

Comparing rates and characteristics of ambulance attendances related to extramedical use of pharmaceutical opioids in Australia: a protocol for a retrospective observational study

## Supplementary materials

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## Appendix A. Description of coder training and inter-rated reliability processes

Research Assistants undertake extensive and ongoing training to ensure coding is consistent. To assist with this, coding guides are utilised that detail categories, the process of classification, provide examples of typical attendance types, and examples of uncommon attendance types. When a new Research Assistant commences, they are first trained by senior researchers, and then paired with multiple experienced Research Assistants on a rotating basis, until they and their senior coding partner are confident of coding consistency. Senior researchers review attendances coded by new Research Assistants to ensure inter- and intra-coder reliability. In addition to training upon appointment, all Research Assistants participate in monthly ongoing training. This training covers issues like complex cases or the introduction of new variables. This training is completed with workshops and “dummy case exercises”.

On a day-to-day basis, if Research Assistants are not confident in coding a specific attendance, the attendance is escalated to a senior researcher for review (<1% of attendances). These review cases then feed into regular workshops, which are also used to identify common coding issues, and disseminate coding clarifications on an ongoing basis.

To maintain inter-coder validation, inter-rater review audits are completed by a senior researcher. These are used as a personal learning tool for Research Assistants, and to identify common issues that may need to be addressed across the coding team. As an example of inter-coder validation, results of the most recent coding audit are described below: A maximum of 90 previously coded attendances per Research Assistant were extracted, from the Victoria Quarter 1, 2017 dataset. The 90 attendances met 26 criteria for case-classification. Each Research Assistant then re-coded a random selection of attendances for which they were not the original coder. At that time, there were 23 individual Research Assistants, and the attendances they re-coded came from an average of  $9 \pm 3$  (mean  $\pm$  standard deviation) other Research Assistants. A total of 1,718 attendances were re-coded, which meant 221,622 AOD variables were re-coded, of which only 470 differences were identified (i.e. 0.2% of variables). Differences were systematically identified, and reviewed by a senior researcher for personalised feedback to each Research Assistant and then followed up with systemic team training.

Appendix B. Description of variables to be examined in association with pharmaceutical opioid-related ambulance attendances

| Variable   | Description   | Transformations/ intended aggregations and final response options used for analyses   | Data source   |
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| Presenting Glasgow Coma Scale (GCS)              | The Glasgow Coma Scale [1] is a 13 point (range 3-15) scale that assesses injured patients' level of consciousness. The GCS's overall reliability is adequate [2], and it is used by prehospital and hospital staff in most English speaking countries and most of Europe [3].  | Response Options: 3 (non-responsive), 4-8 (severe impairment), 9-12 (moderate impairment), 13-15 (minor-no impairment), consistent with previous research with substance-related attendances [4, 5].<br><br>This study further isolated the "non-responsive" group (GCS=3) who would not have responded at all, to any of the three components of eye, verbal and motor response to external stimuli. | GCS score is assessed and directly entered into the ePCR by trained paramedics.   |
| Presenting respiratory rate (breaths per minute) | There are not clearly defined standard grouping for respiration rate. However, the normal adult respiration rate is generally considered 12-20 breaths per minute [6], and high doses of opioids depress ventilation [7]. The dispatch protocols from the ambulance systems involved in this study class less than 6 breaths a minute as ineffective breathing. | Grouped into three response Options: <6, 6-12, >12  | Respiration rate is assessed and directly entered into the ePCR by trained paramedics.  |
| Transport to hospital                            | Transport outcome relating to attendance  | Response Options: Not transported, transported  | Outcome of attendance directly entered into the ePCR as a binary variable by trained paramedics and validated by trained coders after reviewing free-text fields. |
| Naloxone administered: not stated, yes           | Naloxone is an opioid antagonist that reverses the effects of opioid overdose [7].  | Response Options: Not stated, yes   | Binary variable in ePCR, entered by trained paramedic and validated by trained coders after free-text fields.   |

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| Naloxone response: not effective, effective |   | Response Options: Not effective, effective  | Binary variable entered by trained paramedic and validated by coders checking free text field on clinical descriptions e.g. GCS ~3 returning to GCS ~15. |
| Sex of patient                              | Sex is coded into male, female and non-binary options, however states vary on how they to record non-binary gender.<br><br>Coders validate and re-code gender as male, female, and other/unknown.   | For these analyses response options were coded as: Male (0), female (1), other/unknown (9), missing (.)<br>All patients regardless of sex included in analyses related to Aim 1 (rates) and Aim 3 (context of presentation). Those with known sex will be included in the analyses for Aim 2, with missing data quantified. | Four options in the ePCR entered by paramedics, missing data may be coded based on information in free-text.   |
| Age of patient                              | Our categories were based on previous age categories used in studies of opioid use for pain which were <55, 55-65 and 65+ [8] to enable comparison. In Australia, most overdoses occur in adults with the peak age category in 35-44 [9] and increases observed in older age categories. For this reason we have split those aged from 12 -54 into two categories, 12-34 and 35-55, to enable comparison with national overdose trends. Smaller age groups are not possible due to low rates in younger adults leading to potential censoring of cells. We will exclude cases where age is reported to be less than 12 due to the unclear intention of use in children of this age, consistent with previous research [10, 11]. | Response Options: 12-34, 35-54, 55-65 (nearing retirement age) and 65+  | DOB is entered by paramedic, missing data may be coded based on information in free-text.  |

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| <p>Socio-economic status based on residential postcode</p> | <p>The Socio-Economic Indexes for Areas (SEIFA) ranks geographic areas according to relative socio-economic advantage and disadvantage [12, 13]. The SEIFA is one of the most commonly used measures for socioeconomic status in Australia, and it has been updated every 10 years with Census data since 1986 [14].</p> <p>Lower scores indicate more disadvantaged areas and higher scores indicate more advantaged areas.</p> | <p>Response Options: Quintile 1-5.</p> <p>At Turning Point, the postcode from the ePCR is linked to the Australian Bureau of Statistics' (ABS) database of SEIFA ranks by postcode (2016), and then these ranks were aggregated into quintiles specific to each state.</p>   | <p>Postcode is entered by paramedic</p>   |
| <p>Concurrent alcohol involvement</p>                      | <p>Concurrent alcohol use is captured because the simultaneous use of multiple depressant drugs (e.g. opioids, alcohol and heroin) increase the risk of overdose [15].</p>   | <p>Response Options: Not stated, alcohol involved but no evidence of intoxication, alcohol intoxication.</p> <p>The involvement of alcohol is coded as 'alcohol involved' and 'alcohol intoxication'. Attendances where the person has consumed alcohol, but the paramedic notes do not clearly indicate alcohol intoxication are coded as 'alcohol involved', and 'alcohol intoxication' is a subset of 'alcohol involved'. The default code is for 'alcohol involved' unless the paramedic notes provide clear evidence of alcohol intoxication. For this study, these cases were recoded into exclusive categories – not stated, alcohol involved but no evidence of intoxication and alcohol intoxication.</p> | <p>Coders extract information about alcohol involvement from free-text fields as 'not stated' or 'alcohol involved'. There is a subcategory of 'intoxication' under 'alcohol involved'.</p> |

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| Concurrent heroin involvement                         | Response Options: Not stated, present  | Analysed as binary coded variable.  | Coders extract information about heroin involvement from free-text fields and code.                       |
| Concurrent illicit drug use (excluding heroin)        | Response Options: Not stated, present (based on the presence of at least one of the illicit drugs coded for; meth(amphetamine), cannabis, synthetic cannabinoids, emerging psychoactive substances, cocaine, MDMA, GHB, ketamine, LSD, psilocybin, inhalant, illicit drug other or unspecified)  | Not stated/ present if any one of the illicit substances listed are reported as being used in the ePCR                                | Coders extract information about illicit drug involvement from free-text fields and code.                 |
| Concurrent non-opioid extramedical pharmaceutical use | Response Options: Not stated, extramedical use present (based on the presence of at least one of the pharmaceutical groups coded for; non-opioid analgesics, benzodiazepines, anti-depressants, anti-psychotics, anti-convulsants, opioid-dependence treatments, pharmaceutical stimulants, other medication)                                      | Not stated/ present if any one of the pharmaceutical drugs listed are reported in the ePCR  | Coders extract information about extramedical use of pharmaceutical drugs from free-text fields and code. |
| Co-morbid mental health symptoms                      | Response Options: Not stated, present (based on the presence of at least one of; symptoms of anxiety, depression, psychosis, social / emotional distress, symptoms associated with disorders with clinical evidence, and mental health unspecified). Symptomology is reported rather than diagnoses, as paramedics do not diagnose mental illness. | Recorded as binary option of not stated/ present if any one co-morbid symptoms listed are reported in the ePCR                        | Coders extract information from free-text fields and code.  |
| Co-morbid suicidal thoughts or behaviours             | Response Options: Not stated, present (based on the presence of at least one of; suicidal ideation, suicide, suicide attempt)  | Recorded as binary option of not stated/ present if any one co-morbid suicidal thoughts or behaviours listed are reported in the ePCR | Coders extract information from free-text fields and code.  |
| Co-morbid non-suicidal self-injury                    | Response Options: Not stated, present (based on the presence of at least one of;   | Recorded as binary variable of not stated or present based on either threat of non-suicidal   | Coders extract information from free-text fields and code.  |

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|   | threat of non-suicidal self-injury, non-suicidal self-injury)   | self-injury or non-suicidal self-injury documented in the ePCR |  |
| Unintentional alcohol and other drug overdose | Where information provided in the patient care records by the paramedic suggests that the person did not intend to die (though they may have intended to take the substance). Overdose (also referred to as <i>AOD poisoning</i> ) determined using GCS < 9 or 10x dose (for pharmaceuticals), however must also be evidence available to suggest poisoning was unintentional to be coded as yes. | Recorded as binary variable of not stated, yes                 | Coders extract information from free-text fields and code. |
| Undetermined intent overdose                  | Where information provided in the patient care records by the paramedic means that the coding team cannot determine if the overdose was unintentional (also referred to as ' <i>accidental</i> ') or if there was suicidal intent.  | Response Options: Not stated, yes                              | Coders extract information from free-text fields and code. |
| Past history of psychiatric issues            | Response Options: Not stated, present (based on the presence of at least one of; past history of mood disorder (including anxiety, depression, PTSD, Bipolar and OCD), psychosis, suicidal ideation, suicide attempt, alcohol and other drug misuse).   | Response Options: Not stated, present                          | Coders extract information from free-text fields and code. |

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