The extent and correlates of community-based pharmaceutical opioid utilisation in Australia

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Running head: Pharmaceutical opioid use in Australia

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Take home messages:

- There has been considerable concern regarding the increasing use of pharmaceutical opioids for pain and their potential to cause harm.
- This is particularly of concern in rural and regional areas, where there appears to be increasing problems related to opioid misuse, but almost no epidemiological research on utilisation.
- We provide an overview of pharmaceutical opioid utilisation across Australia, and consider socio-demographic factors that may affect utilisation levels.
- We present 2013 Australian pharmaceutical opioid sales data to community pharmacies by opioid type (buprenorphine, over-the-counter and prescribed codeine, dextropropoxyphene, fentanyl, hydromorphone, methadone, morphine, oxycodone, tapentadol and tramadol).
- In 2013, an estimated 10,747 kg (measured in oral morphine equivalents [OME]) of pharmaceutical opioids were utilised across Australia, equating to 481 OME mg per person over the year.
- There was considerable geographic variation in opioid utilisation, with higher rates of opioid utilisation (OME mg per person) in rural and regional areas. Geographic areas that were less populated, had more males and older people, proportionally more low income earning households and greater proportions in jobs requiring physical labour had higher utilisation rates.

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Abstract

Purpose: There has been concern regarding increasing use of opioids and related harm. We present data on opioid utilisation across Australia, and consider socio-demographic factors that may affect utilisation rates.

Methods: IMS Health national sales data for over-the-counter (codeine) and prescription opioids (buprenorphine, codeine, dextropropoxyphene, fentanyl, hydromorphone, methadone, morphine, oxycodone, tapentadol and tramadol) were used to estimate total utilisation rates in the community during 2013, mapped to Statistical Local Areas (SLAs) and Remoteness Areas (RAs). All opioid amounts were measured in pack sales and milligrams, then converted to oral morphine equivalent milligrams (OME mg) for comparison across opioids. Data on the demographic characteristics of SLAs were obtained from the ABS (sex and age distribution, income, and levels of physical labour) and other sources (number of pharmacies in SLAs), and were included in linear regression analyses.

Results: In 2013, an estimated 10,747 kg (OME) of opioids were sold across Australia, equating to 481 OME mg per person. There was considerable geographic variation in opioid utilisation, with higher rates of use in rural and regional areas. Geographic areas that were less populated, had more males and older people, proportionally more low-income earning households and greater proportions in jobs requiring physical labour, had higher utilisation rates.

Conclusions: Substantial geographic variation in opioid utilisation was identified, with areas outside of major cities having higher rates of utilisation of all types of opioids. Prescription monitoring and best practice interventions aimed at improving opioid use need to have a particular focus on areas outside of major cities.

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Introduction

Pharmaceutical opioids are increasingly used for the treatment of chronic non-cancer pain, with a considerable rise in the use of these medicines in multiple countries.^{1, 2} The increasing utilisation of pharmaceutical opioids has been met with concern regarding the potential for parallel increases in the non-medical use of these medicines, given the contribution to morbidity and mortality that non-medical use may cause.³ Strong associations between the extent of opioid supply and harms have been demonstrated in jurisdictions with high opioid use.^{4, 5} Further, substantial concerns have been raised about the lack of evidence for the effectiveness of long-term use of opioids for the management of chronic non-cancer pain.⁶ Pharmaceutical opioids have become a public health burden through dependence,² overdose,⁷⁻¹¹ and serious morbidity from the use of high doses of combination products containing paracetamol or ibuprofen.¹²⁻¹⁴ Some attempts have been made to summarise the divergent literature on the rates of these outcomes that do occur¹⁵, although the variation in definitions and operationalisation of terms, and in the study populations, makes it difficult to be too confident about the pooled estimates¹⁶⁻¹⁸. There has also been concern that levels of opioid harms may be higher in rural and regional areas, where there may be significant problems related to problematic pharmaceutical opioid use.¹⁹⁻²¹

To date, many reports detailing pharmaceutical opioid utilisation have relied on data from records of reimbursed or subsidised prescriptions.^{1, 2, 11, 22-25} However, often only subsidised or reimbursed medicines and quantities (for example, in Australia, only those subsidised under the Pharmaceutical Benefits Scheme, or PBS) appear in these statistics, providing an incomplete picture of total pharmaceutical opioid utilisation. These data typically do not capture (1) items supplied to patients that do not meet the threshold for reimbursement (in Australia these data are only available from April 2012), or (2) unsubsidised prescriptions, including prescriptions for larger quantities or for other indications. The *Australian Statistics on Medicines* published by the Drug Utilisation Sub-committee of the Australian Pharmaceutical Benefits Advisory Committee (PBAC) provides PBS data and estimates of non-PBS supply from surveys of sentinel

pharmacies, but only at a national level, which has limited utility for examining geographic supply in sub-national areas. Additionally, prescription data do not include opioids purchased without a prescription (over-the-counter (OTC) opioids); in Australia this includes many products containing codeine.

Notable increases in reported opioid prescriptions have been observed in Australia,¹ particularly of oxycodone.^{2, 24} Between 1992 and 2013, the total number of opioid prescriptions subsidised by the PBS increased fifteen-fold.²⁶ However, these data did not capture medications that did not meet the co-payment threshold, or over-the-counter opioids. To our knowledge there has been no detailed examination of opioid sales data to quantify opioid utilisation at a national level. The aim of this study is to provide the first comprehensive overview of opioid utilisation across Australia, and to consider factors that may affect utilisation levels. Specifically, we aimed to:

1. Estimate total prescription and over-the-counter pharmaceutical opioid utilisation and determine geographic distribution across Australia;
2. Identify the proportion of utilisation accounted for by different types of opioids; and
3. Identify socio-demographic correlates of opioid utilisation.

Methods

Opioid sales data

A third party access request to obtain pharmaceutical opioid sales data in Australia was approved by IMS Health. These data include all pharmaceutical opioid purchases made through pharmaceutical wholesalers and manufacturers who sold direct to pharmacies in the 2013 calendar year, representing over 94% coverage of the Australian market²⁷. This study focused on opioids sold in the community and excluded opioids supplied in hospitals. Because of the legal requirements for secure storage in pharmacies, and monitoring and recording of some opioids, the number of packs sold in pharmacies over a 12 month period very closely approximates the number used.

All opioids available in Australia that are indicated of pain were included and coded according to the World Health Organization's (WHO) Anatomical Therapeutic Classification system (http://www.whocc.no/atc_ddd_index/): buprenorphine (N02AE01), codeine (N02BA51, N02BE51, N02AA59, R05DA04), dextropropoxyphene (N02AC04, N02AC54), fentanyl (N02AB03), hydromorphone (N02AA03), methadone (N02AC52), morphine (N02AA01), oxycodone (N02AA05, N02AA55), and tapentadol (N02AX06) and tramadol (N02AX02). Injectable formulations were excluded as they are typically used in hospital settings; these represent an extremely small proportion of total opioids sold in the community. Formulations of methadone and buprenorphine used solely for the treatment of opioid dependence were not included. Opioids were grouped into *strong prescription opioids* (buprenorphine, fentanyl, hydromorphone, methadone, morphine and oxycodone as per WHO guidelines²⁸), *other prescription opioids* (prescribed codeine, dextropropoxyphene, tapentadol and tramadol) and *over-the-counter opioids* (codeine products available at pharmacies without a prescription; see Appendix for more details).

Data on PBS opioid prescriptions subsidised in 2013 were also obtained to examine the magnitude of opioid sales relative to the number of prescriptions subsidised by the PBS. Australia has a publically funded universal healthcare system entitling all Australian citizens and permanent residents to a range of subsidised health services. This includes free treatment in

public hospitals (funded jointly by Commonwealth and State/Territory governments), subsidised outpatient services including consultations with medical and selected health care professionals (funded by the Commonwealth's Medicare Benefits Scheme) and medicines prescribed in the community and private hospitals (funded by the PBS). Medicines prescribed to public hospital inpatients are covered primarily by hospital budgets. Aggregated data on all subsidised prescriptions supplied on the PBS are publically available through item supply reports³¹ (<http://www.pbs.gov.au/info/statistics/dos-and-dop/dos-and-dop/>). We searched these reports for each of the opioids and items included in the IMS data described above to obtain national data on the number of opioid prescriptions subsidised by the PBS in 2013. We were unable to account for multiple packs supplied for a single prescription as data on the quantity of opioids dispensed are not publically available.

Geographic coding

IMS Health data were provided in sales "bricks" (n=1,023), which are geographic boundaries containing clusters of pharmacies, developed for medicine sales and distribution purposes across Australia. Sales bricks were mapped to postcodes (n=2,862), which were then mapped to 2011 Statistical Local Areas (SLAs) (n=1,375) using the Australian Bureau of Statistics' (ABS) Australian Standard Geographical Classification system.²⁹ SLAs are a method of statistical geographic classification, providing a spatial pack comprising of areas covered by local government councils as well as unincorporated areas. Additionally, SLAs were coded according to remoteness, which was based upon the ABS' Remoteness Areas classification.^{30, 31} These were "Major Cities", "Inner Regional", "Outer Regional", "Remote" and "Very Remote". Where SLAs covered multiple RAs, we selected the RA which covered the majority percentage of the SLA. Details of the classification of SLAs according to these groupings can be found elsewhere.^{30,}

³¹

Data on characteristics of Statistical Local Areas

Data on the characteristics of SLAs were obtained from a range of sources. The number of people in each SLA (measured in 10,000s) was obtained from ABS 2012 Population Estimates.³² Socio-demographic characteristics of residents in each SLA were obtained from the ABS Census

(<http://www.abs.gov.au/websitedbs/censushome.nsf/home/tablebuilder?opendocument&navpos=240>). This included: proportion who were male; proportion over 65 years of age; proportion working in jobs involving physical labour (which we defined as agriculture, mining, manufacturing and construction industries); and proportion of low-income households (defined as less than AUD\$400 per week). The rate of community pharmacies in each SLA (measured as number of pharmacies per 1,000 persons) was estimated using a marketing database containing details of all pharmacies across Australia.³³

Analyses

Analyses were conducted using SAS Enterprise Guide 6.1 (SAS Institute Inc., Cary, NC, USA), STATA 13 (StataCorp LP, Texas, USA), and Microsoft Excel 2010 (Microsoft, Seattle, WA). Opioid utilisation was estimated in three ways by totalling: (1) the number of packs sold, (2) the weight of active opioid ingredient in milligrams (mg) and (3) the total opioid contained in oral morphine equivalent milligrams (OME mg)³⁴.

All opioid amounts were converted into OME mg, based on existing guidelines developed to compare across opioid preparations.³⁴ OME are considered a better representation of opioid utilisation as opioid doses tend to vary widely between individuals, particularly among those using opioids on a long-term basis.³⁵ In order to better represent actual utilisation of patch formulations of fentanyl and buprenorphine, the amount in mg represents the total amount released if used in accordance with the manufacturer's directions (ie. every 3 days for fentanyl³⁶ and every 7 days for buprenorphine³⁶), rather than the total mg contained in the patch. Depending on specific brands, the estimated amount of active ingredient released is approximately 43% for fentanyl patches and 17% for buprenorphine patches.

Once sales data were coded according to SLAs and RAs, total utilisation was calculated and rates estimated, based on population data from the ABS.³² Confidence intervals (95% CIs) were calculated for the number of packs, mg and OME mg per person, by jurisdiction and remoteness. A map showing the geographic distribution of pharmaceutical opioid utilisation (OME mg per person) across Australia in 2013 was generated using the ArcMap component of

ESRI ArcGIS software.³⁷ Bivariate and multivariate linear regressions were undertaken to examine socio-demographic correlates of the rate of pharmaceutical opioid utilisation (OME mg per person). Variables included in regression analyses were the number of pharmacies per 1,000 persons in SLAs and the ABS variables representing the characteristics of SLAs listed above. Unstandardised regression coefficients are reported in models examining the association between remoteness and total retail opioid utilisation. Unstandardised coefficients show the change in the outcome (OME mg per person) as a result of increasing remoteness. Standardised regression coefficients are reported in models examining other correlates of total retail opioid utilisation. Standardised regression coefficients indicate the effect of a one standard deviation change in the predictor variable on the outcome. They are not sensitive to the units in which the predictor is measured, and are therefore comparable.

Results

Pack sales of opioids

A total of 42.3 million opioid packs were sold across Australia in 2013 (Table 1). One quarter (23.8%) of these were packs of *strong prescription opioids*, 39.6% *other prescription opioids* and 36.6% *over-the-counter opioids*. Codeine (both prescription and OTC) accounted for two thirds of all pack sales across Australia (29% prescription codeine and 37% OTC codeine). One in seven packs sold (13.7%) were oxycodone and 9.5%, tramadol. Dextropropoxyphene, morphine and methadone packs accounted for 1.8%, 1.1% and 1.3% of pack sales, respectively. Very few opioid packs sold were of tapentadol (0.01%) and hydromorphone (0.5%).

The number of packs sold was far higher than the number of PBS dispensings for prescription opioids (Table 1). The ratio of total packs of prescription opioids sold: PBS dispensings was 2.1:1.0, with higher ratios for methadone (5.7:1.0) and prescription codeine (3.2:1.0).

Table 1 about here

The rate of packs sold was highest in Tasmania (2.71 packs/person), followed by South Australia (2.41 packs/person), Western Australia (1.96 packs/person) and Queensland (1.91 packs/person) and New South Wales (NSW) (1.86 packs/person). Rates of packs sold for total prescription and OTC opioids (packs per person) were higher in more remote areas in NSW, Tasmania and Victoria. Rates of packs sold in Very Remote areas of NSW were six times higher than in Major Cities of NSW for the year (Table 2).

Table 2 about here

Estimated utilisation in oral morphine equivalent milligrams (OME mg)

An estimated 10,747.24kg of opioids (i.e. 10.7 tonnes), measured as oral morphine equivalent kg (OME kg), was sold across Australia in 2013. This equated to 481.16 OME mg per person over the year. Utilisation by jurisdiction and according to remoteness is

presented in Table 3. Nearly 70% of the total opioid utilisation, as measured via OME, was through *strong prescription opioids*, with *other prescription opioids* accounting for 25% and *over-the-counter opioids* accounting for 6% of OME utilisation. The types of opioids comprising the greatest proportion of OME utilisation were oxycodone (31%) and tramadol (17%). Dextropropoxyphene (<1%) and tapentadol (<1%) formed the smallest proportion of total OME utilisation. Although representing only 3% of pack sales nationally, fentanyl accounted for 15% of OME utilisation. Morphine accounted for 4% of OME utilisation.

Jurisdictions in crude OME utilisation are shown in Table 3. When the number of people in SLAs was accounted for, the highest rates of OME utilisation per person were in Tasmania (640.63 OME mg/person), South Australia (605.32 OME mg/person) and Queensland (521.99 OME mg/person). The lowest rate of OME utilisation per person was in the Northern Territory (272.49 OME mg/person).

There was also considerable variation in levels of OME utilisation according to remoteness (Table 3). In New South Wales, Tasmania and Victoria, the rate of total opioid utilisation per person increased with increasing remoteness, but not in other jurisdictions, although in general, major cities had lower levels of opioid utilisation than the other, more remote areas. Higher rates of OME utilisation occurred in more remote regions in New South Wales. Total OME utilisation per person in Very Remote areas (3206.55 OME mg/person) of New South Wales was eight times that of Major Cities (382.81 OME mg/person). For *strong prescription opioid* utilisation, OME utilisation per person in Very Remote areas (2377.00 OME mg/person) of New South Wales was nearly nine times higher than Major Cities (267.39 OME mg/person).

Table 4 demonstrates these associations statistically. As can be seen, more remote areas had higher rates of opioid utilisation than major cities. The associations between remoteness and opioid utilisation were much stronger for prescription opioids than for OTC opioids, with only small differences between remote and very remote areas compared to major cities in this type of opioid utilisation.

Table 3 and 4 about here

Predictors of opioid utilisation (measured as OME mg per person)

In adjusted regression analyses (Table 5), predictors of higher opioid utilisation (measured in OME mg) per person in SLAs, across all types of opioids, were consistent. The rates of utilisation were higher in SLAs with a 1) greater proportion of males, 2) a greater proportion of people over 65 years, 3) a greater proportion of people with occupations involving physical labour, 4) more low income households, and 5) those with fewer people in SLAs (population measured in 10,000s).

Insert Table 5 about here

Discussion

These are the first data estimating the full extent of pharmaceutical opioid utilisation in Australia, including supply of unsubsidised opioid items and OTC codeine. There are a number of clear findings. First, there is considerable utilisation of opioids in Australia, far higher than estimates based upon the number of subsidised prescriptions dispensed in Australia.

Second, in terms of packs sold (around 15 million packs in 2013 alone), OTC codeine is the most commonly sold opioid and is also the most accessible opioid in the community setting. Numerous studies and clinical experts have highlighted concerns about the effectiveness and adverse events of prescribed and OTC codeine^{12, 38-40}. Our findings highlight that in Australia, codeine still appears to be used as a first-line analgesic in quite high volumes despite these concerns. It is also possible that some people may be using codeine for non-medical purposes, increasing risks of dependence²¹ and for adverse effects due to the other ingredients contained in these products, including paracetamol and ibuprofen. Many of these preparations contain sub-therapeutic doses that are likely to offer little clinical benefit^{38, 41}, and have been demonstrated to have potential for serious adverse effects from escalating use and dependence.¹²⁻¹⁴ In addition to concerns about limited effectiveness, concerns have also been raised about inter-individual variations in codeine metabolism and the potential for either no/limited analgesia among poor metabolisers, or toxicity among ultra-rapid metabolisers.⁴² The high rates of codeine utilisation observed in this study highlight the need for further work to better understand codeine use in Australia, including determining if use represents evidence-based and effective treatment.

Third, there is also substantial utilisation per person of stronger prescription opioids, with an average of 0.5 packs of stronger prescription opioids used per person in Australia. When considering utilisation of opioids across a common metric (OMEs), it was also clear that most opioid utilisation (accounting for different potencies and strengths) is of stronger opioids. Chronic pain is highly prevalent,⁴³ and its prevalence will continue to increase as the

population ages. However, there is limited evidence supporting the use of opioids for the long-term management of pain.⁶ With the increased utilisation of strong opioids in the treatment of chronic pain, it will be important to monitor these data to detect patterns and changes in opioid use over time.

Fourth, there was clear variation in utilisation geographically, with areas outside of major cities having higher rates of utilisation of all types of opioids. Additionally, areas with indicators suggestive of greater disadvantage (e.g. more physical labour, unemployment) had higher rates of utilisation. There is evidence that regional and more remote communities may also have higher rates of problematic pharmaceutical opioid use¹⁹, with higher rates of treatment episodes per million people observed in regional and remote areas for morphine and oxycodone,⁴⁴ and higher oxycodone mortality rates in rural areas in Victoria⁸. Research from the United States similarly indicates morbidity and mortality related to opioids is greater in remote areas, even after adjusting for population density^{7, 45, 46}.

This may be in part related to a lack of alternative treatment options for pain in more remote areas, but may also reflect the complex social determinants of health and chronic pain, including ecological, sociological and political factors impacting opioid prescribing and healthcare provision in rural communities.⁴⁵ We have previously found that among chronic non-cancer pain patients prescribed opioids, correlates of higher opioid utilisation and of problematic opioid use and dependence, included lower socio-economic status and psychiatric comorbidity⁴⁷, consistent with other work with this patient group⁴⁸⁻⁵¹. The term “adverse selection”⁵¹ has been coined to describe this apparent contradiction whereby those using higher levels of opioids are also those with greater social disadvantage as well as more complex physical and mental health problems.

It is clear that if there are intervention programs targeting the extent of inappropriate opioid prescribing and use, they need to have a particular focus on areas outside of major cities. The impact of any reduction in opioid use among some patient populations would

need to consider potential increases in demand for non-opioid interventions in rural and regional areas, which are often difficult to access. Recent data from Canada and the United States suggest that it may also be important to target *high dose* prescribing, given the strong associations observed between opioid overdose risk and the use of high doses (200mg OME per day) of opioids^{52, 53}.

There were also jurisdictional differences in the rates of utilisation observed. Tasmania had the highest rates of utilisation of prescription opioids (both strong and other prescription opioids, with particularly elevated rates of *other prescription opioids*), and lower rates of OTC opioids compared to other jurisdictions. Given its geographic isolation from the rest of Australia, and the consistently limited availability of illicit opioids such as heroin in that State, Tasmania has traditionally had higher levels of use and injection of diverted opioids among people who use and inject illicit drugs.⁵⁴ It has traditionally also been the jurisdiction with among the highest levels of opioid prescribing in the country.⁵⁵ Partly in response to this, Tasmania began implementing real-time opioid prescription monitoring in recent years; it remains the only jurisdiction to date to have done so.⁵⁵ Although the data we have presented here cannot be used to infer the impact of any such program and there has been varied uptake across Tasmanian pharmacies and prescribers of this program, some have suggested that real-time monitoring of opioid prescribing has led to prescribing of less restricted opioids over more restricted opioids (sometimes referred to as a “chilling effect”⁵⁶). Direct examinations of this possibility in the United States have not suggested that there is clear support for this.^{57, 58}

It is important to note that even in Tasmania, and certainly throughout other Australian States, people who inject drugs are estimated to use only a small proportion of the total amount of pharmaceutical opioids used in the community⁵⁹. It is also important to remember that people who use pharmaceutical opioids outside the bounds of a doctor’s prescription do not only do so with their own medication. We have also recently demonstrated that considerable proportions of people using pharmaceutical opioids via

tampering obtain them from someone dealing in diverted opioids, or from someone else to whom they had been prescribed.^{60, 61}

Limitations

Some limitations of this work need to be acknowledged. These data refer to packs sold, but we do not have information about the number of individuals to whom these opioids were sold, nor of the extent of utilisation per annum per individual. It is also important to be clear that the number of packs sold is not synonymous with utilisation (although the same is true for data on subsidised medicines). Furthermore, given that we assumed fentanyl and buprenorphine patches were used for the number of days recommended in prescribing guidelines, we did not account for variations in use at the individual level. The amount released from a patch provides a more reasonable reflection of use and had we taken into account the raw amounts contained in each patch, it would have resulted in much higher estimates of the actual amount of opioids used in Australia.

Higher levels of utilisation do not necessarily indicate that the use of these opioids is inappropriate or problematic in nature. The extent of diversion and/or extra-medical use of opioids is unable to be determined from these data.

Finally, this is a snapshot of opioid sales in 2013. Any subsequent changes to the regulatory environment, such as additional regulatory controls for OTC codeine products or the introduction of new abuse-deterrent opioid formulations, may result in changes in opioid utilisation in the future.

Conclusions

To our knowledge, this is one of few studies to estimate pharmaceutical opioid utilisation in detail using sales data, and to consider geographic and socio-demographic factors associated with utilisation of different opioids. There is considerable geographic variation in opioid utilisation, with areas outside of major cities having higher rates of utilisation of all types of opioids. It is likely that complex social determinants of health and pain play a role in

the higher opioid utilisation in more economically-disadvantaged communities. Prescription monitoring and best practice interventions aimed at improving the treatment of chronic pain need to have a particular focus on areas outside of major cities.

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References

1. Leong M, Murnion B, Haber PS. Examination of opioid prescribing in Australia from 1992 to 2007. *Internal Medicine Journal*. 2009; **39**(10): 676-81. doi: 10.1111/j.1445-5994.2009.01982.x
2. Roxburgh A, Bruno R, Larance B, Burns L. Prescription of opioid analgesics and related harms in Australia. *The Medical Journal of Australia*. 2011; **195**(5): 280-4. doi:
3. Degenhardt L, Hall W. Extent of illicit drug use and dependence, and their contribution to the global burden of disease. *Lancet*. 2012; **379**(9810): 55-70. doi:
4. Fischer B, Nakamura N, Urbanoski K, Rush B, Rehm J. Correlations between population levels of prescription opioid use and prescription-opioid-related substance use treatment admissions in the USA and Canada since 2001. *Public Health*. 2012; **126**(9): 749-51. doi: 10.1016/j.puhe.2012.04.010
5. Fischer B, Jones W, Rehm J. High correlations between levels of consumption and mortality related to strong prescription opioid analgesics in British Columbia and Ontario, 2005-2009. *Pharmacoepidemiology and Drug Safety*. 2013; **22**(4): 438-42. doi: 10.1002/pds.3404
6. Chou R, Turner JA, Devine EB, Hansen RN, Sullivan SD, Blazina I, et al. The Effectiveness and Risks of Long-Term Opioid Therapy for Chronic Pain: A Systematic Review for a National Institutes of Health Pathways to Prevention Workshop Effectiveness and Risks of Long-Term Opioid Therapy for Chronic Pain. *Annals of Internal Medicine*. 2015; **N/A**(N/A): N/A-N/A. doi: 10.7326/m14-2559
7. Paulozzi LJ, Budnitz DS, Xi Y. Increasing deaths from opioid analgesics in the United States. *Pharmacoepidemiology and Drug Safety*. 2006; **15**(9): 618-27. doi:
8. Rintoul AC, Dobbin MDH, Drummer OH, Ozanne-Smith J. Increasing deaths involving oxycodone, Victoria, Australia, 2000–09. *Injury Prevention*. 2011; **17**(4): 254-9. doi:
9. Centers for Disease C, Prevention. Vital signs: overdoses of prescription opioid pain relievers---United States, 1999--2008. *MMWR Morbidity and Mortality Weekly Report*. 2011; **60**(43): 1487-92. doi:
10. Office of Applied Studies—Substance Abuse and Mental Health Services Administration. Emergency department trends from DAWN: final estimates 1995 – 2002. DAWN Series D-24, DHHS publication no. (SMA) 03-3780. Rockville, MD: Department of Health and Human Services; 2003.
11. Roxburgh A, Burns L, Drummer OH, Pilgrim J, Farrell M, Degenhardt L. Trends in fentanyl prescriptions and fentanyl-related mortality in Australia. *Drug and Alcohol Review*. 2013; **32**(3): 269-75. doi: 10.1111/dar.12033
12. Frei MY, Nielsen S, Dobbin MD, Tobin CL. Serious morbidity associated with misuse of over-the-counter codeine-ibuprofen analgesics: a series of 27 cases. *The Medical Journal of Australia*. 2010; **193**(5): 294-6. doi:
13. Bond GR, Ho M, Woodward RW. Trends in hepatic injury associated with unintentional overdose of paracetamol (Acetaminophen) in products with and without

opioid: an analysis using the National Poison Data System of the American Association of Poison Control Centers, 2000-7. *Drug Safety*. 2012; **35**(2): 149-57. doi: 10.2165/11595890-000000000-00000

14. Mort JR, Shiyanbola OO, Ndehi LN, Xu Y, Stacy JN. Opioid-paracetamol prescription patterns and liver dysfunction: a retrospective cohort study in a population served by a US health benefits organization. *Drug Safety*. 2011; **34**(11): 1079-88. doi: 10.2165/11593100-000000000-00000

15. Vowles KE, McEntee ML, Julnes PS, Frohe T, Ney JP, van der Goes DN. Rates of opioid misuse, abuse, and addiction in chronic pain: a systematic review and data synthesis. *Pain*. 2015; **156**(4): 569-76. doi: 10.1097/01.j.pain.0000460357.01998.f1

16. Scholten W, Henningfield JE. A meta-analysis based on diffuse definitions and mixed quality literature is not a good fundament for decisions on treatment of chronic pain patients. *Pain*. 2015; **156**(8): 1576-7. doi: 10.1097/j.pain.0000000000000213

17. Minozzi S, Amato L, Davoli M. Development of dependence following treatment with opioid analgesics for pain relief: a systematic review. *Addiction*. 2013; **108**(4): 688-98. doi: 10.1111/j.1360-0443.2012.04005.x

18. Noble M, Treadwell JR, Tregear SJ, Coates VH, Wiffen PJ, Akafofomo C, et al. Long-term opioid management for chronic noncancer pain. *Cochrane Database of Systematic Reviews*. 2010; (1): CD006605. doi:

19. Day C, Conroy E, Lowe J, Page J, Dolan K. Patterns of drug use and associated harms among rural injecting drug users: comparisons with metropolitan injecting drug users. *Aust J Rural Health*. 2006; **14**(3): 120-5. doi:

20. Keyes KM, Cerda M, Brady JE, Havens JR, Galea S. Understanding the rural-urban differences in nonmedical prescription opioid use and abuse in the United States. *American Journal of Public Health*. 2014; **104**(2): e52-9. doi: 10.2105/ajph.2013.301709

21. Nielsen S, Murnion B, Dunlop A, Degenhardt L, Demirkol A, Muhleisen P, et al. Comparing treatment-seeking codeine users and strong opioid users: Findings from a novel case series. *Drug and Alcohol Review*. 2015; **34**(3): 304-11. doi: 10.1111/dar.12224

22. Rintoul AC, Dobbin MDH, Drummer OH, Ozanne-Smith J. Increasing deaths involving oxycodone, Victoria, Australia, 2000-09. *Injury Prevention*. 2010. doi: 10.1136/ip.2010.029611

23. Hollingworth SA, Gray PD, Hall WD, Najman JM. Opioid analgesic prescribing in Australia: a focus on gender and age. *Pharmacoepidemiology and Drug Safety*. 2015. doi: 10.1002/pds.3767

24. Hollingworth SA, Symons M, Khatun M, Loveday B, Ballantyne S, Hall WD, et al. Prescribing databases can be used to monitor trends in opioid analgesic prescribing in Australia. *Australian and New Zealand Journal of Public Health*. 2013; **37**(2): 132-8. doi: 10.1111/1753-6405.12030

25. Furu K, Wettermark B, Andersen M, Martikainen JE, Almarsdottir AB, Sørensen HT. The Nordic Countries as a Cohort for Pharmacoepidemiological Research. *Basic & Clinical Pharmacology & Toxicology*. 2010; **106**(2): 86-94. doi: 10.1111/j.1742-7843.2009.00494.x

26. Blanch B, Pearson S, Haber P. An overview of the patterns of prescription opioid use, costs and related harms in Australia. *Br J Clin Pharmacol*. 2014; **78**(5): 1159-66. doi:

27. IMS Health. Australian Pharmaceutical Index: IMSPlus workshop manual Sydney: IMS Health Australia; 2009.
28. Zech DF, Grond S, Lynch J, Hertel D, Lehmann KA. Validation of World Health Organization Guidelines for cancer pain relief: a 10-year prospective study. *Pain*. 1995; **63**(1): 65-76. doi:
29. Australian Bureau of Statistics. 1270055006C184 Postcode 2011 to Statistical Local Area 2011. In: Australian Bureau of Statistics, editor. Canberra: Commonwealth of Australia; 2012.
30. Australian Bureau of Statistics. 1216.0.15.003 - Australian Standard Geographical Classification (ASGC) Remoteness Area Correspondences, 2006 Canberra: Australian Bureau of Statistics; 2006.
31. Australian Bureau of Statistics. 1216.0 - Australian Standard Geographical Classification (ASGC), July 2006. In: Australian Bureau of Statistics, editor. Canberra: Australian Bureau of Statistics; 2006.
32. Australian Bureau of Statistics. 3235.0 Population by Age and Sex, Regions of Australia, 2012. Canberra: Australian Bureau of Statistics; 2013.
33. Maven Marketing. List of Pharmacies and Chemists in Australia. 2014 [cited 2014 14th March]; Available from: <http://www.mavenmarketing.com.au/list-of-pharmacies-in-australia/>
34. Nielsen S, Degenhardt L, Hoban B, Gisev N. Comparing opioids: A guide to estimating oral morphine equivalents (OME) in research. NDARC Technical Report No. 329. . Sydney: National Drug and Alcohol Research Centre, UNSW Australia; 2014.
35. Svendsen K, Borchgrevink P, Fredheim O, Hamunen K, Mellbye A, Dale O. Choosing the unit of measurement counts: the use of oral morphine equivalents in studies of opioid consumption is a useful addition to defined daily doses. *Palliative Medicine*. 2011; **25**(7): 725-32. doi:
36. MIMs Australia. MIMs Online. Australia: MIMs. <https://www.mimsonline.com.au/Search/Search.aspx>; 2015.
37. Environmental Systems Research Institute Inc. ESRI ArcGIS Desktop 10.2. California: Esri; 2013.
38. Derry S, Karlin SM, Moore RA. Single dose oral ibuprofen plus codeine for acute postoperative pain in adults. *Cochrane Database Syst Rev*. 2015; **2**: CD010107. doi: 10.1002/14651858.CD010107.pub3
39. Nielsen S, Tobin CL, Dobbin MD. OTC codeine: Examining the evidence for and against. *Australian Pharmacist*. 2012; **31**(3): 236-40. doi:
40. Roxburgh A, Hall WD, Burns L, Pilgrim J, Saar E, Nielsen S, et al. Trends and characteristics of accidental and intentional codeine overdose deaths in Australia. *Med J Aust*. 2015; **203**(7): 299. doi:
41. Toms L, Derry S, Moore RA, McQuay HJ. Single dose oral paracetamol (acetaminophen) with codeine for postoperative pain in adults. *Cochrane Database Syst Rev*. 2009; (1): CD001547. doi: 10.1002/14651858.CD001547.pub2

42. Gasche Y, Daali Y, Fathi M, Chiappe A, Cottini S, Dayer P, et al. Codeine Intoxication Associated with Ultrarapid CYP2D6 Metabolism. *New England Journal of Medicine*. 2004; **351**(27): 2827-31. doi: doi:10.1056/NEJMoa041888
43. Blyth FM, March LM, Brnabic AJM, Jorm LR, Williamson M, Cousins MJ. Chronic pain in Australia: a prevalence study. *Pain*. 2001; **89**(2-3): 127-34. doi:
44. Nielsen S, Roxburgh A, Lintzeris N, Jefferson A, Degenhardt L. Changes in non-opioid substitution treatment episodes for pharmaceutical opioids and heroin from 2002 to 2011. *Drug & Alcohol Dependence*. 2015; **149**: 212-9. doi:
45. Prunuske JP, St Hill CA, Hager KD, Lemieux AM, Swanoski MT, Anderson GW, et al. Opioid prescribing patterns for non-malignant chronic pain for rural versus non-rural US adults: a population-based study using 2010 NAMCS data. *BMC Health Serv Res*. 2014; **14**: 563. doi: 10.1186/s12913-014-0563-8
46. Havens JR, Oser CB, Leukefeld CG, Webster JM, Martin SS, O'Connell DJ, et al. Differences in prevalence of prescription opiate misuse among rural and urban probationers. *Am J Drug Alcohol Abuse*. 2007; **33**(2): 309-17. doi: 10.1080/00952990601175078
47. Campbell G, Nielsen S, Larance B, Bruno R, Mattick R, Hall W, et al. Pharmaceutical Opioid Use and Dependence among People Living with Chronic Pain: Associations Observed within the Pain and Opioids in Treatment (POINT) Cohort. *Pain Medicine*. 2015; **DOI: 10.1111/pme.12773**. doi:
48. Clarke H, Soneji N, Ko DT, Yun L, Wijeyesundera DN. Rates and risk factors for prolonged opioid use after major surgery: population based cohort study. *BMJ (Clinical research ed)*. 2014; **348**: g1251. doi: 10.1136/bmj.g1251
49. Cochran BN, Flentje A, Heck NC, Van Den Bos J, Perlman D, Torres J, et al. Factors predicting development of opioid use disorders among individuals who receive an initial opioid prescription: mathematical modeling using a database of commercially-insured individuals. *Drug and Alcohol Dependence*. 2014; **138**: 202-8. doi: 10.1016/j.drugalcdep.2014.02.701
50. Rogers KD, Kemp A, McLachlan AJ, Blyth F. Adverse Selection? A Multi-Dimensional Profile of People Dispensed Opioid Analgesics for Persistent Non-Cancer Pain. *PLoS One*. 2013; **8**(12): e80095. doi:
51. Sullivan MD. Who gets high-dose opioid therapy for chronic non-cancer pain? *Pain*. 2010; **151**(3): 567-8. doi:
52. Dasgupta N, Funk MJ, Proescholdbell S, Hirsch A, Ribisl KM, Marshall S. Cohort Study of the Impact of High-dose Opioid Analgesics on Overdose Mortality. *Pain Medicine (Malden, Mass)*. 2015. doi: 10.1111/pme.12907
53. Kaplovitch E, Gomes T, Camacho X, Dhalla IA, Mamdani MM, Juurlink DN. Sex Differences in Dose Escalation and Overdose Death during Chronic Opioid Therapy: A Population-Based Cohort Study. *PLoS One*. 2015; **10**(8): e0134550. doi: 10.1371/journal.pone.0134550
54. Stafford J, Burns L. Australia Drug Trends 2014: Findings from the Illicit Drug Reporting System (IDRS). Australian Drug Trends Series No. 127. Sydney: National Drug and Alcohol Research Centre, University of New South Wales. 2015. doi:

55. Mattick RP, Shand F, Cohen M, Degenhardt L, Farrell M, Hall W, et al. A Review of Opioid Prescribing in Tasmania: A Blueprint for the Future. Sydney: NDARC, University of New South Wales; 2012.
56. Schmidt C. Experts worry about chilling effect of federal regulations on treating pain. *Journal of the National Cancer Institute*. 2005; **97**(8): 554-5. doi: 10.1093/jnci/97.8.554
57. Ringwalt C, Garrettson M, Alexandridis A. The effects of North Carolina's prescription drug monitoring program on the prescribing behaviors of the state's providers. *The Journal of Primary Prevention*. 2015; **36**(2): 131-7. doi: 10.1007/s10935-014-0381-0
58. Reisman RM, Shenoy PJ, Atherly AJ, Flowers CR. Prescription opioid usage and abuse relationships: an evaluation of state prescription drug monitoring program efficacy. *Substance Abuse: Research and Treatment*. 2009; **3**: 41-51. doi:
59. Degenhardt L, Bruno R, Gilmour S, Campbell G, Mattick RP, Shand F, et al. Estimating the proportion of prescription opioid consumption in Australia that is accounted for by people who inject drugs. *Drug and Alcohol Review*. 2013. doi:
60. Larance B, Lintzeris N, Bruno R, Peacock A, Cama E, Ali R, et al. The characteristics of a cohort who tamper with prescribed and diverted opioid medications. *Journal of Substance Abuse Treatment*. 2015; doi:10.1016/j.jsat.2015.06.001. doi:
61. Peacock A, Bruno R, Cama E, Kihlas I, Larance B, Lintzeris N, et al. Jurisdictional differences in opioid use, other licit and illicit drug use, and harms associated with substance use among people who tamper with pharmaceutical opioids. *Drug and Alcohol Review*. 2015; doi: 10.1111/dar.12279. doi:

Table 1: Number of packs sold and number of Australian Pharmaceutical Benefits Scheme (PBS) dispensings by opioid type, 2013

	Packs sold		PBS prescriptions dispensed		Ratio of packs sold: PBS dispensings
	Number	% of total packs sold	Number	% of total dispensings	
Strong Prescription Opioids	10,096,112	23.8	6,238,531	49.4	1.6
Buprenorphine	1,881,695	4.4	1381217	10.9	1.4
Fentanyl	859,518	2	664509	5.3	1.3
Hydromorphone	224,840	0.5	141478	1.1	1.6
Methadone	541,701	1.3	94809	0.8	5.7
Morphine	775,568	1.8	484459	3.8	1.6
Oxycodone	5,812,790	13.7	3472059	27.5	1.7
Other Prescription Opioids	16,762,307	39.6	6,378,686	50.5	2.6
Codeine	12,290,027	29	3899019	30.9	3.2
Dextropropoxyphene	464,247	1.1	N/A ¹	--	--
Tapentadol	5,074	0	N/A ¹	--	--
Tramadol	4,002,959	9.5	2479667	19.6	1.6
Total prescription opioids	26,858,419	63.4	12,617,217	99.9	2.1
Over-the-counter opioids	15,490,207	36.6	9,807 ²	0.1	1579.5
Codeine	15,490,207	36.6	9807 ²	0.1	1579.5
Total opioids	42,348,626	100	12,627,024	100	3.4

Note: Strong prescription opioids (morphine, oxycodone, buprenorphine, methadone, fentanyl, hydromorphone); other prescription opioids (prescription codeine, dextropropoxyphene, tramadol, tapentadol); over-the-counter opioids (codeine products available at pharmacies without a doctor's prescription)

1. Neither tapentadol nor dextropropoxyphene were subsidised by the PBS in 2013.
2. Some OTC codeine preparations are subsidised on the PBS for eligible patients.

Table 2: Total number of packs per person by opioid type and jurisdiction according to remoteness, 2013¹

	Major cities		Inner Regional		Outer Regional		Remote		Very Remote		Total	
Strong prescription opioids²	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]
Australian Capital Territory	165,203	0.45 [0.45, 0.45]	252	0.41 [0.36, 0.47]	-	-	-	-	-	-	165,455	0.45 [0.45, 0.45]
New South Wales	2,033,728	0.38 [0.38, 0.38]	1,002,123	0.71 [0.71, 0.72]	362,218	0.82 [0.81, 0.82]	28,903	0.95 [0.94, 0.96]	27,492	3.25 [3.21, 3.29]	3,454,467	0.48 [0.48, 0.48]
Northern Territory	-	-	-	-	35,778	0.28 [0.27, 0.28]	5,594	0.11 [0.11, 0.12]	11,255	0.21 [0.21, 0.21]	52,627	0.23 [0.23, 0.23]
Queensland	1,155,011	0.42 [0.42, 0.42]	497,467	0.55 [0.54, 0.55]	333,982	0.51 [0.50, 0.51]	32,529	0.42 [0.41, 0.42]	22,080	0.38 [0.38, 0.39]	2,041,068	0.46 [0.46, 0.46]
South Australia	633,779	0.53 [0.53, 0.53]	107,589	0.61 [0.60, 0.61]	143,263	0.71 [0.71, 0.71]	37,616	0.83 [0.82, 0.84]	3,834	0.26 [0.25, 0.27]	926,081	0.56 [0.56, 0.57]
Tasmania	-	-	185,542	0.55 [0.55, 0.56]	119,446	0.72 [0.72, 0.73]	8,429	1.00 [0.98, 1.02]	3,365	1.38 [1.33, 1.42]	316,782	0.62 [0.62, 0.62]
Victoria	1,464,022	0.35 [0.35, 0.35]	718,055	0.67 [0.67, 0.67]	212,802	0.87 [0.86, 0.87]	5,377	1.12 [1.09, 1.15]	-	-	2,400,257	0.43 [0.43, 0.43]
Western Australia	547,395	0.30 [0.30, 0.31]	85,255	0.40 [0.40, 0.41]	59,293	0.33 [0.32, 0.33]	24,885	0.25 [0.25, 0.25]	22,546	0.36 [0.35, 0.36]	739,375	0.31 [0.31, 0.31]
Australia	5,999,138	0.38 [0.38, 0.38]	2,596,283	0.63 [0.63, 0.63]	1,266,783	0.63 [0.62, 0.63]	143,334	0.46 [0.45, 0.46]	90,571	0.45 [0.45, 0.46]	10,096,112	0.45 [0.45, 0.45]
Other prescription opioids³	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]
Australian Capital Territory	215,967	0.59 [0.59, 0.59]	325	0.53 [0.48, 0.59]	-	-	-	-	-	-	216,292	0.59 [0.59, 0.59]
New South Wales	2,930,806	0.55 [0.55, 0.55]	1,267,753	0.90 [0.90, 0.91]	484,686	1.09 [1.09, 1.10]	47,351	1.55 [1.54, 1.56]	38,775	4.59 [4.54, 4.63]	4,769,375	0.66 [0.66, 0.66]
Northern Territory	-	-	-	-	68,973	0.53 [0.53, 0.54]	13,766	0.28 [0.28, 0.29]	21,704	0.41 [0.40, 0.41]	104,442	0.45 [0.45, 0.45]
Queensland	1,876,646	0.68 [0.68, 0.68]	872,717	0.96 [0.96, 0.96]	598,770	0.91 [0.90, 0.91]	56,635	0.72 [0.72, 0.73]	44,678	0.78 [0.77, 0.78]	3,449,447	0.77 [0.77, 0.77]
South Australia	1,293,345	1.08 [1.08, 1.08]	173,327	0.98 [0.97, 0.98]	282,816	1.40 [1.40, 1.41]	69,339	1.53 [1.52, 1.55]	12,501	0.85 [0.83, 0.86]	1,831,329	1.12 [1.12, 1.12]
Tasmania	-	-	438,494	1.31 [1.30, 1.31]	255,538	1.54 [1.54, 1.55]	18,209	2.16 [2.13, 2.19]	7,085	2.90 [2.83, 2.96]	719,326	1.41 [1.40, 1.41]
Victoria	2,429,564	0.58 [0.58, 0.58]	963,876	0.90 [0.90, 0.90]	313,828	1.28 [1.28, 1.28]	8,459	1.77 [1.73, 1.80]	-	-	3,715,727	0.67 [0.67, 0.67]
Western Australia	1,451,693	0.81 [0.81, 0.81]	221,234	1.05 [1.04, 1.05]	138,882	0.76 [0.76, 0.77]	75,386	0.76 [0.76, 0.77]	69,176	1.10 [1.09, 1.11]	1,956,370	0.83 [0.83, 0.83]
Australia	10,198,021	0.65 [0.65, 0.65]	3,937,726	0.96 [0.96, 0.96]	2,143,493	1.06 [1.06, 1.06]	289,145	0.92 [0.92, 0.92]	193,918	0.97 [0.97, 0.97]	16,762,308	0.75 [0.75, 0.75]
Total prescription opioids	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]
Australian Capital Territory	381,169	1.04 [1.03, 1.04]	577	0.95 [0.87, 1.03]	-	-	-	-	-	-	381,746	1.04 [1.03, 1.04]
New South Wales	4,964,534	0.93 [0.93, 0.93]	2,269,876	1.62 [1.62, 1.62]	846,904	1.91 [1.91, 1.91]	76,254	2.50 [2.48, 2.51]	66,267	7.84 [7.78, 7.90]	8,223,842	1.14 [1.14, 1.14]
Northern Territory	-	-	-	-	104,750	0.81 [0.81, 0.82]	19,360	0.40 [0.39, 0.40]	32,958	0.62 [0.61, 0.62]	157,068	0.68 [0.68, 0.68]
Queensland	3,031,657	1.09 [1.09, 1.10]	1,370,184	1.51 [1.50, 1.51]	932,752	1.41 [1.41, 1.42]	89,164	1.14 [1.13, 1.15]	66,757	1.16 [1.15, 1.17]	5,490,515	1.23 [1.23, 1.23]

South Australia	1,927,124	1.61 [1.60, 1.61]	280,916	1.58 [1.58, 1.59]	426,079	2.11 [2.11, 2.12]	106,956	2.37 [2.35, 2.38]	16,334	1.10 [1.09, 1.12]	2,757,410	1.68 [1.68, 1.68]
Tasmania	-	-	624,036	1.86 [1.86, 1.87]	374,984	2.27 [2.26, 2.27]	26,638	3.16 [3.12, 3.20]	10,450	4.27 [4.19, 4.35]	1,036,108	2.03 [2.02, 2.03]
Victoria	3,893,587	0.92 [0.92, 0.92]	1,681,931	1.57 [1.57, 1.57]	526,631	2.15 [2.14, 2.15]	13,836	2.89 [2.84, 2.94]	-	-	6,115,985	1.10 [1.10, 1.11]
Western Australia	1,999,088	1.11 [1.11, 1.11]	306,489	1.45 [1.45, 1.46]	198,175	1.09 [1.08, 1.09]	100,271	1.01 [1.01, 1.02]	91,722	1.46 [1.45, 1.46]	2,695,745	1.15 [1.14, 1.15]
Australia	16,197,160	1.03 [1.03, 1.03]	6,534,009	1.59 [1.59, 1.59]	3,410,276	1.68 [1.68, 1.68]	432,479	1.37 [1.37, 1.38]	284,489	1.42 [1.42, 1.43]	26,858,419	1.20 [1.20, 1.20]

Table 2 (continued): Total number of packs per person by opioid type and jurisdiction according to remoteness, 2013

	Major cities		Inner Regional		Outer Regional		Remote		Very Remote		Total	
Over-the-counter opioids ⁴	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]
Australian Capital Territory	260,218	0.71 [0.71, 0.71]	313	0.51 [0.46, 0.57]	-	-	-	-	-	-	260,530	0.71 [0.71, 0.71]
New South Wales	3,727,370	0.70 [0.70, 0.70]	1,053,954	0.75 [0.75, 0.75]	337,037	0.76 [0.76, 0.76]	28,421	0.93 [0.92, 0.94]	20,698	2.45 [2.42, 2.48]	5,167,482	0.72 [0.72, 0.72]
Northern Territory	-	-	-	-	119,012	0.92 [0.92, 0.93]	17,452	0.36 [0.35, 0.36]	22,523	0.42 [0.42, 0.43]	158,987	0.69 [0.68, 0.69]
Queensland	1,969,576	0.71 [0.71, 0.71]	571,677	0.63 [0.63, 0.63]	437,611	0.66 [0.66, 0.67]	43,455	0.56 [0.55, 0.56]	31,350	0.54 [0.54, 0.55]	3,053,670	0.68 [0.68, 0.68]
South Australia	938,760	0.78 [0.78, 0.78]	82,748	0.47 [0.46, 0.47]	126,140	0.63 [0.62, 0.63]	35,758	0.79 [0.78, 0.80]	7,056	0.48 [0.47, 0.49]	1,190,464	0.73 [0.72, 0.73]
Tasmania	-	-	226,889	0.68 [0.67, 0.68]	111,917	0.68 [0.67, 0.68]	8,985	1.07 [1.04, 1.09]	2,253	0.92 [0.88, 0.96]	350,045	0.68 [0.68, 0.69]
Victoria	2,618,691	0.62 [0.62, 0.62]	619,602	0.58 [0.58, 0.58]	161,642	0.66 [0.66, 0.66]	3,478	0.73 [0.70, 0.75]	-	-	3,403,413	0.61 [0.61, 0.62]
Western Australia	1,510,825	0.84 [0.84, 0.84]	167,813	0.80 [0.79, 0.80]	102,002	0.56 [0.56, 0.56]	49,837	0.50 [0.50, 0.51]	75,140	1.19 [1.18, 1.20]	1,905,617	0.81 [0.81, 0.81]
Australia	11,025,441	0.70 [0.70, 0.70]	2,722,996	0.66 [0.66, 0.66]	1,395,360	0.69 [0.69, 0.69]	187,386	0.60 [0.59, 0.60]	159,020	0.80 [0.79, 0.80]	15,490,207	0.69 [0.69, 0.69]
Total prescription and OTC opioids	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]	Number of packs	Packs per person [95% CIs]
Australian Capital Territory	641,387	1.75 [1.74, 1.75]	890	1.46 [1.36, 1.56]	-	-	-	-	-	-	642,277	1.75 [1.74, 1.75]
New South Wales	8,691,904	1.63 [1.63, 1.63]	3,323,830	2.37 [2.37, 2.37]	1,183,941	2.67 [2.67, 2.68]	104,675	3.43 [3.41, 3.45]	86,965	10.29 [10.22, 10.36]	13,391,324	1.86 [1.85, 1.86]
Northern Territory	-	-	-	-	223,762	1.73 [1.73, 1.74]	36,812	0.76 [0.75, 0.76]	55,482	1.04 [1.03, 1.05]	316,055	1.37 [1.36, 1.37]
Queensland	5,001,234	1.81 [1.80, 1.81]	1,941,860	2.13 [2.13, 2.14]	1,370,364	2.08 [2.07, 2.08]	132,619	1.70 [1.69, 1.71]	98,107	1.70 [1.69, 1.71]	8,544,184	1.91 [1.91, 1.91]
South Australia	2,865,884	2.39 [2.38, 2.39]	363,665	2.05 [2.04, 2.06]	552,219	2.74 [2.73, 2.74]	142,714	3.16 [3.14, 3.18]	23,391	1.58 [1.56, 1.60]	3,947,873	2.41 [2.41, 2.41]
Tasmania	-	-	850,925	2.54 [2.53, 2.54]	486,901	2.94 [2.93, 2.95]	35,623	4.22 [4.18, 4.27]	12,703	5.19 [5.10, 5.28]	1,386,153	2.71 [2.71, 2.71]
Victoria	6,512,277	1.54 [1.54, 1.55]	2,301,533	2.15 [2.14, 2.15]	688,273	2.81 [2.80, 2.81]	17,314	3.62 [3.56, 3.67]	-	-	9,519,398	1.72 [1.72, 1.72]
Western Australia	3,509,913	1.95 [1.95, 1.95]	474,302	2.25 [2.24, 2.26]	300,177	1.65 [1.64, 1.66]	150,107	1.52 [1.51, 1.53]	166,862	2.65 [2.63, 2.66]	4,601,362	1.96 [1.95, 1.96]
Australia	27,222,600	1.74 [1.73, 1.74]	9,257,005	2.25 [2.25, 2.25]	4,805,636	2.37 [2.37, 2.37]	619,865	1.97 [1.96, 1.97]	443,510	2.22 [2.21, 2.23]	42,348,626	1.90 [1.90, 1.90]

1. Note that cells without data represent areas that do not meet the particular remoteness criteria in that jurisdiction
2. Strong prescription opioids (morphine, oxycodone, buprenorphine, methadone, fentanyl, hydromorphone)
3. Other prescription opioids (prescription codeine, dextropropoxyphene, tramadol, tapentadol)
4. Over-the-counter opioids (codeine products available at pharmacies without a doctor's prescription)

Table 3: Total retail opioid utilisation (measured in oral morphine equivalent (OME) mg) per person by jurisdiction according to remoteness, 2013¹

	Major cities		Inner Regional		Outer Regional		Remote		Very Remote		Total	
Strong prescription opioids²	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]
Australian Capital Territory	113.87	309.97 [309.91, 310.02]	0.18	286.79 [285.45, 288.14]	-	-	-	-	-	-	114.05	309.93 [309.87, 309.98]
New South Wales	1,426.02	267.39 [267.37, 267.40]	741.03	528.17 [528.14, 528.21]	281.43	634.77 [634.70, 634.84]	22.98	752.10 [751.79, 752.40]	20.09	2377.00 [2375.96, 2378.04]	2,491.54	345.16 [345.15, 345.17]
Northern Territory	-	-	-	-	29.35	227.36 [227.27, 227.44]	3.73	76.52 [76.44, 76.59]	7.16	133.94 [133.84, 134.04]	40.24	173.99 [173.94, 174.05]
Queensland	878.48	317.15 [317.13, 317.17]	403.97	443.77 [443.73, 443.81]	301.52	456.84 [456.79, 456.90]	26.78	342.75 [342.62, 342.88]	18.81	326.39 [326.24, 326.54]	1,629.56	364.07 [364.05, 364.08]
South Australia	447.62	372.86 [372.83, 372.90]	76.65	432.20 [432.10, 432.30]	104.55	518.12 [518.02, 518.22]	29.91	662.09 [661.85, 662.33]	2.74	185.24 [185.02, 185.46]	661.48	403.44 [403.41, 403.47]
Tasmania	-	-	114.43	341.49 [341.43, 341.55]	74.17	448.15 [448.05, 448.25]	4.80	568.82 [568.31, 569.33]	2.10	859.40 [858.24, 860.57]	195.50	382.23 [382.18, 382.28]
Victoria	1,015.64	240.95 [240.94, 240.97]	505.44	471.13 [471.08, 471.17]	152.21	621.03 [620.93, 621.13]	3.82	798.73 [797.93, 799.53]	-	-	1,677.11	302.85 [302.83, 302.86]
Western Australia	417.68	232.21 [232.18, 232.23]	70.93	336.34 [336.27, 336.42]	48.15	264.76 [264.69, 264.84]	20.09	203.18 [203.09, 203.27]	18.95	300.67 [300.54, 300.81]	575.80	244.67 [244.65, 244.69]
Australia	4,299.31	274.11 [274.10, 274.11]	1,912.63	465.35 [465.33, 465.37]	991.38	489.16 [489.13, 489.19]	112.12	356.29 [356.22, 356.35]	69.85	349.56 [349.48, 349.64]	7,385.28	330.64 [330.64, 330.65]
Other prescription opioids³	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]
Australian Capital Territory	29.39	79.99 [79.96, 80.02]	0.04	71.12 [70.45, 71.79]	-	-	-	-	-	-	29.43	79.98 [79.95, 80.00]
New South Wales	459.54	86.17 [86.16, 86.18]	198.82	141.71 [141.69, 141.73]	79.29	172.07 [172.03, 172.11]	7.71	252.49 [252.31, 252.67]	6.17	730.46 [729.88, 731.03]	748.55	103.70 [103.69, 103.71]
Northern Territory	-	-	-	-	10.52	81.52 [81.47, 81.57]	2.50	51.38 [51.32, 51.45]	3.32	62.02 [61.95, 62.09]	16.34	70.67 [70.63, 70.70]
Queensland	309.64	111.79 [111.78, 111.80]	147.99	162.57 [162.55, 162.60]	99.98	151.48 [151.45, 151.51]	10.46	133.93 [133.85, 134.01]	7.77	134.86 [134.76, 134.95]	575.85	128.65 [128.64, 128.66]
South Australia	193.12	160.87 [160.84, 160.89]	27.15	153.12 [153.06, 153.18]	46.92	232.52 [232.45, 232.58]	11.03	244.08 [243.94, 244.23]	2.02	136.88 [136.69, 137.06]	280.24	170.92 [170.90, 170.94]
Tasmania	-	-	71.39	213.06 [213.01, 213.11]	42.35	255.90 [255.82, 255.98]	2.87	340.46 [340.06, 340.85]	1.15	471.02 [470.16, 471.88]	117.77	230.26 [230.21, 230.30]
Victoria	380.68	90.31 [90.30, 90.32]	152.27	141.93 [141.91, 141.96]	52.55	214.40 [214.34, 214.46]	1.48	308.69 [308.20, 309.19]	-	-	586.97	105.99 [105.98, 106.00]
Western Australia	262.80	146.10 [146.08, 146.12]	42.49	201.49 [201.42, 201.55]	27.85	153.13 [153.08, 153.19]	14.71	148.70 [148.63, 148.78]	13.20	209.38 [209.27, 209.50]	361.04	153.41 [153.40, 153.43]
Australia	1,635.17	104.25 [104.25, 104.26]	640.17	155.76 [155.74, 155.77]	356.46	175.88 [175.86, 175.90]	50.76	161.32 [161.28, 161.37]	33.63	168.32 [168.26, 168.37]	2,716.20	121.61 [121.60, 121.61]
Total prescription opioids	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]
Australian Capital Territory	143.26	389.96 [389.89, 390.02]	0.22	357.91 [356.41, 359.42]	-	-	-	-	-	-	143.48	389.90 [389.84, 389.97]
New South Wales	1,885.56	353.55 [353.54, 353.57]	939.86	669.89 [669.84, 669.93]	357.72	806.84 [806.76, 806.93]	30.69	1004.59 [1004.23, 1004.94]	26.26	3107.46 [3106.27, 3108.65]	3,240.09	448.86 [448.84, 448.87]
Northern Territory	-	-	-	-	39.88	308.88 [308.78, 308.97]	6.23	127.90 [127.80, 128.00]	10.48	195.96 [195.84, 196.08]	56.59	244.66 [244.60, 244.72]
Queensland	1,188.12	428.94 [428.91, 428.96]	551.97	606.34 [606.29, 606.39]	401.50	608.33 [608.27, 608.39]	37.24	476.69 [476.53, 476.84]	26.58	461.25 [461.07, 461.42]	2,205.41	492.72 [492.70, 492.74]
South Australia	640.74	533.73 [533.69, 533.77]	103.80	585.32 [585.21, 585.43]	151.47	750.63 [750.52, 750.75]	40.94	906.17 [905.90, 906.45]	4.76	322.11 [321.83, 322.40]	941.72	574.36 [574.32, 574.40]

	Major cities		Inner Regional		Outer Regional		Remote		Very Remote		Total	
Tasmania		-	185.83	554.55 [554.47, 554.63]	116.53	704.05 [703.92, 704.18]	7.67	909.27 [908.63, 909.92]	3.25	1330.43 [1328.98, 1331.87]	313.28	612.49 [612.42, 612.55]
Victoria	1,396.32	331.26 [331.25, 331.28]	657.71	613.06 [613.01, 613.11]	204.75	835.43 [835.32, 835.55]	5.30	1107.42 [1106.48, 1108.37]	-	-	2,264.08	408.84 [408.82, 408.86]
Western Australia	680.48	378.31 [378.28, 378.34]	113.41	537.83 [537.73, 537.93]	76.00	417.90 [417.81, 417.99]	34.80	351.89 [351.77, 352.00]	32.14	510.06 [509.88, 510.23]	936.84	398.08 [398.05, 398.10]
Australia	5,934.48	378.36 [378.35, 378.37]	2,552.79	621.11 [621.08, 621.13]	1,347.84	665.04 [665.00, 665.07]	162.88	517.61 [517.53, 517.69]	103.49	517.88 [517.78, 517.98]	10,101.49	452.25 [452.24, 452.26]

Table 3 (continued): Total retail opioid utilisation (measured in oral morphine equivalent (OME) mg) per person by jurisdiction according to remoteness, 2013¹

Over-the-counter opioids ⁴	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]
Australian Capital Territory	10.75	29.26 [29.25, 29.28]	0.01	21.34 [20.97, 21.71]	-	-	-	-	-	-	10.76	29.25 [29.23, 29.27]
New South Wales	156.03	29.26 [29.25, 29.26]	44.83	31.95 [31.94, 31.96]	14.15	31.92 [31.90, 31.94]	1.14	37.36 [37.30, 37.43]	0.84	99.09 [98.88, 99.30]	216.99	30.06 [30.06, 30.06]
Northern Territory	-	-	-	-	4.87	37.73 [37.70, 37.76]	0.70	14.30 [14.27, 14.34]	0.87	16.24 [16.21, 16.28]	6.44	27.83 [27.81, 27.85]
Queensland	84.52	30.51 [30.51, 30.52]	24.51	26.93 [26.92, 26.94]	18.89	28.62 [28.61, 28.64]	1.84	23.50 [23.47, 23.54]	1.26	21.82 [21.78, 21.86]	131.02	29.27 [29.27, 29.28]
South Australia	40.17	33.46 [33.45, 33.47]	3.38	19.05 [19.03, 19.07]	5.40	26.75 [26.73, 26.78]	1.55	34.23 [34.18, 34.28]	0.27	18.56 [18.49, 18.63]	50.76	30.96 [30.95, 30.97]
Tasmania	-	-	9.36	27.92 [27.90, 27.94]	4.58	27.66 [27.64, 27.69]	0.37	43.82 [43.68, 43.96]	0.09	36.50 [36.26, 36.74]	14.39	28.14 [28.13, 28.16]
Victoria	106.41	25.24 [25.24, 25.25]	25.15	23.44 [23.43, 23.45]	6.54	26.70 [26.68, 26.72]	0.14	28.70 [28.55, 28.85]	-	-	138.24	24.96 [24.96, 24.97]
Western Australia	61.47	34.17 [34.17, 34.18]	6.66	31.58 [31.56, 31.61]	4.07	22.36 [22.34, 22.38]	1.96	19.79 [19.77, 19.82]	2.99	47.42 [47.36, 47.47]	77.14	32.78 [32.77, 32.79]
Australia	459.35	29.29 [29.28, 29.29]	113.89	27.71 [27.71, 27.72]	58.50	28.87 [28.86, 28.87]	7.69	24.42 [24.41, 24.44]	6.32	31.61 [31.58, 31.63]	645.75	28.91 [28.91, 28.91]
Total prescription and OTC opioids	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]
Australian Capital Territory	154.01	419.22 [419.15, 419.29]	0.23	379.25 [377.71, 380.80]	-	-	-	-	-	-	154.24	419.15 [419.09, 419.22]
New South Wales	2,041.59	382.81 [382.79, 382.83]	984.68	701.84 [701.79, 701.88]	371.87	838.76 [838.68, 838.85]	31.84	1041.95 [1041.59, 1042.31]	27.10	3206.55 [3205.35, 3207.76]	3,457.08	478.92 [478.90, 478.93]
Northern Territory	-	-	-	-	44.75	346.61 [346.51, 346.71]	6.92	142.20 [142.10, 142.31]	11.35	212.20 [212.08, 212.33]	63.02	272.49 [272.42, 272.56]
Queensland	1,272.64	459.45 [459.43, 459.48]	576.48	633.27 [633.22, 633.32]	420.39	636.95 [636.89, 637.01]	39.08	500.19 [500.03, 500.35]	27.84	483.06 [482.89, 483.24]	2,336.43	521.99 [521.97, 522.01]
South Australia	680.91	567.19 [567.15, 567.23]	107.18	604.37 [604.26, 604.49]	156.87	777.39 [777.27, 777.51]	42.49	940.40 [940.12, 940.69]	5.04	340.68 [340.38, 340.97]	992.49	605.32 [605.28, 605.36]
Tasmania	-	-	195.18	582.47 [582.39, 582.55]	121.11	731.71 [731.58, 731.84]	8.04	953.10 [952.44, 953.76]	3.34	1366.93 [1365.47, 1368.40]	327.67	640.63 [640.56, 640.70]
Victoria	1,502.73	356.51 [356.49, 356.53]	682.86	636.50 [636.45, 636.55]	211.29	862.13 [862.02, 862.25]	5.44	1136.12 [1135.17, 1137.08]	-	-	2,402.32	433.80 [433.78, 433.82]
Western Australia	741.95	412.48 [412.45, 412.51]	120.07	569.41 [569.31, 569.51]	80.07	440.26 [440.16, 440.36]	36.76	371.68 [371.56, 371.80]	35.13	557.47 [557.29, 557.66]	1,013.99	430.86 [430.83, 430.88]
Australia	6,393.83	407.65 [407.64, 407.66]	2,666.69	648.82 [648.79, 648.84]	1,406.34	693.90 [693.87, 693.94]	170.57	542.03 [541.95, 542.11]	109.80	549.48 [549.38, 549.59]	10,747.24	481.16 [481.15, 481.17]

1. Note that cells without data represent areas that do not meet the particular remoteness criteria in that jurisdiction
2. Strong prescription opioids (morphine, oxycodone, buprenorphine, methadone, fentanyl, hydromorphone)
3. Other prescription opioids (prescription codeine, dextropropoxyphene, tramadol, tapentadol)
4. Over-the-counter opioids (codeine products available at pharmacies without a doctor's prescription)

Table 4: Association of remoteness area with total retail opioid utilisation (measured in oral morphine equivalent (OME) mg) per person by, 2013

Unstandardised Beta (SE)	Strong prescription opioids ¹	Other prescription opioids ²	Total over-the-counter opioids ³	Total prescription opioids	Total opioids
Major Cities	Reference	Reference	Reference	Reference	Reference
Inner Regional	206.83 (73.12)**	64.55 (27.10)*	-8.30 (5.25)	271.38 (97.76)**	263.08 (102.11)*
Outer Regional	298.74 (69.71)***	130.18 (25.84)***	-0.80 (5.01)	428.93 (93.20)***	428.13 (97.34)***
Remote	515.42 (118.67)***	294.10 (43.99)***	22.35 (8.52)**	809.52 (158.66)***	831.88 (165.71)***
Very Remote	471.14 (107.18)***	216.14 (39.73)***	20.13 (7.70)**	687.28 (143.31)***	707.41 (149.68)***

Results of linear regressions, with remoteness area predicting OME rate per person for each type of opioid.

* p<.05 ** p<.01 *** p<.001

1. Strong prescription opioids (morphine, oxycodone, buprenorphine, methadone, fentanyl, hydromorphone)
2. Other prescription opioids (prescription codeine, dextropropoxyphene, tramadol, tapentadol)
3. Over-the-counter opioids (codeine products available at pharmacies without a doctor's prescription)

Figure 1: Total opioid utilisation per person (oral morphine equivalent (OME) mg) by Statistical Local Area, 2013

Australia (2011 Statistical Local Areas)
Total opioid utilisation (OME mg) per person

Note: This map shows sub-jurisdictional variation in utilisation at the unit of Statistical Local Areas (SLAs). As can be seen, although the tables previously presented showed variation in opioid utilisation across jurisdictions, there is also considerable variation within jurisdictions in the extent of opioid utilisation.

Table 5: Predictors of opioid utilisation (measured in oral morphine equivalent (OME) mg) per person by Statistical Local Area, 2013

Standardised Beta (SE)	Total opioids		Total prescription opioids		Total over the counter opioids ³	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
% male	0.13 (9.73)***	0.11 (13.68)***	0.13 (9.33)***	0.10 (13.08)**	0.19 (.049)***	0.22 (0.71)***
% over 65 years of age	0.13 (6.71)***	0.10 (7.76)***	0.13 (6.42)***	0.10 (7.42)***	0.00 (0.34)	0.05 (0.40)
% physical labour	0.19 (2.52)***	0.07 (3.02)*	0.19 (2.41)***	0.08 (2.89)*	0.09 (0.13)***	-0.03 (0.16)
% low income households	0.20 (3.51)***	0.14 (3.83)***	0.20 (3.36)***	0.14 (3.67)***	0.06 (0.18)*	0.05 (0.20)
Pharmacies per 1,000 persons	0.02 (9.14)	-0.02 (10.77)	0.02 (8.76)	-0.02 (10.30)	0.05 (0.46)	-0.01 (0.56)
# of people (in 10,000s)	-0.14 (16.66)***	-0.09 (16.66)**	-0.14 (15.97)***	-0.09 (15.94)**	-0.11 (0.85)***	-0.06 (0.87)*
	Strong prescription opioids ¹		Other prescription opioids ²			
	Unadjusted	Adjusted	Unadjusted	Adjusted		
% male	0.12 (6.96)***	0.10 (9.77)**	0.14 (2.60)***	0.10 (3.63)**		
% over 65 years of age	0.14 (4.79)***	0.12 (5.54)***	0.11 (1.80)***	0.05 (2.06)		
% physical labour	0.16 (1.81)***	0.05 (2.16)	0.26 (0.66)***	0.15 (0.80)***		
% low income households	0.18 (2.50)***	0.12 (2.74)***	0.24 (0.94)***	0.18 (1.02)***		
Pharmacies per 1,000 persons	0.02 (6.53)	-0.02 (7.70)	0.01 (2.45)	-0.03 (2.86)		
# of people (in 10,000s)	-0.13 (11.91)***	-0.09 (11.90)***	-0.14 (4.46)***	-0.07 (4.42)**		

* p<.05 ** p<.01 *** p<.001

1. Strong prescription opioids (morphine, oxycodone, buprenorphine, methadone, fentanyl, hydromorphone)
2. Other prescription opioids (prescription codeine, dextropropoxyphene, tramadol, tapentadol)
3. Over-the-counter opioids (codeine products available at pharmacies without a doctor's prescription)

Appendix

Appendix A1. The regulations and availability of codeine preparations in Australia¹

Schedule	Description	Rules	Codeine preparations
Prescription codeine			
Schedule 8	Controlled Drug/Drugs of Addiction	Must be prescribed by an authorised healthcare professional, who may need another permit to prescribe these medicines. May be supplied in hospital or purchased from a pharmacy with a prescription.	<ul style="list-style-type: none"> • 30mg codeine tablets • 5mg/mL codeine linctus
Schedule 4	Prescription Only Medicine	Must be prescribed by an authorised healthcare professional. May be supplied in hospital or purchased from a pharmacy with a prescription.	<ul style="list-style-type: none"> • Codeine 30mg/ paracetamol 500mg combinations • Codeine 30mg/paracetamol 450mg/5mg doxylamine
Over-the-counter analgesic preparations containing codeine			
Schedule 3	Pharmacist Only Medicine	Only available behind the counter at a pharmacy, but no prescription required. A pharmacist must be consulted prior to purchase.	<ul style="list-style-type: none"> • Codeine ≤10mg/ paracetamol ≤500mg combinations • Codeine 15mg/ paracetamol 500mg combinations • Codeine ≤10mg/ 5.1mg doxylamine/ paracetamol ≤500mg combinations • Codeine 1mg/mL combination liquid preparation • Codeine ≤12.8mg/ 200mg ibuprofen • Codeine ≤10mg/ 300mg aspirin

¹ Adapted from the National Prescribing Service. Medicine schedules and availability. 2015 [cited 29 June 2015]. Available from: <http://www.nps.org.au/topics/how-to-be-medicinewise/regulation-clinical-trials/medicine-schedules-availability/>.

Appendix Table A1: Total retail opioid utilisation (measured in mgs and OME mgs) and packs per person per person, by jurisdiction, 2013

Oxycodone	Number of packs	Packs per person [95% CIs]	Crude utilisation kgs	mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]
Australian Capital Territory	108,832	0.30 [0.29, 0.30]	37.30	101.36 [101.33, 101.39]	55.95	152.04 [152.00, 152.08]
New South Wales	2,143,999	0.30 [0.30, 0.30]	776.60	107.58 [107.58, 107.59]	1,164.90	161.38 [161.37, 161.39]
Northern Territory	27,532	0.12 [0.12, 0.12]	7.83	33.87 [33.84, 33.89]	11.75	50.80 [50.77, 50.83]
Queensland	1,180,637	0.26 [0.26, 0.26]	451.98	100.98 [100.97, 100.99]	677.97	151.47 [151.46, 151.48]
South Australia	429,898	0.26 [0.26, 0.26]	142.02	86.62 [86.60, 86.63]	213.03	129.93 [129.91, 129.94]
Tasmania	154,543	0.30 [0.30, 0.30]	49.31	96.40 [96.37, 96.42]	73.96	144.60 [144.56, 144.63]
Victoria	1,405,920	0.25 [0.25, 0.25]	458.09	82.72 [82.71, 82.73]	687.13	124.08 [124.07, 124.09]
Western Australia	361,428	0.15 [0.15, 0.15]	135.34	57.51 [57.50, 57.52]	203.01	86.26 [86.25, 86.27]
Australia	5,812,790	0.26 [0.26, 0.26]	2,058.46	92.16 [92.15, 92.16]	3,087.68	138.24 [138.23, 138.24]
Codeine (prescribed)	Number of packs	Packs per person [95% CIs]	Crude utilisation kgs	mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]
Australian Capital Territory	170,655	0.46 [0.46, 0.47]	102.85	279.50 [279.44, 279.55]	13.37	36.33 [36.32, 36.35]
New South Wales	3,515,660	0.49 [0.49, 0.49]	2,120.99	293.83 [293.81, 293.84]	275.73	38.20 [38.19, 38.20]
Northern Territory	77,960	0.34 [0.33, 0.34]	47.12	203.73 [203.67, 203.79]	6.13	26.48 [26.46, 26.51]
Queensland	2,525,431	0.56 [0.56, 0.56]	1,519.37	339.45 [339.43, 339.47]	197.52	44.13 [44.12, 44.13]
South Australia	1,399,636	0.85 [0.85, 0.86]	842.39	513.77 [513.74, 513.81]	109.51	66.79 [66.78, 66.80]
Tasmania	543,735	1.06 [1.06, 1.07]	326.90	639.13 [639.06, 639.20]	42.50	83.09 [83.06, 83.11]
Victoria	2,742,683	0.50 [0.49, 0.50]	1,657.95	299.39 [299.37, 299.40]	215.53	38.92 [38.92, 38.93]
Western Australia	1,314,267	0.56 [0.56, 0.56]	791.61	336.37 [336.35, 336.39]	102.91	43.73 [43.72, 43.74]
Australia	12,290,027	0.55 [0.55, 0.55]	7,409.19	331.71 [331.71, 331.72]	963.19	43.12 [43.12, 43.13]

Fentanyl	Number of packs	Packs per person [95% CIs]	Crude utilisation kgs	mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]
Australian Capital Territory	13,148	0.04 [0.04, 0.04]	0.20	0.53 [0.53, 0.54]	24.40	66.32 [66.29, 66.34]
New South Wales	302,277	0.04 [0.04, 0.04]	4.37	0.60 [0.60, 0.61]	544.67	75.45 [75.45, 75.46]
Northern Territory	2,436	0.01 [0.01, 0.01]	0.03	0.13 [0.13, 0.14]	3.87	16.75 [16.73, 16.76]
Queensland	198,275	0.04 [0.04, 0.04]	3.00	0.67 [0.67, 0.67]	374.52	83.67 [83.66, 83.68]
South Australia	96,286	0.06 [0.06, 0.06]	1.23	0.75 [0.75, 0.75]	153.86	93.84 [93.83, 93.86]
Tasmania	10,357	0.02 [0.02, 0.02]	0.14	0.27 [0.27, 0.27]	17.12	33.47 [33.45, 33.48]
Victoria	173,446	0.03 [0.03, 0.03]	2.45	0.44 [0.44, 0.44]	305.51	55.17 [55.16, 55.17]
Western Australia	63,293	0.03 [0.03, 0.03]	0.85	0.36 [0.36, 0.36]	106.25	45.15 [45.14, 45.16]
Australia	859,518	0.04 [0.04, 0.04]	12.26	0.55 [0.55, 0.55]	1,530.21	68.51 [68.50, 68.51]
Hydromorphone	Number of packs	Packs per person [95% CIs]	Crude utilisation kgs	mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]
Australian Capital Territory	4,260	0.01 [0.01, 0.01]	1.13	3.08 [3.07, 3.08]	5.67	15.40 [15.38, 15.41]
New South Wales	71,940	0.01 [0.01, 0.01]	15.86	2.20 [2.20, 2.20]	79.31	10.99 [10.98, 10.99]
Northern Territory	295	0.00 [0.00, 0.00]	0.07	0.32 [0.32, 0.32]	0.37	1.61 [1.60, 1.61]
Queensland	58,057	0.01 [0.01, 0.01]	14.03	3.13 [3.13, 3.14]	70.14	15.67 [15.67, 15.67]
South Australia	14,660	0.01 [0.01, 0.01]	3.01	1.83 [1.83, 1.84]	15.03	9.17 [9.16, 9.17]
Tasmania	1,456	0.00 [0.00, 0.00]	0.30	0.59 [0.59, 0.59]	1.51	2.94 [2.94, 2.95]
Victoria	44,707	0.01 [0.01, 0.01]	9.26	1.67 [1.67, 1.67]	46.29	8.36 [8.36, 8.36]
Western Australia	29,466	0.01 [0.01, 0.01]	6.30	2.68 [2.67, 2.68]	31.49	13.38 [13.38, 13.39]
Australia	224,840	0.01 [0.01, 0.01]	49.96	2.24 [2.24, 2.24]	249.80	11.18 [11.18, 11.19]

Methadone	Number of packs	Packs per person [95% CIs]	Crude utilisation kgs	mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]
Australian Capital Territory	4,922	0.01 [0.01, 0.01]	0.99	2.68 [2.68, 2.69]	4.64	12.60 [12.59, 12.61]
New South Wales	153,633	0.02 [0.02, 0.02]	55.69	7.71 [7.71, 7.72]	261.73	36.26 [36.25, 36.26]
Northern Territory	6,523	0.03 [0.03, 0.03]	1.36	5.88 [5.87, 5.89]	6.39	27.62 [27.60, 27.64]
Queensland	86,777	0.02 [0.02, 0.02]	33.21	7.42 [7.42, 7.42]	156.10	34.87 [34.87, 34.88]
South Australia	80,911	0.05 [0.05, 0.05]	20.76	12.66 [12.66, 12.67]	97.58	59.51 [59.50, 59.52]
Tasmania	23,640	0.05 [0.05, 0.05]	8.68	16.97 [16.96, 16.99]	40.81	79.78 [79.76, 79.81]
Victoria	123,251	0.02 [0.02, 0.02]	57.85	10.45 [10.44, 10.45]	271.88	49.09 [49.09, 49.10]
Western Australia	62,045	0.03 [0.03, 0.03]	22.30	9.48 [9.47, 9.48]	104.82	44.54 [44.53, 44.55]
Australia	541,701	0.02 [0.02, 0.02]	200.83	8.99 [8.99, 8.99]	943.92	42.26 [42.26, 42.26]
Morphine	Number of packs	Packs per person [95% CIs]	Crude utilisation kgs	mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]
Australian Capital Territory	11,815	0.03 [0.03, 0.03]	14.92	40.54 [40.52, 40.56]	14.92	40.54 [40.52, 40.56]
New South Wales	212,920	0.03 [0.03, 0.03]	228.94	31.72 [31.71, 31.72]	228.94	31.72 [31.71, 31.72]
Northern Territory	9,594	0.04 [0.04, 0.04]	15.47	66.90 [66.87, 66.93]	15.47	66.90 [66.87, 66.93]
Queensland	174,378	0.04 [0.04, 0.04]	222.30	49.66 [49.66, 49.67]	222.30	49.66 [49.66, 49.67]
South Australia	110,034	0.07 [0.07, 0.07]	110.08	67.14 [67.12, 67.15]	110.08	67.14 [67.12, 67.15]
Tasmania	25,951	0.05 [0.05, 0.05]	21.08	41.21 [41.20, 41.23]	21.08	41.21 [41.20, 41.23]
Victoria	176,932	0.03 [0.03, 0.03]	189.66	34.25 [34.24, 34.25]	189.66	34.25 [34.24, 34.25]
Western Australia	53,945	0.02 [0.02, 0.02]	66.57	28.29 [28.28, 2.29]	66.57	28.29 [28.28, 28.29]
Australia	775,568	0.03 [0.03, 0.03]	869.01	38.91, 38.90, 38.91]	869.01	38.91 [38.90, 38.91]

Buprenorphine	Number of packs	Packs per person [95% CIs]	Crude utilisation kgs	mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]
Australian Capital Territory	22,478	0.06 [0.06, 0.06]	0.08	0.22 [0.22, 0.22]	8.47	23.03 [23.01, 23.04]
New South Wales	569,697	0.08 [0.08, 0.08]	2.05	0.28 [0.28, 0.28]	212.00	29.37 [29.37, 29.37]
Northern Territory	6,248	0.03 [0.03, 0.03]	0.02	0.10 [0.10, 0.10]	2.39	10.32 [10.31, 10.33]
Queensland	342,945	0.08 [0.08, 0.08]	1.24	0.28 [0.28, 0.28]	128.55	28.72 [28.71, 28.72]
South Australia	194,291	0.12 [0.12, 0.12]	0.69	0.42 [0.42, 0.42]	71.90	43.85 [43.84, 43.86]
Tasmania	100,835	0.20 [0.20, 0.20]	0.39	0.77 [0.77, 0.77]	41.04	80.23 [80.20, 80.25]
Victoria	476,001	0.09 [0.09, 0.09]	1.70	0.31 [0.31, 0.31]	176.65	31.90 [31.89, 31.90]
Western Australia	169,199	0.07 [0.07, 0.07]	0.62	0.26 [0.26, 0.27]	63.66	27.05 [27.04, 27.06]
Australia	1,881,695	0.08 [0.08, 0.08]	6.80	0.30 [0.30, 0.30]	704.66	31.55 [31.55, 31.55]
Tapentadol	Number of packs	Packs per person [95% CIs]	Crude utilisation kgs	mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]
Australian Capital Territory	84	0.00 [0.00, 0.00]	0.19	0.51 [0.51, 0.51]	0.08	0.20 [0.20, 0.21]
New South Wales	2,017	0.00 [0.00, 0.00]	7.88	1.09 [1.09, 1.09]	3.15	0.44 [0.44, 0.44]
Northern Territory	0	-	0	-	0	-
Queensland	251	0.00 [0.00, 0.00]	0.82	0.18 [0.18, 0.18]	0.33	0.07 [0.07, 0.07]
South Australia	341	0.00 [0.00, 0.00]	1.07	0.65 [0.65, 0.66]	0.43	0.26 [0.26, 0.26]
Tasmania	84	0.00 [0.00, 0.00]	0.22	0.42 [0.42, 0.42]	0.09	0.17 [0.17, 0.17]
Victoria	1,308	0.00 [0.00, 0.00]	3.72	0.67 [0.67, 0.67]	1.49	0.27 [0.27, 0.27]
Western Australia	989	0.00 [0.00, 0.00]	2.23	0.95 [0.95, 0.95]	0.89	0.38 [0.38, 0.38]
Australia	5,074	0.00 [0.00, 0.00]	16.12	0.72 [0.72, 0.72]	6.45	0.29 [0.29, 0.29]

Tramadol	Number of packs	Packs per person [95% CIs]	Crude utilisation kgs	mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]
Australian Capital Territory	35,016	0.10 [0.09, 0.10]	76.49	207.85 [207.81, 207.90]	15.30	41.57 [41.55, 41.59]
New South Wales	1,048,197	0.15 [0.14, 0.15]	2,282.01	316.13 [316.12, 316.15]	456.40	63.23 [63.22, 63.23]
Northern Territory	25,115	0.11 [0.11, 0.11]	50.64	218.95 [218.89, 219.01]	10.13	43.79 [43.76, 43.82]
Queensland	845,533	0.19 [0.19, 0.19]	1,864.52	416.56 [416.54, 416.58]	372.90	83.31 [83.30, 83.32]
South Australia	372,939	0.23 [0.23, 0.23]	832.49	507.74 [507.70, 507.77]	166.50	101.55 [101.53, 101.56]
Tasmania	168,339	0.33 [0.33, 0.33]	373.57	730.37 [730.30, 730.44]	74.71	146.07 [146.04, 146.11]
Victoria	894,178	0.16 [0.16, 0.16]	1,824.46	329.45 [329.44, 329.47]	364.89	65.89 [65.88, 65.90]
Western Australia	613,642	0.26 [0.26, 0.26]	1,277.14	542.68 [542.65, 542.71]	255.43	108.54 [108.52, 108.55]
Australia	4,002,959	0.18 [0.18, 0.18]	8,581.31	384.19 [384.18, 384.20]	1,716.26	76.84 [76.83, 76.84]
Dextropropoxyphene	Number of packs	Packs per person [95% CIs]	Crude utilisation kgs	mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]
Australian Capital Territory	10,536	0.03 [0.03, 0.03]	6.89	18.67 [18.65, 18.68]	0.69	1.87 [1.86, 1.87]
New South Wales	203,502	0.03 [0.03, 0.03]	132.63	18.37 [18.37, 18.38]	13.26	1.84 [1.84, 1.84]
Northern Territory	1,367	0.01 [0.01, 0.01]	0.90	3.91 [3.90, 3.92]	0.09	0.39 [0.39, 0.39]
Queensland	78,231	0.02 [0.02, 0.02]	51.05	11.41 [11.40, 11.41]	5.11	1.14 [1.14, 1.14]
South Australia	58,413	0.04 [0.04, 0.04]	38.08	23.22 [23.22, 23.23]	3.81	2.32 [2.32, 2.32]
Tasmania	7,168	0.01 [0.01, 0.01]	4.74	9.26 [9.25, 9.27]	0.47	0.93 [0.92, 0.93]
Victoria	77,558	0.01 [0.01, 0.01]	50.57	9.13 [9.13, 9.13]	5.06	0.91 [0.91, 0.91]
Western Australia	27,472	0.01 [0.01, 0.01]	18.14	7.71 [7.70, 7.71]	1.81	0.77 [0.77, 0.77]
Australia	464,247	0.02 [0.02, 0.02]	302.98	13.56 [13.56, 13.57]	30.30	1.36 [1.36, 1.36]

Over-the-counter codeine	Number of packs	Packs per person [95% CIs]	Crude utilisation kgs	mg per person [95% CIs]	Total OME kg	OME mg per person [95% CIs]
Australian Capital Territory	260,530	0.71 [0.71, 0.71]	82.80	225.01 [224.96, 225.06]	10.76	29.25 [29.23, 29.27]
New South Wales	5,167,482	0.72 [0.72, 0.72]	1,669.15	231.23 [231.22, 231.24]	216.99	30.06 [30.06, 30.06]
Northern Territory	158,987	0.69 [0.68, 0.69]	49.51	214.07 [214.01, 214.13]	6.44	27.83 [27.81, 27.85]
Queensland	3,053,670	0.68 [0.68, 0.68]	1,007.84	225.17 [225.15, 225.18]	131.02	29.27 [29.27, 29.28]
South Australia	1,190,464	0.73 [0.72, 0.73]	390.50	238.17 [238.14, 238.19]	50.76	30.96 [30.95, 30.97]
Tasmania	350,045	0.68 [0.68, 0.69]	110.72	216.48 [216.44, 216.52]	14.39	28.14 [28.13, 28.16]
Victoria	3,403,413	0.61 [0.61, 0.62]	1,063.37	192.02 [192.01, 192.03]	138.24	24.96 [24.96, 24.97]
Western Australia	1,905,617	0.81 [0.81, 0.81]	593.40	252.15 [252.13, 252.17]	77.14	32.78 [32.77, 32.79]
Australia	15,490,207	0.69 [0.69, 0.69]	4,967.30	222.39 [222.38, 222.39]	645.75	28.91 [28.91, 28.91]

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BL has received untied educational grants from Reckitt Benckiser (for post-marketing surveillance of buprenorphine-naloxone tablets and film, development of an aberrant behaviour scale and a study of knowledge and uptake of opioid substitution therapy among chronic pain patients) and MundiPharma (post-marketing surveillance of a tamper-resistant formulation of oxycodone)

8. Manuscript title (first six words are sufficient)

The extent and predictors of pharmaceutical opioid utilisation in community settings in Australia

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Briony Larence

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RB has received an untied educational grant from Reckitt Benckiser for a study examining opioid substitution therapy among chronic non-cancer pain patients. RB had received untied educational grant funding from Mundipharma for post-marketing surveillance of Reformulated OxyContin® in Australia.

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I have been provided with untied educational grant funding from Mundipharma to conduct post-marketing surveillance of a new oxycodone formulation in Australia. The data reported here were provided by Mundipharma to inform that surveillance. That company had no role in the design, conduct, write up or decision to publish findings from that post marketing surveillance.

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