TAPENTADOL USE AND HARMS IN AUSTRALIA: ANALYSIS OF OPIOID SALES DATA AND SENTINEL SURVEY DATA FROM PEOPLE WHO INJECT DRUGS

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Key Findings:

- Tapentadol had the seventh largest market share of number of packs sold in December 2019 (5.5%), and the greatest market share of pharmaceutical opioids sold in that month when considered in oral morphine equivalent units (17.1%).
- Tapentadol 50mg and 100mg sustained-release formulation (SRF) comprised the majority of tapentadol unit sales nationally.
- Highest sales of tapentadol in 2019 were observed in Western Australia; lowest were observed in the Northern Territory.
- Self-reported lifetime non-prescribed use of tapentadol among the samples of people who regularly inject drugs was low (2.2% in 2019) but had increased slightly over time (0.9% in 2017).
- Less than 2% of participants each year reported ever injecting tapentadol in the 2017-2019 samples.
- Few participants (n<5) reported an overdose on tapentadol when queried in 2017 and 2019.

Background

Tapentadol is a centrally-acting opioid analgesic registered for use in Australia to treat moderate to severe pain. Clinical trials suggest that tapentadol provides analgesia for acute and chronic pain similar to oxycodone and morphine [1, 2], but with lower abuse potential [3]. A recent review by the World Health Organisation Expert Committee on Drug Dependence highlighted a lack of data regarding “abuse, dependence, diversion, or recreational use”, noting that tapentadol generally does not feature in drug use surveys or surveillance reports [3]. Whilst subsequent research on this topic has been published in Australia [4,5], there is a need for ongoing surveillance.

Consequently, the aims of this bulletin are to report on: i) population-level utilisation of tapentadol relative to other pharmaceutical opioids in Australia, and ii) indicators of extra-medical use and harms amongst a sentinel sample of people who regularly inject drugs in Australia.

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Methods

Opioid Sales Data

Data on national pharmaceutical opioid sales were obtained via a third-party access request through Seqirus Australia and approved by IQVIA. Data on sales of opioids (by specific opioids, formulations and strengths) from January 2009 to December 2019 were requested. Specifically, this comprised data for all brands, formulations, and strengths of prescribed and over-the-counter (OTC) opioids falling under the Anatomical Therapeutic Chemical (ATC) code N02A and including combination products containing these opioids. Sales for methadone and buprenorphine includes items used for the treatment of pain and excludes those solely used for the purpose of opioid agonist therapy (OAT). Sales of tapentadol SRF were recorded from market launch in February 2013 and for the immediate-release formulation (IRF) from market launch in May 2016. Due to the legal requirements for secure storage of pharmaceuticals in pharmacies and for monitoring and recording of opioids, the number of packs sold over a 12-month period in pharmacies closely approximates the number dispensed. Other information, including geographic region, was also requested. Data on community sales are presented; data on hospital sales are excluded.

Opioid sales data are presented graphically over time by opioid type, presented both as total unit (pack) sales and total oral morphine equivalent (OME) milligrams/kilograms for thirteen opioids: tapentadol, oxycodone, oxycodone-naloxone, tramadol, prescription single-ingredient and high dose combination codeine products (hereafter ‘high dose codeine’), low dose combination codeine products (typically containing 30mg codeine; hereafter ‘low dose codeine’), fentanyl, methadone, buprenorphine, morphine, pethidine, hydromorphone and dextropropoxyphene. OME calculations were based on guidelines developed following review of international guidance and in consultation with clinical experts in pain and addiction fields [6].

National unit (pack) sales of tapentadol IRF and SRF by tablet strength over time (2009-2019) are provided to describe primary strengths sold. We also calculated per person utilisation of tapentadol IRF and SRF in 2019, nationally and by jurisdiction. Estimates of national and jurisdiction population size were extracted from the Australian Bureau of Statistics; population size reported for the June quarter each year was used for these calculations.

Illicit Drug Reporting System Interview Data

The Illicit Drug Reporting System (IDRS) is a national illicit drug monitoring system [7]. As part of the IDRS, annual face-to-face interviews are conducted in each capital city in Australia (in May-June) with people who regularly inject drugs. Data from the 2017, 2018 and 2019 interviews were used for the current study. Participants were recruited through treatment agencies, needle and syringe programs, and peer referral. To be eligible to participate, participants

needed to be at least 17 years of age, to have injected any drug at least monthly during the six months preceding interview, and to have been a resident for at least 10 of the last 12 months in the capital city in which they were interviewed. Informed consent was obtained prior to interview. Participants were reimbursed $40 for their time and expenses incurred.

Results

Population-Level Utilisation of Pharmaceutical Opioids

There was an increase in the unit sales of tapentadol (SRF and IRF) over the monitoring period (Figure 1a; see Appendix Table S1 for unit sales for each pharmaceutical opioid by jurisdiction and year). Increases were also observed in oxycodone-naloxone and high-dose codeine (single ingredient and high dose codeine combination products) unit sales. There was a notable decline in the sale of low-dose codeine products from February 2018, when changes were implemented so that low-dose codeine products could not be purchased over-the-counter.

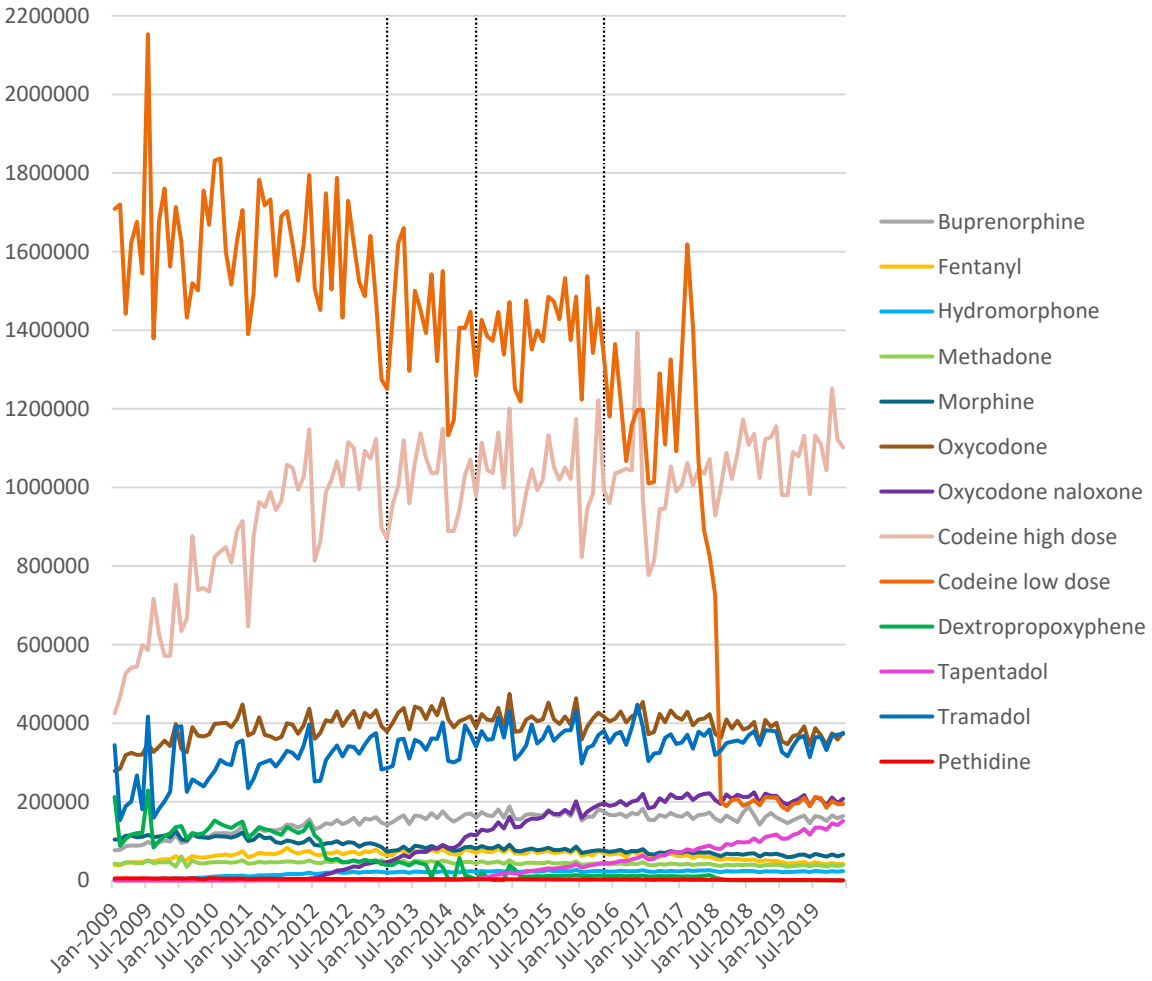
By December 2019, tapentadol had the seventh (5.5%) largest market share of number of packs sold in that month, with greater sales of high dose codeine (40.2%), oxycodone (13.7%), tramadol (13.6%), oxycodone-naloxone combination product (7.6%), low dose codeine (7.1%) and buprenorphine (6%), and fewer pack sales of morphine (2.4%), fentanyl (1.6%), methadone (1.4%) and hydromorphone (0.9%). There were no dextropropoxyphene or pethidine sales in December 2019.

By December 2019, tapentadol and tramadol had the greatest market share of pharmaceutical opioids sold that month when considered in OME (17.1% and 16.8%, respectively), followed by oxycodone (14.1%), oxycodone-naloxone (13%), methadone (8.5%), high dose codeine (7.7%), buprenorphine (7.5%), fentanyl (7.1%), morphine (5.3%), hydromorphone (2.2%) and low dose codeine (0.7%) (Figure 1c; see Appendix Table S3 for OME for each pharmaceutical opioid by jurisdiction and year).

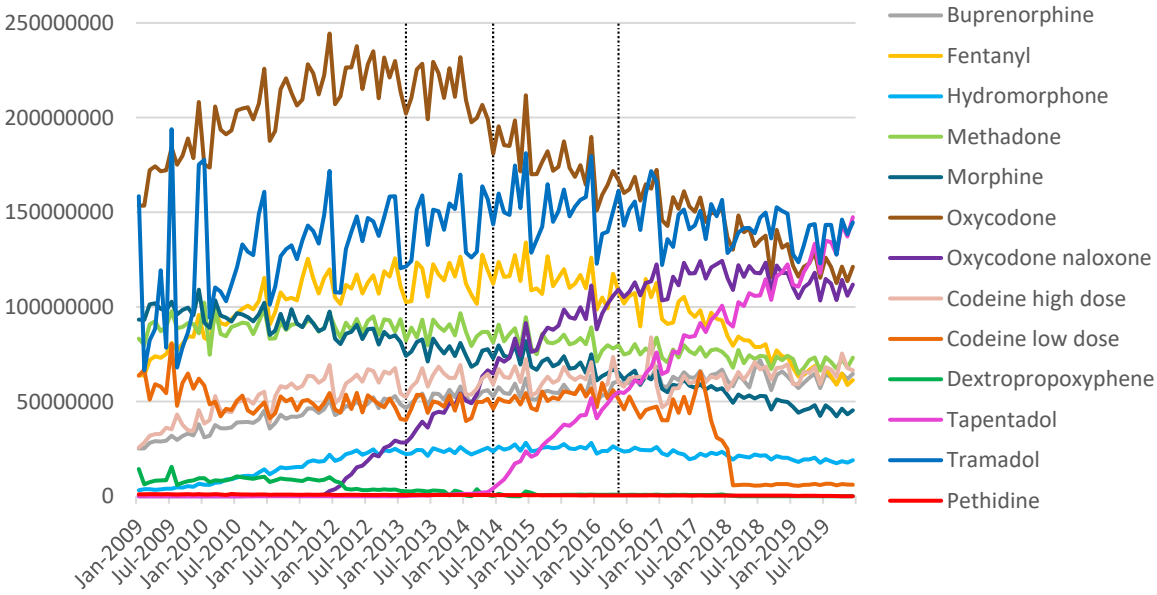
Annual figures for market share of pharmaceutical opioids in OME sold in 2019 were similar to the December 2019 figures, with tramadol and tapentadol having 16.5% and 15.5% of the total market respectively, followed by oxycodone and oxycodone-naloxone (14.5% and 13.3%, respectively), methadone (8.5%), high dose codeine (7.9%), buprenorphine (7.5%), fentanyl (7.7%), morphine (5.5%), hydromorphone (2.3%) and low dose codeine (0.7%).

Figure 1: Population-level utilisation of pharmaceutical opioids per month, by opioid type, 2011-2019

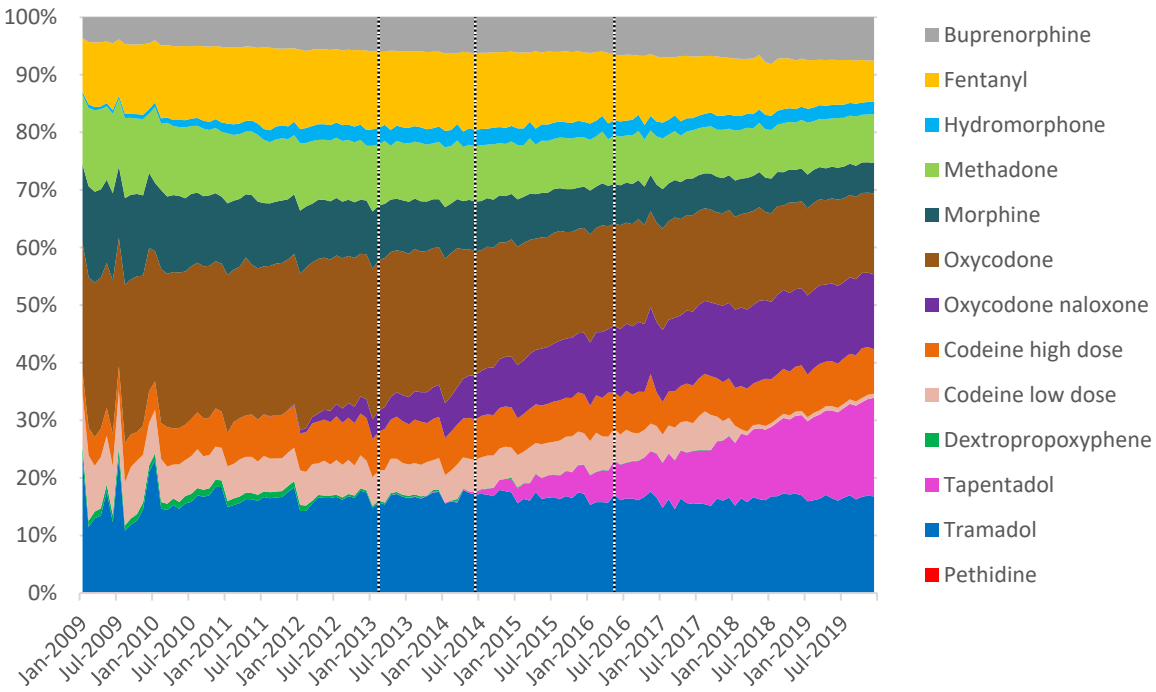
a) Unit sales (number of packs)



b) Total OME mg sold



c) Percentage of total OME mg sold



Note: Tapentadol was registered for use in Australia in January 2011. The vertical lines indicate the market launch date of tapentadol SRF (February 2013), its listing on the PBS (June 2014) and the market launch of tapentadol IRF (May 2016). The tapentadol sales reported here comprise both IRF and SRF. OME: Oral morphine equivalent units. Sales for methadone and buprenorphine includes items used for the treatment of pain and excludes those solely used for the purpose of opioid agonist therapy (OAT).

Population-Level Utilisation of Tapentadol

Tapentadol 50mg and 100mg SRF comprised the majority of tapentadol unit sales nationally from market release (Figure 2). Tapentadol IRF 50mg recorded increasing pack sales from market release in 2016 to the end of the study period.

Analysis of tapentadol annual utilisation by jurisdiction according to population size (Table 1) showed that unit sales were more than double the national average in WA in 2019 (12.9 versus 6.0 packs per 100 people, respectively), with high use by population size also observed in TAS and QLD (8.4 and 6.1 packs per 100 people, respectively). Lowest sales were observed in the NT (1.2 packs per 100 people). Similar patterns were observed when considered as OME mg per person, with highest use (133.9 mg per person) in WA, followed by TAS and QLD (80.2mg and 64.7mg per person, respectively).

Figure 2: National unit (number of packs) sales of tapentadol, by tablet strength, 2013-2019



Note: Tapentadol SRF was launched in February 2013. The vertical lines indicate the date tapentadol SRF was listed on the PBS (June 2014) and the market launch date of tapentadol IRF 50mg (May 2016).

Table 1: Rates of tapentadol utilisation by jurisdiction, 2019

	Tapentadol SRF				Tapentadol IRF				Tapentadol (SRF and IRF)			
	Packs sold		OME Kg / mg sold		Packs sold		OME Kg / mg sold		Packs sold		OME Kg / mg sold	
Jurisdiction	**Total**	**Per 100 people**	**Kg (total)**	**Mg (per person)**	**Total**	**Per 100 people**	**Kg (total)**	**Mg (per person)**	**Total**	**Per 100 people**	**Kg (total)**	**Mg (per person)**
ACT	17,353	4.1	17.8	41.7	4,668	1.1	1.9	4.4	22,021	5.2	19.6	46.0
NSW	305,543	3.8	354.1	43.8	83,406	1.0	33.4	4.1	388,949	4.8	387.4	47.9
NT	2,479	1.0	3.1	12.7	452	0.2	0.2	0.7	2,931	1.2	3.3	13.5
QLD	257,303	5.1	309.3	60.7	50,917	1.0	20.4	4.0	308,220	6.1	329.7	64.7
SA	79,075	4.5	93.9	53.6	21,722	1.2	8.7	5.0	100,797	5.8	102.6	58.6
TAS	36,943	6.9	39.6	74.1	8,130	1.5	3.3	6.1	45,073	8.4	42.9	80.2
VIC	249,142	3.8	274.4	41.6	73,100	1.1	29.2	4.4	322,242	4.9	303.6	46.0
WA	271,075	10.3	323.9	123.5	67,656	2.6	27.1	10.3	338,731	12.9	351.0	133.9
National	1,218,913	4.8	1,416.1	55.8	310,051	1.2	124.0	4.9	1,528,964	6.0	1,540.1	60.7

Note: SRF: Sustained-release formulation; IRF: Immediate release formulation; OME: Oral morphine equivalent units; ACT: Australian Capital Territory; NSW: New South Wales; NT: Northern Territory; QLD: Queensland; SA: South Australia; TAS: Tasmania; VIC: Victoria; WA: Western Australia.

Extra-Medical Use

Focusing specifically on a sentinel population, tapentadol use was rare among IDRS participants who regularly inject drugs in 2017, 2018 and 2019 (Table 2).

A minority (n=13; 1.5%) reported ever using tapentadol in the 2017 survey, with seven reporting non-prescribed use. In 2018, any tapentadol use was mentioned by 23 participants (3.0%), with 17 (2.0%) reporting non-prescribed use. Those numbers further increased in 2019 with 33 (3.7%) participants reporting lifetime use of tapentadol, including 20 (2.2%) reporting non-prescribed use. There were 4, 8, and 10 participants who reported ever injecting tapentadol in the 2017, 2018 and 2019 samples, respectively.

Recent use (i.e. use within the last six months) was reported by five participants in 2017, eight in 2018 and fifteen in 2019. Of these, three, five and eleven participants reported recent non-prescribed use in 2017, 2018 and 2019, respectively.

In 2017, of the five participants who reported past six month tapentadol use, all reported use of SRF and one reported use of IRF. Data on use of tapentadol SRF versus IRF were not available for 2018 and 2019.

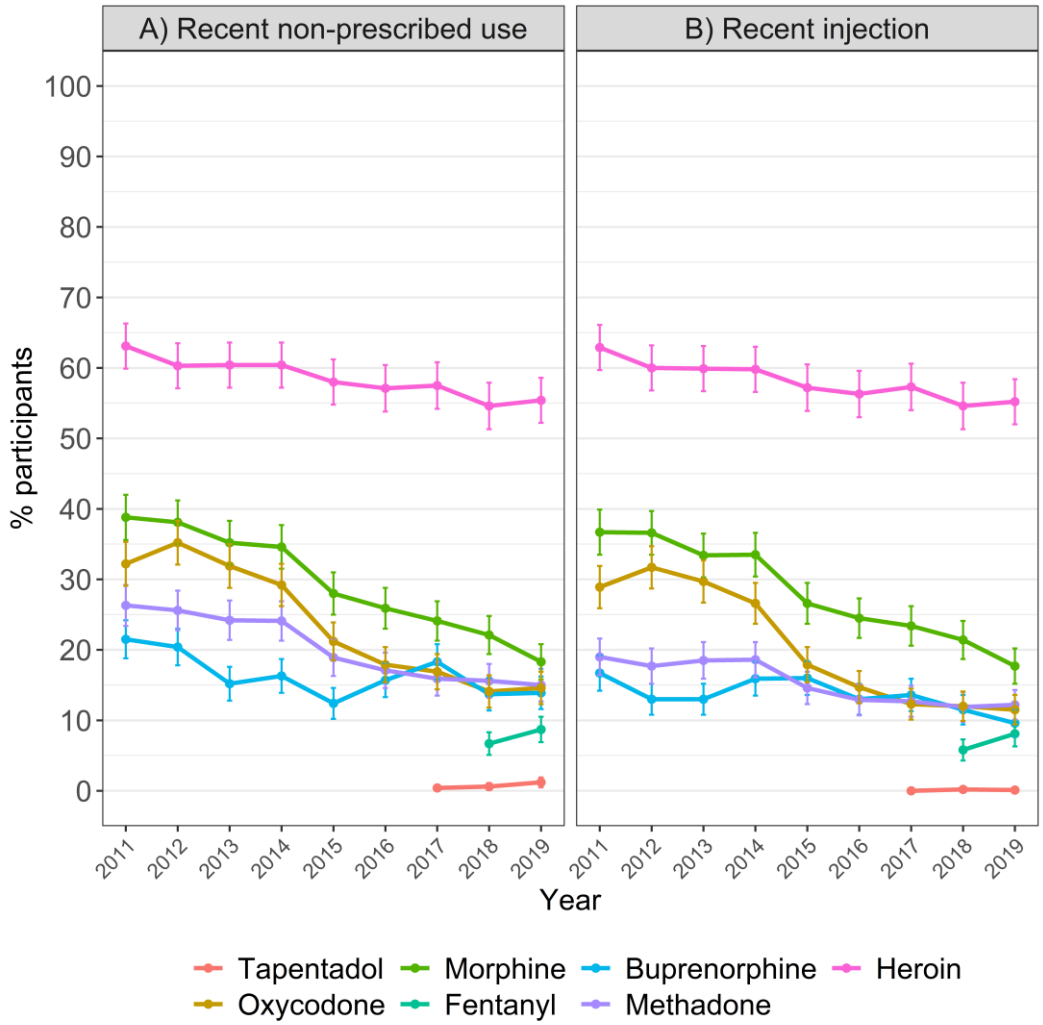
Heroin was the most common recently used opioid in the 2017-2019 samples, and heroin and morphine were the most commonly injected opioids (Figure 3).

Table 2. Percentage of IDRS sample reporting key use behaviours related to tapentadol, 2017-2019

	2017 N=888 % (n)	2018 N=905 % (n)	2019 N=902 % (n)
Any tapentadol use			
Lifetime use	1.5 (13)^	3.0 (23)	3.7 (33)
Lifetime injection	0.5 (4)^	1.0 (8)	1.1 (10)
Past six month use	0.6 (5)	0.9 (8)	1.7 (15)
Past six month injection	0.1 (1)	0.2 (2)	0.3 (3)
Prescribed tapentadol use			
Lifetime use	1.0 (8)^	0.8 (7)	1.4 (13)
Lifetime injection	0.4 (3)^	0.3 (3)	0.4 (4)
Past six month use	0.3 (2)	0.3 (3)	0.4 (4)
Non-prescribed tapentadol use			
Lifetime use	0.9 (7)^	2.0 (17)	2.2 (20)
Lifetime injection	0.1 (1)^	0.7 (6)	0.7 (6)
Past six month use	0.3 (3)	0.6 (5)	1.2 (11)

^Figures refer to tapentadol SRF only; all other figures refer to both tapentadol SRF and IRF.

Figure 3: Percentage of the IDRS sample reporting past six-month non-prescribed use (Panel A) and injection (Panel B) of heroin and pharmaceutical opioids, 2011-2019



Note: Valid percent is reported for each variable. Items about non-prescribed tapentadol were added in 2017, and non-prescribed fentanyl in 2018. 'Buprenorphine' includes buprenorphine and buprenorphine-naloxone. 'Methadone' includes methadone syrup or tablets. 'Heroin' includes heroin and homebake. The proportion reporting use of over the counter (OTC) codeine for non-pain purposes (not shown in figure) were: 7.1% (2011), 15.0% (2012), 10.9% (2013), 18.5% (2014), 13.6% (2015), 15.8% (2016) and 14.3% (2017); in February 2018, rescheduling of codeine meant it was no longer available OTC.

Associated Harms

Of the 809 IDRS participants who responded to questions on heroin overdose in 2017, two-fifths (n=336, 41.5%) self-reported overdosing on heroin in their lifetime. Lifetime non-fatal overdose on morphine (n=839 respondents), methadone (n=833 respondents), and oxycodone (n=852 respondents) was self-reported by 4.2% (n=35), 2.2% (n=18), and 1.1% (n=9), respectively. Of those who responded to questions on tapentadol overdose (n=872), less than one percent (n=2; 95%CI 0.1-0.8) reported ever experiencing a non-fatal overdose following use. This equates to 18.2% of those who reported lifetime tapentadol use and responded to questions about overdose, although small numbers should be noted.

In the 2019 sample, past 12-month experience of non-fatal opioid overdose was self-reported by 14.9% (n=134) of the 902 IDRS participants. Heroin overdose was reported by 11.8% (n=106) of the IDRS participants, methadone by 1.0% (n=9) and morphine by 0.7% (n=6). One participant (0.1%) reported non-fatal overdose on tapentadol in the last 12 months.

Conclusions

The findings of the current study suggest increasing population-level utilisation of tapentadol, with tapentadol holding the largest market share of all opioids by December 2019 when considered in OME sold. This was driven in most part by sales of the SRF, and in certain jurisdictions (e.g., WA).

There were indications of extra-medical use (specifically, non-prescribed use and use via injecting) over the three years of monitoring tapentadol in the IDRS, but on a smaller scale relative to other opioids with similar or larger market share. However, use of tapentadol (prescribed or not prescribed) was low among IDRS participants. These data cannot tell us whether low rates of extra-medical use amongst the IDRS samples reflects lower awareness of tapentadol, low diverted availability, or lower attractiveness for tampering relative to other opioids. This requires further exploration to understand these and other potential drivers of extra-medical use of tapentadol.

The finding that tapentadol now holds the greatest market share (when considered in OME) reinforces the need for ongoing close monitoring, including:

- Ensuring tapentadol is routinely included in forensic drug screening so that harms can be reliably monitored;
- Collecting data on extra-medical use and harms from samples reflective of the broader population being prescribed tapentadol (likely not represented in the IDRS samples); and
- Exploring jurisdictional differences in extra-medical use and harms, with stark differences in sales across the states and territories.

IDRS interviews are conducted with a convenience sample reflecting a sentinel population, and thus findings will not reflect general population use, nor can behaviors reported be generalized. Further, we cannot infer the number of individuals prescribed tapentadol from sales data.

However, these findings suggest that continued monitoring of extra-medical use and harms associated with tapentadol is warranted with increasing sales. This is particularly critical with regulatory changes for pharmaceutical opioids being implemented by the Therapeutic Goods Administration throughout 2020 [8], which may impact on trends observed in the future.

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Participating Researchers and Research Centres

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Supplementary Material

Table S1. Unit sales (number of packs) by opioid type and jurisdiction, 2009 – 2019

	Number of packs sold								
	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	National
All opioids									
2009	710,935	12,450,937	287,062	7,925,957	3,504,575	1,139,525	8,936,129	4,012,533	38,967,653
2010	771,003	13,720,630	283,576	8,693,164	3,983,708	1,244,492	9,661,256	4,647,398	43,005,227
2011	790,975	14,558,192	300,913	9,166,855	4,211,251	1,395,468	9,996,590	5,066,386	45,486,629
2012	784,638	14,550,587	316,750	9,161,378	4,113,117	1,426,218	10,009,625	5,188,635	45,550,948
2013	753,894	14,048,704	324,910	8,947,139	4,096,967	1,432,724	9,897,468	5,053,783	44,555,590
2014	764,119	13,814,359	327,656	8,983,053	4,093,541	1,428,824	9,848,041	5,043,469	44,303,062
2015	785,105	14,300,987	309,839	9,319,277	4,203,205	1,470,736	10,041,862	5,138,607	45,569,617
2016	771,466	13,991,644	290,269	9,195,013	4,102,709	1,416,286	9,841,048	5,005,893	44,614,327
2017	711,057	13,530,467	255,006	8,810,550	3,932,422	1,330,177	9,314,108	4,815,330	42,699,117
2018	546,629	9,622,025	155,840	7,096,414	3,209,032	1,156,209	7,461,690	3,468,668	32,716,506
2019	536,444	9,235,767	149,611	7,070,719	3,141,977	1,135,889	7,092,975	3,432,491	31,795,874
TOTAL	7,926,264	143,824,298	3,001,432	94,369,518	42,592,504	14,576,548	102,100,792	50,873,193	459,264,550
Buprenorphine									
2009	17,317	345,841	3,978	201,488	91,327	66,485	290,583	93,420	1,110,438
2010	19,514	432,509	5,250	244,988	123,224	78,453	362,140	116,025	1,382,103
2011	22,654	491,174	6,042	279,482	148,659	87,812	411,769	135,089	1,582,681
2012	24,785	545,143	6,827	316,682	174,807	97,593	450,495	156,408	1,772,741
2013	25,126	567,315	6,301	349,751	194,276	100,836	476,860	172,666	1,893,131
2014	26,587	588,719	6,611	367,716	214,059	103,496	500,192	188,820	1,996,200
2015	26,970	584,407	6,220	376,883	219,752	99,013	508,648	198,734	2,020,627
2016	29,004	574,733	6,142	381,171	218,375	92,087	513,256	201,845	2,016,613
2017	29,874	556,101	6,110	373,772	213,072	86,067	503,219	199,795	1,968,009
2018	29,135	538,593	5,827	369,199	208,994	81,929	501,767	202,363	1,937,806
2019	28,391	509,945	5,986	360,066	202,834	78,584	495,591	203,013	1,884,411
TOTAL	279,357	5,734,480	65,294	3,621,198	2,009,379	972,355	5,014,520	1,868,178	19,564,760
Codeine (low-dose combination products)									
2009	408,950	6,360,270	193,429	4,252,172	1,548,577	515,319	4,540,810	2,143,250	19,962,777
2010	411,578	6,355,335	175,245	4,063,133	1,536,197	470,269	4,288,138	2,316,632	19,616,526
2011	380,180	6,563,238	172,637	3,940,290	1,520,030	451,729	4,094,658	2,485,329	19,608,091
2012	363,446	6,351,917	177,816	3,716,539	1,438,624	409,527	3,940,201	2,506,403	18,904,473
2013	324,700	5,740,115	165,763	3,368,729	1,316,488	388,399	3,684,871	2,305,798	17,294,862
2014	313,778	5,355,239	166,644	3,163,821	1,241,188	364,704	3,491,015	2,189,585	16,285,974
2015	329,312	5,633,262	150,149	3,309,983	1,274,602	379,893	3,518,656	2,250,331	16,846,188
2016	286,304	5,275,437	132,323	2,973,573	1,128,519	305,085	3,130,748	2,046,823	15,278,811
2017	258,925	5,111,081	113,204	2,615,158	1,022,569	265,107	2,674,509	1,930,036	13,990,588
2018	46,146	963,787	21,217	638,451	203,391	61,940	692,291	314,393	2,941,616
2019	44,986	752,637	14,494	554,747	155,641	50,427	549,963	228,878	2,351,773
TOTAL	3,168,305	54,462,318	1,482,921	32,596,596	12,385,826	3,662,399	34,605,860	20,717,458	163,081,679

Table S1. Unit sales (number of packs) by opioid type and jurisdiction, 2009 – 2019 (continued)

	Number of packs sold								
	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	National
Codeine (single-ingredient and high-dose combination products)									
2009	102,585	2,116,306	32,697	1,297,111	818,567	198,659	1,597,546	763,507	6,926,978
2010	137,857	2,829,655	36,025	1,891,964	1,121,029	303,471	2,171,730	1,023,226	9,514,957
2011	177,706	3,354,190	51,450	2,394,518	1,302,814	474,827	2,626,035	1,226,205	11,607,745
2012	188,608	3,547,759	61,218	2,533,538	1,346,579	525,248	2,744,815	1,308,002	12,255,767
2013	189,703	3,518,619	78,401	2,513,181	1,399,478	543,739	2,743,995	1,319,838	12,306,954
2014	200,070	3,516,832	81,028	2,526,954	1,418,567	544,390	2,726,887	1,320,328	12,335,056
2015	200,719	3,518,021	73,914	2,501,179	1,436,455	549,015	2,693,185	1,308,269	12,280,757
2016	218,220	3,495,667	71,569	2,573,519	1,469,593	561,942	2,720,338	1,348,650	12,459,498
2017	185,571	3,222,428	62,049	2,482,713	1,395,413	524,050	2,621,128	1,256,028	11,749,380
2018	227,025	3,626,508	65,844	2,748,301	1,524,789	558,147	2,785,688	1,435,502	12,971,804
2019	226,431	3,650,144	64,606	2,835,308	1,530,895	557,332	2,680,162	1,460,327	13,005,205
TOTAL	2,054,495	36,396,129	678,801	26,298,286	14,764,179	5,340,820	28,111,509	13,769,882	127,414,101
Dextropropoxyphene									
2009	31,607	647,470	5,933	297,632	186,348	26,490	255,725	93,622	1,544,827
2010	33,060	660,916	5,711	303,720	219,062	26,103	252,575	93,562	1,594,709
2011	32,296	618,471	4,481	282,831	222,553	24,189	239,034	91,644	1,515,499
2012	16,423	307,881	2,067	125,079	88,785	12,359	122,171	46,873	721,638
2013	11,117	203,405	1,369	77,895	58,413	7,168	77,622	27,494	464,483
2014	4,737	61,292	331	26,399	21,447	3,808	24,682	11,561	154,257
2015	3,796	63,253	430	26,737	19,565	3,125	22,880	9,772	149,558
2016	3,642	55,026	478	23,109	17,853	2,995	23,177	9,282	135,562
2017	3,196	51,509	248	22,510	17,807	2,842	22,234	8,291	128,637
2018	250	4,889	9	1,678	1,669	160	1,711	934	11,300
2019	-	-	-	-	-	-	-	-	-
TOTAL	140,124	2,674,112	21,057	1,187,590	853,502	109,239	1,041,811	393,035	6,420,470
Fentanyl									
2009	11,805	194,520	1,699	132,918	65,822	6,956	116,155	50,960	580,835
2010	12,935	247,492	2,199	169,472	83,007	7,490	150,728	65,887	739,210
2011	13,974	282,586	2,405	190,492	96,176	8,630	167,519	76,730	838,512
2012	13,850	289,619	2,429	195,756	93,748	9,936	169,940	65,942	841,220
2013	14,663	300,713	2,452	201,894	96,276	10,357	173,849	64,407	864,611
2014	13,747	312,610	2,621	211,130	95,693	11,031	173,985	62,103	882,920
2015	13,334	306,751	2,787	209,383	94,121	11,241	169,122	58,662	865,401
2016	13,123	279,730	2,707	200,748	88,614	11,251	162,601	52,654	811,428
2017	11,820	251,174	2,590	187,230	81,503	10,631	148,514	48,308	741,770
2018	10,596	206,920	1,857	161,599	67,966	8,686	129,033	40,598	627,255
2019	7,952	169,987	1,871	136,725	56,101	7,038	109,423	35,876	524,973
TOTAL	137,799	2,842,102	25,617	1,997,347	919,027	103,247	1,670,869	622,127	8,318,135

Table S1. Unit sales (number of packs) by opioid type and jurisdiction, 2009 – 2019 (continued)

	Number of packs sold								
	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	National
Hydromorphone									
2009	585	16,452	129	6,389	1,895	1,153	9,818	5,019	41,440
2010	2,832	36,952	311	21,728	7,116	1,998	22,189	10,829	103,955
2011	4,421	60,657	250	41,062	10,456	1,498	33,937	18,767	171,048
2012	6,526	81,485	179	61,941	13,888	2,017	47,154	27,951	241,141
2013	6,014	86,910	310	62,978	16,014	2,167	49,659	31,812	255,864
2014	6,500	93,872	584	64,003	17,793	2,866	49,952	35,735	271,305
2015	7,937	96,727	530	66,690	18,608	3,266	54,665	33,455	281,878
2016	8,974	96,888	400	64,441	18,114	3,760	53,017	33,502	279,096
2017	11,112	103,374	291	61,027	18,346	4,663	52,759	34,161	285,733
2018	12,817	97,525	229	56,987	17,086	4,788	52,332	32,691	274,455
2019	11,728	94,563	293	56,090	17,153	4,993	52,662	31,923	269,405
TOTAL	79,446	865,405	3,506	563,336	156,469	33,169	478,144	295,845	2,475,320
Methadone									
2009	5,017	150,424	7,200	91,461	78,886	27,673	113,090	55,956	529,707
2010	5,686	159,354	7,858	98,459	84,067	26,507	118,394	60,790	561,115
2011	5,386	156,784	7,546	94,443	81,611	25,571	122,859	63,568	557,768
2012	5,678	155,931	6,835	97,124	80,119	25,177	127,914	63,175	561,953
2013	5,833	160,139	6,623	92,557	83,046	24,567	131,898	64,934	569,597
2014	6,299	156,432	6,215	86,973	81,465	24,053	124,656	65,806	551,899
2015	7,419	149,509	6,163	84,926	77,318	22,800	120,203	62,061	530,399
2016	7,716	137,857	5,364	81,225	74,387	21,871	121,662	56,308	506,390
2017	8,122	130,345	4,685	78,613	70,674	20,432	122,107	53,826	488,804
2018	8,298	122,546	3,852	75,945	65,929	19,176	120,263	50,725	466,734
2019	7,363	112,458	3,355	76,092	61,701	17,180	120,698	49,019	447,866
TOTAL	72,817	1,591,779	65,696	957,818	839,203	255,007	1,343,744	646,168	5,772,232
Morphine									
2009	22,136	370,636	10,609	277,809	150,027	43,233	353,627	115,544	1,343,621
2010	20,471	366,530	10,928	284,478	152,128	40,914	345,768	111,847	1,333,064
2011	18,738	337,500	11,482	266,932	146,794	38,535	307,956	97,310	1,225,247
2012	17,692	306,039	10,521	253,664	137,131	36,771	268,322	85,825	1,115,965
2013	15,126	269,159	10,475	223,342	125,057	31,181	236,027	73,866	984,233
2014	15,787	278,566	8,991	230,386	122,973	31,006	233,731	70,474	991,914
2015	14,634	268,495	9,016	215,981	117,967	29,834	224,097	62,415	942,439
2016	13,699	255,760	8,686	206,137	111,259	26,701	217,118	54,740	894,100
2017	13,222	239,020	8,132	197,721	104,464	26,683	207,445	50,095	846,782
2018	11,088	229,003	6,555	185,688	95,065	25,500	195,252	45,458	793,609
2019	11,260	221,534	5,562	181,487	88,116	26,070	181,576	42,687	758,292
TOTAL	173,853	3,142,242	100,957	2,523,625	1,350,981	356,428	2,770,919	810,261	11,229,266

Table S1. Unit sales (number of packs) by opioid type and jurisdiction, 2009 – 2019 (continued)

	Number of packs sold								
	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	National
Oxycodone									
2009	82,049	1,426,221	14,141	709,210	324,028	122,591	972,225	305,899	3,956,364
2010	93,356	1,656,485	18,055	838,071	365,646	134,704	1,145,872	349,418	4,601,607
2011	97,983	1,678,185	21,312	862,809	363,378	128,528	1,141,088	327,485	4,620,768
2012	101,330	1,797,968	23,459	952,514	373,405	130,025	1,182,219	317,419	4,878,339
2013	103,803	1,872,684	26,130	1,018,745	377,122	128,200	1,217,759	292,261	5,036,704
2014	103,096	1,842,667	24,559	1,047,528	368,339	120,849	1,179,445	273,961	4,960,444
2015	94,874	1,818,309	28,272	1,073,891	360,784	118,853	1,182,144	258,114	4,935,241
2016	91,463	1,805,206	27,585	1,100,408	360,220	115,420	1,202,388	246,975	4,949,665
2017	87,250	1,768,653	25,723	1,111,848	362,339	113,860	1,189,566	241,085	4,900,324
2018	88,075	1,662,151	22,245	1,080,472	342,774	109,581	1,131,011	224,953	4,661,262
2019	81,341	1,556,893	20,481	1,029,605	326,668	104,003	1,055,870	209,447	4,384,308
TOTAL	1,024,620	18,885,422	251,962	10,825,101	3,924,703	1,326,614	12,599,587	3,047,017	51,885,026
Oxycodone-naloxone									
2009	-	-	-	-	-	-	-	-	-
2010	123	575	-	224	105	51	246	87	2,823
2011	1,176	6,775	14	2,230	841	653	3,314	1,204	32,414
2012	8,290	113,969	935	66,525	23,575	10,261	77,797	30,054	662,813
2013	17,218	257,985	1,585	171,181	52,897	26,347	189,129	74,296	1,581,276
2014	26,052	452,232	3,104	322,481	92,661	43,241	365,531	119,264	2,849,132
2015	33,016	625,097	4,783	457,541	124,887	59,593	513,534	141,915	3,920,733
2016	37,643	734,974	6,609	555,632	136,792	69,237	608,895	154,755	4,609,074
2017	40,329	797,917	6,932	618,048	145,550	73,818	654,535	162,642	4,999,541
2018	41,115	805,434	6,649	634,931	150,321	74,717	666,253	161,328	5,081,495
2019	38,959	761,353	6,835	623,220	143,742	73,534	635,336	148,574	4,863,107
TOTAL	243,921	4,556,311	37,446	3,452,013	871,371	431,452	3,714,570	994,119	28,602,408
Pethidine									
2009	617	15,080	97	13,525	2,365	145	19,067	9,347	60,243
2010	383	12,027	99	12,234	2,033	131	18,295	9,117	54,319
2011	287	11,891	123	11,628	1,852	87	13,776	6,469	46,113
2012	257	11,462	308	11,737	1,765	105	11,173	4,318	41,125
2013	271	9,876	116	13,803	1,488	134	9,211	3,805	38,704
2014	236	8,585	98	13,055	1,237	106	8,804	3,659	35,780
2015	146	7,156	144	9,943	1,110	108	7,742	2,282	28,631
2016	112	6,277	156	7,733	1,032	105	6,391	1,894	23,700
2017	87	3,876	170	7,347	830	85	5,531	1,473	19,399
2018	101	3,052	103	6,267	821	23	5,514	1,489	17,370
2019	54	1,037	55	3,542	506	10	2,173	793	8,170
TOTAL	2,551	90,319	1,469	110,814	15,039	1,039	107,677	44,646	373,554

Table S1. Unit sales (number of packs) by opioid type and jurisdiction, 2009 – 2019 (continued)

	Number of packs sold								
	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	National
Tapentadol									
2009	-	-	-	-	-	-	-	-	-
2010	-	-	-	-	-	-	-	-	-
2011	-	-	-	-	-	-	-	-	-
2012	-	-	-	-	-	-	-	-	-
2013	89	2,011	-	255	341	84	1,308	989	5,077
2014	1,111	28,527	113	15,424	4,012	2,270	18,839	16,978	87,274
2015	4,294	103,354	494	78,533	17,222	10,000	66,164	58,449	338,510
2016	6,855	156,864	1,133	126,958	31,061	18,574	113,214	101,304	555,963
2017	10,081	232,770	1,896	183,121	48,217	26,717	189,226	168,889	860,917
2018	16,874	306,618	2,190	240,915	66,637	35,897	257,500	253,130	1,179,761
2019	22,020	388,949	2,931	308,220	100,797	45,073	322,242	338,731	1,528,963
TOTAL	61,324	1,219,093	8,757	953,426	268,287	138,615	968,493	938,470	4,556,465
Tramadol									
2009	28,268	807,716	17,150	646,243	236,733	130,821	667,483	376,009	2,910,423
2010	33,209	962,800	21,895	764,694	290,094	154,401	785,181	489,978	3,502,252
2011	36,175	996,742	23,171	800,136	316,087	153,409	834,645	536,586	3,696,951
2012	37,753	1,041,414	24,156	830,277	340,691	167,199	867,424	576,265	3,885,179
2013	40,231	1,059,776	25,385	852,829	376,071	169,545	905,280	621,617	4,050,734
2014	46,119	1,118,786	26,757	907,181	414,107	177,004	950,322	685,195	4,325,471
2015	48,653	1,126,646	26,937	907,606	440,814	183,995	960,822	694,148	4,389,621
2016	54,712	1,117,226	27,117	900,358	446,890	187,258	968,243	697,161	4,398,965
2017	51,468	1,062,220	22,976	871,445	451,638	175,222	923,335	660,701	4,219,005
2018	55,109	1,055,002	19,263	895,981	463,590	175,665	923,075	705,104	4,292,789
2019	55,958	1,016,266	23,142	905,615	457,823	171,645	887,279	683,223	4,200,951
TOTAL	487,655	11,364,594	257,949	9,282,365	4,234,538	1,846,164	9,673,089	6,725,987	43,872,341

Note: As tapentadol was not launched on the market until February 2013, there were no tapentadol sales in 2009, 2010, 2011 and 2012.

Table S2. Kilograms (kg) sold by opioid type and jurisdiction, 2009 – 2019

	Kg sold								
	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	National
All opioids									
2009	340.0	7,090.4	149.3	4,492.1	1,989.5	681.6	4,678.3	2,371.7	21,792.9
2010	349.5	7,177.2	148.2	4,862.0	2,226.6	756.9	5,035.3	2,674.4	23,230.1
2011	375.7	7,580.2	161.3	5,252.4	2,407.6	850.6	5,384.7	2,931.6	24,944.2
2012	376.2	7,646.3	167.5	5,314.8	2,376.2	902.6	5,436.0	3,057.8	25,277.4
2013	378.2	7,580.5	176.9	5,331.5	2,446.5	914.8	5,477.4	3,120.0	25,425.8
2014	401.6	7,637.1	183.5	5,485.2	2,513.2	934.3	5,562.1	3,263.6	25,980.6
2015	421.4	8,051.3	178.3	5,775.3	2,638.3	981.7	5,746.4	3,403.7	27,196.4
2016	429.3	8,057.0	169.7	5,844.5	2,656.5	983.2	5,774.0	3,464.0	27,378.2
2017	393.7	7,874.6	151.0	5,725.7	2,612.5	938.3	5,637.9	3,446.0	26,779.7
2018	344.8	6,410.5	102.5	5,126.2	2,344.2	876.3	4,996.1	3,137.6	23,338.1
2019	345.2	6,276.1	105.6	5,203.7	2,349.2	868.8	4,824.6	3,236.4	23,209.5
TOTAL	4,155.6	81,381.1	1,693.8	58,413.5	26,560.3	9,689.2	58,552.6	34,106.8	274,552.9
Buprenorphine									
2009	0.06	1.23	0.01	0.71	0.33	0.25	1.04	0.33	3.97
2010	0.07	1.54	0.02	0.87	0.44	0.30	1.29	0.41	4.93
2011	0.08	1.75	0.02	1.00	0.53	0.34	1.47	0.49	5.68
2012	0.09	1.95	0.02	1.14	0.62	0.38	1.60	0.57	6.37
2013	0.09	2.04	0.02	1.26	0.69	0.39	1.70	0.63	6.84
2014	0.10	2.11	0.02	1.34	0.77	0.40	1.78	0.70	7.22
2015	0.10	2.08	0.02	1.37	0.79	0.39	1.82	0.75	7.32
2016	0.11	2.18	0.03	1.50	0.85	0.39	1.97	0.82	7.85
2017	0.12	2.27	0.03	1.61	0.90	0.39	2.11	0.89	8.32
2018	0.12	2.23	0.03	1.62	0.90	0.38	2.15	0.94	8.37
2019	0.12	2.11	0.03	1.62	0.88	0.36	2.17	0.96	8.24
TOTAL	1.05	21.50	0.26	14.04	7.70	3.97	19.11	7.49	75.11
Codeine (low-dose combination products)									
2009	140.1	2,694.9	63.3	1,472.7	532.8	167.6	1,422.9	753.3	7,247.7
2010	116.3	1,967.6	49.3	1,206.6	450.4	133.0	1,202.5	669.2	5,794.9
2011	110.5	1,964.6	50.8	1,195.2	462.2	131.8	1,192.9	731.8	5,839.7
2012	110.5	1,981.3	53.6	1,176.1	458.8	125.6	1,188.8	775.3	5,870.0
2013	107.9	1,926.4	52.3	1,150.7	447.6	126.7	1,185.2	775.1	5,771.8
2014	115.6	1,939.4	56.9	1,164.6	451.0	128.4	1,208.0	785.8	5,849.7
2015	127.8	2,118.0	55.7	1,274.6	487.0	141.4	1,263.3	830.6	6,298.4
2016	113.2	2,046.4	50.9	1,178.1	454.6	118.3	1,148.2	779.0	5,888.8
2017	101.6	1,990.7	45.5	1,045.2	419.5	103.7	983.8	743.3	5,433.4
2018	14.2	306.6	6.7	195.8	63.0	18.3	207.9	95.9	908.3
2019	14.2	239.3	4.5	172.3	50.3	14.7	164.5	71.6	731.4
TOTAL	1,071.9	19,175.2	489.4	11,232.1	4,277.1	1,209.4	11,168.1	7,011.0	55,634.2

Table S2. Kilograms (kg) sold by opioid type and jurisdiction, 2009 – 2019 (continued)

	Kg sold								
	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	National
Codeine (single-ingredient and high-dose combination products)									
2009	62.2	1,276.4	20.0	784.0	494.1	121.3	969.2	462.5	4,189.8
2010	83.4	1,707.1	21.9	1,141.4	675.7	183.5	1,313.7	617.5	5,744.2
2011	107.1	2,022.8	31.2	1,441.7	784.0	286.0	1,587.1	739.3	6,999.3
2012	113.6	2,138.3	37.0	1,524.2	810.4	316.2	1,658.0	787.5	7,385.3
2013	114.3	2,122.7	47.4	1,512.1	842.3	326.9	1,658.6	795.0	7,419.3
2014	120.8	2,122.9	49.0	1,521.3	853.7	327.4	1,647.4	795.3	7,437.8
2015	121.3	2,123.9	45.0	1,506.8	864.3	330.3	1,627.2	788.1	7,406.8
2016	131.7	2,110.2	43.5	1,550.2	883.9	338.1	1,641.9	811.6	7,511.2
2017	111.9	1,948.0	37.5	1,495.2	839.1	315.4	1,580.5	755.9	7,083.5
2018	137.2	2,194.5	39.8	1,657.2	918.0	336.1	1,680.9	864.0	7,827.5
2019	137.2	2,210.6	39.0	1,708.6	921.0	335.0	1,615.0	878.3	7,844.8
TOTAL	1,240.7	21,977.4	411.4	15,842.5	8,886.5	3,216.3	16,979.6	8,294.9	76,849.3
Dextropropoxyphene									
2009	21.8	450.0	4.9	207.2	127.3	18.5	176.2	68.4	1,074.4
2010	22.9	456.8	4.6	211.0	148.7	18.0	173.3	68.4	1,103.8
2011	22.4	425.6	3.4	194.8	151.0	16.7	163.2	66.6	1,043.7
2012	11.4	213.7	1.7	86.4	61.0	8.7	83.7	34.8	501.3
2013	7.2	132.6	0.9	50.8	38.1	4.7	50.6	18.2	303.1
2014	3.1	39.8	0.2	17.2	13.9	2.5	16.0	7.5	100.3
2015	2.5	41.1	0.3	17.4	12.7	2.0	14.9	6.4	97.2
2016	2.4	35.8	0.3	15.0	11.6	1.9	15.1	6.0	88.1
2017	2.1	33.5	0.2	14.6	11.6	1.8	14.5	5.4	83.6
2018	0.2	3.2	0.01	1.1	1.1	0.10	1.1	0.6	7.3
2019	-	-	-	-	-	-	-	-	-
TOTAL	95.9	1,832.0	16.5	815.6	577.0	75.1	708.5	282.2	4,402.8
Fentanyl									
2009	0.17	2.70	0.03	1.96	0.87	0.10	1.72	0.68	8.22
2010	0.19	3.35	0.03	2.48	1.07	0.11	2.17	0.85	10.24
2011	0.21	3.90	0.03	2.77	1.24	0.12	2.42	0.93	11.62
2012	0.21	4.14	0.04	2.92	1.22	0.14	2.44	0.91	12.01
2013	0.22	4.35	0.03	3.04	1.23	0.14	2.45	0.87	12.32
2014	0.20	4.61	0.03	3.17	1.21	0.13	2.37	0.82	12.55
2015	0.19	4.63	0.04	3.08	1.17	0.13	2.23	0.75	12.22
2016	0.17	4.23	0.04	2.88	1.09	0.13	2.10	0.63	11.26
2017	0.13	3.81	0.03	2.65	1.01	0.12	1.90	0.56	10.21
2018	0.12	3.08	0.02	2.21	0.82	0.10	1.61	0.47	8.42
2019	0.09	2.45	0.02	1.82	0.67	0.07	1.29	0.40	6.81
TOTAL	1.90	41.23	0.35	28.98	11.59	1.28	22.69	7.86	115.89

Table S2. Kilograms (kg) sold by opioid type and jurisdiction, 2009 – 2019 (continued)

	Kg sold								
	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	National
Hydromorphone									
2009	0.05	2.22	0.02	0.98	0.23	0.07	1.50	1.06	6.13
2010	0.44	5.75	0.07	4.11	1.22	0.15	3.99	2.21	17.94
2011	1.09	11.52	0.05	9.47	2.06	0.17	6.76	4.05	35.18
2012	1.49	15.23	0.06	14.21	2.81	0.28	9.29	6.03	49.40
2013	1.32	16.45	0.08	14.62	3.08	0.32	9.66	6.56	52.09
2014	1.44	17.73	0.15	15.29	3.35	0.43	9.60	6.99	54.96
2015	1.56	17.74	0.16	16.13	3.40	0.43	10.28	6.39	56.10
2016	1.69	17.01	0.10	15.48	3.10	0.46	9.94	5.85	53.63
2017	1.72	15.29	0.07	13.95	2.92	0.48	8.93	5.06	48.41
2018	1.82	14.56	0.05	12.90	2.70	0.49	8.60	4.75	45.87
2019	1.56	12.44	0.07	11.77	2.47	0.43	7.75	4.16	40.64
TOTAL	14.19	145.95	0.88	128.91	27.33	3.71	86.29	53.10	460.37
Methadone									
2009	1.9	60.7	1.7	41.2	22.8	10.5	62.4	25.7	226.8
2010	2.1	62.9	1.7	42.6	23.4	9.9	61.9	26.2	230.8
2011	1.6	62.5	1.7	40.6	23.0	10.0	62.7	26.2	228.3
2012	1.6	62.0	1.6	40.4	22.3	9.7	66.1	25.5	229.2
2013	1.7	61.7	1.4	38.0	22.7	9.5	66.3	25.0	226.2
2014	1.7	60.7	1.3	35.5	22.6	9.3	62.2	24.5	217.8
2015	1.9	58.2	1.3	34.4	20.9	9.0	59.9	23.3	208.9
2016	1.9	51.2	1.1	32.4	20.2	8.8	61.1	20.7	197.3
2017	1.9	48.3	1.0	31.0	19.3	8.1	63.4	20.3	193.2
2018	2.1	45.1	0.8	29.2	17.9	7.4	62.7	19.9	185.0
2019	2.0	41.2	0.7	28.5	16.7	6.9	63.2	19.8	178.9
TOTAL	20.3	614.4	14.2	393.8	231.8	99.2	691.6	257.0	2,322.4
Morphine									
2009	20.8	290.3	18.5	251.2	140.8	27.8	274.8	99.2	1,123.4
2010	19.4	277.7	19.1	252.5	135.5	24.8	257.5	94.3	1,080.8
2011	18.1	270.6	18.8	250.1	128.1	24.5	241.9	85.6	1,037.5
2012	17.6	253.3	16.4	240.7	120.2	23.7	217.4	77.4	966.7
2013	16.6	234.0	15.6	228.8	111.5	21.6	195.7	69.2	893.1
2014	16.1	229.1	13.8	226.7	102.6	20.2	181.7	63.4	853.5
2015	14.0	211.8	13.2	219.4	96.5	18.7	167.5	54.7	795.7
2016	12.9	193.0	11.6	203.7	87.9	16.6	153.1	45.3	724.1
2017	11.4	171.9	10.6	188.5	78.5	16.0	139.4	38.2	654.5
2018	9.4	150.7	8.8	169.0	69.1	14.3	124.9	33.2	579.4
2019	8.2	132.9	6.5	152.8	60.9	13.7	109.1	28.4	512.6
TOTAL	164.5	2,415.3	152.9	2,383.4	1,131.5	221.9	2,063.1	688.9	9,221.4

Table S2. Kilograms (kg) sold by opioid type and jurisdiction, 2009 – 2019 (continued)

	Kg sold								
	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	National
Oxycodone									
2009	28.8	500.5	4.6	265.0	114.8	37.4	338.2	118.6	1,408.0
2010	31.2	572.2	5.2	299.7	122.9	39.4	382.8	132.3	1,585.8
2011	35.1	633.8	6.4	335.2	127.8	40.9	406.3	131.7	1,717.3
2012	35.8	675.1	6.9	370.4	126.8	41.3	405.8	124.7	1,786.8
2013	34.6	666.4	7.1	381.4	119.3	39.0	385.3	107.7	1,740.8
2014	31.6	593.0	6.4	352.1	109.9	34.8	339.8	92.8	1,560.5
2015	25.1	528.7	6.6	325.1	99.5	31.3	308.9	77.1	1,402.2
2016	21.8	493.6	5.8	309.0	93.2	27.4	288.2	67.6	1,306.7
2017	19.0	455.4	5.1	288.2	88.3	24.8	268.5	61.5	1,210.8
2018	17.9	396.1	4.2	264.0	79.6	22.7	242.0	54.5	1,081.1
2019	16.1	349.4	3.6	238.0	72.5	20.5	212.7	48.4	961.2
TOTAL	297.3	5,864.3	62.0	3,428.1	1,154.5	359.5	3,578.6	1,016.9	15,761.2
Oxycodone-naloxone									
2009	-	-	-	-	-	-	-	-	-
2010	0.1	0.1	-	0.07	0.03	0.02	0.09	0.02	0.4
2011	0.5	2.2	0.003	0.7	0.3	0.2	1.3	0.5	5.6
2012	3.7	47.1	0.4	28.8	9.6	4.2	30.9	12.1	136.8
2013	7.3	104.9	0.8	74.0	22.7	10.3	73.1	28.9	322.0
2014	10.6	171.8	1.3	132.8	36.4	16.0	129.8	44.1	542.9
2015	12.8	233.7	1.9	184.3	48.2	21.8	178.7	49.8	731.2
2016	13.9	272.0	2.7	224.5	52.4	24.8	211.7	52.8	854.9
2017	14.7	295.8	2.9	252.6	56.1	26.5	230.1	55.0	933.7
2018	14.8	291.7	2.7	258.8	58.1	26.3	232.6	54.2	939.2
2019	13.8	267.9	2.8	249.5	54.8	25.6	217.3	49.5	881.2
TOTAL	92.1	1,687.3	15.6	1,406.1	338.7	155.6	1,305.4	347.0	5,347.8
Pethidine									
2009	0.34	8.00	0.05	6.61	1.19	0.08	10.37	4.24	30.87
2010	0.23	6.73	0.05	5.72	0.99	0.08	9.71	4.42	27.93
2011	0.17	6.42	0.06	5.57	0.92	0.04	7.24	3.05	23.46
2012	0.15	6.07	0.15	5.63	0.87	0.05	5.82	2.06	20.80
2013	0.15	5.18	0.06	6.48	0.74	0.07	4.93	1.77	19.37
2014	0.12	4.55	0.05	6.17	0.62	0.05	4.73	1.79	18.08
2015	0.08	3.76	0.07	4.79	0.56	0.05	4.36	1.17	14.85
2016	0.07	3.35	0.08	3.76	0.54	0.05	3.62	1.03	12.50
2017	0.06	2.29	0.09	3.66	0.48	0.04	3.28	0.95	10.86
2018	0.07	1.77	0.05	3.08	0.47	0.01	3.18	0.91	9.54
2019	0.04	0.64	0.01	1.46	0.28	0.003	1.36	0.54	4.34
TOTAL	1.48	48.76	0.72	52.93	7.65	0.54	58.60	21.93	192.59

Table S2. Kilograms (kg) sold by opioid type and jurisdiction, 2009 – 2019 (continued)

	Kg sold								
	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	National
Tapentadol									
2009	-	-	-	-	-	-	-	-	-
2010	-	-	-	-	-	-	-	-	-
2011	-	-	-	-	-	-	-	-	-
2012	-	-	-	-	-	-	-	-	-
2013	0.2	7.9	-	0.8	1.1	0.2	3.7	2.2	16.1
2014	2.8	85.9	0.4	40.8	11.7	6.3	54.8	46.8	249.4
2015	12.4	326.9	1.3	240.4	51.4	29.6	199.5	182.0	1,043.4
2016	19.6	492.1	3.1	401.7	96.0	51.2	338.2	311.4	1,713.1
2017	25.9	692.4	5.9	560.1	147.8	69.3	523.2	486.8	2,511.2
2018	40.0	839.3	6.7	687.4	190.4	88.9	657.9	686.7	3,197.4
2019	49.1	968.5	8.3	824.2	256.5	107.2	759.1	877.4	3,850.3
TOTAL	150.0	3,413.0	25.6	2,755.5	754.9	352.6	2,536.3	2,593.3	12,581.0
Tramadol									
2009	63.7	1,803.4	36.3	1,460.5	554.1	298.0	1,419.9	837.7	6,473.6
2010	73.1	2,115.3	46.3	1,694.9	666.4	347.6	1,626.3	1,058.5	7,628.3
2011	79.0	2,174.6	48.8	1,775.4	726.5	339.9	1,711.4	1,141.5	7,997.0
2012	80.0	2,248.2	49.6	1,823.8	761.6	372.5	1,766.2	1,210.8	8,312.8
2013	86.6	2,296.0	51.2	1,869.5	835.6	374.9	1,840.1	1,288.9	8,642.8
2014	97.5	2,365.5	53.9	1,968.1	905.4	388.4	1,903.9	1,393.1	9,075.8
2015	101.7	2,380.7	52.8	1,947.7	951.8	396.7	1,908.0	1,382.7	9,122.0
2016	110.0	2,335.9	50.3	1,906.3	951.2	395.0	1,898.9	1,361.3	9,008.9
2017	103.1	2,214.9	42.1	1,828.4	947.1	371.6	1,818.5	1,272.3	8,597.9
2018	107.0	2,161.7	32.6	1,844.0	942.0	361.1	1,770.6	1,321.6	8,540.7
2019	102.7	2,048.7	40.1	1,813.1	912.2	344.4	1,671.1	1,256.9	8,189.1
TOTAL	1,004.4	24,144.8	504.0	19,931.6	9,154.0	3,990.1	19,334.7	13,525.3	91,588.8

Note: As tapentadol was not launched on the market until February 2013, there were no tapentadol sales in 2011 and 2012. National figures may not equal to the sum of the state figures and TOTAL may not equal to the sum of the year figures due to rounding.

Table S3. OME kg sold by opioid type and jurisdiction, 2009 – 2019

	OME kg sold								
	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	National
All opioids									
2009	134.44	2,583.80	54.03	1,689.57	781.16	259.26	1,945.18	816.59	8,264.02
2010	143.76	2,841.44	57.74	1,893.81	863.72	275.57	2,132.13	916.79	9,124.96
2011	156.03	3,077.85	60.96	2,051.40	916.33	291.34	2,252.24	965.97	9,772.13
2012	165.37	3,257.12	60.60	2,198.53	927.09	310.31	2,319.93	996.35	10,235.30
2013	168.46	3,343.33	60.69	2,284.67	952.56	315.92	2,352.46	1,004.40	10,482.49
2014	172.28	3,404.61	59.51	2,373.50	973.11	322.08	2,363.58	1,037.47	10,706.14
2015	170.24	3,489.52	60.58	2,479.24	988.72	332.66	2,419.75	1,056.42	10,997.13
2016	168.66	3,450.43	57.86	2,526.08	984.23	335.43	2,469.76	1,057.71	11,050.16
2017	159.89	3,379.34	53.37	2,517.72	974.83	328.37	2,481.32	1,079.96	10,974.81
2018	156.03	3,056.68	42.24	2,389.76	914.10	314.95	2,370.77	1,087.06	10,331.60
2019	147.33	2,845.27	40.53	2,316.68	883.82	307.15	2,257.33	1,117.05	9,915.16
TOTAL	1,742.50	34,729.37	608.10	24,720.96	10,159.67	3,393.05	25,364.46	11,135.78	111,853.89
Buprenorphine									
2009	5.5	112.4	1.3	65.0	30.3	22.9	94.9	30.2	362.6
2010	6.3	140.3	1.7	79.1	40.4	27.1	118.4	37.4	450.5
2011	7.3	160.1	2.0	91.4	48.5	30.9	134.4	44.1	518.7
2012	8.1	177.7	2.2	104.0	56.7	34.9	146.8	51.5	581.8
2013	8.3	185.7	2.1	115.1	63.3	36.1	155.7	57.2	623.6
2014	8.8	192.3	2.1	122.0	70.0	36.8	163.1	62.7	657.7
2015	8.8	189.6	2.1	124.5	72.4	35.5	166.0	66.1	664.9
2016	10.0	199.0	2.3	136.6	77.4	35.4	180.0	71.5	712.3
2017	11.2	206.8	2.5	145.5	81.9	35.6	192.5	77.4	753.4
2018	11.2	203.1	2.3	146.3	82.2	34.4	195.2	80.4	755.1
2019	10.8	191.0	2.4	144.8	80.6	33.1	195.0	81.4	739.2
TOTAL	96.3	1,958.0	23.2	1,274.3	703.7	362.6	1,742.0	659.8	6,819.9
Codeine (low-dose combination products)									
2009	14.0	269.5	6.3	147.3	53.3	16.8	142.3	75.3	724.8
2010	11.6	196.8	4.9	120.7	45.0	13.3	120.2	66.9	579.5
2011	11.0	196.5	5.1	119.5	46.2	13.2	119.3	73.2	584.0
2012	11.0	198.1	5.4	117.6	45.9	12.6	118.9	77.5	587.0
2013	10.8	192.6	5.2	115.1	44.8	12.7	118.5	77.5	577.2
2014	11.6	194.1	5.7	116.7	45.2	12.9	120.9	78.7	585.7
2015	12.8	212.8	5.6	128.4	49.0	14.3	126.8	83.7	633.3
2016	11.3	205.4	5.1	118.8	45.8	11.9	115.2	78.5	591.9
2017	10.2	199.9	4.6	105.1	42.2	10.4	98.6	74.9	545.9
2018	1.4	30.7	0.7	19.6	6.3	1.8	20.8	9.6	90.8
2019	1.4	23.9	0.5	17.2	5.0	1.5	16.4	7.2	73.1
TOTAL	107.2	1,920.4	48.9	1,125.9	428.6	121.3	1,117.9	703.0	5,573.2

Table S3. OME kg sold by opioid type and jurisdiction, 2009 – 2019 (continued)

	OME kg sold								
	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	National
Codeine (single-ingredient and high-dose combination products)									
2009	6.2	127.6	2.0	78.4	49.4	12.1	96.9	46.2	419.0
2010	8.3	170.7	2.2	114.1	67.6	18.4	131.4	61.8	574.4
2011	10.7	202.3	3.1	144.2	78.4	28.6	158.7	73.9	699.9
2012	11.4	213.8	3.7	152.4	81.0	31.6	165.8	78.8	738.5
2013	11.4	212.3	4.7	151.2	84.2	32.7	165.9	79.5	741.9
2014	12.1	212.3	4.9	152.1	85.4	32.7	164.7	79.5	743.8
2015	12.1	212.4	4.5	150.7	86.4	33.0	162.7	78.8	740.7
2016	13.2	211.0	4.4	155.0	88.4	33.8	164.2	81.2	751.1
2017	11.2	194.8	3.8	149.5	83.9	31.5	158.0	75.6	708.3
2018	13.7	219.4	4.0	165.7	91.8	33.6	168.1	86.4	782.7
2019	13.7	221.1	3.9	170.9	92.1	33.5	161.5	87.8	784.5
TOTAL	124.1	2,197.7	41.1	1,584.3	888.6	321.6	1,698.0	829.5	7,684.9
Dextropropoxyphene									
2009	2.18	45.00	0.49	20.72	12.73	1.85	17.62	6.84	107.44
2010	2.29	45.68	0.46	21.10	14.87	1.80	17.33	6.84	110.38
2011	2.24	42.56	0.34	19.48	15.10	1.67	16.32	6.66	104.37
2012	1.14	21.37	0.17	8.64	6.10	0.87	8.37	3.48	50.13
2013	0.72	13.26	0.09	5.08	3.81	0.47	5.06	1.82	30.31
2014	0.31	3.98	0.02	1.72	1.39	0.25	1.60	0.75	10.03
2015	0.25	4.11	0.03	1.74	1.27	0.20	1.49	0.64	9.72
2016	0.24	3.58	0.03	1.50	1.16	0.19	1.51	0.60	8.81
2017	0.21	3.35	0.02	1.46	1.16	0.18	1.45	0.54	8.36
2018	0.02	0.32	0.001	0.11	0.11	0.01	0.11	0.06	0.73
2019	-	-	-	-	-	-	-	-	-
TOTAL	9.59	183.20	1.65	81.56	57.70	7.51	70.85	28.22	440.28
Fentanyl									
2009	19.3	303.8	3.1	220.5	97.4	10.7	192.9	76.9	924.6
2010	21.1	376.6	3.4	278.3	120.9	12.3	243.7	95.4	1,151.7
2011	23.6	438.1	3.7	311.8	138.9	13.5	272.1	104.1	1,305.8
2012	23.9	464.7	3.9	328.0	136.8	15.4	274.8	101.6	1,349.1
2013	24.6	488.3	3.5	341.6	138.5	15.4	275.6	97.5	1,385.1
2014	22.8	517.6	3.7	356.5	136.2	15.1	266.2	91.9	1,410.0
2015	21.5	519.9	4.5	346.7	131.7	14.2	251.0	83.7	1,373.2
2016	19.0	475.7	4.2	323.7	122.2	14.5	235.8	70.4	1,265.4
2017	14.7	427.8	3.8	297.4	113.2	13.5	213.1	63.1	1,146.6
2018	13.1	345.4	2.7	248.0	92.3	10.8	180.4	52.8	945.4
2019	9.8	274.9	2.8	204.4	75.3	8.1	144.9	44.6	764.7
TOTAL	213.5	4,632.7	39.4	3,256.9	1,303.4	143.4	2,550.5	881.8	13,021.5

Table S3. OME kg sold by opioid type and jurisdiction, 2009 – 2019 (continued)

	OME kg sold								
	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	National
Hydromorphone									
2009	0.6	18.0	0.2	9.2	1.6	0.6	14.0	7.6	51.7
2010	2.7	36.8	0.7	25.2	7.0	1.3	26.3	12.9	112.8
2011	5.9	65.5	0.3	50.9	10.8	1.2	39.9	22.0	196.5
2012	8.5	85.0	0.3	77.2	14.8	1.6	52.2	32.7	272.4
2013	7.4	92.3	0.4	77.9	16.3	1.9	53.3	35.3	284.8
2014	8.0	99.2	0.8	80.1	17.7	2.6	52.6	37.1	298.2
2015	8.7	100.1	0.8	85.1	17.4	2.8	57.7	34.8	307.6
2016	9.3	95.8	0.6	81.8	16.3	2.8	55.4	31.4	293.5
2017	10.0	87.8	0.4	73.6	15.2	2.9	48.2	27.4	265.4
2018	10.5	82.7	0.2	67.1	14.1	2.9	46.5	25.7	249.7
2019	8.7	73.7	0.4	61.3	13.3	2.7	42.0	22.8	224.7
TOTAL	80.2	837.0	5.0	689.4	144.5	23.3	488.1	289.7	2,557.3
Methadone									
2009	8.7	285.5	7.8	194.3	107.5	49.4	293.1	121.0	1,067.4
2010	9.7	295.8	8.0	201.1	110.2	46.7	291.0	123.3	1,086.0
2011	7.4	294.1	8.0	191.3	108.2	47.0	295.0	123.1	1,074.2
2012	7.6	291.7	7.4	190.5	104.9	45.7	310.6	119.9	1,078.5
2013	7.8	290.1	6.7	179.2	106.6	44.9	311.5	117.5	1,064.3
2014	8.0	285.8	5.9	167.4	106.3	44.0	292.3	115.4	1,025.1
2015	9.2	274.2	5.9	161.9	98.5	42.2	281.5	109.7	983.0
2016	8.9	241.1	5.4	152.7	94.9	41.4	287.3	97.3	928.9
2017	9.0	227.5	4.8	145.9	90.6	38.1	298.0	95.3	909.2
2018	9.8	212.5	3.7	137.2	84.2	34.7	294.7	93.6	870.5
2019	9.3	194.2	3.2	133.9	78.5	32.6	296.9	93.2	841.9
TOTAL	95.4	2,892.7	66.9	1,855.5	1,090.5	466.5	3,251.8	1,209.4	10,928.8
Morphine									
2009	21.7	307.4	18.6	262.0	145.5	29.2	298.1	105.4	1,187.9
2010	20.0	294.7	19.2	263.3	139.9	26.1	280.4	100.4	1,144.0
2011	18.7	287.5	18.9	261.9	132.3	25.7	260.1	91.2	1,096.2
2012	18.3	269.6	16.6	254.4	123.8	25.0	232.0	82.7	1,022.4
2013	17.2	247.5	15.8	239.7	114.4	22.7	207.8	74.0	939.0
2014	16.7	243.0	13.9	237.2	105.7	21.3	193.1	68.0	899.0
2015	14.6	224.6	13.3	228.7	99.5	19.8	178.1	59.0	837.5
2016	13.3	205.1	11.8	212.4	91.0	17.7	164.1	49.2	764.5
2017	11.8	183.7	10.7	196.9	81.6	17.2	149.4	41.6	693.0
2018	9.7	162.3	9.0	176.5	71.8	15.5	134.8	36.2	615.9
2019	8.6	143.3	6.6	160.1	63.2	14.8	117.1	30.7	544.3
TOTAL	170.6	2,568.7	154.3	2,493.0	1,168.8	234.9	2,215.2	738.4	9,743.8

Table S3. OME kg sold by opioid type and jurisdiction, 2009 – 2019 (continued)

	OME kg sold								
	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	National
Oxycodone									
2009	43.2	750.8	6.9	397.6	172.3	56.1	507.3	177.9	2,112.0
2010	46.9	858.4	7.8	449.6	184.3	59.1	574.3	198.5	2,378.7
2011	52.6	950.7	9.6	502.8	191.7	61.4	609.5	197.6	2,575.9
2012	53.8	1,012.6	10.3	555.7	190.1	61.9	608.7	187.1	2,680.3
2013	51.9	999.6	10.7	572.0	178.9	58.6	578.0	161.5	2,611.3
2014	47.5	889.6	9.6	528.2	164.8	52.2	509.8	139.2	2,340.9
2015	37.7	793.1	9.9	487.6	149.2	46.9	463.4	115.6	2,103.4
2016	32.8	740.5	8.8	463.5	139.8	41.1	432.3	101.3	1,960.0
2017	28.5	683.2	7.7	432.3	132.4	37.2	402.7	92.3	1,816.4
2018	26.9	594.2	6.3	396.0	119.5	34.1	363.0	81.7	1,621.7
2019	24.2	524.1	5.3	357.1	108.8	30.8	319.1	72.5	1,441.9
TOTAL	445.9	8,796.6	93.0	5,142.4	1,731.9	539.3	5,368.1	1,525.3	23,642.5
Oxycodone-naloxone									
2009	-	-	-	-	-	-	-	-	-
2010	0.08	0.2	-	0.1	0.05	0.02	0.1	0.04	0.6
2011	0.7	3.3	0.005	1.0	0.5	0.3	1.9	0.7	8.4
2012	5.5	70.6	0.7	43.1	14.4	6.3	46.3	18.2	205.1
2013	10.9	157.4	1.1	111.1	34.1	15.4	109.6	43.3	482.9
2014	15.9	257.7	2.0	199.2	54.7	24.0	194.7	66.2	814.3
2015	19.3	350.5	2.9	276.4	72.3	32.6	268.0	74.7	1,096.8
2016	20.8	408.1	4.1	336.8	78.6	37.1	317.6	79.2	1,282.3
2017	22.1	443.8	4.3	378.9	84.1	39.8	345.1	82.5	1,400.5
2018	22.2	437.5	4.1	388.2	87.1	39.5	348.8	81.3	1,408.7
2019	20.7	401.8	4.2	374.2	82.1	38.4	326.0	74.3	1,321.9
TOTAL	138.2	2,530.9	23.3	2,109.1	508.0	233.4	1,958.2	520.4	8,021.7
Pethidine									
2009	0.14	3.20	0.02	2.64	0.47	0.03	4.15	1.69	12.35
2010	0.09	2.69	0.02	2.29	0.40	0.03	3.89	1.77	11.17
2011	0.07	2.57	0.02	2.23	0.37	0.02	2.90	1.22	9.38
2012	0.06	2.43	0.06	2.25	0.35	0.02	2.33	0.82	8.32
2013	0.06	2.07	0.02	2.59	0.29	0.03	1.97	0.71	7.75
2014	0.05	1.82	0.02	2.47	0.25	0.02	1.89	0.72	7.23
2015	0.03	1.50	0.03	1.92	0.22	0.02	1.74	0.47	5.94
2016	0.03	1.34	0.03	1.50	0.22	0.02	1.45	0.41	5.00
2017	0.03	0.92	0.04	1.46	0.19	0.02	1.31	0.38	4.34
2018	0.03	0.71	0.02	1.23	0.19	0.01	1.27	0.36	3.82
2019	0.02	0.26	0.01	0.59	0.11	0.001	0.54	0.22	1.74
TOTAL	0.59	19.50	0.29	21.17	3.06	0.22	23.44	8.77	77.04

Table S3. OME kg sold by opioid type and jurisdiction, 2009 – 2019 (continued)

	OME kg sold								
	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	National
Tapentadol									
2009	-	-	-	-	-	-	-	-	-
2010	-	-	-	-	-	-	-	-	-
2011	-	-	-	-	-	-	-	-	-
2012	-	-	-	-	-	-	-	-	-
2013	0.08	3.1	-	0.3	0.4	0.09	1.5	0.9	6.5
2014	1.1	34.3	0.1	16.3	4.7	2.5	21.9	18.7	99.8
2015	5.0	130.8	0.5	96.1	20.6	11.8	79.8	72.8	417.4
2016	7.8	196.8	1.2	160.7	38.4	20.5	135.3	124.5	685.2
2017	10.3	276.9	2.3	224.1	59.1	27.7	209.3	194.7	1,004.5
2018	16.0	335.7	2.7	275.0	76.2	35.6	263.1	274.7	1,279.0
2019	19.6	387.4	3.3	329.7	102.6	42.9	303.6	351.0	1,540.1
TOTAL	60.0	1,365.2	10.3	1,102.2	301.9	141.1	1,014.5	1,037.3	5,032.4
Tramadol									
2009	12.8	360.6	7.3	292.0	110.7	59.6	283.9	167.5	1,294.3
2010	14.6	422.9	9.3	338.9	133.2	69.5	325.2	211.6	1,525.2
2011	15.8	434.7	9.7	355.0	145.2	68.0	342.2	228.2	1,598.8
2012	16.0	449.4	9.9	364.7	152.2	74.5	353.1	242.0	1,661.9
2013	17.3	459.0	10.2	373.8	167.0	75.0	368.0	257.6	1,727.8
2014	19.5	472.8	10.8	393.5	180.9	77.7	380.7	278.5	1,814.4
2015	20.4	475.9	10.6	389.4	190.1	79.3	381.5	276.4	1,823.7
2016	22.0	467.0	10.1	381.1	190.1	79.0	379.7	272.2	1,801.1
2017	20.6	442.8	8.4	365.6	189.3	74.3	363.5	254.4	1,718.9
2018	21.4	432.1	6.5	368.7	188.2	72.2	354.0	264.2	1,707.4
2019	20.6	409.6	8.0	362.5	182.2	68.9	334.2	251.3	1,637.2
TOTAL	200.9	4,826.8	100.8	3,985.3	1,829.1	797.8	3,865.9	2,704.0	18,310.6

Note: As tapentadol was not launched on the market until February 2013, there were no tapentadol sales in 2009, 2010, 2011 and 2012. OME: Oral morphine equivalent units. National figures may not equal to the sum of the state figures and TOTAL may not equal to the sum of the year figures due to rounding.