The effects of restricting publicly subsidised temazepam capsules on benzodiazepine use among injecting drug users in Australia

Courtney L Breen, Louisa J Degenhardt, Raimondo B Bruno, Amanda D Roxburgh and Rebecca Jenkinson

ABSTRACT

Objective: To assess the effect of a restriction on publicly subsidised temazepam 10 mg capsules upon the injection of benzodiazepines by injecting drug users (IDUs).

Design and participants: Cross-sectional study of regular IDUs targeting periods before and after the policy change. Analysis of prescription data, including time-series analysis.

Setting: Drug services in the capital cities of New South Wales, Victoria, Tasmania, Queensland and the Northern Territory.

Main outcome measures: Changes in prescriptions and patterns of benzodiazepine use; harms associated with benzodiazepine use.

Results: There was a decrease in temazepam 10 mg capsule prescriptions and a corresponding increase in temazepam 10 mg tablet prescriptions after the policy change. IDU survey data suggested that IDUs continued to inject benzodiazepines and temazepam capsules. The frequency of the injection of capsules after the restriction appeared similar to that before the policy change. There was no change in the frequency of injection of tablets. Most IDUs reported obtaining their benzodiazepines from doctors, with substantial proportions obtaining capsules even after the restriction. About half the IDUs reported purchasing benzodiazepines on the street. Most IDUs who injected benzodiazepines reported injection-related problems.

Conclusion: Limiting the prescribing of temazepam capsules may have reduced their injection by some IDUs, but additional strategies are needed to reduce the misuse among this group. These may include further restriction of capsule preparations, continued education of doctors and IDUs, and the examination of prescribing practices of individual doctors.

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The misuse of benzodiazepines among injecting drug users (IDUs) has been documented in many countries,[1-6] and has been associated with serious harms. These include benzodiazepine dependence, increased risk of heroin overdose, increased risky injection behaviour,[1,2,7-9] and injection-related health problems, including gangrene and, sometimes, limb amputation.[10]

Because of concerns about the rising incidence of injection-related harm associated with temazepam gel-filled capsules, the Australian Pharmaceutical Advisory Council recommended the capsules be restricted under the Pharmaceutical Benefits Scheme (PBS). Before 1 May 2002, temazepam 10 mg tablets and 10 mg capsules (Euhypnos, Nocturne, Normison, and Temaze) were subsidised on the PBS or could be obtained on private prescription. Temazepam 20 mg capsules could only be obtained on private prescription. From 1 May 2002, temazepam 10 mg capsules required an Authority prescription (ie, prior approval from the Health Insurance Commission) to allow subsidy on the PBS. Temazepam 10 mg tablets remained on the PBS and no authority was required. The temazepam 10 mg tablets, 10 mg capsules and 20 mg capsules continued to be available on private prescription (ie, they could still be prescribed by any doctor and purchased without PBS subsidy). The restriction was not designed to reduce benzodiazepine use *per se*, but to reduce the injection of temazepam capsules.

We aimed to assess the effects of the restriction of temazepam capsules by examining:

- Rates of benzodiazepine prescribing and prescribing patterns of general practitioners before and after the policy change;
- The injection of temazepam capsules by a sentinel group of regular IDUs, and their sources of these drugs, before and after the policy change; and
- Self-reported injection-related harms after the policy change.

The study was conducted in New South Wales, the Northern Territory, Queensland, Tasmania and Victoria, as these states reported the highest levels of benzodiazepine injection among sentinel groups of IDUs.[11,12]

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METHODS

Prescription data

Data on PBS-subsidised medicines and estimates of non-subsidised medicines were examined for changes in prescribing patterns by benzodiazepine type. The estimated prescription data were calculated from continuous data on all prescriptions dispensed from a validated sample of community-based pharmacies. Inpatient hospital prescribing was not included.[13] The PBS data are based on the date of supply or dispensing of prescriptions.

GP prescribing practices

We examined data from the General Practice Research Network (GPRN) records on prescribing patterns of a random sample of general practitioners who use Medical Director software.[14] Data from 348 GPs in NSW, QLD and VIC were examined. Numbers in the NT and TAS were too few for analysis.

Patterns of benzodiazepine use among IDUs

Two surveys with sentinel groups of IDUs were conducted. The first survey, in June 2002, examined patterns of benzodiazepine use before the policy change (January to April 2002), and use in the month after the change (May 2002). As any effect may not be immediate, a second survey was conducted 6 months after the policy change (December 2002), examining patterns of use in the month before interview.

IDUs recruited from needle and syringe programs, treatment agencies and street-based drug markets were interviewed face-to-face about their methods and patterns of benzodiazepine and other drug use, associated health problems, and sources of benzodiazepine supply. A sheet with pictures of all formulations of benzodiazepines was used to assist identification and recall.

Criteria for study entry were at least monthly injection (of any drug) in the 6 months preceding the interview; and residence in the capital city for the preceding 12 months, with no significant periods out of the illicit drug market (such as incarceration or drug rehabilitation) during that time.

In the June 2002 sample ($n = 350$: VIC, 102; TAS, 75; NSW, 66; QLD, 55; NT, 52), participants were required to have used benzodiazepines between January and April 2002. A small number of participants (18 in NT; 8 in QLD) had to be recruited specifically on the criteria of recent benzodiazepine injection to obtain samples that included at least 30 recent benzodiazepine injectors from each jurisdiction.

The December sample ($n = 255$: QLD, 53; VIC, 52; NSW, 50; TAS, 50; NT, 50) was recruited using the same strategies; however, benzodiazepine use in the past month was required. Twenty-four per cent of the December sample reported also participating in the June 2002 survey.

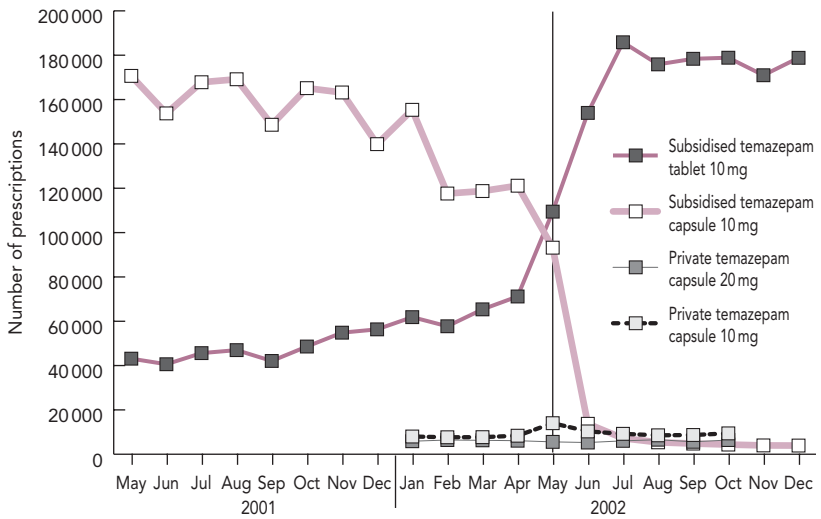
Ethics approval

Ethics approval was granted by the ethics committees of the contributing research institutions.

Statistical analysis

Intervention ARIMA (Autoregressive Integrated Moving Average) time-series models were used to estimate the effect of the restriction on weighted numbers of GPRN prescriptions dispensed between 1999 and 2003. The effect of the restriction was modelled as a step or a change in slope. Transfer functions were applied to the step function to model its shape and long-term properties.[15] Results of the time-series analysis set the context for surveys of IDUs' benzodiazepine use. Confidence intervals (95%) were calculated for proportions. Categorical variables were analysed using χ^2. Analysis was conducted using SPSS for Windows.[16]

1 Number of private and subsidised prescriptions of temazepam capsules and tablets in Australia, May 2001 to Dec 2002*



* Data for private temazepam prescriptions were only available for January to October 2002. *Source:* Drug Utilisation Subcommittee, Australian Department of Health and Ageing. The vertical line indicates the start of the capsule restrictions.

RESULTS

Population trends in prescriptions

There was a decrease of 393 370 PBS prescriptions for temazepam 10 mg capsules and an increase (368 951 prescriptions) for PBS temazepam 10 mg tablets from January–April to May–August 2002 (Box 1). There were smaller increases in PBS prescriptions of other tablet preparations during this time (data available on request).

Private (non-PBS) prescriptions of temazepam 10 mg capsules increased in May 2002 and stabilised in subsequent months (8350 in April, 14 006 in May, 10 291 in June) (Box 1). The 33% (10 334) increase in private temazepam 10 mg capsule prescriptions in May–August 2002 compared with January–April 2002 was substantially less than the decrease in PBS prescriptions (77%; 393 370). Private prescriptions for temazepam 20 mg capsules decreased by 1221 between January–April and May–August 2002.

Effect of restrictions on prescribing

GP prescribing patterns changed immediately following May 2002 (with a shift from capsule to tablet prescribing) (Box 2), but the overall rate of benzodiazepine prescribing did not. The overall rate ranged from 62 prescriptions per 1000 patient visits in May 2002 to 70 prescriptions per 1000 patient visits in January 2003.

There was a permanent 73% reduction in the number of capsule prescriptions dispensed. The decline occurred within 6 weeks of the restriction, indicating stability in prescriptions dispensed beyond that time.

There was some evidence in both the population trends and the prescribing patterns that the effect of the restriction began 1–2 weeks before its inception, probably due to pre-warning of GPs. Details of time-series analyses are available on request.

IDU surveys

Demographic characteristics of samples recruited in June and December 2002 were similar. Their mean ages were 31.0 years in June and 31.7 years in December. Most of the IDUs surveyed were male (June, 65%; December, 66%), and were unemployed (June, 78%; December, 77%). About half of the participants had a prison history (June, 47%; December, 46%) and most were not in treatment (June, 59%; December, 64%).

Drug-use patterns

Patterns and frequency of drug use among the June and December samples were similar. In the month before interview, opiates (including heroin, methadone and morphine) were injected by more than two-

thirds of IDUs (June, 69%; December, 68%). Heroin was used on a median of 72 days in the preceding 6 months by both groups. Large proportions of both samples (June, 44%; December, 52%) reported injecting several times a week, but less than daily, in the month before interview (data not shown).

Frequency of benzodiazepine use (Box 3) was higher in the December sample, reflecting the requirement of use in the past month for entry into this sample. However, frequency of benzodiazepine use was similar when only past-month benzodiazepine users were compared (Box 3).

Oral benzodiazepine use

Most IDUs in the June and December samples reported oral use of benzodiazepine tablets. The proportions reporting only using temazepam capsules orally remained stable after the 1 May restriction (June, 10%; December, 14%) (Box 3).

Benzodiazepine injection

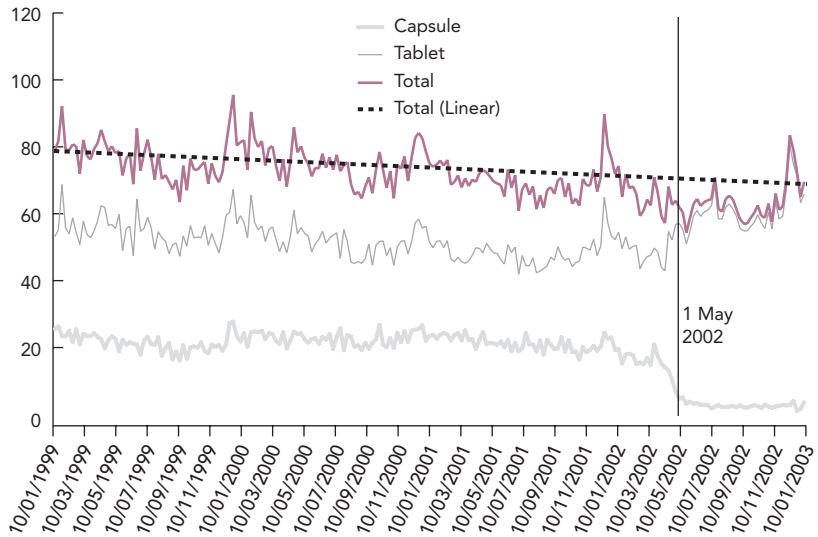
In the June 2002 survey, fewer IDUs reported injecting benzodiazepines (capsules or tablets) in the month after the restriction (28%) than in the 4 months preceding the restriction (49%) (Box 3). This apparent decrease should be interpreted with caution, as it may reflect the shorter time period (one month) used to measure the behaviour. A third of the December sample reported injecting benzodiazepines in the preceding month.

Similar proportions in the June (8%) and December (9%) sample reported injecting benzodiazepine tablets in the preceding month. In both samples, the tablets most commonly reported to have been injected were Hypnodorm, Valium and Xanax.

Use of temazepam capsules

In June, 54% of the national sample reported using temazepam capsules between January and April (before the restriction), and most of these (37% overall) reported injecting the capsules (Box 3). The proportion who used and injected temazepam capsules (46% and 32%, respectively) in the month before the December survey (6 months after the restriction) was not significantly different from those reporting use and injection (54% and 37%, respectively) in January–April, before the restriction (Box 3). Rates of injecting temazepam capsules in the month before interview were not significantly different in the two periods following the restriction (June, 22%; December, 32%).

2 Rate of overall, capsule and tablet benzodiazepine prescribing by general practitioners, per 1000 patient visits per week in Australia, January 1999 to January 2003



Source: General Practice Research Network database. The vertical line indicates the start of the capsule restrictions.

3 Benzodiazepine use among injecting drug users in the national June and December samples

	June 2002				December 2002	
	Use between January and April (*n* = 350)		Use in past month (*n* = 285)		Use in past month (*n* = 255)	
	%	95% CI	%	95% CI	%	95% CI
Benzodiazepines						
Any oral use	96	94–98	95	93–98	98	96–100
Oral only use	51	46–56	72	66–77	67	62–73
Any injecting	49	43–54	28	23–33	33	27–38
Injecting only	4	2–6	5	3–8	2	1–3
Oral and injecting	44	39–49	23	18–28	31	25–36
Daily users	24	19–28	29	24–34	29	23–35
Benzodiazepine form						
Oral use of tablets*	96	94–98	93	90–96	98	96–100
Injected tablets*	11	1–15	8	5–12	9	6–13
Any temazepam capsule use	54	49–59	32	27–37	46	40–52
Oral use temazepam capsules	33	28–38	15	11–20	26	21–32
Injected temazepam capsules	37	33–43	22	17–27	32	26–37
Temazepam oral only	16	12–20	10	7–14	14	10–18
Temazepam injection only	21	16–25	16	12–21	20	15–25
Temazepam oral and injection	17	13–21	5	3–8	12	8–16
Frequency of benzodiazepine use						
Median days used any benzodiazepine in the past 6 months	30 (1–180)		60 (1–180)		72 (1–180)	

* "Tablets" includes any benzodiazepine tablet formulation (including temazepam tablets).

4 Source of benzodiazepines reported by injecting drug users in June and December 2002

	June 2002				December 2002	
	Use between January and April		Use in past month		Use in past month	
	%	95% CI	%	95% CI	%	95% CI
Main source of benzodiazepines (any form)	(n = 350)		(n = 285)		(n = 255)	
Doctors (genuine symptoms)	53	47–58	52	47–58	55	49–61
Doctors (fake symptoms)	9	6–12	6	3–9	3	1–5
Friends and family	27	22–31	29	24–34	22	17–27
Street (illicit)	11	7–14	12	8–16	18	13–22
Ease of obtaining temazepam capsules from a doctor*	(n = 128)		(n = 59)		(n = 80)	
Very easy	32	23–39	10	2–18	11	4–18
Easy	29	21–37	14	6–24	20	11–29
Difficult	24	17–32	19	9–29	13	5–20
Very difficult	15	9–22	59	47–72	34	23–44
Benzodiazepines obtained illicitly ("on the street")	(n = 350)		(n = 285)		(n = 255)	
Any benzodiazepine	50	45–55	52	46–58	55	48–61
Temazepam capsules	30	25–35	21	16–25	32	26–37
10 mg capsules	17	13–21	8	5–11	14	10–18
20 mg capsules	21	17–25	14	10–18	26	20–31
Tablets†	41	35–46	38	32–44	47	41–53

* Of those who requested temazepam capsules from a doctor (genuine or fake symptoms).
† "Tablets" includes any benzodiazepine tablet formulation (including temazepam tablets).

5 Injection-related problems in the month before interview by benzodiazepine injectors* in the December sample

	Injected any benzodiazepine (n = 83)		
	n	%	(95% CI)
Prominent scarring or bruising	32	40%	(28%–50%)
Difficulty finding veins to inject into	29	36%	(25%–46%)
Benzodiazepine dependence	16	20%	(11%–28%)
Swelling of arm	18	23%	(13%–31%)
Swelling of hand	11	14%	(6%–21%)
Abscesses or infections from injecting	10	13%	(5%–19%)
Thrombosis/blood clots	7	9%	(2%–15%)
Other†	19	23%	(14%–32%)

* Injection-related problems were reported by similar proportions of injecting drug users who inject capules only. Only three participants reported injecting tablets only, of whom one had reported difficulty finding veins to inject into.
† Other problems reported included overdose, swelling of legs, swelling of feet, skin ulcers, dirty "hit", hospitalisation, contact with ambulance and contact with police.

Injection of temazepam capsules was more common than oral use in both samples, with the largest proportions of those using them reporting injection as the sole route of administration in the month before interview (June, 16%; December, 20%).

Source of benzodiazepines

Half of both samples reported obtaining benzodiazepines from doctors by presenting with genuine symptoms (Box 4). Of those who sought a benzodiazepine prescription in the past month, 86% reported that they were successful every time. Most of the December sample reported obtaining benzodiazepines from one (73%) or two (15%) doctors.

Access to benzodiazepines

About half the respondents in June (47%) and December (46%) reported that it was "easy" to obtain tablet benzodiazepines from doctors. A third reported it was "very easy" (June, 31%; December, 36%).

More participants in the June survey (71%) reported that it had become more difficult to obtain temazepam capsules from the doctor than in the December survey (34%). Even so, 24% and 31% of the June and December samples, respectively, reported access through practitioners as "easy" or "very easy".

Half of the IDUs reported buying benzodiazepines on the street before and after the policy change, with a third reporting the purchase of capsules (Box 4). In December, 49% of respondents reported that capsules were "easy" or "very easy" to obtain on the street, although 60% reported that access had become more difficult in the previous 6 months.

Health effects of benzodiazepine use

Among the December sample, most benzodiazepine injectors reported injecting mainly into their arms (71%). Smaller groups reported injecting mainly in their hands (9%) or groin (7%).

Two-thirds of IDUs who injected benzodiazepines reported injection-related problems. The most commonly reported problems were prominent scarring or bruising, difficulty finding veins to inject into, and perceived benzodiazepine dependence (Box 5).

Benzodiazepine injectors were more likely to report difficulty finding veins to inject into than IDUs who did not inject benzodiazepines (56% compared with 40%; $\chi^2 = 5.275$, df = 1, $P < 0.05$).

Participants who reported injecting benzodiazepines more than once a week reported a higher number of injection-related problems than those injecting weekly or less (median 2 versus 1; $U = 557.0$; $P < 0.05$).

DISCUSSION

A large reduction occurred in the prescribing of temazepam 10 mg capsules, with a concomitant increase in temazepam 10 mg tablets, after the 1 May 2002 restriction in PBS subsidy. Nevertheless, IDUs still reported accessing temazepam capsules after the restriction through prescription and illicit sources, with substantial proportions reporting injection of these capsules in the month preceding interview. Most IDUs who injected benzodiazepines reported injection-related problems, suggesting that the harms

associated with injecting benzodiazepines are of ongoing concern.

We assessed the effect of the policy on a sentinel group of IDUs. These IDUs may not be representative of all IDUs who use benzodiazepines. About half the IDUs reported they were largely obtaining their benzodiazepines legitimately. Small proportions presented with "fake symptoms" to obtain benzodiazepines from a doctor. Specific guidelines may be required to assist doctors with assessing need for benzodiazepines. Although there was a decrease in the proportion of IDUs reporting easy access to temazepam capsules from doctors, substantial proportions reported access remained easy. This suggests there were doctors who would provide temazepam 10 mg capsules with an authority, or temazepam capsules on private prescription. Specific strategies aimed at supporting doctors and assisting them to refine their prescribing practices may be required, including improving skills in patient assessment, provision of alternatives to benzodiazepines, and reductions in overall benzodiazepine prescribing.

A commonly reported problem among the December sample was difficulty finding veins to inject into, indicative of vascular damage. This damage is probably not solely due to benzodiazepine injection, but temazepam capsules can be particularly harmful.[3] Benzodiazepine dependence was also commonly reported, and this needs to be adequately assessed and treated.

As few respondents reported only injecting tablets, it was difficult to examine differences in problems between "tablet only" and "capsule only" injectors. As temazepam capsules have been restricted further, it is important to monitor the injection of tablets and the associated harms. Our study did not show a substantial increase in the injection of tablets after publicly subsidised temazepam capsules were restricted. However, doctors may need to pay particular attention to the prescribing of rapid-acting formulations, including Hypnodorm (flunitrazepam) and Xanax (alprazolam), as these may replace temazepam among IDUs. These tablets, in addition to the widely available Valium (diazepam), were the most commonly reported tablets injected in this survey.

Although it is difficult to estimate the costs associated with the injection of benzodiazepines, this issue is a significant public health concern, as the more severe conditions associated with this practice, such as pulmonary microemboli and gangrene, are costly to treat. Additionally, benzodiazepine-using IDUs have been found to use healthcare services more than IDUs who do not use benzodiazepines, with benzodiazepine injectors reporting significantly more GP visits than oral users.[17,18]

The restriction in temazepam capsules has limited the availability of the easily injectable temazepam capsules in the community, but additional measures may need to be taken to further reduce harm among IDUs who continue to access and inject capsules that have been acquired illicitly (from diversion) *and* on doctors' prescriptions. Evidence reported here suggests further restrictions are required to limit temazepam capsule injecting and its associated harms. Strategies such as the treatment of benzodiazepine dependence, the promotion of safer injecting practices, and more proactive education for users regarding vein care and the associated harms of injecting need to be considered in order to reduce misuse of benzodiazepines and limit the associated harms.

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COMPETING INTERESTS

None identified.

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