW MEDICINE SUPPORT SERVICE STUDY

Introduction

The New Medicine Support Service (NMSS), based on a similar service in the UK, is delivered through community pharmacy and provides support to patients newly prescribed medicines for a specific set of long-term conditions: asthma/COPD, conditions requiring antiplatelet or anticoagulant therapy, depression, dyslipidaemia, hypertension and type 2 diabetes.

Overall, the service aims to improve health outcomes by increasing patient adherence to newly prescribed medicines for chronic conditions.

The NMSS is delivered in three stages:

- **Recruitment** by pharmacists of patients with a newly prescribed medicine or by patient self-referral. During the initial patient engagement, patients are offered the service when they present to a pharmacy with a prescription for a new medicine. The prescription is dispensed and initial advice about the medicine is provided by the pharmacist.
- The **intervention discussion 1** stage with the patient takes place 7 to 14 days after the new medicine is dispensed, with the pharmacist conducting a face-to-face or telephone semi-structured interview with the patient to assess adherence to the medicine, identify any problems, establish any support the patient may need and answer any questions the patient may have about their new medicine. If problems are found, remedial steps are identified, or the patient is referred to their GP.
- The **intervention discussion 2** stage with the patient occurs 14 to 21 days later with a second face-to-face or telephone semi-structured interview. If the patient is adhering to the regimen with no problems, they exit from the service. If problems are identified, the pharmacist and patient agree to a solution or the patient may be referred to their GP for review and the service is completed.

Following a successful pilot of the NMSS in 2016, this service was extended to a larger number of pharmacies. This second phase explored the ability to scale up the service to a larger number of pharmacies and measure the impact of the NMSS on patient adherence to newly prescribed medicines.

Method

The primary method used to measure if the NMSS had an impact on medicines adherence was a randomised controlled trial (RCT) using PBS data, pharmacist dispensing data and patient's self-report. Patient's self-reported impacts of the NMSS were measured through telephone interviews.

Ethics approval was obtained from Bellberry ethics committee in January 2017 to run the trial which was also registered on the Australian New Zealand Clinical Trials Registry.

This report only details findings for 672 patients recruited up until March 2018, where data was available. The full dataset will be reported on in the 2018–19 report when all evaluation data will be available.

Randomised Controlled Trial design

Objective

The objective of the RCT was to demonstrate the effectiveness of a pharmacy support service to patients' adherence of newly prescribed medicines for identified chronic conditions.

Design

A pragmatic randomised controlled trial was conducted that used a parallel group design. Pharmacies recruited patients into the study and randomisation occurred within pharmacies at the patient level after recruitment, where patients were randomised to the 'control' or 'intervention' groups. Patients were blinded

to the study arm they were allocated to and pharmacists did not know the study arm until they had recruited the patient and subsequently randomised them.

The intervention was the delivery of the NMSS by pharmacists. Intervention patients received up to two telephone or face-to-face consultations with a pharmacist who assessed patient adherence to their new medicine; identified any medicine related problems; established any support the patient needed; and answered any questions the patient had about their new medicine. In some cases, a patient only received one consultation if at the first consultation the pharmacist deemed it necessary to refer the patient back to their GP.

The intervention was the delivery of the NMSS by pharmacists, as highlighted in Figure 14.

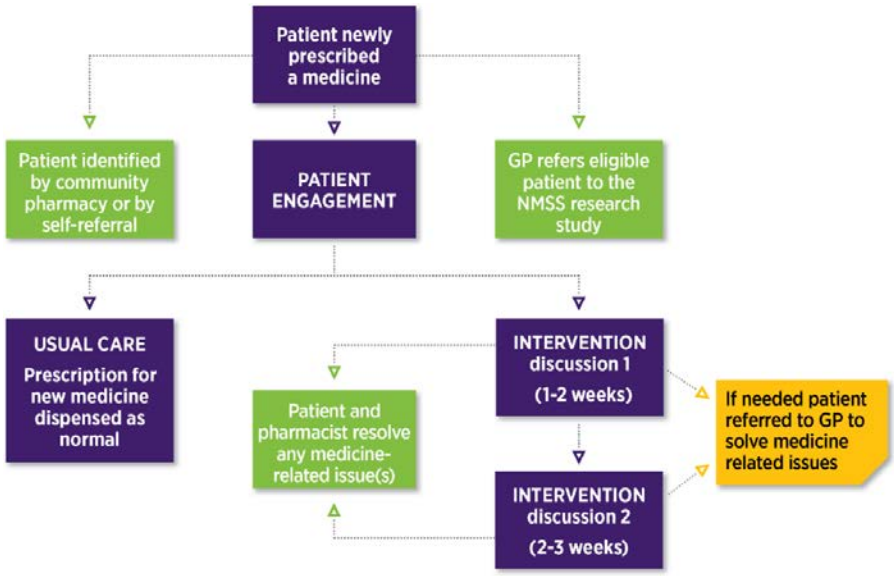


Figure 14: RCT design and patient flow

Patient recruitment

A minimum of 712 patients (not including withdrawals) from at least 47 pharmacies was required for the RCT. Estimation of sample size was based on expecting an increase in adherence of 10%, based on a baseline adherence level of 60%, assuming 80% power, a two-sided test and alpha = 0.05.

Patients were recruited by participating pharmacies over a 14-month period between March 2017 and May 2018.

It was expected that each pharmacy could recruit approximately 16 patients over 4-5 months, based on the pilot. Patients were recruited by participating pharmacies over a 14-month period between March 2017 and May 2018. Patients who met the inclusion criteria (outlined in Appendix 4) were invited to participate in the study by the pharmacist. Self-referral by the patient was also possible, if they had seen the poster in the pharmacy advertising the study. GPs in the NQPHN area were also informed about the study and asked to refer eligible patients into the study.

Pharmacy recruitment

Pharmacies were recruited in partnership with Northern Queensland Primary Health Network (NQPHN) using a pragmatic convenience sample in February 2017. All pharmacies in the Townsville area were approached as well as a sample in Mackay and Cairns. Pharmacies were expected to recruit patients from March 2017 through to June 2017.

Due to low patient numbers, patient recruitment was extended from June 2017 until December 2017 for pharmacies who wished to continue. Two pharmacies in New South Wales, who had participated in the 2016 Pilot, were invited to participate in August 2017. Patient recruitment was further extended to June 2018 and an additional 10 pharmacies in Queensland and Victoria (both those who had participated in the 2016 Pilot and new ones through NPS MedicineWise contacts) were recruited in February 2018.

Pharmacy training

All pharmacists involved in the trial were requested to complete a training module (emailed as a pdf to each pharmacist) prior to implementation. This provided information on the background of and evidence for the intervention, the requirements for the trial, and how to plan, prepare for and deliver the trial.

At least one pharmacist from each pharmacy subsequently took part in a training workshop or site visit facilitated by NPS MedicineWise and NQPHN (for pharmacies recruited by NQPHN). This provided a greater depth of information about how to implement the trial, including patient recruitment, randomisation, intervention delivery and data collection. Pharmacists were also provided with resources to facilitate implementation including, a poster for the pharmacy, an eligibility guide, intervention flyers and FAQs.

Trial outcomes

The *primary outcome* measure of the trial was patient adherence to their newly prescribed medicine at 2, 3 and 6 months following study registration, through measurement of self-reported adherence and linked PBS data of individual patients.

Data collection

- **The Morisky Medicine Adherence Scale[1] survey (MMAS-4)**. (1-3) The MMAS-4 was administered at 2 months by NPS MedicineWise staff. Each patient was telephoned up to 3 times, 2 months after study registration to complete the MMAS-4 questions. Due to extension of patient recruitment, not all MMAS-4 surveys have yet been completed. *This report provides MMAS-4 data for patients recruited up to 13 March 2018 only. The 2018-2019 report will provide all MMAS-4 data.*
    - Patients were classified as having high, moderate or low adherence, based on the survey results. However, due to the small number of patients in the low adherence group, patients in the low and moderate adherence groups were grouped together for subsequent analyses, resulting in a 'highly adherent' group and a 'less adherent' group.
- **Individual level PBS data**. PBS data were requested from the Department of Human Services (DHS) for every patient providing written consent. This provides data on prescriptions dispensed for each patient from approximately 1 year from the earliest index date (first date a new prescription is dispensed for a patient in the study) to up to 7 months from the last index date (the date on which the last new prescription is dispensed for a patient in the study). Proportion of days covered (PDC) at 2 months, 3 months and 6 months were calculated based on the medicine supply date provided in the PBS data.

  Due to extension of patient recruitment, PBS data were requested from the DHS for three separate time periods based on when the patient was recruited: up to 31st December 2017; up to 31st May 2018; and up to 31st December 2018. This report uses PBS data for the December 2017 time period only due to a 3-month processing lag of PBS data. The 2018-2019 report will use the data from all time periods.

  The use of prescribing date to calculate PDC would generally provide a more complete and accurate estimate of a patient's adherence behaviour, however PDC was calculated from the first supply date instead for the purposes of this trial. This was primarily due to the lack of information in the PBS data between the prescribing date and the first supply date (e.g. whether the prescription was a deferred supply or not). Therefore, PDC was calculated as the sum of the intended duration of each script within 60 days, 90 days and 180 days after first dispensing, divided by 60, 90 or 180, respectively. PDC ranges from 0% to 100%. An 80% cut-off threshold, commonly used in medicine adherence studies, was applied to classify a patient as highly adherent (≥80%) or less adherent (<80%).

[1] Use of the ©MMAS-4 is protected by US copyright laws. Permission for use is required. A Licensure agreement is available from: Donald E. Morisky, ScD, ScM, MSPH, Professor, Department of Community Health Sciences, UCLA School of Public Health, 650 Charles E. Young Drive South, Los Angeles, CA 90095-1772, dmorisky@ucla.edu

- Medicine information was limited by the information available in the PBS data, which does not provide comprehensive information on a patient's prescribed medicine. The PBS data lacks information on the medicine dosage instruction, the frequency of administration and the intended duration of the script. Therefore, the intended duration of a script was derived from the maximum quantity able to be supplied under the PBS item and information supplied by the pharmacist via the online portal on medicine instructions and frequency. If a pharmacist did not record such information, the maximum quantity supplied under the PBS was assumed to be the duration of the script.

- **Pharmacy dispensing data**. Pharmacists provided the first 3 dispensing dates for a patient's new medicine, if these were available. This report uses dispensing date data for patients recruited up to 19 December 2017 only. Pharmacists provided the first 3 dispensing dates for a patient's new medicine, if these were available. These dates were entered into an online portal, set-up specifically for this trial, which contained de-identified details of all recruited patients, the medicine, condition, intervention data (where required) and medicine dispensing dates. Due to extension of patient recruitment, not all dispensing dates are yet available. This report uses dispensing date data for patients recruited up to 19 December 2017 only. The 2018-2019 report will contain data for all patients.

    - Pharmacy dispensing data were used to facilitate the identification of each patient's newly prescribed medicine and its first supply date in the PBS data. If a patient registered in the trial with newly prescribed medicines for more than one condition, only the first condition in the dataset and its related medicine were identified through pharmacy dispensing data. This was then matched to the corresponding MMAS-4 and PBS data for analyses.

- **Composite outcome measure**. A composite measure was created for MMAS-4 and the PBS data by including or adjusting patients' adherence to the initial medicine and patients whose medicines had been stopped or changed. The status of "Stopped" or "Changed" in a medicine was noted during the MMAS-4 telephone survey or recorded ad-hoc by the pharmacists. The composite outcome is reported as the proportion of patients who are adherent to their newly prescribed medicine or have stopped or changed their medicine. It is reported as an additional outcome in the MMAS-4 findings but used as the main outcome in the PBS data analysis. This avoids patients being classed as non-adherent if their medicine had been stopped or changed. However, it should be noted that information on whether medicines have been stopped or changed may not have been recorded for all patients due to the ad-hoc nature of pharmacists recording this or the possibility that patients went to a different non-participating pharmacy.

Patient's self-reported impacts of the service

- **Telephone interviews**. A purposive sample of intervention patients were selected for a short 15-minute telephone interview to understand what information and advice had been provided to patients and how this had impacted their use and feelings towards their new medicine.

    - A total of 44 patients were asked to participate in an interview. Of those: 24 participated; 15 did not want to participate; 3 agreed but could not be reached to conduct the interview; and 2 could not recall receiving the intervention. The 24 patients represented 15 pharmacies and all study conditions.
    - Interview data were transcribed, the transcripts reviewed and de-identified. De-identified transcripts were imported into N-Vivo software (QSR, version 12) for coding prior to content analysis. Of the 24 interview transcripts, only 21 were coded as transcript review revealed that 3 of the 21 patients did not recall the intervention and only spoke about information received when their medicine was dispensed.

Data analysis – primary outcome measure (adherence)

- Simple logistic regression was used to assess the unadjusted effect of the NMSS intervention on the primary outcome. Random-effects logistic regression was used to adjust effect size for clustering of data and confounding by age, gender, concessional status and number of other medicine counts. Two levels of random effects were defined in the analysis: (1) Condition, (2) Pharmacy. Effect size of the intervention was reported as an odds ratio (OR) along with its 95% confidence interval and p-value. Final models were selected based on Bayesian information criterion. All statistical analyses were conducted using statistical software R. lme4 package in R was used for the random-effects models.

Results

Over the trial period 60 community pharmacies were recruited and trained to implement the trial. Over 800 patients were recruited into the trial between March 2017 and May 2018. Of the 672 participants recruited up until March 2018, 51% were randomised to the intervention arm and 49% to the usual care arm. Those in the intervention arm received the NMSS. Intervention *discussion 1* was delivered to 77% (n = 263) of intervention patients and intervention *discussion 2* to 62% (n = 204) of eligible patients.

Adherence at 2 months: MMAS-4

The MMAS-4 was conducted with 56% (n = 378) of 672 eligible patients at approximately 2 months dependent on how many telephone calls were required to reach a patient. A quarter of patients could not be reached and 10% (n = 67) were no longer on the medicine they entered the study with.

Adherence was calculated for 348 (51.8%) patients: 251 (37.4%) patients were excluded as the MMAS-4 was not administered to these patients (patient could not be reached, no longer on medicine or did not want to answer questions). An additional 73 (10.9%) patients had either changed or stopped their medicine and so were excluded for these analyses. Overall, 114/169 (67.5%) control patients were highly adherent to their newly prescribed medicine and 128/179 (71.5%) intervention patients were highly adherent at 2 months (Table 17).

For the composite measure (includes patients who had stopped or changed their medicine, as defined by the pharmacist), 421 patients (62.6%) were included in the analysis. A total of 145/200 (72.5%) and 170/221 (76.9%) patients were highly adherent at 2 months in the control and intervention arms, respectively.

For both the standard and composite adherence outcomes, none of the intervention effects were statistically significant in the unadjusted and adjusted logistic regression analyses. However, differences in the odds of adherence to the newly prescribed medicine were observed between groups. The adjusted odds of adherence at 2 months were 41% higher for patients receiving the intervention, although still not statistically significant. All the effects were somewhat in favour of the intervention with an increase in odds ratios (ORs: from 1.21 to 1.41); a decrease in p-values (p-values: from 0.412 to 0.139); and the 95% CIs moving towards the right-hand side of the reference value of 1 (95% CIs: from 0.77 – 1.92 to 0.89 – 2.24).

Table 17: Reported adherence based on MMAS-4 at 2 months and results from unadjusted and adjusted logistic regression

Outcomes (N = patients with responses, and without responses	Number of highly adherent patients / total responses (%)	Unadjusted OR (95% CI; p)	Adjusted OR (95% CI; p)
Adherence MMAS-4 (N = 348, 251 responses missing and 73 changed or stopped)			
Control	114 / 169 (67.5)	1	1
Intervention	128 / 179 (71.5)	1.21 (0.77 - 1.92; 0.412)	1.36 (0.85 – 2.20; 0.200)
Composite (highly adherent + stopped/changed) MMAS-4 (N = 421, 251 responses missing)			
Control	145 / 200 (72.5)	1	1
Intervention	170 / 221 (76.9)	1.26 (0.81 – 1.97; 0.297)	1.41 (0.89 – 2.24; 0.139)

Adherence at 2 months, 3 months and 6 months: PBS data

A patient's adherence to their initial newly prescribed medicine was based on the composite measure, calculated and derived from the PBS data. As in the analysis for MMAS-4, the composite outcome was defined as either 'highly adherent + stopped/changed' or 'less adherent'. Patients were classed as 'highly adherent' where PDC ≥ 80% or where their newly prescribed medicine had been recorded as stopped or changed by the pharmacist. Patients were classified as 'less adherent' where PDC < 80%.

PBS data were received for 261 patients. Of these, 248 patients were included in the analysis. Nine patients were excluded, as examination of the PBS data showed that they had previously received the medicine (despite requirements for the pharmacist to check that the patient had never previously received the

medicine) and so it was not newly prescribed, and another 4 patients were excluded as their newly prescribed medicine did not appear in their PBS data record (these may have been private prescriptions).

At 2, 3 and 6 months, 82.4%, 76% and 62.4% of intervention patients, respectively, were highly adherent to their medicine. Similarly, 80.5% (2 months), 69.9% (3 months) and 61% (6 months) of control patients were highly adherent to their medicine. When comparing adherence at 2 months, as measured by MMAS-4 and the PBS data, adherence levels are similar (Figure 15). Interestingly, the self-reported MMAS-4 demonstrates slightly lower adherence levels than the PBS data. Adherence is higher in the intervention group at 2, 3 and 6 months, however these results are not statistically significant at this point. As time goes on adherence in both groups decreases.

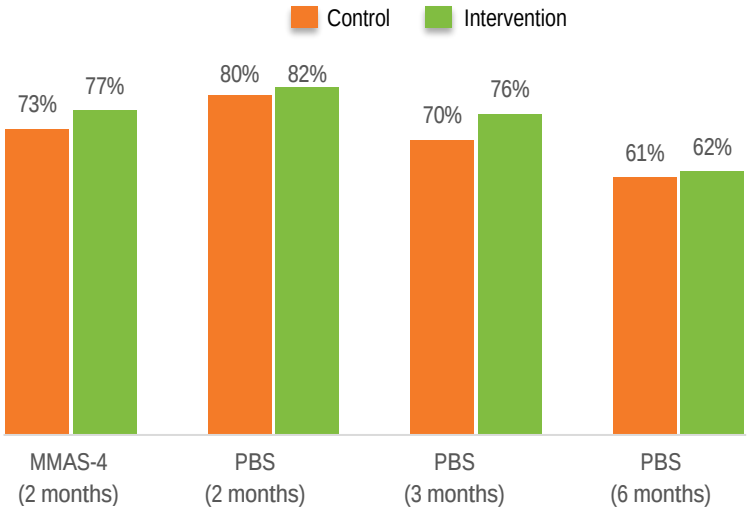


Figure 15: Comparison of composite outcomes between MMAS-4 and PBS data for highly adherent patients

Despite the lack of statistical significance, adherence was higher in the intervention group (Table 18), but the difference shown with the PBS data was minimal, especially at 2 months (p = 0.699) and 6 months (p = 0.818). The biggest difference of 6% between the two groups was observed at 3 months. The effect sizes from both unadjusted and adjusted logistic regression models were similar to the adjusted results for MMAS-4. Differences in the odds of adherence to the newly prescribed medicine were observed between groups. The greatest ORs were observed at 3 months, where the adjusted odds of adherence were 38% higher for patients receiving the intervention.

Table 18: Results from unadjusted and adjusted logistic regression for composite adherence outcome (adhere + Stopped/changed) using PBS data at 2, 3 and 6 months

RCT Arm	2 months	3 months		6 months	
	Unadjusted OR (95% CI; p)	Adjusted OR (95% CI; p)	Unadjusted OR (95% CI; p)	Adjusted OR (95% CI; p)	Unadjusted OR (95% CI; p)	Adjusted OR (95% CI; p)
Control	1	1	1	1	1	1
Intervention	1.13 (0.60 – 2.17; 0.699)	1.14 (0.58 – 2.26; 0.697)	1.36 (0.78 – 2.40; 0.282)	1.38 (0.76 – 2.56; 0.296)	1.06 (0.64 – 1.77; 0.818)	1.04 (0.61 – 1.77; 0.880)

Patients' self-reported impacts

Patients who received the NMSS stated that they felt reassured as a result of receiving the service. This was related to their awareness that a pharmacist would call them, reassurance by the pharmacist that taking the medicine would help their condition and alleviation of any concerns the patient had.

'Yes, it was more the reassurance to know that I was going to be okay as it was quite frightening.' Patient 15

Patients' thoughts on or use of their medicine changed

Receipt of the intervention led to changes for some patients in how they thought about or used their new medicine:

- Improved clarity on the best time to take the medicine and reminder strategies to use.
- Proper use of inhalers – prior to the intervention one patient administered their inhaler wrongly and so it would have had little effect on managing their condition.
- Increased confidence to take the medicine rather than stopping or changing how they took it.
- Continuation of the medicine as they were no longer 'hesitant' or concerned about it.

'She advised that I go back to the GP and have a conversation with him, see how he feels about it, and maybe talk to him about upping the dosage and whatnot, which is what ended up happening. So, I'm now on a better dosage.' Patient 9

'I suppose I'm just less concerned about it and just take it. I feel reasonably confident, more confident than I started with anyway.' Patient 14

Discussion

Did the NMSS improve adherence to new medicines for the current cohort?

The composite analyses of MMAS-4 and the PBS data were conducted on 421 (59%) and 248 (35%) patients, based on the minimum sample size of 712 patients. Therefore, limited conclusions can currently be drawn about the effectiveness of the NMSS to improve patient adherence to newly prescribed medicines until all data has been received. Based on the interim results from the analyses of the composite adherence outcomes, the results show greater adherence to new medicines in the intervention group than the control group. Adherence overall was greater at 2 months following a patient's commencement of their medicine and subsequently decreased at 3 and 6 months. It is unknown why this decrease occurred but a recent study about adherence to antidepressants also demonstrates that patients' adherence to their medicine decreases over a 12-month period.[1] About 20% of patients in the study had medicines for depression and so this may be a contributing factor.

Given the small sample size, particularly for the PBS dataset, adherence associated with each condition was not investigated in this interim report but will be fully investigated in the final report in 2019. The final report will contain data from the full MMAS-4 and PBS data sets and will allow a definitive conclusion on whether the NMSS was effective in improving patient adherence in the Australian setting.

Limitations

There are several limitations to this study. Recruitment of patients to the study was limited for some pharmacies. This was often due to pharmacy or patient time constraints or pharmacies seeing fewer eligible patients than expected. This may have introduced bias due to the differences in numbers of patients recruited by each pharmacy, ranging from 1 to 104, however within the analysis, the effect of the pharmacy was controlled for.

A major limitation is related to the lack of medicine administration information in the PBS data. Therefore, assumptions were made about the intended duration of a script and reliance was placed on pharmacists' recorded information about the medicine to help derive the PDC and the resulting adherence. Such

[1] Keyloun, KR, Hansen, RN, Hepp, Z, Gillard, P, Thase, ME, Devine, EB. Adherence and Persistence Across Antidepressant Therapeutic Classes: A Retrospective Claims Analysis Among Insured US Patients with Major Depressive Disorder (MDD). CNS Drugs. 2017;31:421-32.

information or assumptions may not be accurate which could result in underestimation or overestimation of adherence for some patients. This is especially the case for patients with asthma or COPD where the prescribed medicine is an inhaler.

Another limitation is that the composite outcome used in both MMAS-4 and PBS analyses were based on self-reported information during the survey and the pharmacists' notes about the patient's medicine. This could also lead to an underestimate of patients' adherence.

However, it is worthwhile to note that the results from both the self-reported MMAS-4 and the PBS data were comparable to each other in numbers of patients who were highly adherent to their medicine, particularly in the short term. Therefore, the limitations of the data or potential inaccuracies in the pharmacists' notes likely had limited impact.

HEALTH OUTCOMES OF THE 2011 OSTEOPOROSIS PROGRAM

The NPS MedicineWise 2011 Osteoporosis program was evaluated to determine the impact on medicine use and patient health outcomes using linked data from the Sax Institute 45 and Up Study.

Osteoporosis is a condition which causes bones to become weak and fragile so that even minor accidents can cause fractures, often referred to as 'minimal trauma fractures' or 'fragility fractures'. The condition is asymptomatic and often remains undiagnosed until a person presents with a fracture. Around 6% of men and 23% of women aged over 50 years have osteoporosis in Australia, and prevalence increases with age. Bone fractures related to osteoporosis reduce quality of life because of ongoing pain, increase the chances of disability, loss of function and reduced independence, and ultimately may lead to premature death.

NPS MedicineWise has conducted regular programs on the management of osteoporosis. In 2007, a large visiting program with associated support material and distribution of information on osteoporosis was conducted. In 2011, a non-visiting program was implemented, followed by another visiting program in 2015. Each program based its key messages on the available evidence at the time, including consideration of an anti-osteoporotic drug after a minimal trauma fracture. Anti-osteoporotic medicines recommended included bisphosphonates, denosumab, raloxifene, strontium and teriparatide.

This study investigated the impact of educational messages delivered as part of the non-visiting 2011 Osteoporosis program, using a retrospective cohort study by comparing outcomes for the participants identified before the intervention program and those identified after the program. The pre-intervention period included the 2007 program, the impact of which was unable to be isolated due to availability of the data. This study examined the initiation of a recommended anti-osteoporotic medicine and the occurrence of refractures in female participants of the 45 and Up Study, 50 years and older, who had already experienced an initial fracture that was likely to be related to osteoporosis.

The main finding from this study was that women who experienced an initial bone fracture before the start of the NPS MedicineWise intervention in 2011 were more likely to have been initiated on a recommended anti-osteoporotic medicine and less likely to have a refracture in the 2- to 5-year follow-up compared with those with an initial fracture in the post-intervention period. This was confirmed by time-to-event analyses which found that, at any point during the 60 months of follow-up, there was a statistically higher probability of initiation of a recommended medicine and a lower probability of a refracture for the pre-intervention group. We concluded that the non-visiting 2011 program had no positive impact on medication initiation and refracture outcomes for patients with an initial fracture likely to be associated with osteoporosis in the period following the more intensive 2007 osteoporosis program. It will be possible to evaluate the impact of the more intensive 2015 visiting program in the future.

There are several possible reasons for the decreased initiation of the recommended medicines, including: the potential positive impact of the earlier 2007 program, unknown level of GP exposure in the 2011 non-visiting program compared to the 2007 program in NSW, concerns about the side effects of bisphosphonates, such as osteonecrosis of the jaw, among health professionals and patients, and other messages from the 2011 program being considered, including encouraging adequate calcium, vitamin D and physical activity.

It is recommended that a further outcome study be conducted when more data becomes available to evaluate the impact of the 2015 visiting program. This will allow a comparison between the outcomes of a more intensive visiting program to a non-visiting program. Although it is preferable to have a control group, this is not possible for the retrospective evaluation of national programs that did not factor this into the design of the program. This should be considered for future programs.

The aim of the study was to evaluate the impact of the osteoporosis program in 2011 on medication use and health outcomes in relation to reduced secondary minimal trauma. The study was conducted using the 45 and Up Study with linked datasets for individual participants.

We hypothesized that prompt treatment through pharmacotherapy would reduce future fractures and associated emergency department visits and hospital admissions among people after a minimal trauma fracture event.

The objectives were:

1. To determine the impact of the 2011 NPS educational program for osteoporosis on the use of anti-osteoporotic medicines among females 50 years and older who had a minimal trauma fracture between 2006 and 2016.
2. To determine the impact of the 2011 program on the incidence of further minimal trauma fractures in female participants following the first minimal trauma fracture in the study period.

Data Sources and Linkage

The Sax Institute's 45 and Up Study is a longitudinal study of 265,000 participants, aged 45 years and over, based in the population of the state of New South Wales (NSW), Australia. Participants were randomly sampled from the enrolment database of Australian Government of Department of Human Services (DHS) and recruited from January 2006 to December 2009. Participants completed a baseline health and lifestyle questionnaire and consented to follow-up and linkage of their information to routine health databases.
The data sources linked and utilized in this study included:

1. 45 and Up Study baseline questionnaire;
2. Hospital separations from public and private hospitals in NSW from the Admitted Patient Data Collection (APDC) (2001 – 2016);
3. Presentations to NSW Emergency Department from the Emergency Department Data Collection (EDDC) (2006 – 2016);
4. Medicines dispensed and subsidised by the Pharmaceutical Benefits Scheme (PBS) (2004 – 2016);
5. Deaths recorded in the NSW Register of Births Deaths and Marriages (RBDM) (2006 – 2016).
6. National death index (NDI) (2004 – 2016)

The linkage of APDC and EDDC was conducted by the NSW Centre for Health Record Linkage. The MBS and PBS data were supplied by the Australian Government Department of Human Services and linked by the Sax Institute.

Study Population

The study population were women aged 50 years and over who were admitted to a hospital or attended an emergency department for a first fracture likely to be osteoporosis-related in a pre-intervention and post-intervention time periods. Pre-intervention period was set from 1 July 2006 to 30 June 2009 and post-intervention period was from 1 July 2011 to 30 June 2014. Women 50 years and older were chosen as they most commonly experience osteoporotic-related fractures and there is robust evidence for the impact of pharmacotherapy to prevent further fractures in this group.

Fractures likely to be osteoporosis-related are often referred to as 'minimal trauma fractures' or 'fragility fractures', and can be identified from hospital data where variables are available for coding the diagnosis of fracture and an external cause for the fracture related to a minor bump, a fall from a standing height or an event that would not normally result in a fracture if the bone was healthy. However, a visit to an emergency department available in EDDC only includes diagnosis codes for one reason of presentation. This means that the diagnosis of fractures can be identified, but fractures due to minimal trauma cannot be differentiated. As a substantial proportion of fractures in women in this age-group are associated with either osteoporosis or osteopenia(14), we also included participants with a record of a presentation for any fracture from this data source.

Participants were selected if:

1. they had experienced a **minimal trauma fracture** with following ICD10 diagnosis codes in APDC based on the definition used by Briggs et al.(15):
    - diagnosis code for osteoporosis with pathological fracture (ICD10: M80) in any diagnosis field OR
    - diagnosis codes suggesting minimal trauma fractures: one of the following diagnosis codes for fracture due to injury in any diagnosis field (ICD10: S02, S12, S22, S32, S42, S52, S62, S72, S82, S92, T02, T08, T10, T12, T14.2) with an external cause of accidental falls (ICD10: W00, W01, W02, W03, W04, W05, W06, W07, W08, W10, W18, W19, W22, W50, W51, W54.8.)

OR

2. they had experienced **a fracture** with diagnosis codes in EDDC using ICD-9 and SNOMED diagnosis codes.

ICD-10 diagnosis codes used in the APDC data to define osteoporotic fractures or minimal trauma fractures, and ICD-9 and SNOMED diagnosis codes for the list of fracture types used in EDDC are available on request.

For each participant, we defined the **index fracture** as the very first fracture event which can be identified in the APDC and/or EDDC data, and the date of the index fracture was defined as the index date.

Participants were excluded if the following criteria were encountered

(1) less than 50 years old at the index date;

(2) had an index fracture prior to July 2006 or between 01 July 2009 and 30 June 2011;

(3) the index fracture was associated with a planned hospital admission or ED visit;

(4) had been dispensed an anti-osteoporotic medicine prior to the index date;

(5) entered the study after 30 June 2014.

Medicines for minimal trauma fracture

The medicines investigated included all medicines recommended by the 2011 NPS osteoporosis program for use in women following a minimal trauma fracture. Table 1 summarises the medicines available on the PBS for the management of osteoporosis.

Table 1. Medicines recommended by the NPS program and available on PBS for osteoporosis (2006-2016).

Medicine group	Medicine	PBS codes where restrictions for use in osteoporosis
Bisphosphonates	alendronate alone or in combination with colecalciferol and/or calcium carbonate	
	etidronate alone or in combination with calcium carbonate	
	risedronate alone or in combination with colecalciferol and/or calcium carbonate	
	zoledronic acid	10555M, 9288W
Selective estrogen receptor modulators	raloxifene	
Other medicines affecting bones structure and mineralisation	strontium	
	teriparatide	
	denosumab	5457F

Data analysis

ED or hospital separations (including hospital transfer) associated with the same minimal trauma fracture or pathological fracture due to osteoporosis were cross-matched and de-duplicated to avoid over-counting the number of re-fracture events. Descriptive analyses were conducted to compare study populations who entered study between July 2006 – June 2009 and July 2011 – June 2104.

We defined the primary endpoints for Objective 1 and 2 as the initiation of a recommended medicine and the first re-fracture event after the index fracture. The re-fracture event was identified using both APDC and EDDC data.

Non-parametric statistical estimator through Kaplan-Meier curves for the length of time after the index fracture until occurrence of the primary endpoints, were presented for the pre-intervention (July 2006 – June 2009) and post-intervention groups (July 2011 – June 203). The follow-up time of a 2-year period was set following the last date of each study entry period for each group. Therefore, the maximum follow-up time for participants entering the study was 60 months and the minimum follow-up time was 24 months, depending on the index date for each participant. Observations were regarded censored if participants died during the study period or did not experience the primary endpoints. Log rank test was used to test whether the observed difference of occurrence time between the two groups was significant or not.

All data preparation and analyses were conducted in the statistical software SAS 9.4 (SAS Institute, Cary, NC).

NATIONAL GP SURVEY

Introduction

The 9th National GP Survey investigates GPs' attitudes towards technology-based formats used in continuing professional development such as podcasts, webinars and online courses as well as their participation in NPS MedicineWise CPD activities across technology-based and traditional formats. In addition, this survey explores how GPs value NPS MedicineWise and specifically what GPs value about the services offered by the organisation.

In addition to the support that new technology provides in the day-to-day clinical practice of GPs, the digitisation of general practice has encouraged an influx of technology-based options in health professional learning and quality improvement. In 2016-17, NPS MedicineWise offered 63 online learning activities to GPs: 51 online courses and 12 online case studies, in addition to more traditional face-to-face educational visits. On 11 July 2017, NPS MedicineWise launched the Australian Prescriber podcasts and to date, 25 podcasts have been released with several episodes reaching over 7,000 total downloads.

Method

A random sample of 3,000 GPs across Australia were invited to participate in a postal self-administered paper-based survey and 625 responses (21% response rate) were analysed.

Results

Likelihood of participating in continuing professional development (CPD) by format

The survey found that face-to-face group meeting with an educator is the CPD activity GPs are most likely to participate in (89%), followed by online self-paced course (72%) and face-to-face visit with an educator (one-to-one). Less than half of GPs are likely to participate in medical podcasts (46%) and webinars (40%). (Figure 16)

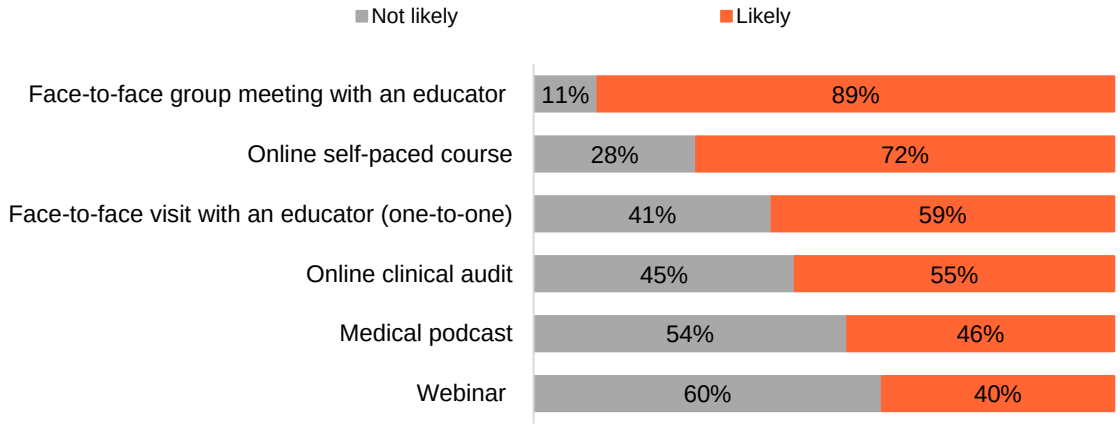


Figure 16: 'How likely are you to participate in a CPD or quality improvement activity delivered in the following formats?'

Some of the reasons that GPs are not so interested in listening to medical podcasts include unfamiliarity with the activity (36%), being time-poor (27%) and preference for a different format (27%). A common reason for not participating in webinars, on the other hand, is that GPs dislike being locked into a specific time or having their schedule inconvenienced by the webinar (30%). Like podcasts, the preference for a different format (27%) and being time-poor were other reasons for the relative lack of interest in webinars (14%). (Table 19)

Table 19: Reasons for lack of interest in participating in medical podcasts and webinars

	% GPs not interested in listening to medical podcasts (n = 323)	% GPs not interested in participating in webinars (n = 358)
Don't like being locked into a specific time/Inconvenient time		30%
Unfamiliar with activity	36%	14%
Time poor	27%	27%
Prefer another format	15%	13%
Negative experience with activity (eg, impersonal, lack of interaction, easily interrupted)	11%	9%
Hardware/internet connection problems	5%	4%
Spend too much time on computer/online	3%	3%
Prefer to listen to music not podcasts	1%	-
No need for other sources of CPD/learning	1%	1%
Lack CPD points	0.3%	-

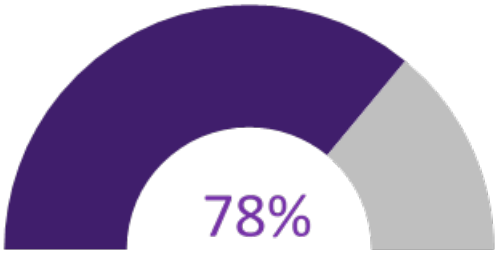
What GPs value about NPS MedicineWise

- Forty-five per cent of GPs value the **health professional education** they receive from NPS MedicineWise, specifically the educational visits (38%), CPD activities (eg, online courses, clinical audit) (5%), and advice given about clinical guidelines (4%).
- Thirty-five per cent of GPs value the **information** provided by NPS MedicineWise, viewing it as unbiased (20%), up to date (12%) and evidence-based (5%). The accessible nature (3%) and relevance (2%) of the information are other reasons why they value the organisation.
- Twenty per cent of GPs value the **feedback they receive about their practice** and the comparison with their peers.

Participation in NPS MedicineWise CPD and quality improvement activities

Nearly three-quarters (74%) of GPs have participated in an educational group meeting, while 61% have participated in a one-to-one educational meeting. Over half of GPs have taken a clinical audit (56%), while less than half have participated in an online course (45%) or online case study (40%).

> **!** About 8 out of 10 GPs (78%) have participated in at least one NPS MedicineWise CPD activity in the last 2 years.



Participated in at least one NPS MedicineWise CPD activity in the last 2 years

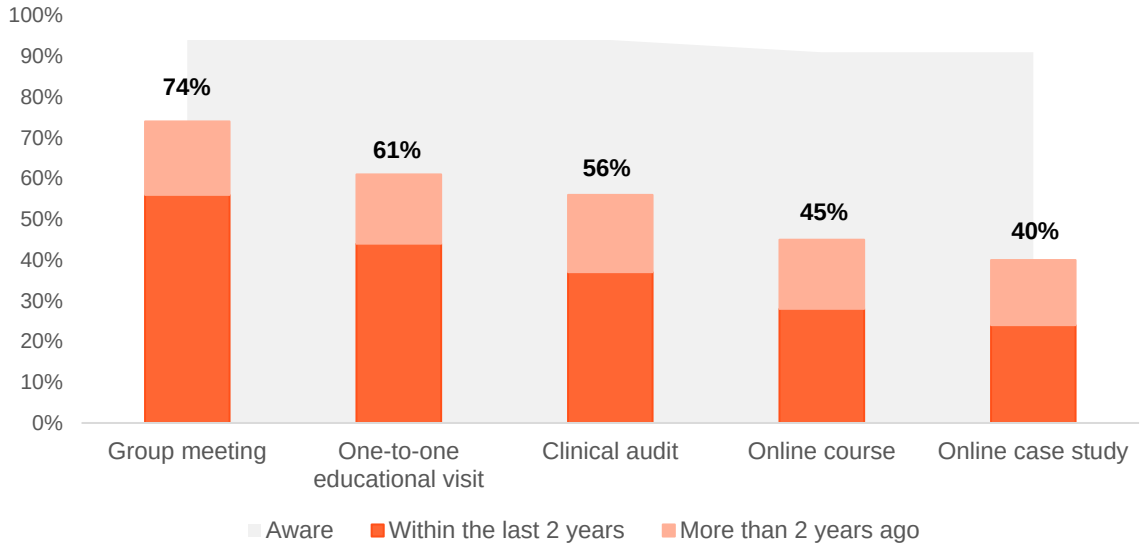


Figure 17: The last time GPs participated in each NPS MedicineWise CPD activity

Discussion

The National GP Survey 2018 confirms that the health professional education, quality of information and practice feedback provided by NPS MedicineWise is valued by GPs. Furthermore, the health professional education provided by NPS MedicineWise across multiple platforms has allowed a greater number of GPs to take part in the educational activities. Eight out of 10 GPs (78%) have participated in an NPS MedicineWise CPD activity in the last 2 years in at least one of the following activities: group meeting, one-to-one educational visit, clinical audit, online course, and online case study.

The interest of most GPs in participating in online courses confirms that NPS MedicineWise's online CPD activities are increasingly relevant to GPs. The significant interest in technology-based CPD overall signals that general practice has adapted well to the digital era and GPs are ready to navigate and use technology-based tools and activities offered to them.

NATIONAL CONSUMER SURVEY

Introduction

Consumer habits are evolving in response to a rapidly changing digital landscape, and NPS MedicineWise is interested in investigating how consumer needs and behaviours have changed online. With a better understanding of how consumers find information about medicines and medical tests, NPS MedicineWise can more effectively guide people towards better decisions about their health.

The NPS MedicineWise National Consumer Survey is a biennial study that measures key performance indicators of NPS MedicineWise as an overall brand as well as its key products. The survey measures changes in consumer awareness, knowledge and attitudes about program-related topics over time.

The National Consumer survey 2017 explored consumers' needs and habits for sourcing information about medicines online. The survey also monitored consumer attitudes and behaviours towards NPS MedicineWise programs, products and services.

Method

The National Consumer Survey is a cross-sectional study conducted with a representative sample of consumers from the Australian population. The survey was conducted online through a consumer panel and achieved a total of 2,509 responses with a response rate of 30%.

Results

NPS MedicineWise

Most consumers who are aware of NPS MedicineWise trust the organisation, receiving a 'good' to 'very good' trustworthiness rating from 62% of consumers.

The NPS MedicineWise website is rated highly on 'trustworthiness', and on being 'up to date', 'easy to understand', 'evidence-based' and 'Australian'. Areas for improvement include 'health professional recommendation', 'navigation' and providing 'short and concise' content.

Source of information about medicines

Most consumers ask a GP (75%), a pharmacist (62%) or visit a website (45%) when seeking information about medicines. Only 9% use social media and blogs to obtain information about medicines in the general population, although certain groups were found to be drawn to this platform more than others. Consumers aged 16–34 years (15%), people who speak English as a second language (20%) and those who have Aboriginal or Torres Strait Islander heritage (20%) access social media and blogs for medicines information more than the general population (Table 20).

Table 20: What consumers usually do to obtain information about medicines

	Total (N = 2509)	English as second language (n = 275)	English only (n = 2234)	Indigenous (n = 93)	Not Indigenous (n = 2416)
Ask a health professional	86%	84%	87%	84%	86%
GP	75%	73%	75%	71%	75%
Specialist	20%	21%	20%	22%	20%
Pharmacist	62%	56%	63%	44%	63%
Other health professional	10%	12%	10%	10%	10%
Visit a website	45%	45%	45%	25%	46%
Read the CMI	22%	15%	23%	4%	23%
Speak with family or friends	14%	20%	13%	12%	14%
Use social media & blogs	9%	20%	8%	20%	9%
View traditional media (TV/newspaper/magazines)	5%	6%	5%	4%	5%
Use an app on a smartphone	2%	4%	2%	2%	2%
Other	2%	2%	2%		2%
I have not actively looked for information about medicines	5%	3%	5%	4%	5%

Attributes considered important in an online source of medicines information

Respondents were asked to rank specific attributes in order of importance when choosing an online source of information about medicines. The list of attributes was developed after a series of focus group discussions with consumers.

Consumers prioritise a website that is ‘trustworthy’, followed by a website that is ‘up to date’, ‘easy to understand’ and ‘recommended by a health professional’ (Table 21). The fifth most important attribute is a website offering ‘research or evidence-based information’.

Table 21: Ranking of website attributes according to importance to consumers

(N = 2509 respondents)	Mean ranking	Rank
Trustworthy source	3.7	#1
Up to date	4.4	#2
Easy to understand	4.8	#3
Recommended by a health professional	4.8	#4
Research or 'evidence-based' information	5.0	#5
An Australian website	5.5	#6
Easy to navigate	6.1	#7
Information provided is short and concise	6.2	#8
Does not promote a specific brand of medicine	6.3	#9
Appealing and interesting website	8.2	#10

Discussion

Trust is a critical factor when communicating to consumers about medicines. Consumers prioritise a website that they consider ‘trustworthy’ when choosing an online source of information about medicines. NPS MedicineWise is considered a trusted source of health information by most consumers who are aware of the organisation. This continues to be an important asset of NPS MedicineWise.

The survey showed that social media does not play a significant role as a source of information about medicines among the general population. Consumers prefer to obtain this type of information from health professionals and websites. However, consumers aged 34 years and below, people who speak English as their second language, and Aboriginal and/or Torres Strait Islander people, are drawn more to social media compared with others when searching for information about medicines. This finding exposes both a gap and an opportunity for NPS MedicineWise. Established traditional channels of communication such as consultation with doctors and pharmacists and websites may be less effective for these groups and NPS MedicineWise has an opportunity to use social media to provide evidence-based information to these consumers in a more acceptable setting.

MEDICINES LINE

Introduction

NPS MedicineWise's national phone line service Medicines Line is a collaborative effort with *healthdirect* Australia, which triages calls to Medicines Line from all States and Territories except Queensland and Victoria. The NPS MedicineWise national phone line service aims to provide independent and evidence-based information to consumers from all Australian States and Territories with accurate and up-to-date information on prescription, over-the-counter and complementary medicines. Medicines Line also promotes QUM, encourages responsible use of medicines and increases public awareness about medicines.

The purpose of this study was to evaluate and improve the NPS MedicineWise Medicines Line telephone service. The primary aim of the evaluation was to examine participants' satisfaction with the Medicines Line service. The secondary aim was to identify gaps in consumer knowledge about medicines information and to use this information to further meet the needs of consumers.

The evaluation objectives included:

- Examining outcomes of contact with a medicines information telephone service
- Determining resultant decision-making
- Determining common enquiries consumers have about their medicines
- Exploring motivations for seeking medicines information
- Evaluating participant satisfaction.

Methods

A mixed-methods study was used, including a quantitative arm and a qualitative arm. Qualitative data were used to provide more context, and to augment and explain the quantitative results.

The quantitative arm involved conducting paper-based surveys with follow-up via telephone and short telephone surveys, with a sample of 70 Medicines Line callers. The survey used in this evaluation was adapted using items from the telephone survey used in the 2011 evaluation, with additional questions to address objectives of interest for the current evaluation.

Users of the Medicines Line service who expressed interest in participating were sent paper-based surveys in the mail following their initial call to the service and were followed up after 2 weeks. Researchers made follow-up calls encouraging callers to return their surveys or offering them the opportunity to complete a telephone survey.

The qualitative arm involved conducting semi-structured telephone interviews with a subset of participants from the total study population (n = 20). The semi-structured telephone interview protocol included all survey questions from the quantitative arm with interview question prompts integrated.

Quantitative data obtained through the 2017 evaluation was compared with quantitative data from the 2011 evaluation in order to identify any emergent trends in medicines information seeking, as well as to improve the delivery of the Medicines Line service and enhance our understanding of how best to target the needs of consumers through medicines information products and services.

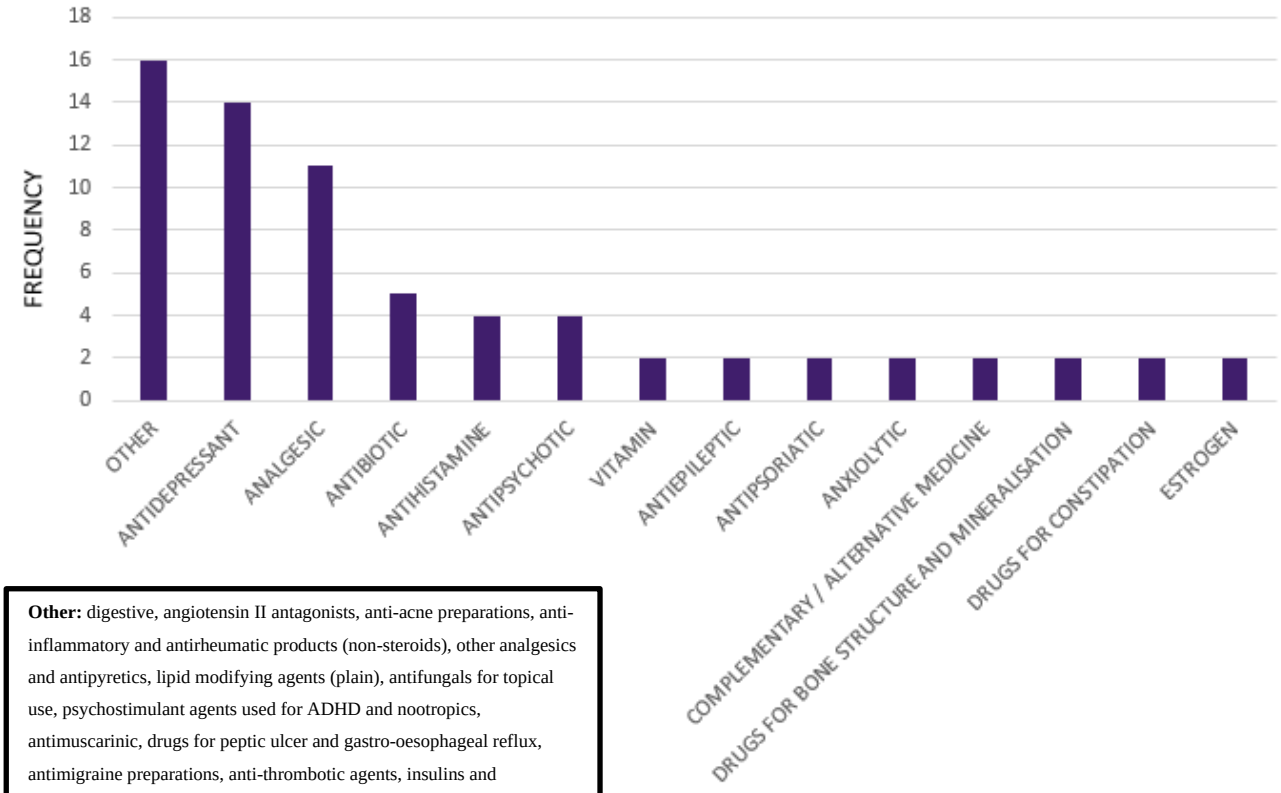
Results

The most commonly recorded motivations for contacting Medicines Line included seeking more information in general (47.1%, n = 33), seeking more information about a new medicine (28.6%, n = 20) and seeking information about a new health condition (12.9%, n = 9).

The three most common enquiries about medicines were:

- Concerns about the effects of a medicine (37.1%, n = 26)
- To check one medicine's compatibility with another (25.7%, n = 18)
- To check effects on baby because I'm pregnant/breastfeeding (15.7%, n = 11)

The medicines most commonly enquired about were antidepressants (20%, n = 14), followed by analgesics (15.7%, n = 11) and antibiotics (7.1 %, n = 5) (Figure 18).



Other: digestive, angiotensin II antagonists, anti-acne preparations, anti-inflammatory and antirheumatic products (non-steroids), other analgesics and antipyretics, lipid modifying agents (plain), antifungals for topical use, psychostimulant agents used for ADHD and nootropics, antimuscarinic, drugs for peptic ulcer and gastro-oesophageal reflux, antimigraine preparations, anti-thrombotic agents, insulins and analogues.

Figure 18: Frequency of types of medicines enquiries

Most participants were 'very satisfied' with both the information they received (77.1%, n = 54) from the service and their overall call experience (82.9%, n = 58).

Most participants also reported that their expectations had been either 'exceeded' or 'met' (97.1%, n = 68); that their knowledge had improved (94.3%, n = 66) and they felt more confident (77.1%, n = 54) about their enquiry as a result of their contact with the service.

Many participants reported feeling as though the information provided by Medicines Line was either 'very useful' or 'moderately useful' (94.2%, n = 65) and helped them make decisions (88.6%, n = 62) about using their medicines.

In cases where participants were advised by Medicines Line pharmacists to follow up with a health professional about their enquiry, a high proportion (75%, n = 24) followed this advice. The most commonly recommended health professional for follow-up was a GP (62.5%, n = 20) followed by a medical specialist (18.8%, n = 6).

Qualitative research methods were used to explore the outcomes of consumers' contact with the service and the impact of the service on consumers' medicines information needs. Interviews yielded several themes, summarised in Table 22.

Table 22: Summary of themes

Theme	*Subthemes*
Efficiency & convenience	• Medicines Line was perceived to be more efficient than consulting a community pharmacist or using a GP or specialist appointment as an opportunity to have medicine(s) enquiries handled. o Participants felt that Medicines Line was a more appropriate service to approach with medicine(s) enquiries than a GP or specialist appointment, as participants often felt that they were 'wasting the doctor's time' with basic questions about medicine(s). o The service was perceived as convenient as participants did not have to leave the house or take leave from work to attend an in-person appointment. o Participants felt more comfortable asking questions over the phone and they felt they had more time to ask questions as they were not allocated an appointment time and did not feel pressured by the health professional's schedule.
Trust	• Participants perceived the information and advice provided by Medicines Line to be trustworthy as the information was able to be cross-checked with other health professionals through: o the pharmacists' own networks o the participants' own health professionals supporting the information. • Medicines Line was perceived as more trustworthy than the internet, because participants were able to discuss their enquiries with a real person. • Pharmacists were willing and able to access the latest research. • Participants were often referred to the service by a source they trusted. • Other contributors to perceived trustworthiness included the Medicines Line pharmacists' professionalism, and honesty about knowledge gaps.
Technical knowledge of medicines	• The operators of Medicines Line were perceived to have above-average knowledge of medicines due to their training in pharmacy, their ability to access the latest research, their time-availability to research information in response to participant enquiries, and their ability to assess participants' health literacy and deliver information at an appropriate level.
Reporting system to help others	• Medicines Line was perceived to be a service to hear 'real stories' from other people, including pharmacists' own experiences with medicine(s). • Medicines Line was also perceived to be a mechanism or form of surveillance system for reporting adverse events and side effects of medicine(s). Participants were motivated to report their experiences due to their belief that the data they provided would help others stay safe from medicine-related harm.

Comparison between studies

Comparative analysis between data obtained in this evaluation and the one conducted in 2011 found that the mean age of patients who contact the Medicines Line service has decreased between 2011 and 2017. This is partly due to a statistically significant increase in young mothers using the service.

Trust remains high. However, participants in the 2017 sample (Mean Rank = 148.73, n = 70) were significantly less likely to 'strongly agree' that Medicines Line was trustworthy, than participants in the 2011 sample (Mean Rank = 130.87, n = 200, p = .015).

Participants in the 2017 sample (Mean Rank = 107.90, n = 70) were more likely to report that they are 'more confident' in using the medicine or health product that they enquired about as a result of the call, than participants in the 2011 sample (Mean Rank = 145.16, n = 200), p = .000. This effect can be described as approaching 'medium' (r = 0.25) and is illustrated in Figure 19.

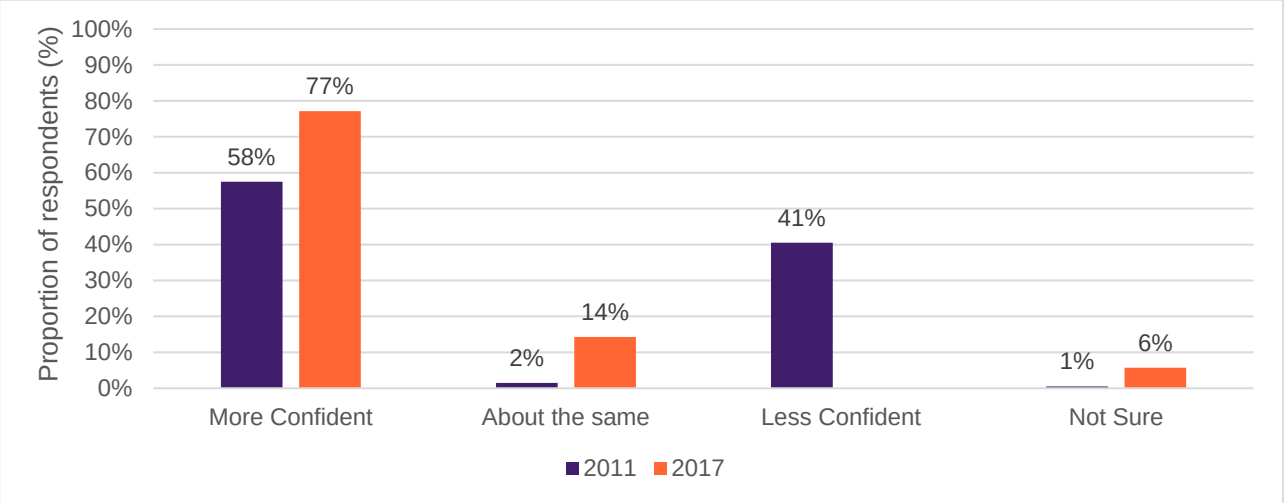


Figure 19: Confidence in participants, 2011 and 2017

Discussion

The evaluation highlighted participants were highly satisfied with the information and overall service they received from Medicines Line.

The most common enquiries received by Medicines Line were about antidepressants and the effects of medicines. The mean age of participants who contact Medicines Line has decreased, partly due to the increase in young mothers seeking information about the effects of medicines on their children or babies. These findings suggest that these are areas representing gaps in consumer knowledge.

Participants who sought advice from the Medicines Line service were likely to follow this advice, as well as follow up with health professionals where recommended.

Qualitative research found that the service was perceived by participants to be trustworthy, efficient and convenient, and useful as a reporting system for monitoring medicines use and adverse events which may help others to stay safe from medicine-related harm. Medicines Line pharmacists were perceived as having highly specialised medicine knowledge. The service was also perceived to be a useful alternative to GP and specialist consultations when patients had non-urgent enquiries about medicines.

REMOTE ACADEMIC DETAILING VISITING EVALUATION

Introduction

Educational visiting at NPS MedicineWise involves the delivery of evidence-based content to GPs and other health professionals by specially trained CSS staff. Traditionally, the mode of delivery for educational visiting has been face-to-face and in person. However, the challenge of delivering educational visits to regional, rural and remote health professionals, as well as those who are becoming increasingly time-poor, has prompted the implementation of a new mode of delivery.

In 2016, NPS MedicineWise trialled the use of web-enabled technology to deliver educational visits. Following on from this trial, remote academic detailing (known as virtual visits) were rolled out to GPs and other health professionals in 2017. The primary aim of introducing virtual visiting was to provide equitable access to healthcare education. This mode of delivery was anticipated to be of particular value to rural and remote GPs for whom an in-person visit might be difficult to arrange.

Remote academic detailing visits provides NPS MedicineWise with the opportunity to expand our service by conducting more educational visits, reaching additional GPs and delivering more programs. Remote academic detailing visits are not intended to serve as a replacement for face-to-face in-person visits, but are viewed as a convenient, alternative mode of delivery for GPs and other health professionals wanting to experience an NPS MedicineWise educational visit.

Remote academic detailing visits are currently being promoted to practices that CSSs are unable to visit regularly, such as GPs who are more than 100 km from their nearest CSS, or on island locations that are difficult to visit in person, GPs who are unable to attend a scheduled practice visit, and GPs who cannot be visited in person at a mutually convenient time.

An evaluation of the remote academic detailing mode of delivery was conducted to identify the realities and benefits of virtual visits and the opportunities for improvement. GPs and CSSs were invited to participate in the evaluation and provide feedback on their experiences of remote academic detailing visiting.

Method

GP survey

Approximately 1 week after completing an educational visit via the remote academic detailing visiting mode of delivery, GP participants were sent a link to an online survey in the Survey Gizmo platform. A total of 26 GPs completed the survey during the data collection period of 1 January 2017 to 31 December 2017, which is a response rate of approximately 14%. The data were analysed in statistical software package SPSS v.23.

GP interviews

A list of eligible GPs who had participated in a remote academic detailing visit during the data collection period was extracted from the CRM database. Email invitations to participate in an interview were sent to 115 GPs. Due to low response, the Program Engagement Coordinators were asked to assist with recruitment by following up with the selected GPs by email or phone.

A total of 6 semi-structured interviews were conducted by telephone with GPs in November/December 2017. These interviews were 45 minutes in duration.

GPs were sent a participant information sheet and consent form. The participant information sheet outlined the study and what was involved for GPs. An incentive of $75, in the form of a gift voucher, was provided to GPs who participated in the interview as compensation for their time.

The interviews were audio-recorded and transcribed by a transcription company. The data were de-identified during the transcription process. A thematic analysis of the data was conducted, and main themes have been presented.

CSS interviews

A list of eligible CSSs who had conducted one or more virtual visits during the data collection period was extracted from the CRM database. Of the 18 eligible CSSs, 12 were randomly selected in Excel. These 12 CSSs were sent an email invitation in September 2017 to participate in an interview about their experience with virtual visiting.

Nine semi-structured interviews were conducted with CSSs in October 2017; eight by telephone and one face-to-face. The interviews were 30 minutes in duration and notes were taken throughout the interview. Data were de-identified, aggregated and analysed for main themes.

Results

GP survey

Most respondents (92%) were 'entirely satisfied' with the virtual visit, and 95% reported that they were 'very likely' to participate in a remote academic detailing visit in the future. Quite a high Net Promoter Score of 69 was achieved for the remote academic detailing visiting activity. This score is comparable to the traditional face-to-face educational visits, which achieved a Net Promoter Score of 70.

Fifty per cent of survey respondents stated that they intended to change their current practice as a result of what they had learned in the remote academic detailing visit.

GP suggestions for improving the remote academic detailing visiting mode of delivery included;

- Increase the frequency of visits
- Offer a more diverse selection of topics through this mode of delivery
- Maintain the one-hour duration so that all content can be covered and there is time for discussion
- Continue providing this service to rural practitioners
- Offer more instruction on setting up and using Skype/Skype for Business.

GP interviews

GP participants were 'very satisfied' with the content of the remote academic detailing visit and described it as 'clinically based' and easy to 'apply to daily practice'. The program materials were also highly valued because it was perceived that NPS MedicineWise produced 'evidence-based' content which 'covered a lot of new things'.

> 'It was good, I like the way the education was delivered, the content and the manner it was delivered in… it was concise, it was precise, and I was happy with it'.

One of the challenges posed by virtual visiting was that many GP practices only had access to Skype and not Skype for Business. The main reasons for not being able to access Skype for Business were: they don't use the software often enough to justify a subscription to Skype for Business, the practice could not afford the costs of an ongoing subscription, and practices in regional or remote areas have greater difficulty keeping up to date with the latest technologies and are resistant to change.

Several factors were found to influence GP participants' preferred mode of delivery (ie, face-to-face in-person visits versus the virtual visit). These included:

- Flexibility provided by the visit, ie, some GP participants conducted their visit outside of work hours and in the comfort of their own home, which they found to be 'very convenient'.
- Learning styles – those who prefer learning in a one-to-one setting, rather than in a group, liked the remote academic detailing visits.
- Quality of the internet connection and other technological challenges.
- Location of the practice.

Technological challenges and satisfaction with the internet connection were interrelated themes across the interviews, meaning that GPs with poor internet connections were commonly those who experienced issues during their remote academic detailing visit. This was particularly prevalent among GPs located in regional and remote areas with very slow internet speeds.

CSS interviews

A common theme raised in the interviews was that formal training in the use of Skype for Business was not provided to CSSs. While guidance provided via their CSS network was helpful, it was not necessarily enough to equip CSS participants with the knowledge or confidence to help practices set up Skype for Business or 'troubleshoot' when faced with technological challenges.

> 'Formal training would have been helpful. I don't feel confident helping practices to download the software'…CSS 3

Poor internet connection was a technological challenge faced by seven of the nine CSS participants. This was particularly the case in rural or remote areas where the CSSs or GP practices were not well serviced by internet coverage. Another challenge for conducting virtual visits was the lack of functionality that occurs between Skype for Business and Skype. As a result, most of the virtual visits did not enable CSSs to share screens with the GPs. This meant that the CSS had to organise for the GPs to receive hard copies of the relevant materials in advance of the scheduled visits and had to employ workarounds during the visits such as holding hardcopy materials up to the camera for the GPs to see which sections they were referring to.

The biggest non-technological challenge that CSS participants experienced was how to strategically position and promote virtual visiting to GPs and practices. CSS participants discovered that the most effective way to position the remote academic detailing visit was as a convenient, alternative way of participating in an educational visit, when a face-to face in-person visit wasn't a viable option, so that GPs wouldn't 'miss out' on a topic of interest. Promoting visits as a service that could be delivered outside of traditional work hours appeared to be an attractive prospect for GP registrars and GPs with busy workloads.

> 'Getting GPs interested is the hardest part. Convenience seems to be a factor for interest, and virtual visits I have done with GPs after hours have been the best meetings because the GP is not stressed and has time for discussion and questions. It would be a good selling point for GP registrars to do virtual visits after hours rather than on the practice time. If GPs think they will miss out on a topic of interest they will also book a visit'…CSS 6

Some GPs and practices expressed the opinion that the remote academic detailing visits feel like an imposed replacement service for face-to-face in-person visits, particularly for rural and remote locations that are difficult to reach. This is a perception that needs to be overcome through the marketing strategy to minimise any reputational risk.

CSS participants made suggestions that they believed would improve the virtual visiting experience for themselves and the recipients of the visits. The top three were:

- Develop a clear strategy for marketing and positioning the virtual visits
- Conduct virtual visits using Skype or other video conferencing software used by GP practices
- Provide CSSs with formal training in Skype/Skype for Business and in troubleshooting.

Discussion

Overall, GPs who participated in remote academic detailing visits were satisfied with the experience and were highly likely to participate in another visit in the future. GPs particularly valued the convenience and flexibility that the virtual mode of delivery offered – being able to participate outside of traditional work hours, or for rural and remote GPs, being able to participate in additional programs they might otherwise miss out on.

Remote academic detailing visiting received a high Net Promoter Score (69), which was comparable to the face-to-face educational visits. This score reflects the high-quality content and perceived suitability of remote academic detailing visiting as a mode for delivering individualised one-to-one visits.

CSS participants still preferred face-to-face in-person educational visits, mostly because this mode allows CSSs to build rapport and maintain relationships with GPs in a way that cannot be replicated using web-enabled technology. Remote academic detailing visiting also had the potential to lower CSS confidence because of the added pressure of having to set up, use or troubleshoot technology that could fail during scheduled visits.

CSSs' experiences of virtual visiting varied greatly from very positive experiences to negative experiences, where technological challenges impacted the quality of the visit. Most GP participants also experienced technological challenges in setting up the software or during the visit.

One complication that contributed to the technological challenges faced by CSSs and GPs, was that most practices did not subscribe to Skype for Business and preferred to conduct the visits using alternative teleconferencing software such as Skype, GoToMeeting or Scopia. This forced CSSs to develop workarounds to be able to conduct the visits and share the program materials.

It is clear from the findings that training and accessible, ongoing technological support is essential for the success of the virtual visiting mode of delivery. Another factor for success is the adoption of a teleconferencing platform that is mutually acceptable.

The marketing of remote academic detailing visits was perceived by CSS participants as the 'biggest challenge' they face. Engaging GPs in visits has been difficult to date, and visits do need to be positioned carefully as there is a reputational element for NPS MedicineWise to consider. Face-to-face in person visits have been positioned and perceived as a valuable 'gold standard' service offered by NPS MedicineWise and has now become an expectation of many GPs and practices, including regional and rural practices.

While it is undeniable that remote academic detailing visiting is a convenient and flexible alternative to in-person visiting that supports equitable access to healthcare education, the challenges that NPS MedicineWise has acknowledged must be addressed for this mode of delivery to be successful in the future.

BE MEDICINEWISE WEEK 2017

Introduction

Be Medicinewise Week (BMW) is an annual campaign run by NPS MedicineWise to help Australians get the most out of their prescription, over-the-counter, and complementary medicines. This year the event ran from 21–27 August 2017.

BMW contributes to the organisation's strategic goals by engaging with consumers and increasing consumer knowledge about being medicine wise.

Theme

The theme of this year's campaign was 'Medicine misuse can happen to anyone'. This applies to misuse of both prescription and over-the-counter medicines.

Goal

Starting a national conversation about medicine misuse and encouraging medicine wise behaviour.

Marketing material

The following marketing materials were created to promote BMW 2017:

- **Campaign toolkit**: An 11-page A4 PDF that was designed to give tips and tools for spreading medicine wise messages at the workplace.
- **Event kit**: A physical kit that could be ordered to help organisations promote BMW. Each kit contained a poster, infographic, bunting, bundle of flyers, flyer stand and thank you note, which explained how to enter the social media competition
- **Poster**: A3 hero poster that showed a woman driving a car with a pill as the steering wheel.
- **Infographic**: A3 poster containing 4 'did you know' facts related to medicine misuse.
- **Images for use on social media**: 4 social media images were designed for external use to support the campaign.
- **Video**: Medicine misuse can happen to anyone – a video that shared the unique experience of four different Australians and their medicine misuse stories.
- **Emails**: Dedicated email campaigns were designed to raise awareness among pharmacists, nurses and practice managers.

Method

Process evaluation was conducted to measure the implementation and reach of campaign activities.

It was expected that increased exposure to Be Medicinewise Week messages improves consumer awareness and knowledge.

All data for BMW 2017 covers the period from 24 July to 3 September 2017 unless otherwise noted.

Results

Execution of the BMW 2017 media plan was successful in attracting a large number of media mentions (n = 2,081) and driving downloads of the audio news release (n = 1,743). The target for media mentions was exceeded (595% of target achieved) as was the target for downloads of the audio news release (581% of target achieved). The estimated media total reach was 4.75 million, with an earned media value of $358,388. As part of the media execution, the use of figures from a Galaxy poll about how millions of 'Aussies misuse their medicines' attracted significant media attention including an exclusive story in the *Sydney Morning Herald*.

The printed event kit and downloadable campaign toolkit were in high demand with 1,000 event kits produced and ordered. The campaign toolkit achieved more than three times as many unique downloads during BMW 2017 (n = 1,204) as the equivalent resource for BMW 2016 (n = 338).

Targeted emails to health professionals were a key driver of traffic to the website, with 1,318 click-throughs to the landing page.

Paid promotion on LinkedIn is a relatively new component of social media activity; the LinkedIn campaign for Be MedicineWise week drove 103 clicks with an average cost per click of $6.50. This is the second-best performance of the four LinkedIn campaigns trialled.

Discussion

The media approach worked strategically to drive media coverage through providing interesting content and building relationships with journalists. These approaches delivered strong performance in media coverage. Continuing to nurture these relationships with journalists will encourage good coverage for future BMW and other NPS MedicineWise campaigns.

The orderable Event Kit was a successful new product offered for BMW 2017. Issues with the ordering system hindered distribution and should be addressed so that all orders that are taken can be fulfilled. Real-time monitoring in the ordering system should be considered.

While the paid social media spend increased by 25%, the reach achieved by paid posts increased by 60%. At the same time, organic reach declined, so the social media spend was important in maintaining the campaign's reach.

A new social media competition linked to the Event Kit was launched as part of BMW 2017 with 10 high quality entries received.

Dedicated eDMs drove more than 1,300 clicks to the campaign landing page, and visitation peaked on days the eDMs were sent.

The incorporation of key findings from the BMW 2016 Evaluation Report contributed to the success of the BMW 2017 campaign.

WORLD ANTIBIOTIC AWARENESS WEEK 2017

Introduction

World Antibiotic Awareness Week (WAAW) is an annual, global event to raise awareness about the serious health issue of antibiotic resistance. NPS MedicineWise runs the campaign to support the global initiative in Australia each year. The aim of the campaign is to reduce antibiotic resistance and educate Australians about the steps they can take to preserve the power of antibiotics. The 2017 campaign ran from 13–19 November 2017.

Theme

The global theme for WAAW 2017 was 'Handle antibiotics with care'.

Key messages

- The future of antibiotics is in your hands.
- Spread knowledge, not antibiotic-resistant infections.
- Antibiotics don't work for all infections.
- Misusing antibiotics can cause harm.

Marketing material

The following materials were created to support WAAW 2017:

- Posters and flyers
    - A3 poster – The future of antibiotics is in your hands
    - A3 poster – Antibiotic resistance: the facts
    - A3 poster folded to A4 – Be part of the solution (Health Professionals)
    - DL flyer – How to get involved in World Antibiotic Awareness Week
- Social media campaign images
- Event kit – Comprised of an A3 poster, DLflyer, bunting, word bubbles, tissues, hand sanitizer, and two balloons.

Method

Process evaluation was used to assess this campaign. All data for WAAW 2017 span the period from 23 October to 24 November 2017, unless otherwise noted.

Results

The WAAW campaign performed strongly against predefined targets for earned media, social media, and orders of event kits.

There were 1,316 downloads of the audio news release, achieved 263% of the target, and represented an increase of 285% from 2016 downloads. This was achieved through a focussed strategy that selected strong spokespeople and crafted media releases with specific audiences in mind.

Media releases were effective in driving media mentions with 570 achieved, 114% of the target. The campaign achieved an estimated reach of 4.9 million.

Table 23: World Antibiotic Awareness Week Results, 2017

Metric	AAW 2017 (target)	AAW 2017 (actual)	% of target achieved	% change 2016 to 2017
Unique visits to campaign landing page	10,000	5,962	60%	▼ 51%
Unique downloads of campaign toolkit	2,500	1,044	42%	▼ 48%
Poster downloads (avg. per poster)	1,500	556	37%	▼ 11%
Event kits ordered (print)	2,000	1,667	83%	▲ 204%
Email open rate (avg. across sends)	35%	22%	63%	n/a
Email click through rate (among those who opened messages)	5%	5%	102%	n/a
Social media reach (paid and organic)	600,000	933,903	156%	▲ 8%
Social media engagements (paid and organic)	1,000	11,131	1,113%	▼ 22%
Entries to morning tea competition	50	26	52%	▲ 30%
Video views (3+ seconds)	50,000	27,836	56%	-64%
Downloads of audio news release	500	1,316	263%	▲ 285%
Total mentions in editorial media (excl. radio release)	500	571	114%	▼ 13%
Media reach (new metric)	1,000,000	4,929,912	493%	n/a

The target for social media reach was exceeded, with 156% of the target met, and an 8% increase on 2016 figures. The target for social media engagements was also exceeded, with 11,131 engagements achieving more than 10 times the target.

Event kits were popular, and increased production meant that the number of orders at 1,667 increased by 204% from 2016. Entries to the morning tea competition using the kits increased to 26, a 30% improvement. When surveyed, people who ordered the event kit expressed enthusiasm for the kits and indicated that they are using them in their workplaces even if they are not entering the competition.

Discussion

Media coverage was a highlight of the campaign. All targets in this area were achieved and there was strong growth in downloads of the audio news release with downloads increasing by 285% from 342 in 2016 to 1,316 in 2017. Much of the coverage generated for WAAW was achieved in the lead-up to the week. Strong coverage was achieved despite competing news stories.

The event kits were well received by those who ordered them, and a high rate of responses to the event kit survey (42%) indicates a high degree of engagement among contacts who ordered the kit.

Recommendations from the AAW 2016 campaign were incorporated into WAAW 2017 campaign planning and had a positive impact on information sharing in the lead up to the campaign, distribution of event kits, and greater understanding of how the kits were used.

STAKEHOLDER SURVEY 2017

Introduction

Organisations were identified for inclusion in the Stakeholder Survey if they had collaborated with NPS MedicineWise on an educational program within the last two years. Primary representatives from these organisations were invited to participate and provide feedback on their collaborative experience.

The purpose of the survey was fourfold.

- To identify the level of engagement between partner organisations and NPS MedicineWise.
- To understand the motivations of partner organisations for engaging with NPS MedicineWise.
- To assess the level of satisfaction with NPS MedicineWise as a collaborative partner.
- To identify the possibility of future collaborations.

Method

A self-completion questionnaire was developed, based on the aims of the survey, and conducted online using Survey Gizmo as the online survey platform. Representatives from selected partner organisations were sent an email invitation to participate which included the survey link. To date, the survey has been sent to 14 representatives from 11 organisations. These organisations included: the Lung Foundation Australia, Asthma Australia, National Asthma Council Australia, Australian Diabetes Society, Arthritis Australia, Thoracic Society of Australia, University of Western Australia, University of Sydney, Monash University, Griffith University, Sydney South West Area Health Service.

Stakeholder survey round one

The link was distributed to the first round of organisations in April 2017. Round one included eight representatives from six organisations that had worked collaboratively with NPS MedicineWise on visiting programs for asthma, COPD and diabetes.

The survey was open to respondents for a period of 3 weeks. Five of the eight representatives completed the survey within the data collection period, which was a response rate of 63%.

Stakeholder survey round two

The link was distributed to the second round of organisations in December 2017. Round two included six representatives from five organisations that had worked collaboratively with NPS MedicineWise on visiting programs for osteoarthritis and statins.

The survey was open to respondents for a period of 3 weeks. Three of the six representatives completed the survey within the data collection period, which was a response rate of 50%.

Overall, eight representatives from seven organisations responded to the Stakeholder Survey in 2017, which is a 57% response rate. The data set for the Stakeholder Survey is currently small, so findings are indicative and may change as more data are collected in subsequent years.

Results

The collaborative experience mostly consisted of resource development, cross-promotion of materials and expert review of materials.

Over half of the respondents reported a ‘high’ level of awareness of NPS MedicineWise, prior to collaborating with our organisation, and most respondents ‘strongly agreed’ or ‘agreed’ that NPS MedicineWise was an independent, evidence-based organisation and a trusted source of information about medicines and medical tests.

The top two motivations for engaging with NPS MedicineWise were; to provide evidence-based information for educational programs and to take up the opportunity to partner with NPS MedicineWise.

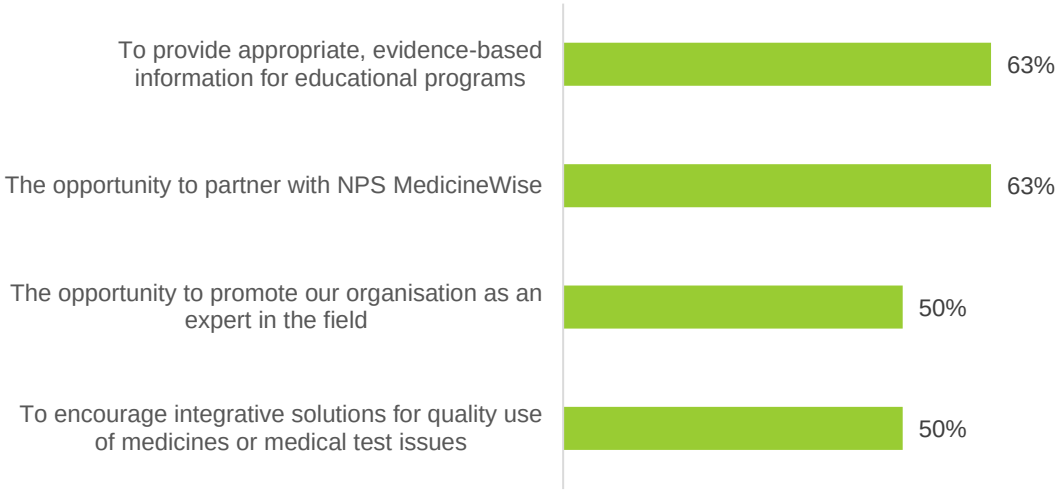


Figure 20: Respondent motivation for engaging with NPS MedicineWise

For most respondents (71%), expectations of working with NPS MedicineWise on a visiting program were 'entirely met'.

All respondents were 'very satisfied' or 'satisfied' with communications between their organisation and NPS MedicineWise, and with the collaboration experience overall. In fact, 57% of respondents were identified as 'promoters' who would be 'very likely' to recommend a collaboration with NPS MedicineWise to others. No respondents were identified as 'detractors', giving a net promoter score of 57 for the collaborative experience, which is an excellent score indicating high customer experience and loyalty.

All respondents were positive that their organisation would consider working with NPS MedicineWise again in the future, and some identified specific opportunities for future collaboration, such as extending audience reach with health professional and consumer resources, developing joint strategies, holding joint symposiums and working together on QUM projects.

Discussion

Overall, representatives from organisations who completed the Stakeholder Survey 2017 were highly aware of NPS MedicineWise before starting a collaboration and commonly perceived our organisation to be a reputable source of independent and evidence-based information about medicines and medical tests.

The primary motivation for wanting to collaborate on activities, such as resource development and cross-promotion of materials, was to provide appropriate evidence-based information for our educational programs. The opportunity to partner with NPS MedicineWise as a way of sharing expertise and reaching audiences was also an important motivation.

Cross-promotion of resources and collaboration with a view to extending audience reach for both parties were activities that most organisations were keen to do more of.

The findings indicate that it is imperative that the expectations of both parties be clearly communicated and agreed upon before starting the collaboration.

All representatives who participated in the survey reported a high level of satisfaction with their communications with NPS MedicineWise and the overall collaborative experience. These organisations were also positive about the possibility of collaborating with NPS MedicineWise on educational programs, activities and resources in the future.

Suggestions for improvement included implementing formal partnership agreements at the initial scoping stage of a program or activity that would allow for co-collaboration of education resources and acknowledgements and to meet with stakeholder organisations twice a year to discuss initiatives.

CHOOSING WISELY – THE THIRD YEAR

Introduction

Evaluation of the third year of Choosing Wisely Australia initiative sought to assess reach and engagement, and measurable change in awareness, attitudes, knowledge and practice of health professionals and consumers. Choosing Wisely Australia® is an initiative led by Australian medical colleges and professional societies and facilitated by NPS MedicineWise. One of the main aims of the initiative is to encourage clinicians and consumers to start a conversation about appropriateness of care. Key messages are disseminated through activities and information for health professionals and consumers.

Key messages

- Choosing Wisely Australia is enabling clinicians, consumers and healthcare stakeholders to start important conversations about tests, treatments and procedures where evidence shows they provide no benefit and, in some cases, lead to harm.
- Focussed on high quality care, the initiative is being led by Australia's medical colleges and societies and facilitated by NPS MedicineWise.
- Choosing Wisely Australia is empowering consumers and health professionals to initiate frank discussions about what care is truly needed.
- Not all tests, treatments and procedures are in the consumer's best interest. The right choice should be based on the best available evidence and discussion between the consumer and clinician.
- Unnecessary practices are a diversion from high quality care. They can lead to more frequent and invasive investigations that can expose consumers to undue risk of harm, emotional stress and financial cost. We all need to understand the evidence and appropriateness in ordering tests, treatments and procedures.
- The medical community is coming together, speciality by speciality, to develop recommendations, lists of tests, treatments and procedures to question.
- Choosing Wisely Australia is changing the culture to one where more is not always better when it comes to medical tests, treatments and procedures.
- Choosing Wisely Australia enables the medical community to take a leadership role in the responsible management and fair distribution of finite healthcare resources.

Method

Process evaluation was conducted to assess reach and engagement among the target audience from July 2017 to June 2018. The third year of the Choosing Wisely Australia initiative was evaluated using a range of methods.

Health professional surveys: online surveys (designed using Survey Gizmo software) were conducted with a national sample of GPs and medical specialists to monitor trends over time and identify changes in awareness, attitudes, knowledge and self-reported practice in relation to tests, treatments and procedures. The AMPCo mailing list was used to select a representative sample of GPs and medical specialists, and the survey link was sent via email to approximately 4,000 GPs and 2,500 medical specialists. The surveys were sent out in November 2017 for a period of 4 weeks with one reminder. The response rates were 6% of GPs (n = 234) and 7% of specialists (n = 194).

Health services survey: NPS MedicineWise supported several health services to conduct consumer surveys to determine baseline attitudes and knowledge about medical tests and management of their health.

Member survey: an online survey was conducted with representatives from member colleges, societies, associations, health services and consumer organisations about key aspects of working with NPS MedicineWise and their involvement in Choosing Wisely Australia. The survey was sent to the CEO and/or primary contact of 59 members organisations in September 2018. The survey was open for 3 weeks with one reminder.

Results

The third year of the Choosing Wisely Australia initiative exceeded expectations in many areas.

- Nine new health service members were recruited, three more than anticipated.
- Choosing Wisely Australia was mentioned in over 1,000 general media stories, 50% more than the target.
- '5 Questions' resource was downloaded 833 times, 7% more than the target.
- Choosing Wisely messages were incorporated into three-quarters of NPS MedicineWise programs and products.

Health professional awareness of Choosing Wisely Australia

Health professional awareness of the Choosing Wisely Australia initiative has increased year on year, with a 4% increase in GP awareness and a 7% increase in specialist awareness observed between the second and third year of the initiative (Figure 21).

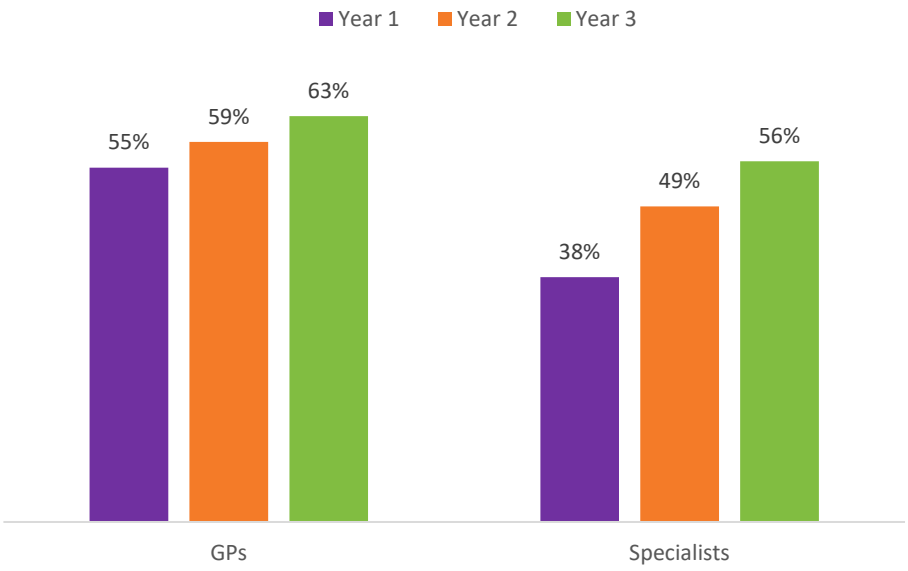


Figure 21: Percentage of health professional awareness of Choosing Wisely Australia

Health professional knowledge and practice change

The third year of the initiative shows an increase in GP knowledge and practice in line with Choosing Wisely Australia recommendations (Table 24).

Table 24: Percentage change in GP practice in line with Choosing Wisely recommendations

Selected recommendations	Year 2	Year 3	Difference
I would 'often or always' choose not to use PPIs long-term in patients with uncomplicated disease without regular attempts at reducing dose or ceasing	64%	70%	+6%
I would 'rarely or never' advocate routine self-monitoring of blood glucose for people with Type 2 diabetes who are on oral medication only	39%	44%	+5%
I would 'often or always' have conversations around prognosis, wishes, values and end of life planning in patients with advanced disease	60%	63%	+3%
I would 'rarely or never' prescribe antibiotics for otitis media in non-indigenous children aged 2–12 years, where reassessment is a reasonable option	36%	39%	+3%

Consumer attitudes and knowledge related to medical tests and self-management

Of the consumers surveyed, 9 out of 10 indicated having had a medical test in the last 3 months. These consumers primarily had the test because it was recommended by their health professional.

To assess consumer understanding of the risks of unnecessary tests, respondents were asked to indicate their level of agreement with statements about medical tests. Positively, about 93% of consumers felt confident asking their doctor questions about medical tests. The survey findings do suggest that further education is required to increase understanding of risks, with just over half of consumer respondents agreeing that having a medical test when they don't need it may be harmful for their health, and only one-quarter of respondents agreeing that some tests can produce misleading results that can lead to unnecessary treatment.

Consumers were also asked to indicate their level of agreement with statements about managing their own health. The majority felt confident telling their doctor about their health concerns and agreed that they take an active role in their own healthcare (Figure 22).

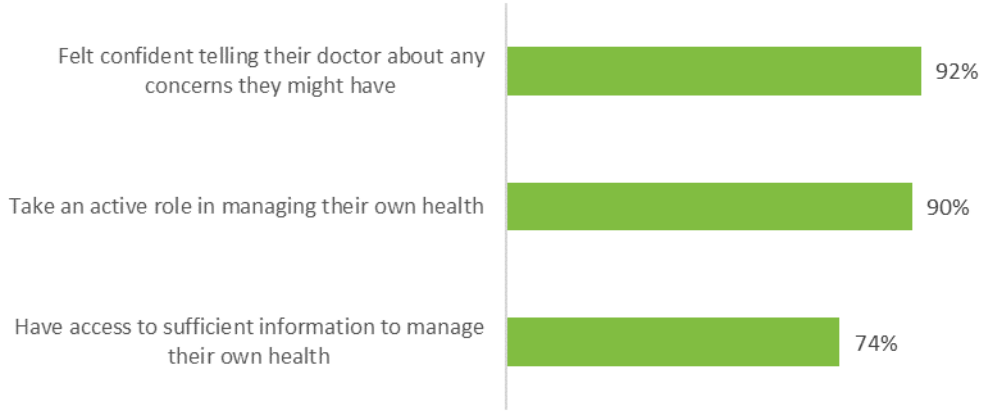


Figure 22: Consumer attitudes to managing health

Feedback from member organisations

The member survey was completed by 35 representatives from 26 member organisations, including 14 health services and 12 colleges, societies or associations. Ten of the member organisations were new to Choosing Wisely Australia, becoming members in the last 12 months. For these organisations, the top motivations for becoming a part of this initiative were:

- to be part of an initiative that is reducing unnecessary tests, treatments and procedures (85%)
- to promote appropriate, evidence-based care to their members (77%).

All members who responded to the survey were satisfied with the implementation of Choosing Wisely Australia and 60% found working with NPS MedicineWise to be a valuable experience. Of the 40% of members who have not found the collaboration to be a valuable experience to date, these members did not feel that they could claim to have shared a valuable experience with NPS MedicineWise because, as associations or sub-groups of College or Society members, they had not received direct communication from NPS MedicineWise about Choosing Wisely. All their communication had come from their professional body, so they were unaware of the role played by NPS MedicineWise in the initiative

Member organisations have developed resources, such as posters, brochures, webpages and guidelines, to support the implementation of Choosing Wisely Australia. In the last 12 months, 60% of member organisations have initiated conversations with other organisations about Choosing Wisely Australia; 57% have participated in teleconferences with NPS MedicineWise; and 54% have actively promoted Choosing Wisely Australia to their members.

In the last 12 months, member organisations have experienced many Choosing Wisely achievements, and have also faced some challenges, as outlined in Table 25.

Table 25: Common achievements and challenges of implementing the Choosing Wisely Australia initiative

Achievements	Challenges
Measurable reductions in unnecessary tests in project areas	Limited time available to focus on Choosing Wisely
Media coverage and recognition via health excellence awards	Obtaining resources to support implementation
Developing list of recommendations	Maintaining momentum among staff and members
Receiving funding to implement Choosing Wisely	Reaching consensus on recommendations
Developing new protocols	Developing recommendations from a consumer perspective
Working with consumers	
Sharing projects at conferences	

Discussion

For this financial year, Choosing Wisely messages were incorporated into three quarters of NPS MedicineWise programs and products. Evaluation findings for the third year of Choosing Wisely Australia indicate that awareness of the initiative among health professional has continued to grow. Next year we will be reporting the success of communicating Choosing Wisely messages through our educational programs.

Health professionals who were aware of Choosing Wisely Australia were more likely to select the survey responses that were in line with Choosing Wisely Australia messages. The third year of the initiative also demonstrated positive changes in GP practice associated with particular Choosing Wisely Australia recommendations.

Findings from the consumer surveys indicate that nine out of ten consumers feel confident asking their doctors in hospitals and outpatient clinics questions about medical tests and discussing any concerns they may have. However, it is evident that education about the risks of unnecessary tests is still needed to increase consumer knowledge and prompt positive changes in behaviours associated with medical tests, treatments and procedures.

Australian medical colleges, societies, associations, health services and consumer organisations remain engaged with the initiative. They are motivated to promote evidence-based care to their members and contribute to the reduction of unnecessary tests, treatments and procedures.

EXPERT ASSESSMENT OF EVALUATION METHODS USED BY NPS MEDICINEWISE

An assessment of the evaluation methods used by NPS MedicineWise was conducted by Rosalie Viney (CHERE), Stephen Jan (George Institute), Anita Katharina Wagner (Harvard University) and a report was provided to NPS MedicineWise on 8 October 2018. The team of three evaluation scientists came from diverse backgrounds and assessed six NPS MedicineWise evaluations against pre-specified general criteria for valid observational studies and considered the specific context of NPS MedicineWise evaluations.

The team found that:

- NPS MedicineWise is exemplary in implementing multi-faceted interventions targeting prescribers and patients; the need for NPS MedicineWise's health system-wide programs to ensure quality use of medicines is expected to increase in the future.
- NPS MedicineWise has developed and applies a consistent and methodologically sound approach to estimating changes in medication utilisation and resultant savings associated with its programs. In addition, it has developed systems to allow for estimation of program costs.
- NPS MedicineWise appropriately uses extensive longitudinal data and the most valid quasi-experimental evaluation design to demonstrate effects of its interventions. In light of these methods, the main findings of NPS MedicineWise's evaluations are valid and important.

The assessment team suggested ways in which NPS MedicineWise could enhance its evaluation reports and evaluations in the future. Those are, in the short-term, to:

- Provide additional detail in evaluation reports on analysis methods used
- Provide more detailed discussion in evaluation reports of the impacts of potential limitations
- Establish a system of independent peer-review for each report, and seek publication of findings in peer-reviewed journals
- Apply strategies to further strengthen interrupted time series evaluation designs
- Use external evidence to support findings

Longer-term recommendations are to:

- Assess options for prospective designs of evaluations of future interventions that are rolled-out in waves, to allow for non-intervention control groups
- Broaden the NPS MedicineWise mandate beyond achieving PBS savings
- Include, where possible, cost-effectiveness in addition to cost-savings assessments

Independent, not-for-profit and evidence based, NPS MedicineWise enables better decisions about medicines and medical tests. We are funded by the Australian Government Department of Health.

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