Long-term outcomes after severe drug overdose

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ABSTRACT

Objective: The long-term outcomes of patients with drug overdose admitted to the intensive care unit compared with those admitted to general wards have not been assessed. We aimed to compare the recurrence of overdose, mortality after hospital discharge, cause of death and quality-of-life scores (using the EQ-5D questionnaire) between the ICU patients and general ward patients.

Methods: We performed a retrospective cohort study of 102 ICU patients with drug overdose and 102 matched general ward patients with drug overdose in a university-affiliated teaching hospital between 2009 and 2013. We undertook standardised follow-up of patients for recurrence of overdose, long-term mortality and quality-of-life assessment.

Results: At 4-year follow-up, 33.3% of ICU patients had experienced further self-harm attempts, compared with 36.3% of general ward patients ($P = 0.66$). Ten ICU patients (10%) and five general ward patients (5%) had died. Causes of death included hanging in three patients and drug overdose in another three. On multivariate regression analysis, previous overdose attempts significantly predicted future overdoses and self-harm (odds ratio, 2.34; 95% CI, 1.27–4.30; $P = 0.006$). Overall, 101 patients (49.5%) were lost to follow-up and eight (3.9%) refused participation. For those remaining, EQ-5D scores were low, especially in the dimensions of anxiety/depression, usual activities and pain/discomfort.

Conclusions: ICU and general ward patients with overdose have similar, overwhelming prevalences of psychiatric disease, and similar outcome profiles. Such patients experience frequent overdoses and, despite being young, if admitted to the ICU, have a 10% 4-year mortality, with self-harm the dominant cause of death. Finally, among survivors who responded to the follow-up questionnaire, quality of life is poor.

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Intentional drug overdose is a common cause of presentation to hospital, and some patients require intensive care unit admission[1] due to respiratory or neurological compromise.[2,3] With such severe overdoses, patients typically require mechanical ventilation,[4] and the overdose carries a high poisoning severity score.[5] Despite such severity, the clinical course for these patients in the ICU is generally short,[3,6,7] with low in-hospital mortality rates.[2,3,6-10] However, their subsequent higher mortality rates[11] suggest a continued high-risk state for morbidity and mortality.

Despite these concerns, there is a substantial knowledge gap about the long-term outcomes of these patients, especially in relation to further episodes of drug overdose. There is a lack of knowledge about long-term mortality, cause and timing of death[12,13] in relation to hospital discharge, and health-related quality of life (HRQoL).[14-20] This lack of information is problematic, because understanding the long-term outcomes of such patients and identifying predictors of poorer outcomes might help focus care appropriately[4] and help achieve the complex goal of decreasing self-harm.[21]

In a cohort of patients with intentional drug overdose, we aimed to determine rates of re-presentation to hospital for self-harm, long-term mortality rates, cause and timing of death, and HRQoL among surviving patients. We hypothesised that patients with drug overdose who required mechanical ventilation would have poorer long-term outcomes than control patients matched for age, sex and overdose who did not require ICU treatment. We further hypothesised that all patients would be at risk of long-term mortality and morbidity, and aimed to identify risk factors predicting such complications.

Methods

Study population

We performed a retrospective cohort study of all patients admitted to the Austin Hospital ICU after intentional drug overdose, over a 5-year period (January 2009 to December 2013). The study was approved by the Austin Health Human Research Ethics Committee.

The Austin Hospital is a tertiary referral institution with a mixed adult and paediatric emergency department (ED), a 24-bed ICU, and about 70 000 ED presentations and 2200 ICU admissions annually.

Patients were included in the ICU group if they had an intentional drug overdose and required mechanical ventilation in the ICU for at least 1 hour. Other inclusion criteria were presentation to the ED between 2009 and 2013, age 18 years or older, and discharge from hospital at least 12 months before follow-up. Patients were included in the control group (general ward) if they had an intentional drug overdose and were admitted to a general ward without requiring mechanical ventilation, and met the other inclusion criteria.

Only data from the first (index) admission during the study period were used (ie, re-attendances during the study period were excluded). There were no other exclusion criteria.

Study design

We identified all potential patients by their International Classification of Diseases, 10th revision (ICD-10) discharge classification (of drug overdose) in the hospital's electronic medical record. We generated a list of ICU patients and controls who met the study inclusion criteria. One control patient was matched to each ICU patient on the following hierarchy of criteria: age (±5 years), sex, type of drug(s) taken in overdose, and date of presentation. Beginning on the date of presentation of an ICU patient, the list of potential control patients was manually searched, forward and backward in time, until a suitable matched control was found. All patients on the final list of ICU patients and matched controls were assigned a study identification number, and all data identifying their group status were removed. The order of patients on the list was then electronically randomised. A single investigator (D T) undertook this process. All other investigators were blinded to the group status of the patients.

We then undertook explicit retrospective data extraction from the electronic medical record. Data included patient demographics, physical and psychiatric comorbidities, types of drugs ingested, prior and subsequent ICU admissions and prior or subsequent drug overdose or self-harm attempts. We identified patients who died after discharge from the medical records and the Victorian Registry of Births, Deaths and Marriages, which subsequently supplied the cause and date of death as determined by the death certificate or coroner's report. The censoring date was 1 August 2015.

Assessment of quality of life

We subsequently undertook a structured telephone interview with all surviving patients. Patients were contacted by telephone (by L W) using hospital records. At least five attempts were made to contact each patient, by telephone only, on different occasions, before they were considered lost to follow-up. Every contacted patient undertook a three-point patient identification check (name, date of birth and address) and we obtained verbal consent from them to participate. The EuroQol (EQ)-5D and EQ Visual Analogue Scale (EQ-VAS) structured questionnaire[22,23] were then administered. These are evaluation instruments measuring HRQoL (see Supplementary Text 1 in the Appendix online at cicm.org.au/Resources/Publications/Journal) and have been validated in critical care patients.[15-17,24] Patients were asked to quantify their level of functional impairment (none, moderate or severe) across five dimensions (mobility, self-care, usual activities, pain or discomfort, and anxiety or depression). We suggested referral to community psychiatric follow-up for patients who scored poorly on the questionnaire.

Based on patients' responses, an overall EQ state score, representing their current health state, was assigned[25] (range, 0 [health state equal to death] to 1 [full health]). The addition of the EQ-VAS allowed participants to further quantify their perceived overall health state (range, 0 [worst imaginable health state] to 100 [best imaginable health state]).

Outcomes

Our primary study outcome was HRQoL, measured using the EQ-5D and EQ-VAS tools. The secondary outcomes were subsequent drug overdose, self-harm and suicide, and all-cause mortality.

Power calculations

The study sample size was based on expected values reported for the EQ-VAS. In Australia, there are only reference values for EQ state scores,[26] with the mean score for ages 35–44 years being 0.89 (95% CI, 0.88–0.90). However, Kind and colleagues[27] reported a mean EQ-VAS score for the general United Kingdom population aged 18–39 years of 86.6 (SD, 14.2). We believed that a mean EQ-VAS score for ICU patients of 80 (SD, 14.2) would represent a difference that was clinically significant. Given this, we estimated that we would need 97 patients in the ICU group to show a statistically significant difference from the general population. Therefore, we planned to enrol at least 100 ICU patients. Our comparison of the ICU and matched control patients was exploratory and was undertaken to determine if there were substantial differences in the outcomes of the two patient groups.

Statistical analysis

Data were summarised as medians with interquartile ranges (IQRs) or as frequencies with percentages. We compared continuous variables using the Mann–Whitney *U* test, and categorical variables using the χ^2 test or the Fisher exact test. We compared time to event using the log-rank test, and show it as Kaplan–Meier survival curves. We compared EQ state scores and EQ-VAS scores using the Spearman correlation. Multivariate logistic regression analysis was performed with all baseline variables carrying a $P < 0.2$ on univariate analysis, and with repeat overdose attempt or the combined outcome of repeat overdose attempt and death as the dependent variables. We performed data analysis using Stata, version 11.2 (Stata Corp). A two-sided $P < 0.05$ was considered statistically significant.

Results

Patient characteristics

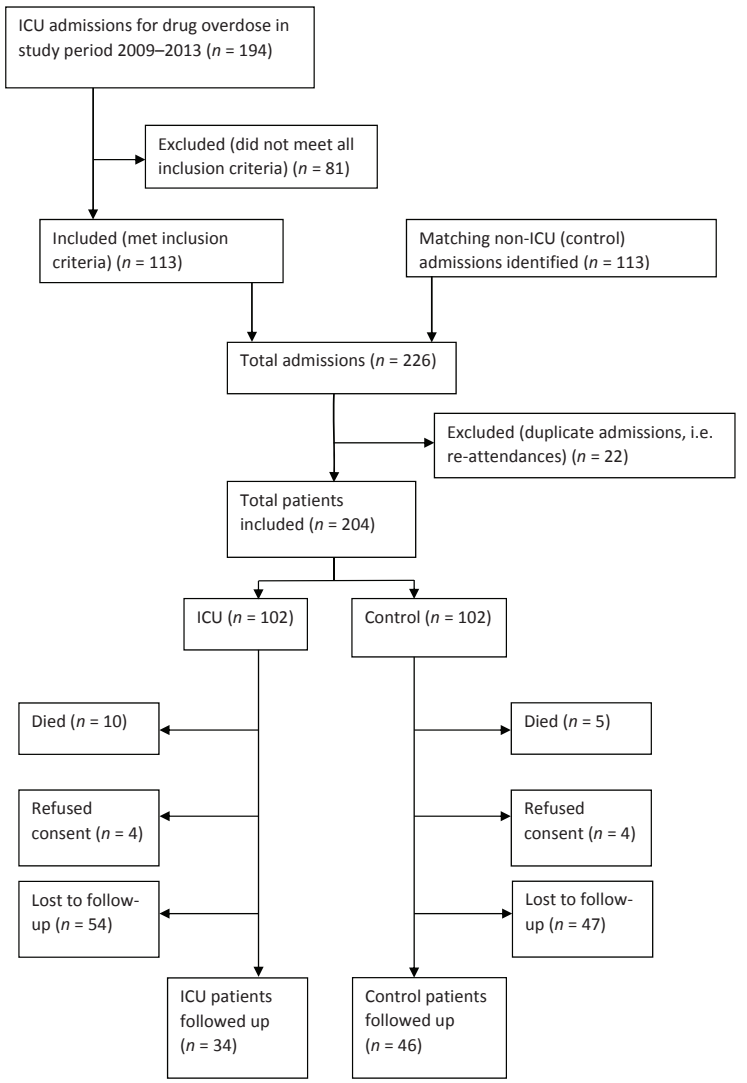
There were 113 patients admitted to the ICU during the study period who met the inclusion criteria. They were matched with 113 control patients (Figure 1). Sixteen patients had multiple reattendances within the study period. The 22 reattendance events were excluded.

Patient characteristics are described in Table 1. Most patients were young women. Many had a history of overdose or self-harm. Drugs of overdose are listed in the Supplementary Table 1. Mechanical ventilation for the ICU patients was instituted typically for less than 24 hours, and the median length of ICU stay was less than 2 days (Table 2).

Repeat overdose and mortality

At follow-up of ICU patients (median duration, 47 months [IQR, 32–64 months]) and control patients (median duration, 46.5 months [IQR, 35–64 months]), about one-third of all patients had had at least one further overdose or self-harm attempt, with most of them occurring within 12 months of hospital discharge (Table 2). All-cause mortality at the time of follow-up was 10 patients (10%) and five patients (5%) in the ICU and control groups, respectively. The causes of death included hanging in three patients and drug overdose in three patients (Supplementary Table 2). All self-inflicted deaths occurred within 14 months of the patient's index presentation. Kaplan–Meier survival curves comparing ICU and control patients are shown in Supplementary Figure 1.

Figure 1. Participant selection pathway



ICU = intensive care unit.

Patients with psychiatric diagnoses

Overall, 171 patients (83.8%) had at least one psychiatric disorder (Table 1). These patients had more than double the rate of subsequent overdose or self-harm compared with patients with no psychiatric disease (65 [38%] v 6 [18.2%]; P = 0.03) (Supplementary Table 3). Kaplan–Meier survival curves showed that patients with psychiatric diagnoses had mortality rates almost three times those of patients with no psychiatric diagnoses, with mortality continuing to increase over time (Supplementary Figure 2).

Follow-up quality of life

Of the 189 patients alive at follow-up, 101 (49.5%) were not contactable and considered lost to follow-up, and eight (3.9%) refused to consent. The remaining 80 patients participated in the follow-up survey.

There was no significant difference in overall EQ state scores (Table 3). Both groups rated their health poorly in the dimensions of "anxiety or depression", "usual activities" and "pain or discomfort." There was a moderate positive correlation between the EQ-VAS and EQ state scores (ρ = 0.34, P = 0.002 [data not shown]).

For both groups combined, a significantly lower HRQoL was reported for patients with a previous overdose (median EQ state score, 0.68 [IQR, 0.22–0.8]) compared with no previous overdose (median EQ state score, 0.75 [IQR, 0.6–0.8]) (P = 0.02), and in women (median EQ-VAS score, 60 [IQR, 43.75–75]) compared with men (median EQ-VAS score, 70 [IQR, 53.75–80]) (P = 0.03) (Supplementary Figures 3 and 4).

Table 1. Patient characteristics at baseline, intensive care unit patients v general ward (control) patients

Patient characteristic	ICU (*n* = 102)	Control (*n* = 102)	*P*
Median age, years (IQR)	41.5 (30–52)	45.5 (30–54)	0.81
Men, *n* (%)	36 (35.3%)	35 (34.3%)	0.88
Previous overdose or self-harm, *n* (%)	44 (43.1%)	37 (36.3%)	0.32
Previous ICU admission, *n* (%)	10 (9.8%)	7 (6.9%)	0.45
Type of overdose, *n* (%)			
Antipsychotic	35 (34.3%)	32 (31.4%)	0.66
Benzodiazepine/sedative	36 (35.3%)	33 (32.4%)	0.66
Antidepressant	26 (25.5%)	23 (22.5%)	0.62
Paracetamol	23 (22.5%)	27 (26.5%)	0.52
Other*	46 (45.1%)	39 (38.2%)	0.32
Psychiatric diagnoses, *n* (%)	89 (87.3%)	82 (80.4%)	0.25
Major depressive disorder	34 (33.3%)	32 (31.4%)	
Major depressive and bipolar affective disorder	5 (4.9%)	1 (1.0%)	
Major depressive and borderline personality disorder	10 (9.8%)	6 (5.9%)	
Major depressive disorder and schizophrenia	5 (4.9%)	1 (1.0%)	
Major depressive disorder and anxiety	10 (9.8%)	10 (9.8%)	
Major depressive disorder with >2 other psychiatric diagnoses	3 (2.9%)	6 (5.9%)	
Bipolar affective disorder	5 (4.9%)	5 (4.9%)	
Borderline personality disorder	3 (2.9%)	2 (2.0%)	
Schizophrenia	5 (4.9%)	7 (6.9%)	
Bipolar affective disorder and other psychiatric diagnoses	3 (2.9%)	4 (3.9%)	
Other†	6 (5.9%)	8 (7.9%)	
No psychiatric diagnosis, *n* (%)	13 (12.7%)	20 (19.6%)	

IQR = interquartile range. * See Appendix Table 1 (online at cicm.org.au/Resources/Publications/Journal) for breakdown of drugs by classes.
† Including anxiety, substance dependency and misuse, alcohol dependency and misuse and anorexia nervosa.

Table 2. Patient outcomes, ICU patients v general ward (control) patients

Patient outcome	ICU (*n* = 102)	Control (*n* = 102)	*P*
Median duration of mechanical ventilation, hours (IQR)	18 (11–36.5)	na	
Median duration of ICU stay, hours (IQR)	39.5 (24.75–68.25)	na	
Median duration of hospital stay, days (IQR)	4 (2–6)	1 (1–2)	< 0.001
Subsequent overdose/ self-harm, *n* (%)			
Within 12 months	25 (24.5%)	26 (25.5%)	0.87
Total	34 (33.3%)	37 (36.3%)	0.66
Mortality > 12 months, *n* (%)	10 (9.8%)	5 (4.9%)	0.18
Median duration of index overdose to follow-up, months (IQR)	47.0 (32–64)	46.5 (35–64)	0.97

ICU = intensive care unit. IQR = interquartile range.
na = not applicable.

Prediction of outcomes

Multivariate regression analysis showed that a previous overdose attempt was a significant predictor of future overdose and self-harm (odds ratio, 2.34; 95% CI, 1.27–4.30, $P = 0.006$). Patients with a pre-existing diagnosis of a psychiatric disorder showed a similar trend for future overdose and self-harm (Table 4). Again, previous overdose attempts and diagnoses of psychiatric disorders were associated with the composite outcome of future overdose, self-harm and/or death at follow-up.

Discussion

Key findings

In our study, more than one-third of all overdose patients went on to subsequent self-harm or intentional overdose regardless of the severity of the initial overdose attempt. Ten per cent of ICU patients subsequently died (double the rate of the control group), with half of these deaths due to self-harm and most occurring within 14 months of hospital discharge. All surviving patients, regardless of

Table 3. Quality of life at follow-up,* ICU patients v general ward (control) patients (follow-up participants only)

Scoring component	ICU (*n* = 34)	Control (*n* = 46)	*P*
EQ dimension and level			
Mobility, *n* (%)			
No problems	24 (70.6%)	27 (58.7%)	0.52
Some problems	8 (23.5%)	14 (30.4%)	
Severe problems	2 (5.9%)	5 (10.9%)	
Personal care, *n* (%)			
No problems	27 (79.4%)	35 (76.1%)	0.77
Some problems	6 (17.6%)	8 (17.4%)	
Severe problems	1 (2.9%)	3 (6.5%)	
Usual activities, *n* (%)			
No problems	16 (47.1%)	24 (52.2%)	0.08
Some problems	18 (52.9%)	17 (37.0%)	
Severe problems	0 (0.0%)	5 (10.9%)	
Pain/discomfort, *n* (%)			
No problems	19 (55.9%)	21 (45.7%)	0.08
Some problems	14 (41.2%)	16 (34.8%)	
Severe problems	1 (2.9%)	9 (19.6%)	
Anxiety/depression, *n* (%)			
No problems	7 (20.6%)	8 (17.4%)	0.06
Some problems	24 (70.6%)	24 (52.2%)	
Severe problems	3 (8.8%)	14 (30.4%)	
Overall EQ state score†			
Mean (SD)	0.70 (0.25)	0.54 (0.34)	0.02‡
Median (IQR)	0.75 (0.59–0.8)	0.72 (0.23–0.8)	0.08
EQ-VAS score§			
Mean (SD)	62.2 (21.9)	55.8 (22.9)	0.2‡
Median (IQR)	70 (50–80)	60 (50–70)	0.19

ICU = intensive care unit. EQ = EuroQol. IQR = interquartile range. VAS = Visual Analogue Scale. * Median time to follow-up: ICU patients, 47 months (IQR, 32–64 months); control patients, 46.5 months (IQR, 35–64 months). † Mean EQ state score for general Australian population aged 34–44 years: 0.89 (95% CI, 0.88–0.90). ‡ Student *t* test. § Mean EQ-VAS score for general United Kingdom population aged 18–39 years: 86.6 (SD, 14.2).

Table 4. Univariate and multivariate regression analysis showing factors associated with outcomes

	Univariate analysis		Multivariate analysis*	
Factor	OR (95% CI)	*P*	OR (95% CI)	*P*
Associated with future overdose				
Age, per year	0.99 (0.97–1.01)	0.29		
Male	0.63 (0.34–1.18)	0.15	0.76 (0.39–1.45)	0.40
Psychiatric diagnosis	2.76 (1.08–7.04)	0.03	2.01 (0.76–5.33)	0.16
Major depressive disorder	1.22 (0.67–2.21)	0.51		
Bipolar affective disorder	2.49 (1.05–5.88)	0.04		
Borderline personality disorder	1.47 (0.69–3.15)	0.32		
Schizophrenia	1.29 (0.55–3.04)	0.56		
Anxiety disorder	0.93 (0.42–2.04)	0.85		
Admitted to ICU	0.88 (0.49–1.56)	0.66		
Previous overdose	2.64 (1.46–4.78)	0.001	2.34 (1.27–4.30)	0.006
Associated with composite outcome of future overdose and/or death at follow-up				
Age, per year	1.00 (0.98–1.02)	0.97		
Male	0.90 (0.50–1.62)	0.72		
Psychiatric diagnosis	2.83 (1.17–6.88)	0.02	2.26 (0.91–5.62)	0.08
Major depressive disorder	1.10 (0.62–1.96)	0.73		
Bipolar affective disorder	2.88 (1.19–6.94)	0.02		
Borderline personality disorder	1.33 (0.63–2.81)	0.46		
Schizophrenia	1.22 (0.53–2.85)	0.64		
Anxiety disorder	1.14 (0.54–2.43)	0.73		
Admitted to ICU	0.96 (0.55–1.68)	0.89		
Previous overdose	2.53 (1.42–4.52)	0.002	2.26 (1.25–4.09)	0.007

OR = odds ratio. ICU = intensive care unit. * Variables with $P < 0.2$ on univariate analysis were included in the multivariate analysis.

group, showed similar and substantially poorer HRQoL than the general population. Previous overdose attempts significantly predicted greater risk of subsequent overdose and mortality.

Relation to previous studies

Our study is consistent with previous studies showing that most patients with drug overdose have an existing diagnosis of psychiatric disorder.[4,28] The nature of the drugs taken for overdose was consistent with nationwide trends,[28] making our cohort representative of the larger population of overdose patients.

More than one-third of our patients had a previous presentation with an overdose, and one-third went on to have another overdose or self-harm attempt after the index presentation. This is potentially an underestimate of the overall burden of self-harm, because only presentations to our health service were taken into account. Our findings reflect the recurrent nature of intentional overdose,

with values higher than in previous studies,[1,3,19] which was probably due to the longer duration of follow-up in our investigation. In contrast with previous studies,[1,29] however, we identified that previous overdose attempts are a significant predictor of future self-harm and mortality.

Our follow-up mortality rate is comparable to that of an ICU cohort in the Netherlands[19] (9.3% at 24 months) but lower than that of one in Ireland[11] (25% at 31 months). The Irish study also focused on patients with illicit and recreational drug overdoses, which is potentially a more at-risk population. However, our study also examined the cause of death, which showed a high rate of completed suicide. The high rate of suicide mortality in our ICU group is similar to that found in a study by Baer and colleagues,[4] of 7% at 12 months. Our study shows that patients with psychiatric illness are at an increased and persistent risk of future self-harm, overdose and death, as shown in our survival analyses.

The general HRQoL of our patients, as reflected by the EQ and EQ-VAS scores, was poor. However, it was similar to that shown in studies by Brandenburg and colleagues[20] and Soliman and colleagues.[17] In our study, both groups had substantially lower EQ state and EQ-VAS scores compared with the general Australian and UK populations,[26,27] respectively.

Our initial hypothesis that ventilated ICU patients with overdose would report worse HRQoL than control patients was not supported by our data. However, our loss to follow-up was substantial and affected our ability to show statistical significance. Further, the ICU group had better functional outcomes, but their overall mortality rates were higher, potentially creating a selection bias.

Another important finding in this study was that patients with a previous overdose reported a significantly poorer HRQoL. This further emphasises the chronic and complex interplay between repeated overdose attempts and poor quality of life, which may gradually increase a patient's risk of completed suicide.[1]

Implications

As there were 31 177 episodes of intentional drug overdose in adults (an incidence of 10.8 per 10 000 people per year) in Victoria in the same period of 2009–2013 (Ray Robbins, Victorian emergency department state-wide data, Department of Administrative Informatics, Austin Hospital, personal communication, 18 May 2016), with 5200 ICU admissions (an incidence of 1.8 per 10 000 people per year), this condition has a significant public health impact.[3]

Our findings show that an acute drug overdose should be considered a "sentinel event"[13] or a "warning sign of high mortality risk".[19] This applies to all overdose patients, regardless of admission disposition. The suicide risk in our ICU patient population is about 50 times that of the general population.[30] Our findings support the view that drug overdose is an acute-on-chronic public health issue which, given prescription trends,[31] can only be expected to increase over time,[28] despite social engineering interventions to enhance social cohesion and connectedness for those at risk.[32]

Strengths and limitations

Our study has several strengths. We have addressed key knowledge gaps[13] with the identification of the causes and timing of death in relation to acute overdose. We have identified predictors of future overdose and self-harm. We have characterised the long-term morbidity of patients and identified factors closely associated with worse quality of life.

A further strength is that our study included the similarities in patient characteristics across both groups. Moreover, the long median time from index presentation to follow-up allowed a more in-depth assessment of patients' long-term outcomes. We also blinded the principal investigator to the patients' groups when conducting the follow-up interviews, minimising bias. Finally, we conducted our study in a patient population with similar drug overdose trends to those of the general Australian population,[28] which confers a high degree of relevance and external validity for developed countries.

Our study carries some limitations. First, it was a retrospective, cohort, single-centre study, and we were unable to obtain information from other health services where patients may have received treatment. This may have influenced the outcomes and implies that we may have underestimated the magnitude of the problem, thus emphasising the importance of this public health issue. Second, a large proportion of patients were lost to follow-up, but this has been noted as a common problem in follow-up studies involving this type of population.[4,20] Although using alternative methods such as letters or emails to contact patients may have increased follow-up rates, the expected response would be poor, and it could be difficult to standardise written and verbal scores. This substantial loss to follow-up may also have accounted for our study not showing significant differences in mortality or quality of life between the two groups. However, regression analysis showed that factors such as previous overdose and psychiatric illness had a greater impact on future cumulative self-harm.

Third, the matching of control patients to ICU patients could have led to selection bias, because patients were matched only on age, sex and drug overdose criteria. However, the controls were selected on a "closest and first-match" basis and they represented a very similar population. Finally, the study did not examine the specific psychiatric follow-up for patients after discharge, including potential loss to follow-up care, but we assumed that all patients received standard care in the community.

Conclusions

Patients admitted to the ICU have a similar outcome profile to those admitted to the general wards after an overdose, with an overwhelming prevalence of pre-existing psychiatric disease. Specifically, ICU patients have 10% mortality at 4 years, with self-harm the dominant cause of death. Moreover, most overdose patients are young and experience frequent recurrences of overdose. Survivors continue to report a substantially lower perceived quality of life compared with that of the general population, even years after the sentinel drug overdose. Importantly, patients at greatest risk for future overdose, self-harm and death have pre-existing psychiatric illnesses and previous overdose attempts, representing a cohort requiring the highest level of post-admission care.

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Competing interests

None declared.

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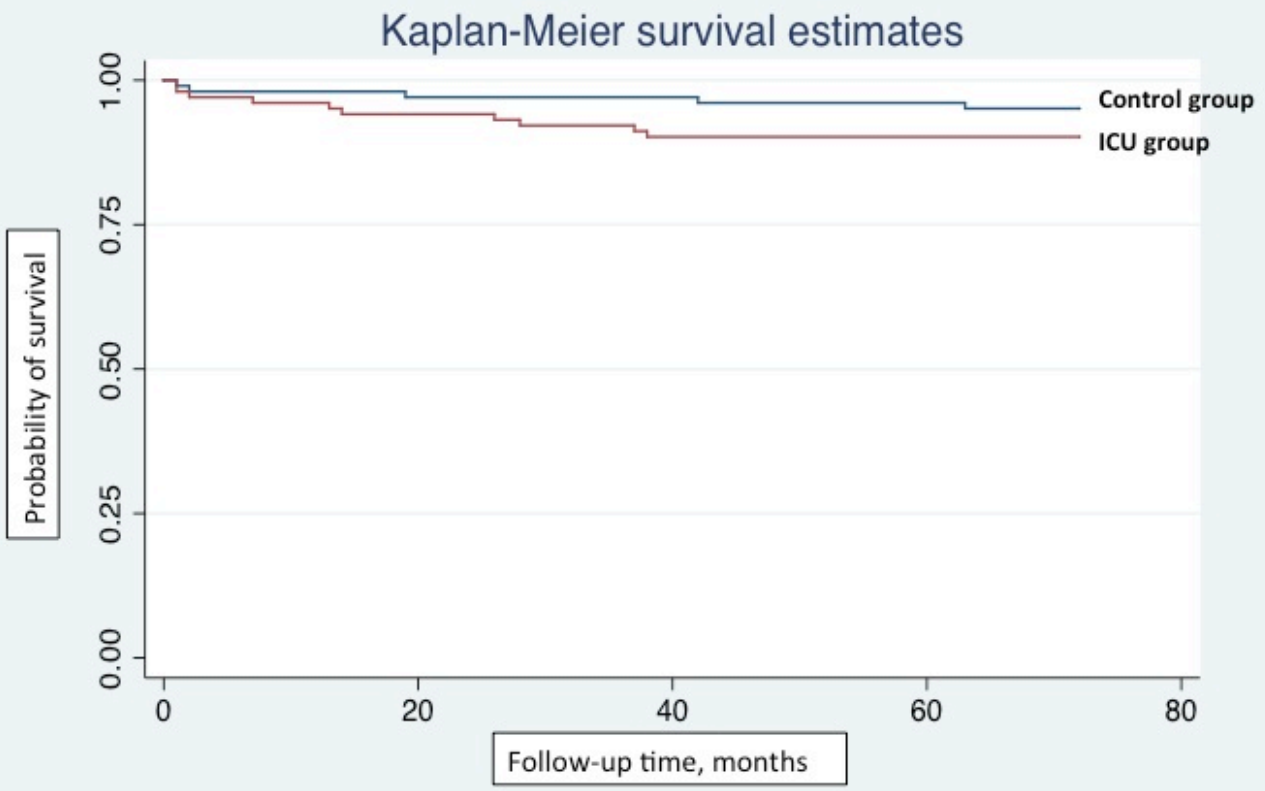
Appendix – Supplementary Text 1. This appendix was part of the submitted manuscript and has been peer reviewed. It is posted as supplied by the authors.

Supplementary Text 1: EQ-5D

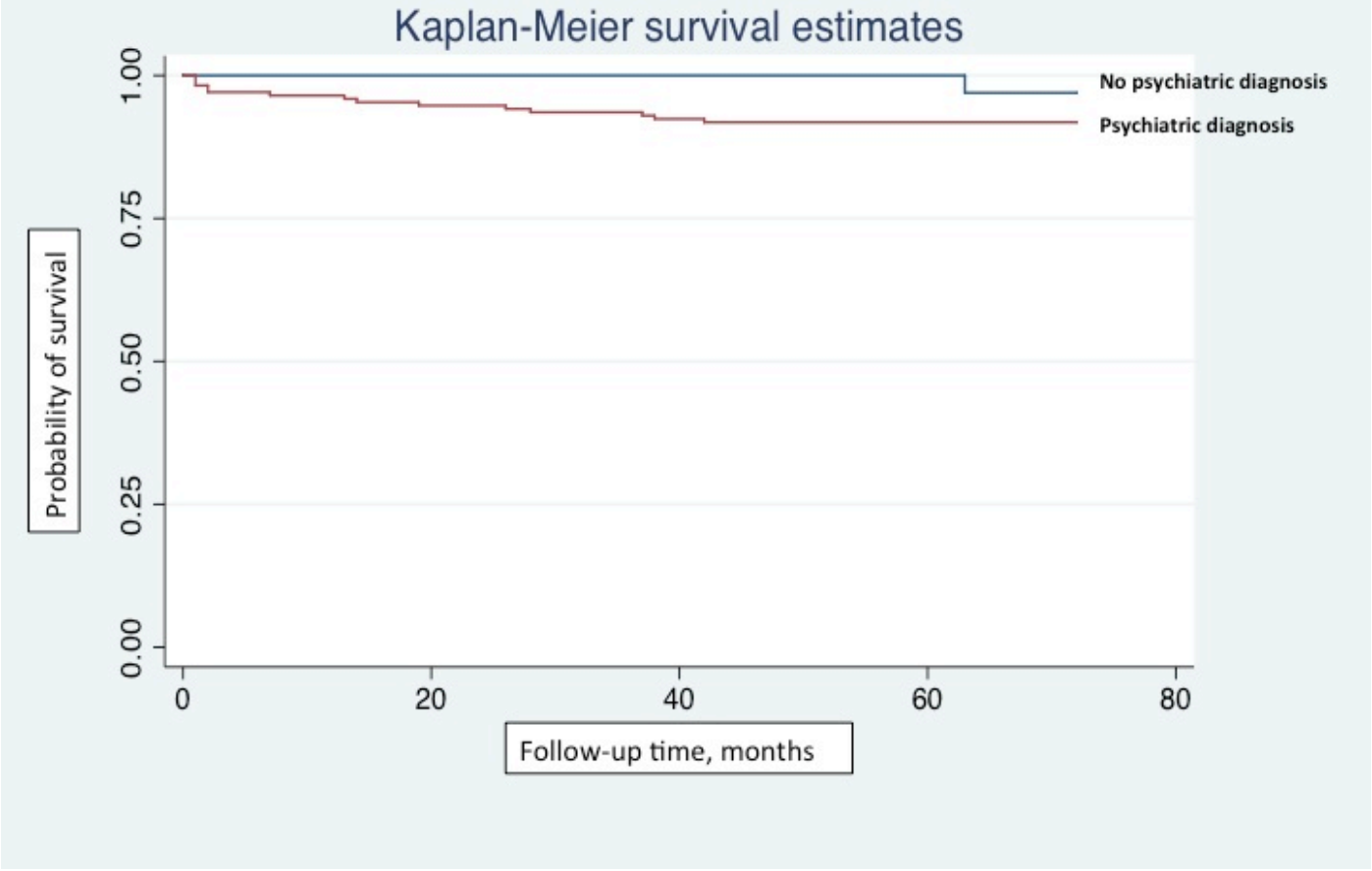
One of the validated tools used is the EQ-5D, which is a generic health related quality of life instrument examining 5 dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression.[22]

The EQ-5D-3L and EQ-VAS questionnaires have been well validated in follow up of the general population as well as critical care patients.[15-17,24] EQ-5D is recommended for measuring HRQoL in critical care.[18] In ICU patients there is variation, with median HRQoL being 0.83 in a previous study using EQ-6D.[17] Lowest HRQoL was noted in specific subgroups of patients with sepsis or chronic renal failure and HRQoL does not change over time.[18] Only one study has used EQ-5D in assessing HRQoL in patients with drug overdose.[20] The EQ-5D can be administered via written or telephone questionnaire.

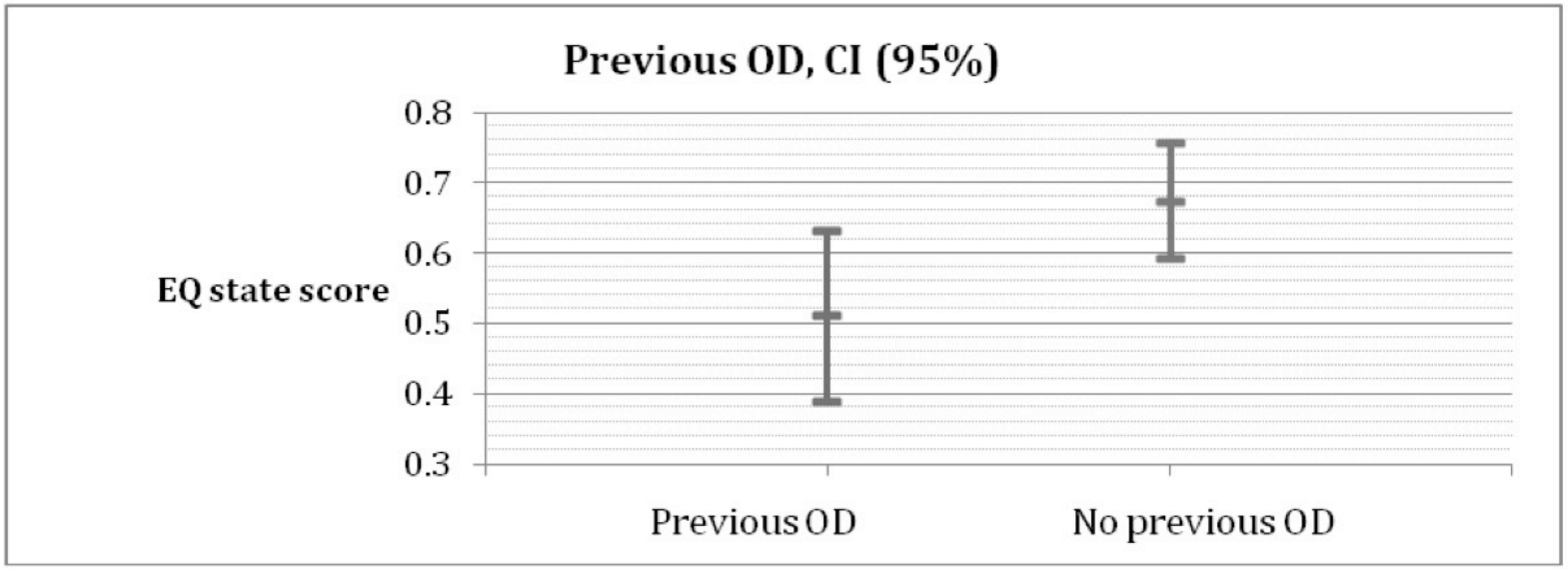
Supplementary Figure 1: Kaplan-Meier curve showing long-term survival of patients in the ICU group vs. control group (log-rank test for equality of survivor functions, *P*=0.18)



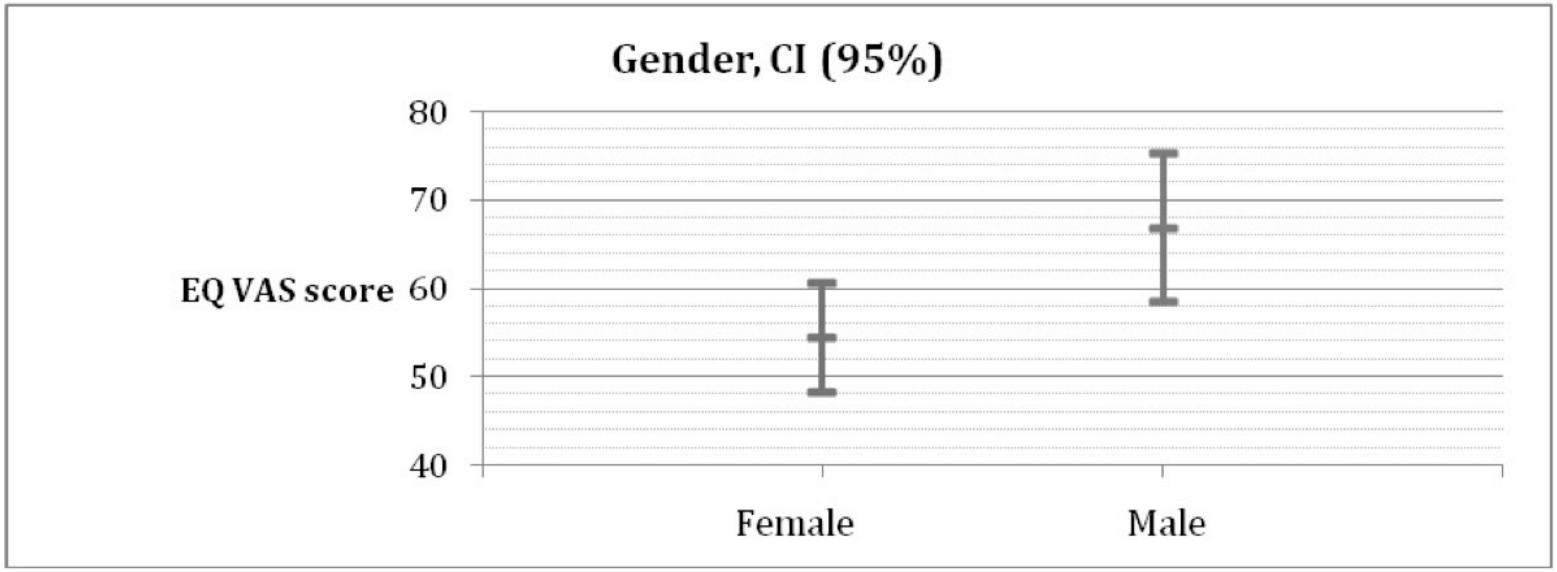
Supplementary Figure 2: Kaplan-Meier curve showing long-term survival of patients with psychiatric diagnosis vs. patients with no psychiatric diagnoses (log-rank test for equality of survivor functions, *P*=0.30)



Supplementary Figure 3: Measured EQ state scores in patients with previous overdose vs. patients without previous overdose (Mean scores and 95% Confidence Intervals, p = 0.02)



Supplementary Figure 4: Measured EQ VAS scores in female vs. male patients (Mean scores and 95% Confidence Intervals, p = 0.03)



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Supplementary Table 1. Breakdown of drugs of overdose by classes

Type of drug in overdose	**ICU (n = 102)**	**Control (n = 102)**	***P***
Antipsychotic, total, *n* (%)	35 (34.3)	32 (31.4)	0.66
Quetiapine	30	22	
Olanzapine	5	6	
Clozapine	2	1	
Chlorpromazine	0	1	
Amisulpride	1	1	
Other	2	2	
Benzodiazepene/sedative, total, *n* (%)	36 (35.3)	33 (32.4)	0.66
Diazepam	14	17	
Temazepam	8	4	
Alprazolam	9	10	
Lorazepam	3	2	
Clonazepam	4	1	
Non-benzodiazepine	4	2	
Other	3	1	
Antidepressant, total, *n* (%)	26 (25.5)	23 (22.5)	0.62
Amitriptyline	6	5	
SSRI	9	7	
SNRI	10	11	
Other	2	2	
Paracetamol, *n* (%)	23 (22.5)	27 (26.5)	0.52
Other, total, *n* (%)	46 (45.1)	39 (38.2)	0.32
Opioids	8	10	
GHB	4	1	
Cannabis	2	3	
Ethanol	21	18	
Methanol	1	0	
Valproate	7	5	
Phenytoin	1	0	
Calcium channel blocker	2	1	
Beta blocker	1	2	
Other cardiac medication	4	2	
Lithium	3	0	

Appendix – Supplementary Table 2. This appendix was part of the submitted manuscript and has been peer reviewed. It is posted as supplied by the authors.

Supplementary Table 2: Details of patients who died, including cause of death and associated psychiatric diagnoses

ICU group

Age	Gender	Associated co-morbidities	Psychiatric diagnoses	Cause of death	Time period from admission to death, months
57	M	Tuberculosis Hypertension Type 2 diabetes	Major depressive disorder Alcohol abuse	Hypoxic brain injury Aspiration of gastric contents, seizures and alcohol dependence	1
56	M	none	Major depressive disorder Anxiety disorder	Suicide: hanging	13
42	M	End stage renal failure Hepatitis C	Major depressive disorder Anxiety disorder	Overdose: Heroin	7
27	F	none	Major depressive disorder Borderline personality disorder Anorexia	Bronchopneumonia	37
88	M	Ischaemic heart disease Stroke Hypertension Cardiac failure	Major depressive disorder	Lower respiratory tract infection	28
72	F	COPD Hypertension Stroke	Major depressive disorder	Gallbladder cancer	38
26	M	none	Major depressive disorder Anxiety disorder Alcohol abuse	Motor vehicle accident	26
28	F	none	Bipolar affective disorder	Suicide: Hanging	14

			Borderline personality disorder Alcohol abuse		
30	M	none	Major depressive disorder	Overdose: Alcohol	2
48	M	none	Bipolar affective disorder	Overdose: Polypharmacy	1

Control group

Age	Gender	Associated co-morbidities	Known psychiatric diagnoses	Cause of death	Time period from admission to death, months
53	M	Acquired brain injury Epilepsy	Schizophrenia	Natural causes	19
54	M	Acquired brain injury Epilepsy Hepatitis C	none	Aspiration pneumonia	63
52	F	Metastatic lung cancer	Anxiety disorder Alcohol abuse	Palliative metastatic lung cancer	1
47	M	Hepatitis C	Bipolar affective disorder	Liver disease	42
49	M	Ischaemic heart disease	Major depressive disorder	Suicide: Hanging	2

M = male

F = female

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Supplementary Table 3: Outcomes comparing patients with psychiatric diagnosis vs patients with no psychiatric diagnosis

Outcome	Psychiatric diagnosis (n = 171)	No psychiatric diagnosis (n = 33)	*P*
Subsequent overdose, *n* (%)	65 (38.0%)	6 (18.2%)	0.03
Died from self-harm, *n* (%)	5 (2.9%)	0 (0%)	1.0
Died on follow up, *n* (%)	14 (8.2%)	1 (3.0%)	0.47
EQ state score[a], median (IQR)	0.70 (0.35, 0.80)	0.75 (0.71, 0.83)	0.13
EQ VAS[a], median (IQR)	60 (50, 75)	65 (55, 75)	0.56

[a] Data on follow-up participants only, n=66 with psychiatric diagnosis and n=14 with no psychiatric diagnosis