Patterns and incidence of γ-hydroxybutyrate (GHB)-related ambulance attendances in Melbourne, Victoria

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ABSTRACT

Objective: To examine the nature and extent of ambulance attendances involving γ-hydroxybutyrate (GHB) and to compare these with heroin-related attendances in Melbourne, Victoria.

Design: Retrospective analysis of a database of ambulance service records on attendances at non-fatal drug overdoses, March 2001 – October 2005.

Participants and setting: Patients who took GHB and were attended to by an ambulance, as recorded by Metropolitan Ambulance Service (Melbourne) paramedics.

Main outcome measures: Transportation to hospital by ambulance; other outcomes included number, age, sex and Glasgow Coma Score (GCS) of patients, characteristics of attendances (in public or private space, others present, police co-attendance).

Results: There were 618 GHB-related ambulance attendances across the 46 months of data collection; 362 involving GHB only and 256 involving the concurrent use of GHB and other drugs. These figures compare to 3723 heroin overdoses observed during the same period. The number of GHB-related attendances increased by around 4% per month, which was a higher rate of increase than that found for heroin overdose attendances. Most patients were younger than 25 years, were attended in public spaces, and had a GCS < 10. Around 90% of patients were transported to hospital, compared with 21% of heroin overdose attendances.

Conclusions: Ambulance attendance data can be used to index GHB-associated harms. The clear increases in GHB-related ambulance attendances over time highlights the need for further research on how best to respond to this emergent drug-related harm.

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The "party drug" γ-hydroxybutyrate (GHB) is a central nervous system depressant drug used recreationally for its euphoric, sedative and aphrodisiac qualities.[1-3] The recreational use of GHB has increasingly been reported across much of the developed world.[4-10] GHB is also reportedly used as a nutritional supplement or growth hormone by bodybuilders,[11] and in "drink-spiking" offences to facilitate sexual assault.[12]

Small variations in GHB dose can result in overdose,[13] which is characterised by altered conscious state or loss of consciousness and respiratory depression.[14] These effects are augmented by other central nervous system depressants.[3] The illicit supply of GHB and its analogues provides little consistency in concentration, further complicating accurate dose measurement by users and increasing the likelihood of overdose.[3] Overdose has been associated with seizure, coma and in some cases, death.[13,15] An Australian study identified 10 confirmed deaths associated with GHB or its analogues in Australia since 2000, eight of which were considered directly attributable to GHB.[15] The authors argued that the distinction that users have been known to make between an overdose and "g-ing out"[15] or "g-napping" (unconsciousness, but presumably rousable)[16] was inappropriate, suggesting that unconsciousness should always be seen as overdose. The attitude that overdose was not necessarily bad has also been reported in other studies.[16,17]

There are few Australian studies of the nature and extent of GHB-associated harms available. Anecdotally, Australian emergency department (ED) data are known to underestimate the true extent of GHB-associated presentations. In the United States, poison centre information and ED data have been used to document patterns of GHB-associated harms over time, with evidence of a decline in GHB-associated harms between 1999 and 2003 across the US.[18] There are no equivalent published Australian data.

In this study, we analysed a unique database of ambulance attendances to determine the nature and extent of GHB-related attendances in Melbourne, and examined trends over time. We compared GHB and heroin overdose attendances to provide a point of reference and a context for interpreting the patterns observed in relation to GHB.

METHODS

We performed a retrospective analysis of a database of ambulance service records on attendances at non-fatal drug overdoses. Fatal overdoses were excluded as they are best captured in different data sources such as coronial records.

Setting and data source

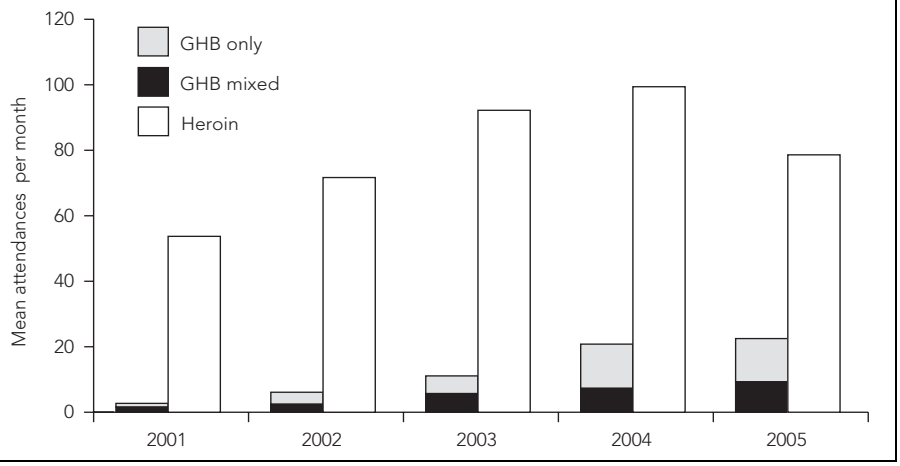
The Metropolitan Ambulance Service is the only emergency ambulance service in greater Melbourne. Paramedics complete patient care records for each patient they attend. From June 1998, all patient care records with drug-related data have been entered into an electronic database.[19] GHB was first recorded on the database in March 2001, and we analysed data through to October 2005. Data for May–July 2001, October 2002 – February 2003, and June–July 2004 were unavailable because of paramedic industrial action.

Patient selection

Relevant attendances were selected based on paramedic assessment, and mainly referred to various degrees of intoxication, but may have also included attendances where there were associated injuries (eg, falls, assaults). The assessment was based on the patient stating that he or she had used GHB or a statement to that effect from associates, and at least one other indication of use (eg, clinical indicators, such as drowsiness). Patients taking GHB may have also taken other drugs, and these attendances are referred to as "GHB-mixed" attendances, but patients using heroin concurrently were excluded from analysis. GHB-only and GHB-mixed attendances are together referred to as GHB-related attendances.

Attendances for heroin overdose were first selected by using a marker of opioid involvement — a positive response to the administration of naloxone (an opioid antagonist).[20] Where possible, paramedic assessment, which included information obtained at the scene (eg, injecting equipment) or statements of heroin use by the patient or his or her associates, were used to rule out the involvement of opioids other than heroin. Patients who overdosed on heroin may have also taken other drugs, but those who also took GHB were excluded from analysis.

1 Mean monthly totals of γ-hydroxybutyrate (GHB)-related and heroin overdose ambulance attendances in metropolitan Melbourne, March 2001 – October 2005



Measures

The following variables were examined: monthly number of attendances, age, sex, location of attendance (private or public space), others present at the scene (associates or bystanders), police co-attendance and presenting Glasgow Coma Score (GCS). The key outcome examined was whether patients were transported to hospital.

Statistical analysis and ethics approval

Count data were analysed using Poisson regression. Binary and ordinal categorical outcomes were analysed using logistic regression after adjusting for age and sex using Stata, version 9 SE (StataCorp, College Station, Tex, USA).

The Human Research Ethics Committee of the Victorian Department of Human Services approved the project.

RESULTS

After excluding patients who had concurrently used heroin and GHB ($n = 10$), there were 618 GHB-related ambulance attendances observed across the data collection period.

There was a roughly linear increase in the number of GHB-related attendances across the period for the GHB-mixed attendances and with a peak in 2004 for the GHB-only attendances (Box 1). Poisson regression revealed an increase in the monthly rate of GHB-only attendances of around 4% (incidence rate ratio [IRR], 1.039; 95% CI, 1.032–1.047) with a similar increase evident for the GHB-mixed category (IRR, 1.033; 95% CI, 1.024–1.041). In contrast, only a small increase (< 1%) in the rate of heroin overdose attendances was observed (IRR, 1.007; 95% CI, 1.005–1.009).

Overall, the GHB-only and GHB-mixed cases presented similarly. Box 2 shows the major characteristics of the GHB-related cases compared with the heroin overdose cases. Around 35%–40% of patients in GHB-related cases were female, a higher percentage than in the heroin cases (26%). The GHB cases were more likely to be attended in public spaces (78%–85% v 67%), and these patients presented in a less obtunded state (as indexed through GCS) than patients who took heroin. There were few other differences in case presentation, with similar rates of police co-attendance (a slightly lower rate was evident for the GHB-mixed category) and similar rates of others present at the scene.

The main outcome measure of this study, the rate of transportation to hospital, was dramatically higher for patients involved in GHB-only (adjusted odds ratio [AOR], 41.68; 95% CI, 27.25–63.75) and GHB-mixed (AOR, 57.05; 95% CI, 32.94–98.81) cases compared with heroin overdose cases, even after adjusting for key variables such as GCS.

DISCUSSION

To our knowledge, this study is one of the first to document the characteristics and increases over time in the extent of GHB-associated harms in Australia. Primarily related to overdose (as evidenced by GCS scores), these patterns of ambulance attendance are consistent with reports of increased GHB use among convenience samples of people who primarily used ecstasy in Melbourne over the study period.[21] With over 600 GHB-related attendances over approximately 4 years, the rate of attendances is much higher than that observed in California through passive surveillance.[18] Further, in contrast to the pattern evident in the US, our analyses showed a trend for increasing numbers of attendances over time; from the first recorded case in 2001, numbers increased through to 2004, and continued to increase through to 2005 for the GHB-mixed attendances.

The GHB-related attendances involved patients who were generally younger and more likely to be female than the heroin attendances. This is probably because people who take GHB fit the profile of people who use "party drugs", rather than those who inject drugs.

Crucially, almost all patients attended by paramedics for GHB-related problems were transported to hospital. This finding was evident in spite of the higher GCS scores in patients who had overdosed on GHB (compared with those who had overdosed on heroin) and probably reflects the more cautious management practices of paramedics for GHB-related cases, where there is currently no suitable reversal drug such as naloxone. This highlights the importance of ED practice for managing the acute consequences of GHB use (as opposed to heroin overdose, where the acute effects can generally be managed outside hospital). This relatively high transportation rate also illustrates the potential for clinical ED data to capture and provide further outcome information on most GHB-related cases in Melbourne.

The main limitation of the data reported here is that the definition of GHB involvement relied on the reports of the patient or others present as well as paramedic clinical assessment. As a result, some GHB-related cases may have been missed because these patients are often unconscious with suppressed respiration, and would not be revived until they reach hospital. Other unknown sources of bias may have influenced paramedic assessment over time (eg, increased media reporting of GHB).

Further, as users have no guarantee about the composition of the GHB they use, it is possible that they used a GHB analogue. In this regard, reports from convenience samples of users suggest differential availability of GHB-like drugs, with 1,4-butanediol (often sold as GHB) reportedly more commonly available than GHB in Melbourne, and that people taking 1,4-butanediol mistakenly believed they were using GHB.[22]

2 Characteristics of γ-hydroxybutyrate (GHB)-related and heroin overdose ambulance attendances in metropolitan Melbourne, March 2001 – October 2005

		GHB related	
	Heroin overdose	GHB mixed	GHB only
Total	3723	256	362
Age (years)			
< 20	157/3551 (4%)	67/251 (27%)	73/347 (21%)
20–24	815/3551 (23%)	100/251 (40%)	145/347 (42%)
25–29	914/3551 (26%)	51/251 (20%)	79/347 (23%)
30–34	749/3551 (21%)	22/251 (9%)	29/347 (8%)
35 +	923/3551 (26%)	11/251 (4%)	21/347 (6%)
Male	2751/3702 (74%)	151/253 (60%)	232/358 (65%)
Unadjusted OR (95% CI)	1.00	1.95 (1.50–2.54)	1.57 (1.25–1.98)
Private space	1191/3593 (33%)	53/245 (22%)	55/358 (15%)
Adjusted* OR (95% CI)	1.00	1.64 (1.19–2.27)	2.46 (1.81–3.33)
Others present	3279/3372 (97%)	235/241 (98%)	329/342 (96%)
Adjusted* OR (95% CI)	1.00	1.07 (0.46–2.54)	0.75 (0.39–1.42)
Police co-attendance	680/3723 (18%)	35/256 (14%)	69/362 (19%)
Adjusted* OR (95% CI)	1.00	0.61 (0.42–0.89)	0.93 (0.69–1.24)
Glasgow Coma Score			
3 (unconscious)	2011/3687 (55%)	44/253 (17%)	59/353 (17%)
4–9 (severely affected)	752/3687 (20%)	119/253 (47%)	155/353 (44%)
10–14 (moderately affected)	835/3687 (23%)	56/253 (22%)	102/353 (29%)
15 (conscious)	89/3687 (2%)	34/253 (13%)	37/353 (10%)
Adjusted* OR (95% CI)	1.00	3.03 (2.39–3.85)	3.23 (2.63–3.96)
Transport to hospital	785/3723 (21%)	235/256 (92%)	324/362 (90%)
Adjusted† OR (95% CI)	1.00	57.05 (32.94–98.81)	41.68 (27.25–63.75)

Data are no. (%) unless otherwise specified. Denominators listed vary because of missing data. OR = odds ratio. * Adjusted for age and sex. † Adjusted for age, sex and all of the remaining variables listed above. ◆

Although pharmacologically different, these precursors pose risks similar to or greater than those of GHB, including overdose, dependence and withdrawal.[23]

Notwithstanding these limitations, our results constitute the first comprehensive study of a key indicator of GHB-associated harms in Australia. The findings not only highlight the need for effective prevention strategies but also point to the importance of hospital EDs as sites for monitoring and intervention to reduce GHB-associated harms.

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COMPETING INTERESTS

None identified.

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