

6 Conclusions

Key points

- Many people for whom asthma management guidelines would recommend using inhaled corticosteroids are not using them regularly. At the same time, most inhaled corticosteroids that are dispensed to adults are in the strongest formulation, which may add to the risk of harmful side effects.
- People with concession cards use inhaled corticosteroids and long-acting beta agonists at more than twice the rate of general patients. This may reflect the impact of the large subsidy available to concession card holders and that the sixfold greater costs to general patients may be a barrier to the use of inhaled corticosteroids.
- The PBS database was designed for administrative purposes. Adapting the PBS database for use as an epidemiological data source requires consideration of the limitations of administrative data.
- Future studies could be enhanced through linkage of the PBS with other clinical data such as hospitalisations and mortality.
- The principles applied to the PBS data in this study could prove useful for investigations of medication use for other conditions and diseases.

6.1 Summary and implications of findings

This study represents the first time that data from the PBS have been used to describe the patterns of asthma medication use by individuals. The purpose of this study was to examine the effect of demographic characteristics on the use of asthma medications; quantify the frequency of use of these medications by individuals; investigate the potency of inhaled corticosteroids used in Australia; and explore the relationship between the use of inhaled corticosteroids and other respiratory medications.

Barriers to use of inhaled corticosteroids

Use of inhaled corticosteroids and long-acting beta agonists was higher among people living in more socioeconomically disadvantaged localities. Concession card holders also represent a more socioeconomically disadvantaged subgroup of the population. Consistent with the finding in socioeconomically disadvantaged localities, rates of dispensing of inhaled corticosteroids and long-acting beta agonists among concession card holders were over double that of general beneficiaries. Although only 35% of the population are concession card holders, 56% of people dispensed inhaled corticosteroids were concession card holders. Average daily use of inhaled corticosteroids and long-acting beta agonists was much higher among people who were concession card holders than among those who did not have concession cards. These observations may be explained by a price barrier that exists for general patients. The cost of inhaled corticosteroids to general beneficiaries is at least six

times more than the cost to concession card holders. The evidence suggests that this is an important barrier to best practice in asthma care.

Lower use of inhaled corticosteroids and long-acting beta agonists was also identified in remote areas compared to major cities. However, the reported prevalence of asthma is similar in these localities (ACAM 2005). In order to improve the management of respiratory disease in rural and remote locations it may be of value to focus on access issues in non-metropolitan locations.

Low average rates of medication use

The finding that, on average, individuals taking asthma medications took approximately a quarter of the World Health Organization's defined daily dose (DDD) per day throughout the study period has different implications in each of the drug classes. For short-acting beta agonists and oral corticosteroids this is a reassuring finding because these drugs should only be used as required.

On the other hand, inhaled corticosteroids and long-acting beta agonists are recommended for regular use by people with persistent asthma. The low rates of use of these drugs, measured as both DDDs per day and number of prescriptions dispensed, indicate that most people who take these medications used them intermittently. While more than 10 out of every 100 people in Australia have asthma (ACAM 2005), only 2.6 daily doses per 100 people were dispensed per day. This implies that only a minority of people with asthma use this class of medications regularly.

Use of high potency inhaled corticosteroids

A further concern about the use of inhaled corticosteroids is that most adults are dispensed the most potent formulations of this class of medications, despite evidence that lower doses are effective, with fewer side effects, especially when used with long-acting beta agonists. This pattern of sporadic use of high potency inhaled corticosteroids is consistent with observations using other data sources (ACAM 2005). It suggests that use of inhaled corticosteroids for asthma is suboptimal in Australia.

The lower rates of use of potent inhaled corticosteroids in children are reassuring and reflect the general caution about use of this class of medication in children.

High rates of multiple asthma medication use

Generally, higher rates of use of inhaled corticosteroids were associated with higher rates of dispensing of short-acting beta agonists, oral corticosteroids and long-acting beta agonists. This implies that inhaled corticosteroids are used more regularly by people with more severe or less well controlled asthma. However, these data are limited in being able to investigate this thoroughly as, apart from the amount of short-acting beta agonist and oral corticosteroids dispensed, there are no other indicators of asthma severity or control. The absence of an observable reduction in short-acting beta agonist and oral corticosteroid use with higher amounts of inhaled corticosteroids further raises the concern that use of inhaled corticosteroids is suboptimal.

6.2 Limitations

The purpose of the PBS database is to support the data custodians in the Department of Health and Ageing in the administration of the PBS. However, in this study, the PBS data was used for a rather different purpose, that is, to acquire epidemiological information about the use of asthma medications in Australia. As the PBS data set was not designed for this purpose, there were a number of limitations and complexities that had to be addressed in the analyses.

Lack of clinical information

A chief constraint in this study is that PBS data on prescriptions dispensed cannot be linked to any clinical data about the person to whom the medications were dispensed. Many of the medications used to manage asthma can be used to treat other acute and long-term respiratory illnesses, especially COPD among older people and wheezy bronchitis. This limitation was addressed by carrying out further analyses among people aged 5 to 34 years in whom it is most likely that these medications were used to treat asthma. This is a major advance on previous analyses of population-wide asthma medication data in Australia where age groups have not been available. Patterns among people aged 5 to 34 years were often similar to those observed for all ages. However, there were some key differences, such as the lower use of inhaled corticosteroids among people aged 5 to 34 years. Among older age groups, which made up the largest proportion of the users, many would have been prescribed their medications for COPD.

A central issue in determining the appropriateness of asthma medication is the underlying severity of asthma or the level of asthma control at the time medications were dispensed. In the absence of clinical data, these cannot be directly assessed. Frequency of dispensing of short-acting beta agonists was used as a proxy indicator of asthma control. However, these data were only available for concessional patients and may not be complete even in that population.

Seasonal variation

Another limitation of this study is that the primary unit of measurement is the number of prescriptions dispensed, not medications consumed. While it seems plausible that most prescriptions that are dispensed will largely correlate with the amount of medication consumed, it is possible that there will be a difference in these two parameters, for example, when people either do not take their medications or 'stockpile' medications. There is some case for the latter by the striking seasonal variation in medication use on the PBS, in which higher rates of purchase of all drugs occurs at the end of each calendar year (data not shown). This is when the number of people on the safety net is greatest and suggests that reaching the safety net acts as an incentive to boost medication purchase once the out-of-pocket price drops. By contrast, hospitalisation and emergency department data suggest that illness due to asthma is more common in the early part of the year among children and during the early winter months among adults (ACAM 2005). Therefore, it was not possible to reliably investigate seasonal variation in asthma medication use in these data.

Interestingly, this seasonal pattern in medication purchase further supports the finding that out-of-pocket cost is an important barrier to regular medication use.

Copayment issues

A particular difficulty with these data is the copayment rates in different subgroups of the population. In this study, the authors were only able to investigate short-acting beta agonists and oral corticosteroids that were dispensed to concession card holders. This is because the retail cost of these medications is lower than the copayment rate for general (non-concessional) beneficiaries. Short-acting beta agonists are available without prescription ('over the counter') and this is a convenient method of purchasing this class of medications, which many patients take advantage of. For general patients, there is no price disincentive to purchasing short-acting beta agonists over the counter, and it is assumed that most do purchase them in this manner. However, the finding that 30% of concessional beneficiaries who were dispensed inhaled corticosteroids had not been dispensed any short-acting beta agonists through the PBS implies that, despite the price disincentive, some concession card holders do purchase short-acting beta agonists over the counter. The convenience of quickly purchasing medication over the counter rather than waiting to see a doctor for a prescription may, in some instances, outweigh the modest extra cost, particularly if such purchases are infrequent.

Data quality

As the PBS system is used in the administration of the Australian Government subsidy for pharmaceutical products, there is considerable investment in ensuring these data are of high quality. However, the presence of 'dummy' PINs and a small number of PINS with implausibly large numbers of prescriptions (defined as a person receiving > 96 prescriptions for one drug in 2 years) indicate likely inaccuracies in these data. This may reflect limitations in the linkage of prescription data to demographic data using PINs generated from the Medicare numbers. For instance, data entry errors could potentially lead to unusual results for a small number of PINs. While PINs ensure patient anonymity, retracing and verifying the accuracy of records and subsequent linkage becomes very difficult. Further research is needed to validate the accuracy of the creation of PINS and linkage.

6.3 Possible future uses of PBS data

The inclusion of demographic information in the PBS database opens the opportunity for future studies to investigate the outcomes of medication treatments. For instance, it is feasible to conduct ecological studies that investigate the trends in medication supply and asthma hospitalisations and mortality within different demographic profiles.

Greater linkage between data sources may enhance this by enabling future studies linking outcomes such as mortality, hospitalisations and visits to emergency departments to prescription data. Such studies will be valuable for understanding the effectiveness of asthma management strategies and the ongoing monitoring of respiratory health in Australia.

The methods used in this study to investigate asthma could also be applied to the use of PBS data to investigate medication use in other diseases. Table 6.1 summarises a number of principles from the current study that can be adopted for this purpose. Such studies will provide some important insights into how well the current use of drugs compares with best practice for the disease in question.

Table 6.1: Principles of analysis of PBS data as applied to asthma

Principle	Application in the study of asthma medication classes
Determine the prescription history of an individual?	Link records pertaining to the same person using the patient identification number (PIN).
Group related drugs together into medication classes?	Use defined daily dose (DDD) as a common currency and add DDDs across members of the same class, as defined by the Anatomical Therapeutic Classification.
Are the medication classes specific to (i.e. exclusively used for) the disease or condition?	<p>All asthma medication classes were also used for COPD in older age groups. Most specific to asthma among age 5–34 years, therefore conduct subsidiary analyses in this age group.</p> <p>Oral corticosteroids are used for many other conditions; therefore improve specificity by excluding individuals who did not use any asthma medication classes other than oral corticosteroids.</p>
Is the medication class subsidised by the PBS?	<p>All prescriptions of inhaled corticosteroids and long-acting beta agonists were subsidised and included in analysis.</p> <p>Prescriptions of short-acting beta agonists and oral corticosteroids were subsidised to concession card holders only, therefore restrict analysis of these medication classes to these patients.</p>
Were there administrative issues that may affect epidemiological analysis?	<p>Dummy PINS were used during data entry when Medicare numbers were unavailable. Identify and remove 'dummy' PINs from data set.</p> <p>If an individual's demographic characteristics change over time, use the values associated with the earliest record for that individual.</p>
Is the apparent prescription rate realistic?	In each medication class, exclude individuals who averaged more than four prescriptions per month of one drug over the study.
Is the estimate of average dose realistic?	In each medication class, exclude individuals who were first dispensed a prescription in the last 7 days of the study period.