

Trends and characteristics of alprazolam-related harms in Victoria, 2012-2023: evidence from ambulance and toxicological surveillance systems

Michael McGrath, Jessica Killian, Naomi Beard, Ziad Nehme, Suzanne Nielsen, Rebekka Syrjanen, Jennifer Schumann, Dan I Lubman, Rowan P Ogeil

Eastern Health 

DISCLOSURE OF INTEREST

Conflicts of interest: None

Funding:

- This research was supported by the Department of Health (Victoria) and the Australian Institute of Health and Welfare.
- Ziad Nehme is supported by a National Heart Foundation fellowship (#105690) and an NHMRC Emerging Leader Fellowship (#2034615). Dan I. Lubman and Suzanne Nielsen are supported by NHMRC Leadership Fellowships (#1196892 & #2025894).

Benzodiazepine-related harms

- Benzodiazepines are frequently used alongside other drugs to self-medicate, reduce symptoms of withdrawal or comedowns, or to augment or sustain highs.
 - Combining benzodiazepines with other drugs, in particular other central nervous system depressants, increases risks.
 - In Australia, benzodiazepines are now present in:
 - 32% of unintentional, drug-related deaths.
 - 65% of all polydrug use deaths.
 - Fourfold increase in the rate of benzodiazepine-related deaths between 2012 and 2018.
- (Pennington Institute 2024; AIHW 2025)

Emerging issues

1

A shift from prescribed products to “street benzos”

- Counterfeit or falsified products, which may contain unexpected adulterants.
- In Australia, “street benzos” are typically sold/packaged as alprazolam or alprazolam-branded products (“Kalma”, “Xanax”, “xannies”)

2

The growth of novel benzodiazepines (NBZDs)

- Unregulated drugs, not approved for medical use.
- Variable potency, toxicity and safety, presenting challenges for detection and clinical management.
- In Victoria, NBZDs were detected in 4 deaths in 2018 to 82 deaths in 2022.

(Drummer et al. 2024)

Prescribing interventions to reduce harms in Australia

- From February 2014, alprazolam was rescheduled from a “prescription only medicine” to a “controlled drug”.
22% reduction in prescribing and a 50% reduction in calls to the Poisons Information Centre (PIC) in NSW.

- From February 2017, 2mg tablets were delisted, pack sizes and repeat prescriptions were reduced.

Observed a potential shift to prescribing on the private market, little/no change in dispensing of 2mg tablets and calls to the PIC.

[Home](#) | [JAMA Internal Medicine](#) | Vol. 176, No. 8

Research Letter

Interrupted Time Series Analysis of the Effect of Rescheduling Alprazolam in Australia Taking Control of Prescription Drug Use

Andrea L. Schaffer, MSc, MBIostat¹; Nicholas A. Buckley, MD²; Rose Cairns, PhD³ ;
Sallie-Anne Pearson, PhD¹

JAMA
Network | **Open.**

Original Investigation | Pharmacy and Clinical Pharmacology

Comparison of Prescribing Patterns Before and After Implementation of a National Policy to Reduce Inappropriate Alprazolam Prescribing in Australia

Andrea L. Schaffer, MSc, MBIostat, PhD; Nicholas A. Buckley, MD; Rose Cairns, PhD; Sallie Pearson, PhD

Research aim and methods

Aims

- Compare trends in alprazolam dispensing and harms in Victoria (2012-2023).
- Identify clinical and demographic characteristics of people experiencing these harms.

Methods

- Time series analysis of ambulance attendances, ED patients and PBS dispensing.
- Joinpoint regression to identify changes in trend.
- Descriptive analysis of patient profiles, comorbidities and polydrug use.

Data sources

National Ambulance Surveillance System (NASS): 2012 - 2023

- The NASS uses electronic patient records created by paramedics and reviewed by trained staff to identify ambulance attendances for harms relating to alcohol and other drugs, mental health, and suicide and self-harm.

Emerging Drug Network Australia – Victoria (EDNAV): 2022 - 2023

- Enhanced surveillance of a sample of patients presenting to 17 emergency departments with a reported or suspected illicit substance exposure and requiring venepuncture or intravenous cannula insertion as part of standard care.

Pharmaceutical Benefits Scheme (PBS)

- Publicly available data, alprazolam products dispensed in the community.

Results

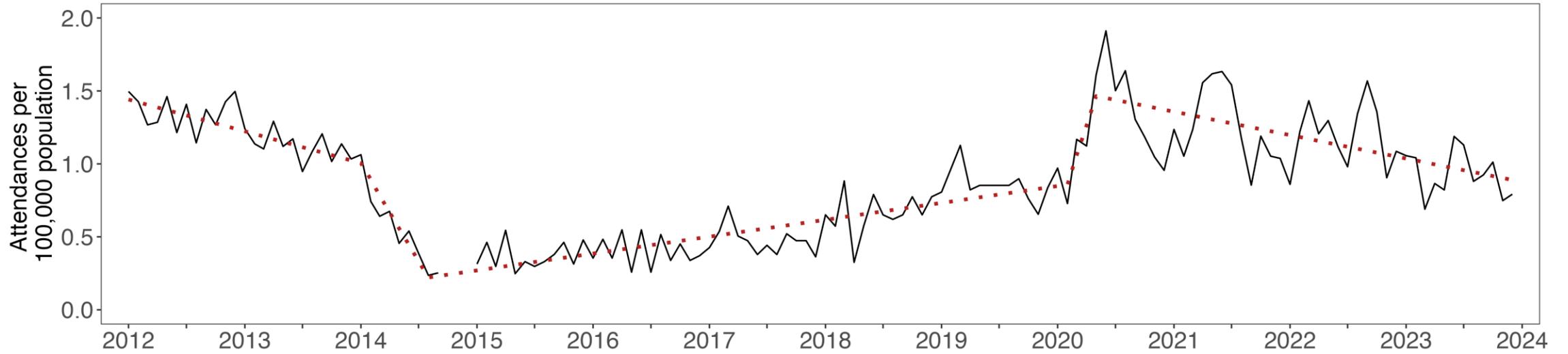
NASS

- 7,825 ambulance attendances for self-reported, extra-medical alprazolam use from 2012 to 2023.
- 83.7% transported to hospital

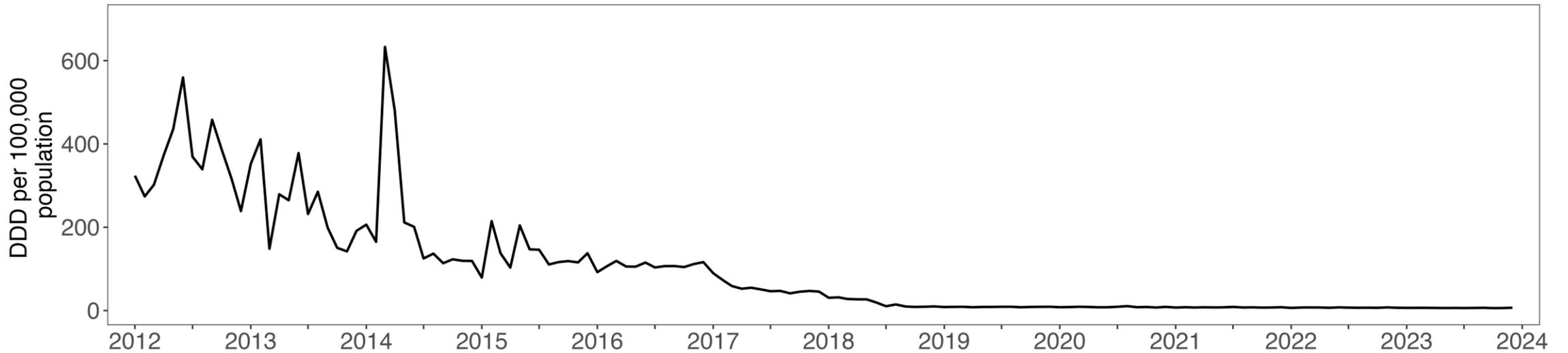
EDNAV

- 358 ED patients self-reporting alprazolam use in 2022-2023.
- 83.0% arrived at hospital via ambulance.

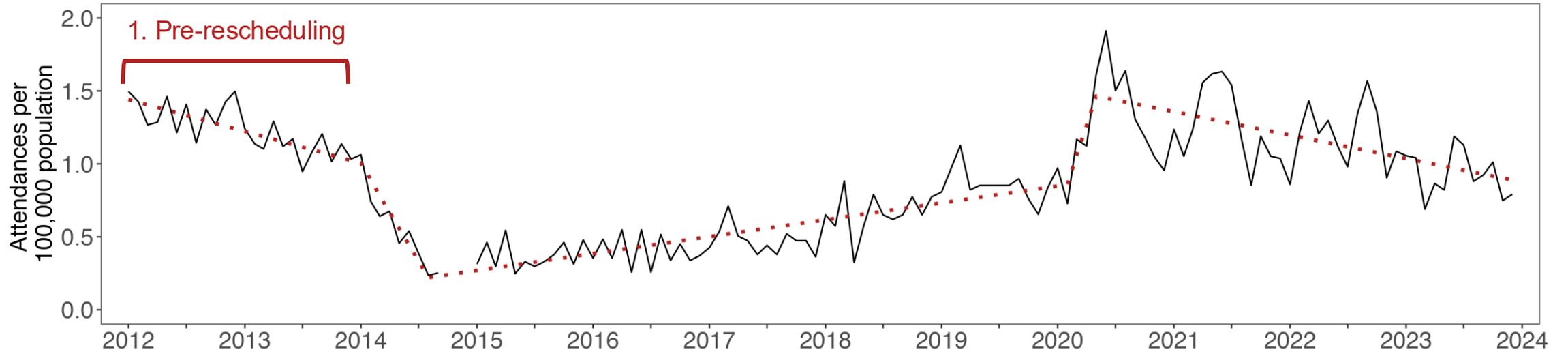
Alprazolam-related ambulance attendances, Victoria, 2012-2023



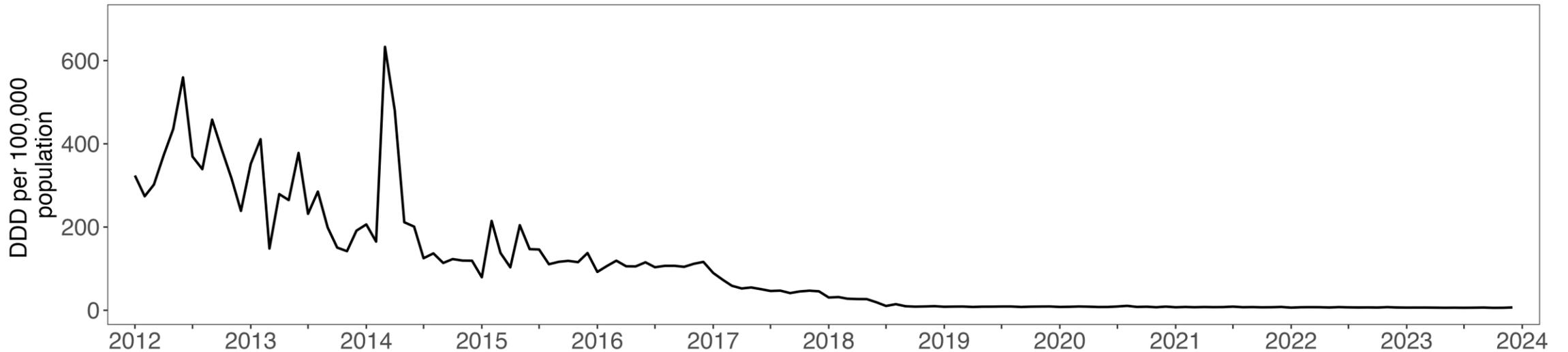
PBS alprazolam dispensing, Victoria, 2012-2023



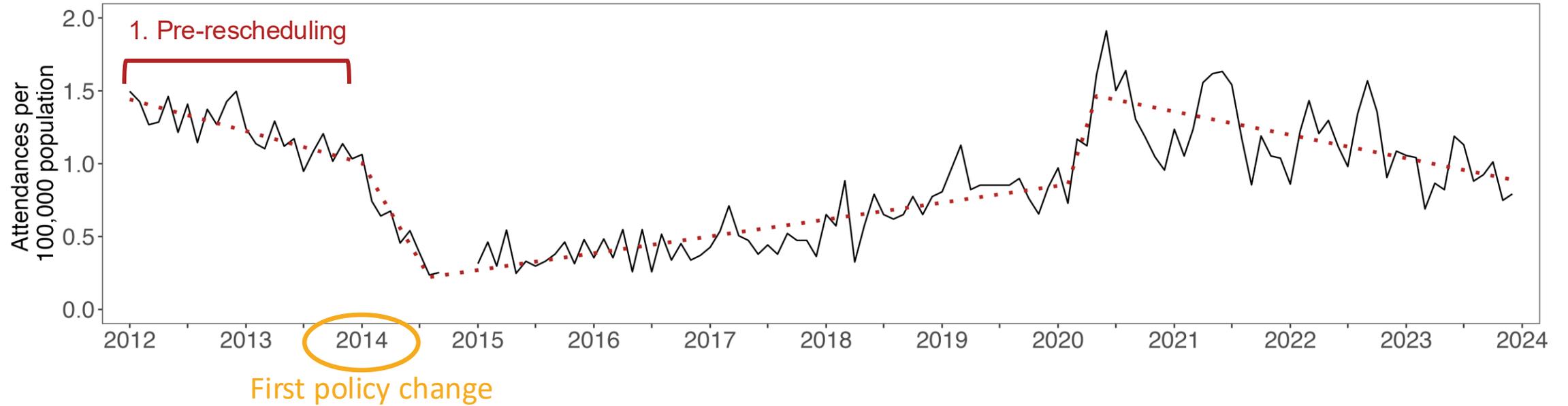
Alprazolam-related ambulance attendances, Victoria, 2012-2023



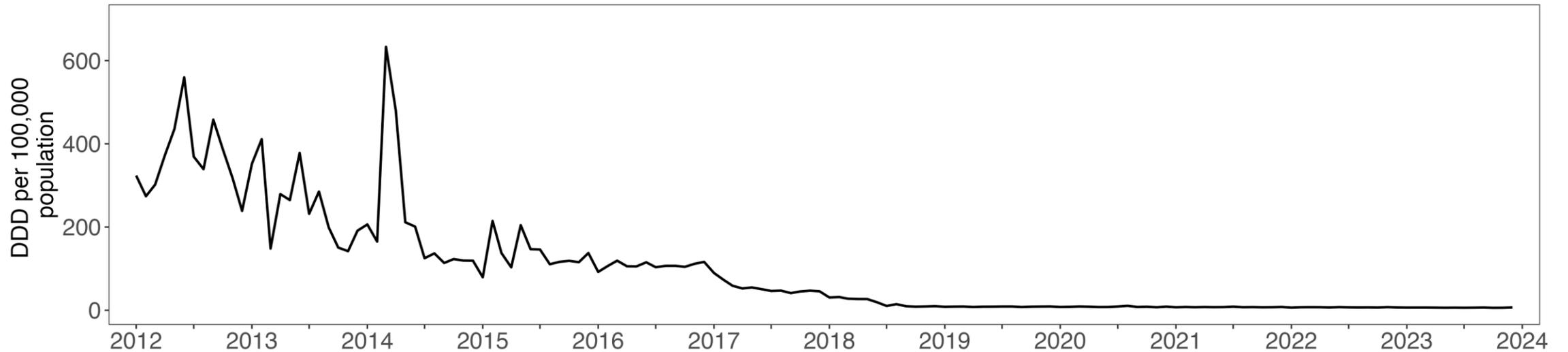
PBS alprazolam dispensing, Victoria, 2012-2023



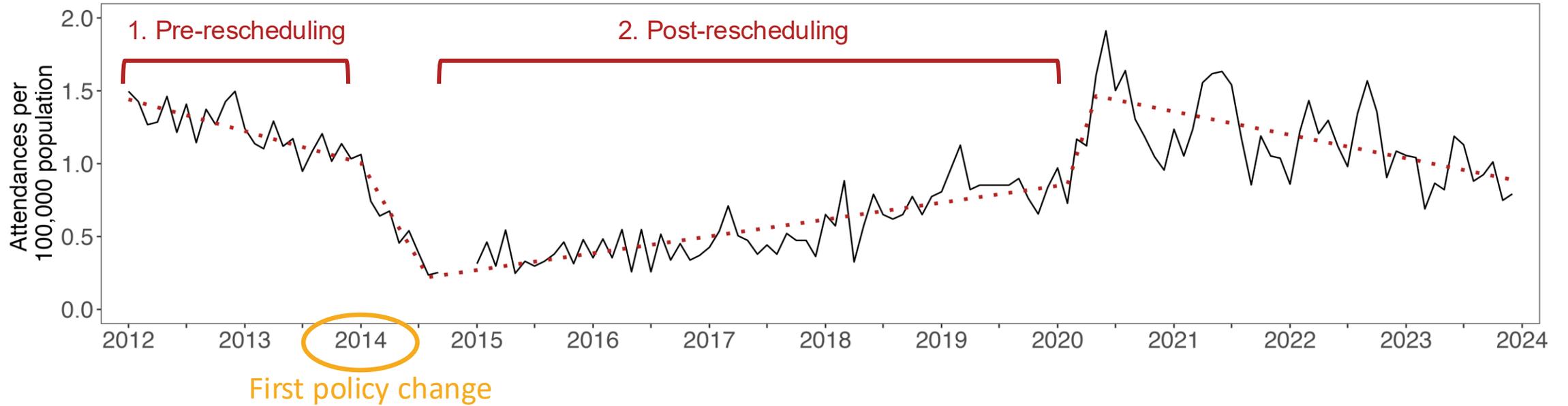
Alprazolam-related ambulance attendances, Victoria, 2012-2023



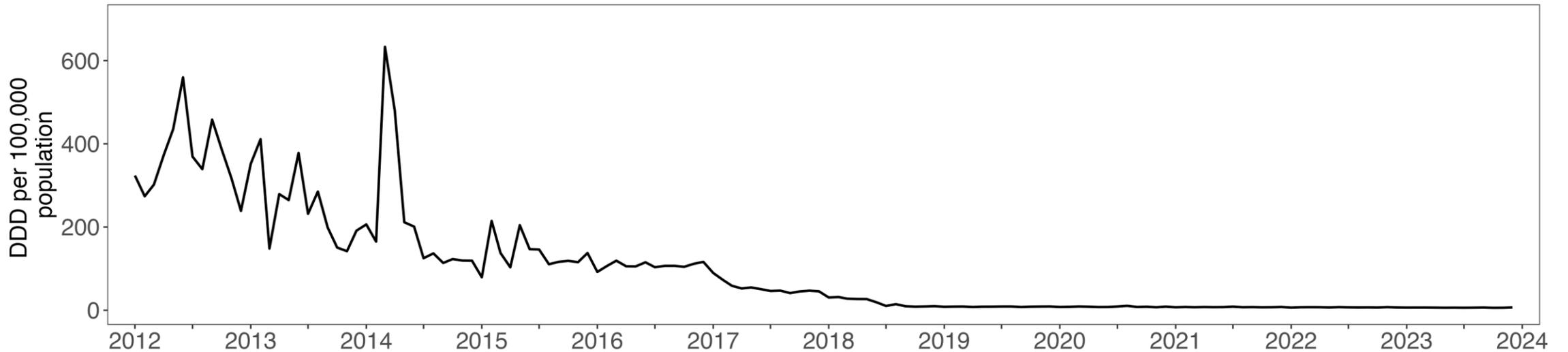
PBS alprazolam dispensing, Victoria, 2012-2023



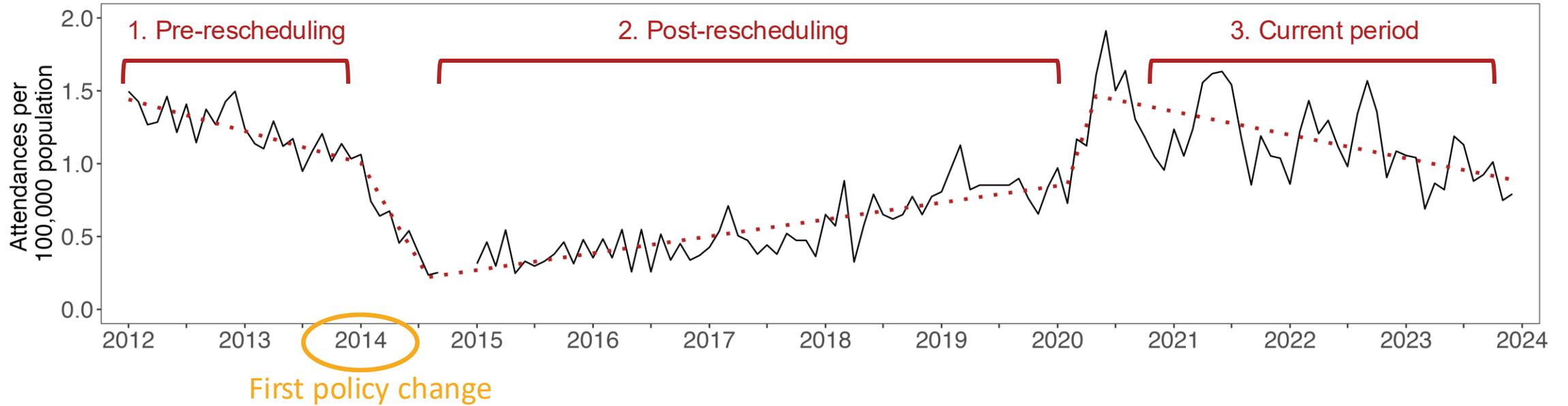
Alprazolam-related ambulance attendances, Victoria, 2012-2023



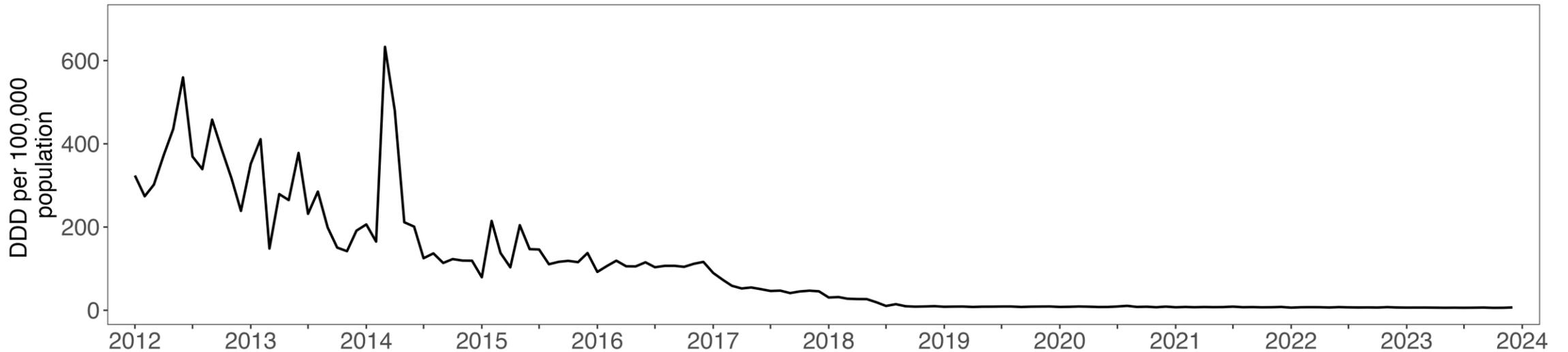
PBS alprazolam dispensing, Victoria, 2012-2023



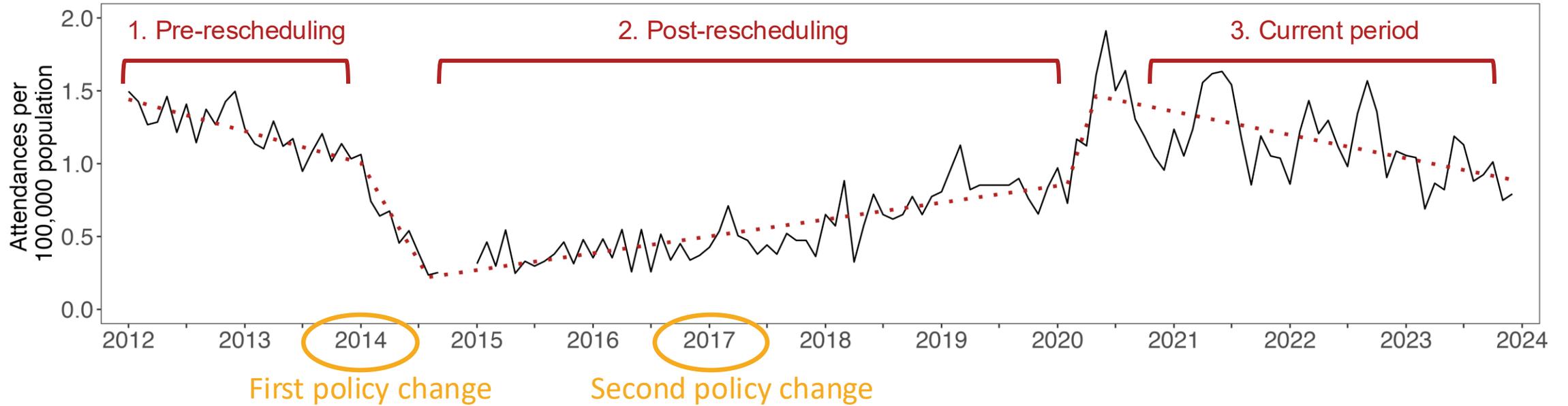
Alprazolam-related ambulance attendances, Victoria, 2012-2023



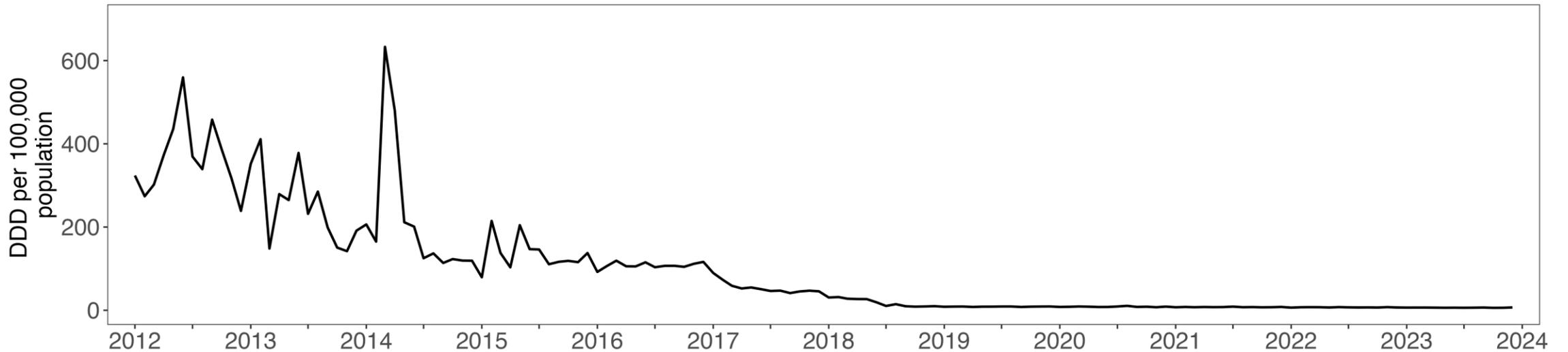
PBS alprazolam dispensing, Victoria, 2012-2023



Alprazolam-related ambulance attendances, Victoria, 2012-2023



PBS alprazolam dispensing, Victoria, 2012-2023



	Pre-rescheduling: Jan 2012 – Dec 2013 (n = 1,770)	Post-rescheduling: Jan 2015 – Feb 2020 (n = 2,228)	Current period: May 2020 – Dec 2023 (n = 3,443)
Male (n, %)	856 (48.4%)	1,299 (58.3%)	2,045 (59.4%)
Mean age	35	30	26
Suicide and self-harm behaviours	718 (40.6%)	939 (42.2%)	1,145 (33.3%)
Concurrent mental health symptoms	374 (21.1%)	277 (12.4%)	302 (8.8%)
Patient transported to hospital (n, %)	1,477 (83.5%)	1,854 (83.2%)	2,901 (84.3 %)
Glasgow Coma Scale score (mean, SD)	13.3 (3.2)	13.0 (3.3)	13.4 (3.1)
Polydrug use (n, %)	1,252 (70.7%)	1,671 (75.0%)	2,544 (73.9%)
Alcohol intoxication	372 (21.0%)	536 (24.1%)	845 (24.5%)
Cannabis	94 (5.3%)	268 (12.0%)	636 (18.5%)
Amphetamines	114 (6.4%)	253 (11.4%)	509 (14.8%)
Opioids	389 (22.0%)	334 (15.0%)	445 (12.9%)
Gamma hydroxybutyrate (GHB)	47 (2.7%)	126 (5.7%)	329 (9.6%)
Cocaine	11 (0.6%)	88 (4.0%)	148 (4.3%)
Ecstasy/MDMA	15 (0.9%)	84 (3.8%)	78 (2.3%)
Ketamine	<5 (<0.2%)	53 (2.4%)	65 (1.9%)
Psychedelics	<5 (<0.2%)	24 (1.1%)	46 (1.3%)
Pharmaceutical stimulants	7 (0.4%)	13 (0.6%)	45 (1.3%)
Nitrous oxide or amyl nitrate	0 (0.0%)	6 (0.3%)	28 (0.8%)

	Pre-rescheduling: Jan 2012 – Dec 2013 (n = 1,770)	Post-rescheduling: Jan 2015 – Feb 2020 (n = 2,228)	Current period: May 2020 – Dec 2023 (n = 3,443)
Male (n, %)	856 (48.4%)	1,299 (58.3%)	2,045 (59.4%)
Mean age	35	30	26
Suicide and self-harm behaviours	718 (40.6%)	939 (42.2%)	1,145 (33.3%)
Concurrent mental health symptoms	374 (21.1%)	277 (12.4%)	302 (8.8%)
Patient transported to hospital (n, %)	1,477 (83.5%)	1,854 (83.2%)	2,901 (84.3 %)
Glasgow Coma Scale score (mean, SD)	13.3 (3.2)	13.0 (3.3)	13.4 (3.1)
Polydrug use (n, %)	1,252 (70.7%)	1,671 (75.0%)	2,544 (73.9%)
Alcohol intoxication	372 (21.0%)	536 (24.1%)	845 (24.5%)
Cannabis	94 (5.3%)	268 (12.0%)	636 (18.5%)
Amphetamines	114 (6.4%)	253 (11.4%)	509 (14.8%)
Opioids	389 (22.0%)	334 (15.0%)	445 (12.9%)
Gamma hydroxybutyrate (GHB)	47 (2.7%)	126 (5.7%)	329 (9.6%)
Cocaine	11 (0.6%)	88 (4.0%)	148 (4.3%)
Ecstasy/MDMA	15 (0.9%)	84 (3.8%)	78 (2.3%)
Ketamine	<5 (<0.2%)	53 (2.4%)	65 (1.9%)
Psychedelics	<5 (<0.2%)	24 (1.1%)	46 (1.3%)
Pharmaceutical stimulants	7 (0.4%)	13 (0.6%)	45 (1.3%)
Nitrous oxide or amyl nitrate	0 (0.0%)	6 (0.3%)	28 (0.8%)

	Pre-rescheduling: Jan 2012 – Dec 2013 (n = 1,770)	Post-rescheduling: Jan 2015 – Feb 2020 (n = 2,228)	Current period: May 2020 – Dec 2023 (n = 3,443)
Male (n, %)	856 (48.4%)	1,299 (58.3%)	2,045 (59.4%)
Mean age	35	30	26
Suicide and self-harm behaviours	718 (40.6%)	939 (42.2%)	1,145 (33.3%)
Concurrent mental health symptoms	374 (21.1%)	277 (12.4%)	302 (8.8%)
Patient transported to hospital (n, %)	1,477 (83.5%)	1,854 (83.2%)	2,901 (84.3 %)
Glasgow Coma Scale score (mean, SD)	13.3 (3.2)	13.0 (3.3)	13.4 (3.1)
Polydrug use (n, %)	1,252 (70.7%)	1,671 (75.0%)	2,544 (73.9%)
Alcohol intoxication	372 (21.0%)	536 (24.1%)	845 (24.5%)
Cannabis	94 (5.3%)	268 (12.0%)	636 (18.5%)
Amphetamines	114 (6.4%)	253 (11.4%)	509 (14.8%)
Opioids	389 (22.0%)	334 (15.0%)	445 (12.9%)
Gamma hydroxybutyrate (GHB)	47 (2.7%)	126 (5.7%)	329 (9.6%)
Cocaine	11 (0.6%)	88 (4.0%)	148 (4.3%)
Ecstasy/MDMA	15 (0.9%)	84 (3.8%)	78 (2.3%)
Ketamine	<5 (<0.2%)	53 (2.4%)	65 (1.9%)
Psychedelics	<5 (<0.2%)	24 (1.1%)	46 (1.3%)
Pharmaceutical stimulants	7 (0.4%)	13 (0.6%)	45 (1.3%)
Nitrous oxide or amyl nitrate	0 (0.0%)	6 (0.3%)	28 (0.8%)

	Pre-rescheduling: Jan 2012 – Dec 2013 (n = 1,770)	Post-rescheduling: Jan 2015 – Feb 2020 (n = 2,228)	Current period: May 2020 – Dec 2023 (n = 3,443)
Male (n, %)	856 (48.4%)	1,299 (58.3%)	2,045 (59.4%)
Mean age	35	30	26
Suicide and self-harm behaviours	718 (40.6%)	939 (42.2%)	1,145 (33.3%)
Concurrent mental health symptoms	374 (21.1%)	277 (12.4%)	302 (8.8%)
Patient transported to hospital (n, %)	1,477 (83.5%)	1,854 (83.2%)	2,901 (84.3 %)
Glasgow Coma Scale score (mean, SD)	13.3 (3.2)	13.0 (3.3)	13.4 (3.1)
Polydrug use (n, %)	1,252 (70.7%)	1,671 (75.0%)	2,544 (73.9%)
Alcohol intoxication	372 (21.0%)	536 (24.1%)	845 (24.5%)
Cannabis	94 (5.3%)	268 (12.0%)	636 (18.5%)
Amphetamines	114 (6.4%)	253 (11.4%)	509 (14.8%)
Opioids	389 (22.0%)	334 (15.0%)	445 (12.9%)
Gamma hydroxybutyrate (GHB)	47 (2.7%)	126 (5.7%)	329 (9.6%)
Cocaine	11 (0.6%)	88 (4.0%)	148 (4.3%)
Ecstasy/MDMA	15 (0.9%)	84 (3.8%)	78 (2.3%)
Ketamine	<5 (<0.2%)	53 (2.4%)	65 (1.9%)
Psychedelics	<5 (<0.2%)	24 (1.1%)	46 (1.3%)
Pharmaceutical stimulants	7 (0.4%)	13 (0.6%)	45 (1.3%)
Nitrous oxide or amyl nitrate	0 (0.0%)	6 (0.3%)	28 (0.8%)

	Pre-rescheduling: Jan 2012 – Dec 2013 (n = 1,770)	Post-rescheduling: Jan 2015 – Feb 2020 (n = 2,228)	Current period: May 2020 – Dec 2023 (n = 3,443)
Male (n, %)	856 (48.4%)	1,299 (58.3%)	2,045 (59.4%)
Mean age	35	30	26
Suicide and self-harm behaviours	718 (40.6%)	939 (42.2%)	1,145 (33.3%)
Concurrent mental health symptoms	374 (21.1%)	277 (12.4%)	302 (8.8%)
Patient transported to hospital (n, %)	1,477 (83.5%)	1,854 (83.2%)	2,901 (84.3 %)
Glasgow Coma Scale score (mean, SD)	13.3 (3.2)	13.0 (3.3)	13.4 (3.1)
Polydrug use (n, %)	1,252 (70.7%)	1,671 (75.0%)	2,544 (73.9%)
Alcohol intoxication	372 (21.0%)	536 (24.1%)	845 (24.5%)
Cannabis	94 (5.3%)	268 (12.0%)	636 (18.5%)
Amphetamines	114 (6.4%)	253 (11.4%)	509 (14.8%)
Opioids	389 (22.0%)	334 (15.0%)	445 (12.9%)
Gamma hydroxybutyrate (GHB)	47 (2.7%)	126 (5.7%)	329 (9.6%)
Cocaine	11 (0.6%)	88 (4.0%)	148 (4.3%)
Ecstasy/MDMA	15 (0.9%)	84 (3.8%)	78 (2.3%)
Ketamine	<5 (<0.2%)	53 (2.4%)	65 (1.9%)
Psychedelics	<5 (<0.2%)	24 (1.1%)	46 (1.3%)
Pharmaceutical stimulants	7 (0.4%)	13 (0.6%)	45 (1.3%)
Nitrous oxide or amyl nitrate	0 (0.0%)	6 (0.3%)	28 (0.8%)

	Pre-rescheduling: Jan 2012 – Dec 2013 (n = 1,770)	Post-rescheduling: Jan 2015 – Feb 2020 (n = 2,228)	Current period: May 2020 – Dec 2023 (n = 3,443)
Male (n, %)	856 (48.4%)	1,299 (58.3%)	2,045 (59.4%)
Mean age	35	30	26
Suicide and self-harm behaviours	718 (40.6%)	939 (42.2%)	1,145 (33.3%)
Concurrent mental health symptoms	374 (21.1%)	277 (12.4%)	302 (8.8%)
Patient transported to hospital (n, %)	1,477 (83.5%)	1,854 (83.2%)	2,901 (84.3 %)
Glasgow Coma Scale score (mean, SD)	13.3 (3.2)	13.0 (3.3)	13.4 (3.1)
Polydrug use (n, %)	1,252 (70.7%)	1,671 (75.0%)	2,544 (73.9%)
Alcohol intoxication	372 (21.0%)	536 (24.1%)	845 (24.5%)
Cannabis	94 (5.3%)	268 (12.0%)	636 (18.5%)
Amphetamines	114 (6.4%)	253 (11.4%)	509 (14.8%)
Opioids	389 (22.0%)	334 (15.0%)	445 (12.9%)
Gamma hydroxybutyrate (GHB)	47 (2.7%)	126 (5.7%)	329 (9.6%)
Cocaine	11 (0.6%)	88 (4.0%)	148 (4.3%)
Ecstasy/MDMA	15 (0.9%)	84 (3.8%)	78 (2.3%)
Ketamine	<5 (<0.2%)	53 (2.4%)	65 (1.9%)
Psychedelics	<5 (<0.2%)	24 (1.1%)	46 (1.3%)
Pharmaceutical stimulants	7 (0.4%)	13 (0.6%)	45 (1.3%)
Nitrous oxide or amyl nitrate	0 (0.0%)	6 (0.3%)	28 (0.8%)

EDNAV data

- 358 ED patients in the EDNAV registry, self-reporting alprazolam use in 2022-2023.
- Similar age and sex profile (mean age: 29 years, 68% male)
- 65.6% of patients described “recreational” drug use.

EDNAV data

- 358 ED patients in the EDNAV registry, self-reporting alprazolam use in 2022-2023.
- Similar age and sex profile (mean age: 29 years, 68% male)
- 65.6% of patients described “recreational” drug use.

- Alprazolam detected in 15.4% (n=55) of samples.
- Novel benzodiazepines detected in 62.6% of samples (n=224)
- Most common NBZDs: bromazolam (28.2%), clonazolam (22.6%), and clobromazolam (21.5%).

Conclusion

- Harms declined following the 2014 rescheduling but are increasing – especially in young men and likely due to falsified products and NBZDs.
- Limits of supply-side, prescribing interventions: initial reductions in harm, but recent increases occurred alongside little to no public dispensing.
- Policy interventions must be accompanied by increased access to treatment and harm-reduction interventions tailored to young people.