Royal Commission
into Defence and Veteran Suicide

UNDERSTANDING AND ENHANCING RESPONSES TO SUICIDE CRISES INVOLVING CURRENT SERVING AND EX-SERVING MEMBERS OF THE ADF: A DATA LINKAGE STUDY

Research Paper

April 2024

The Royal Commission into Defence and Veteran Suicide was established by Letters Patent on 8 July 2021. Amendments to the Letters Patent were subsequently issued on 10 April 2022 and 7 December 2023.

Mr Nick Kaldas APM, the Hon James Douglas KC and Dr Peggy Brown AO have been appointed as Royal Commissioners. They are required to provide an interim report by 11 August 2022, and a final report by 9 September 2024.

The Royal Commission intends to release consultation, research and background papers. This research paper has been prepared by the Queensland Centre for Mental Health Research for the information of Commissioners and the public. The views expressed in this paper are not necessarily the views of the Commissioners.

Content Warning

Please be aware that this research paper contains material dealing with suicide and suicidality that could be distressing for some people.

If this research paper raises any questions or issues for you, please contact the Royal Commission.

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QCMHR
Queensland Centre for
Mental Health Research

Understanding and enhancing responses to suicide crises involving current serving and ex-serving members of the Australian Defence Force (ADF): a data linkage study of veterans subject to a suicide related call to police and ambulance services in Queensland

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Acronyms and Abbreviations

ABS	Australian Bureau of Statistics
ADF	Australian Defence Force
AIHW	Australian Institute of Health and Welfare
ATC	Anatomical Therapeutic Classification
CI	Confidence Interval
CIMHA	Consumer Integrated Mental Health Application
DLQ	Data Linkage Queensland
DD	Department of Defence
DDVA	Department of Defence and Veterans' Affairs
DSM-5	Diagnostic and Statistical Manual Fifth Edition
DVA	Department of Veterans' Affairs
DV-C	Defence and Veteran Comparator Cohort
DV-S	Defence and Veteran Suicidality Cohort
ED	Emergency Department
EDC	Emergency Department Collection
GA-S	General Adult Community Suicidality Cohort
GMRF	Gallipoli Medical Research Foundation
HREC	Human Research Ethics Committee
ICD-10-AM	International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification
MBS	Medicare Benefits Schedule
NDI	National Death Index
NHMRC	National Health and Medical Research Council
PBS	Pharmaceutical Benefits Scheme
PHA	Public Health Act
PiP	Partners in Prevention
PMKeyS	Personnel Management Key Solution

PTSD	Post-Traumatic Stress Disorder
QAS	Queensland Ambulance Service
QCMHR	Queensland Centre for Mental Health Research
QDR	Queensland Death Register
QHAPDC	Queensland Hospital Admitted Patient Data Collection
QPS	Queensland Police Service
QFMHS	Queensland Forensic Mental Health Service
RPBS	Repatriation Pharmaceutical Benefits Scheme
SMRs	Standardised Mortality Ratios
SURE	Secure Unified Research Environment

1 Executive Summary

1.1 Background

Suicidality (suicide ideation, plans, and attempts) is a source of morbidity and often precedes suicide death. It therefore presents as an important opportunity for proactive suicide prevention interactions to alleviate suffering for veterans, their families, and communities. Delivery of timely, targeted, and caring responses is necessary for individuals experiencing suicidality, but the evidence base about suicidality among veterans in Australia has been limited. This study provides information on the demographics and health of veterans who have had a suicide-related contact with police, paramedics or both, and their interactions and pathways through the health system.

Specifically, this report examines:

- Frequency of suicide-related contact between veterans and police or paramedics;
- Demographic and health characteristics of veterans who were subject of a response;
- Service use patterns 12-months before and after a suicide-related call to police or paramedics, including use of pharmaceuticals, with particular reference to those with a diagnosis of post-traumatic stress disorder (PTSD); and
- Mortality of veterans who were subject to a suicide-related call to police or paramedics.

1.2 Methods

This study reports findings from a linked dataset of administrative health data based in Queensland (the Partners in Prevention dataset). This is a population-wide study of individuals who were the subject of a suicide-related call to police or paramedics in Queensland over a three-year period from 1 February, 2014 – 31 January, 2017, linked to state-based and Commonwealth health records that span 1 February, 2013 – 31 January, 2018, to allow examination of health records spanning the period at least 12 months pre- and post- an index suicide related contact for any individual. Veterans were identified through linkage with Department of Defence personnel records. Three cohorts are described in this report:

(i) a cohort of veterans who were the subject of a suicide-related contact with police or paramedics (DV-S);

(ii) a comparator cohort of veterans who were not the subject of a suicide-related contact with police or paramedics (DV-C); and

(iii) a comparator cohort of civilian adults who were the subject of a suicide related call (GA-S).

Analyses are predominately descriptive, with inferential statistics, odds ratios, Standardised Mortality Ratios (SMRs), and logistic regression models used selectively throughout.

1.3 Key findings

1.3.1 Rates of contact with police and paramedics and risk of death

- 1625 veterans (current and ex-serving Australian Defence Force members) were identified as having a suicide related engagement with police or paramedics over the three-year period we examined, out of an estimated population size of veterans in Queensland of 82,449 over the study period.
- The average rate of contact was one new veteran every 16 hours (i.e., not including veterans who re-presented). Extrapolating this finding to a national profile, we estimated that the average rate of contact nationally, was one new veteran every four hours.
- Veterans (both current and ex-serving members) in Queensland had 24% higher odds of having a suicide-related contact with police or paramedics than a civilian adult.
- Overall, 5.2% (n=85) of the total DV-S cohort died, due to any cause, and 2.6% (n=42) of the total DV-S cohort died due to intentional self-harm.
- Those that had a suicide-related contact were more likely to die, due to any cause, than the general population of Queensland. As measured by age-adjusted SMRs, the rate of death of the veteran cohort who experienced suicidality was estimated at nearly 8 times that of the general civilian population for males, and in excess of 10 times for females.

1.3.2 Demographic and occupational characteristics

- Out of the 1625 veterans identified as part of the DV-S cohort, complete personnel data was available for 1168 individuals. Out of individuals for whom complete information was available, approximately 4 out of 5 (83% n= 973) were ex-serving and nearly 1 in 5 (17% n= 195) were current serving at their index contact with police or paramedics.
- The median age of the DV-S cohort was 41 years, 80% (n=929) were male, and 8% (n=96) were Aboriginal and /or Torres Strait Islander people.
- The majority of individuals had Army (77%, n=899) as their most recent area of service at the time of their suicide related contact. This over-representation may relate both to the higher number of personnel employed in Army service relative to Navy and Air Force and the particular over representation of Army personnel in Queensland.

1.3.3 Health and mental health

- 83% (n=968) of the DV-S cohort were estimated to have a probable mental health diagnosis, and 51.6% (n=603) had a specific mental health diagnosis recorded in the Consumer Integrated Mental Health Application (CIMHA), Queensland's public mental health services database.
- 94% (n=1102) of the DV-S cohort had a record of at least one physical health condition that had resulted in a presentation to a hospital or emergency department.
- The most common diseases experienced by veterans were digestive, musculoskeletal, and circulatory diseases. In comparison to the GA-S (matched) cohort, the profile of physical health conditions among the DV-S cohort resulting in a presentation to a hospital or emergency department appeared similar. However, the most notable divergence related to musculoskeletal conditions, which were more prominent among the DV-S cohort (33.9%, n=396 in DV-S compared to 23.9%, n=239 in GA-S (matched)).

- Using the more conservative figure to estimate mental health diagnosis, based on diagnosis recorded in CIMHA, half (50%, n=583) of the cohort had both a recorded mental health diagnosis and physical health co-morbidity.

1.3.4 Use of health services before and after a suicide-related contact with police or paramedics

- High rates of public health services utilisation were evident among the DV-S cohort. More people had contacts with these services after a suicide related contact with police or paramedics than before.
- The majority of individuals in the DV-S cohort who had contact with a public health service had a contact within 24 hours after their index police or paramedic contact, with the proportion of individuals using these services reducing within a month following the index contact.
- Use of Medicare funded services by the DV-S cohort did not vary in the 12 months before (84%, n= 982) versus after a contact (84%, n=979).
- High rates of mental health services use were evident among the DV-S cohort, this included the use of both public and private mental health services.
- A higher proportion of the DV-S cohort engaged with public mental health services compared to private mental health services.
- Substantially higher rates of public health services use were evident in the DV-S cohort in comparison to the DV-C cohort. Minimal differences in rates of Medicare subsidised services between DV-S and DV-C cohorts was evident.
- 44.9% (n=525) of the DV-S cohort had a Medicare subsidised mental health related contact with a psychologist or allied health professional (32.9%; n=384, within the 12 months pre- or post- an index suicide related contact with police or paramedics). This dropped to 35.7% (n=102) of those who also had a recorded diagnosis of post-traumatic stress disorder (PTSD; 23.4%, n=67 in the 12 months pre- or post- an index contact).

1.3.5 Medication dispensing and polypharmacy

- 93.6% (n=1,093) of the DV-S cohort had been prescribed an N class medication (i.e., medicines relating to the nervous system, including pain relievers and drugs used to treat neurological and psychiatric conditions) over the five-year period examined (87%; n=1019), in the 12 months pre- or post- an index suicide related contact).
- Prescribing rates within the DV-S cohort for antidepressants was 81% (n=943), for opioids was 66% (n=777), and for anxiolytics was 59% (n=690), over the five-year period examined.
- Over two thirds (68.2%, n=796) of the DV-S cohort had an instance of polypharmacy prescribing, i.e., the concurrent prescription of two or more N class medications at the Anatomical Therapeutic Chemical (ATC) Classification third level (a more granular grouping based on chemical, pharmacological or therapeutic properties as per World Health Organization, ATC, classification). By comparison, only 16.9% (n=881) of the DV-C cohort had an instance of polypharmacy prescribing and less than two-thirds of the GA-S (matched) cohort (63.5%; n=2923) had an instance of polypharmacy prescribing. The difference in polypharmacy between the DV-S and the GA-S (matched) cohort (i.e., veterans compared to adult civilians who were subjects

to a suicide-related contact with police or paramedics) is specifically explained by the higher rates of prescribing of three or more concurrent N class medicines in the veteran (i.e., DV-S) cohort.

- Almost all individuals within the cohort who had a recorded diagnosis of PTSD, had at least one N class medication prescribed, with 96% (n=275) having had an antidepressant prescribed, 84% (n=239) having an anxiolytic prescribed, 76% (n=218) having at least one opioid prescription and 54% (n=155) having a hypnotic or sedative prescribed.
- 87% (n=249) of individuals with a recorded diagnosis of PTSD had a record of concurrent prescription of two or more N class medication types.
- Prescription of benzodiazepines, specifically, was higher in the DV-S cohort (67.2%; n= 784) in comparison to the GA-S (matched) cohort (63.2%; n=2903) and DV-C cohort (20.0%; n=1043). Rates were highest among individuals within the DV-S cohort with a recorded diagnosis of PTSD (88.4%; n=253).

1.3.6 Time of death following a suicide-related contact with police or paramedics

- The time of death, due to any cause, for the DV-S cohort following an index contact showed that a disproportionately high proportion of those who died (31%, n=26), died within 24 hours of an index contact. The majority of those who died (60, n=51), died more than one month after an index contact.

1.4 Implications

Veterans are at higher risk of a suicide related contact with police or paramedics than the general adult population. Those who are subject to a suicide related contact are also at increased risk of dying due to any cause. These findings indicate that police and paramedics play a key role in the first response to suicidality of veterans.

Prevalence of both mental and physical health conditions were far higher among veterans experiencing suicidality than those who did not, highlighting the importance of holistic responses that address both physical and mental health needs. Substantial use of public and private health services was evident among veterans who experienced a suicide-related contact with police or paramedics. In particular, many received responses from a range of public sector health services within 24 hours of a suicide-related contact.

The relatively high mortality of veterans within the 24 hours following a suicide related police or paramedic response highlights the critical importance of the period immediately prior. General practitioners and other Medicare funded providers were more likely to have been the health services in contact with these veterans in the 30 days prior to their suicide related contact with police or paramedics compared with public health sector providers.

Evidence of high rates of psychotropic medication prescribing and polypharmacy was apparent. Individuals with PTSD diagnosis had higher rates of psychotropic medication prescribing and polypharmacy than the rest of the DV-S cohort as well as the veteran and general population comparator groups. At the same time, contact with psychology or allied health services was well below prescribing rates for mental health conditions, and lower again among those with a PTSD diagnosis. This is important given that there are psychological therapies with strong evidence of efficacy for the treatment of PTSD, and prescription of benzodiazepines, in particular, is strongly cautioned against. These findings support the need to ensure that veterans are receiving appropriate evidence-based treatment that is efficacious, and that use of psychotropic medication is well considered.

2 Background

Suicidality includes suicide ideation, plans, and attempts and commonly precedes suicide death.[1] Suicidality is far more common than suicide death and is a considerable source of suffering, with widespread impacts on individuals, families, communities and health services. Articulations of suicidality therefore present an opportunity for caring responses and an understanding of suicidality is critical to alleviating the suffering of mental health problems and to suicide prevention. Evidence suggests that the experience of suicidality is higher among both male and female ex-serving veterans in comparison to the Australian community.[2] Despite this significance, there remains very limited understanding of suicidality of veterans.[3-5]

Delivery of timely, targeted and caring responses is necessary for individuals experiencing suicidality, but accessing appropriate supports can be complicated by a range of factors, including complexities inherent in Australia's intersecting mental health systems and veteran specific barriers to help-seeking. Mental health services delivered to individuals can be described as dividing into four categories: (i) primary and specialised clinical ambulatory mental health care services; (ii) specialised mental health community support services; (iii) specialised bed-based mental health care services; and (iv) medicines and procedures.[6] Mental healthcare for veterans is delivered both through Department of Defence and Department of Veterans' Affairs funded and run services,[7] including as part of comprehensive medical treatment available for serving members.[8] Veterans can also access services via state and federally funded services as well as private health care providers available to the general Australian population.[7, 8] Civilian health services may be accessed by current and ex-serving members of the ADF either through, or independently of, Department of Defence and Department of Veterans' Affairs services and funding mechanisms. For veterans residing in relatively well serviced metropolitan regions, therefore, a wide range of mental health care choices is potentially available, including those that sit outside Department of Defence or Veterans' Affairs infrastructures. However, this complexity risks suboptimal service delivery arising through institutional restrictions on information sharing and the complexity of care coordination across services that can undermine the delivery of integrated care.

Suicide crises can result in a call to emergency services (either police or paramedics, including co-response services) and thus represent a critical 'touchpoint' with individuals who may be at risk of suicide.[9] The predominant pathway used by first responders in Australia for persons who are in a suicidal crisis, and thus deemed at high risk of suicide, is transportation to a hospital emergency department (ED), although alternative care models are increasingly utilised in many jurisdictions.[10-12]

The link between physical and mental health disorders is increasingly recognised.[1,13,14] While there is an overall stronger association between mental health diagnoses and suicidality and suicide death, physical illnesses are known to be independent risk factors for suicidality and suicide death.[1, 13] The health care needs of those experiencing multimorbidities add another layer of complexity to receiving effective care, both for veterans in need and service providers. In this context, where multiple specialist services may be required to meet a range of needs, general practitioners, other primary care professionals, and care coordinators play unique and crucial roles.

Despite evidence of increased risk of mental health problems among veterans, help seeking does not necessarily accord with rates of mental health problems experienced.[15, 16] Prevalence estimates of mental health problems among veterans vary, with rates influenced by methods of identification, measurement, pre-existing conditions and

the nature, type, method, phase and length of service and transition to community.[5,17] In particular, evidence suggests that those who have transitioned from full-time serving to ex-serving or reserves experience higher rates of mental health problems than do current-serving members and in comparison to the Australian community.[5,16] The *Pathways to Care* report has highlighted that initial engagement with services among veterans with mental health problems is high, but that overall service engagement is suboptimal, in terms of retention, satisfaction and receipt of evidence-based care.[15] Barriers to help-seeking also include cost and stigma, concern some veterans feel that they may be viewed or treated differently, or perceived risks that disclosure could be career limiting.[15] Military cultural awareness and competence of service providers has been identified as an important factor influencing treatment experience of veterans and treatment effectiveness.[18-20]

Using linked data, this report investigates demographic and health charactersitics of a sample of veterans who experience suicidality, their interactions and pathways through the health system, and outcomes.

3 Aims

This report aims to contribute to the work of the Royal Commission into Defence and Veteran Suicide through an analysis of linked administrative data gathered from State and Commonwealth funded health services accessed by veterans who experienced a suicide crisis resulting in a police or paramedic response within Queensland during the three-year period 1 February, 2014 – 31 January, 2017. Specifically, this report examines:

- Frequency of suicide-related contact between veterans and police or paramedics;
- Demographic and health characteristics of veterans who were subject of a response;
- Service use patterns 12-months before and after a suicide-related call to police or paramedics including use of pharmaceuticals, with particular reference to those with a diagnosis of post-traumatic stress disorder (PTSD); and
- Mortality of veterans who were subject to a suicide-related call to police or paramedics.

4 Methods

4.1 Study design and context

This study is based on data gathered on Queensland veterans who were identified within a large dataset, the Partners in Prevention (PiP) data linkage study.[21, 22] Originally funded by Queensland Health, administrative health, police and ambulance datasets were linked to improve the understanding of Queenslanders experiencing suicide crisis who were the subject of contact with police and/or paramedics to inform service system improvements and enhance outcomes. This is a population-wide study of individuals who were the subject of a suicide-related call over a three-year period from 1 February, 2014 – 31 January, 2017, linked to health records that span 1 February, 2013 – 31 January, 2018, to facilitate understanding of contacts at least 12 months before and after an index event. Through payment code information, the study investigators initially identified a "defence-related" cohort (i.e., a cohort comprising veterans as well as family members eligible for veteran health benefits). This provided the unique and important opportunity to study suicidality and suicide death among veterans in the Australian jurisdiction with one of the largest veteran populations.[23] The study reported on here: "Understanding and enhancing responses to suicide crises involving current serving and ex-serving members of the Australian Defence Force (ADF)", originally commenced with funding from the Defence Health Foundation and has continued through funding support by the Royal Commission into Defence and Veteran Suicide. It improves on the initial method of identifying veterans through further linkage to Department of Defence Personnel Management Key Solution (PMKeyS). Linkage to PMKeyS ensured more comprehensive identification of veterans and the disaggregation of veterans from family members. The latter group is not included in the analysis contained in the current report.

4.2 Definitions

4.2.1 Veteran

The term veteran is defined as per the definitions used by the Australian Institute of Health and Welfare, as "A person who is serving or has served at least one day in the ADF since 1 January 1985," and includes both permanent and reserve members.[24] Identification of veteran status is based on linkage to PMKeyS.

Within this cohort of veterans, we identify four sub-groups: (i) individuals who were current serving (permanent); (ii) individuals who were current serving (reserve); (iii) individuals who were ex-serving (at least one day permanent serving) and (iv) individuals who were ex-serving (reserve service only). Individuals are classified into one of these four groups based on their service status at the time of their index contact with police or paramedics (i.e., the first contact with police or paramedics over the study period).

4.2.2 Suicidality

Suicidality is defined based on an individual having a 'suicide-related contact' with police or paramedics in Queensland over the three-year period February 1, 2014 – January 31, 2017. Suicide-related contacts were

identified through dispatch codes and keyword searches within Queensland Police and Queensland Ambulance Service records identifying an articulation of any suicidal behaviour. Further details on the method used for identification can be found in Meurk et al., 2022.[21]

4.3 Cohort description

Where relevant, the findings presented in this report on (i) veterans who had a suicide-related contact with police or paramedics are provided alongside comparative information from one of two other cohorts: (ii) a comparator cohort of veterans and (iii) a comparator cohort of Queensland adults who were not veterans over the period examined. These are as follows:

(i) Veterans who had a suicide-related police or paramedic contact are referred to as the Defence and Veteran – Suicidality (DV-S) cohort. Our primary focus for analysis centres around this cohort.

(ii) Veterans who did not have a suicide-related police or paramedic contact are referred to as the Defence and Veteran – Comparator (DV-C) cohort. This comparator cohort was derived by the Australian Institute of Health and Welfare to match the DV-S cohort at a rate of four DV-C individuals to one DV-S identified individual, based on identification of a Queensland postcode of residence during the period of interest, and matching on age and sex characteristics of the DV-S cohort. While there is no universal optimum for selecting matching ratios, in general, there is a substantial reduction in bias as matching ratios shift from 1:1 to 1:3 and the benefits of adding further controls generally plateau at a ratio of 1:4. By comparing this group to the DV-S cohort, matched in terms of age and sex, we intended to adjust for selection bias in the sampling frame from which the DV-C cohort was selected so that descriptive comparative statistics were not affected by these confounders. Queensland postcode of residence was a necessary delimiter in order for results on health services contacts with Queensland public health sector services to be valid.

(iii) Selective comparisons have been undertaken with the cohort of adult community members who experienced suicidality that resulted in a contact with police or paramedics and is referred to as the General Adult – Suicidality (GA-S) cohort. Analyses in sections 5.1 and 5.5 are based on an adult (>17 year old) population comparator. A matched cohort, matched on age, sex and Aboriginal and/or Torres Strait Islander identity, at a rate of 4:1, was derived for additional analysis, and is designated as “GA-S (matched)” to enhance clarity.

4.4 Linkage process

The linkage for this study was undertaken by Data Linkage Queensland and the Australian Institute of Health and Welfare. Use of third-party services ensured that the separation principle was maintained to preserve individual privacy. Further details and explanation of the regulatory and ethical aspects of data linkage studies are provided in Appendix A.

4.5 Structure of linked dataset

The structure of the linked dataset is depicted in Figure 1. It depicts the three cohorts that have been created from the linkage of the original Partners in Prevention linked dataset to PMKeyS; specifically, to identify veterans who experienced suicidality resulting in a contact with police and paramedics (DV-S) in comparison to adult civilians who had a suicide related contact (GA-S) and a comparator group of veterans who did not have a record of contact with police or paramedics (DV-C).

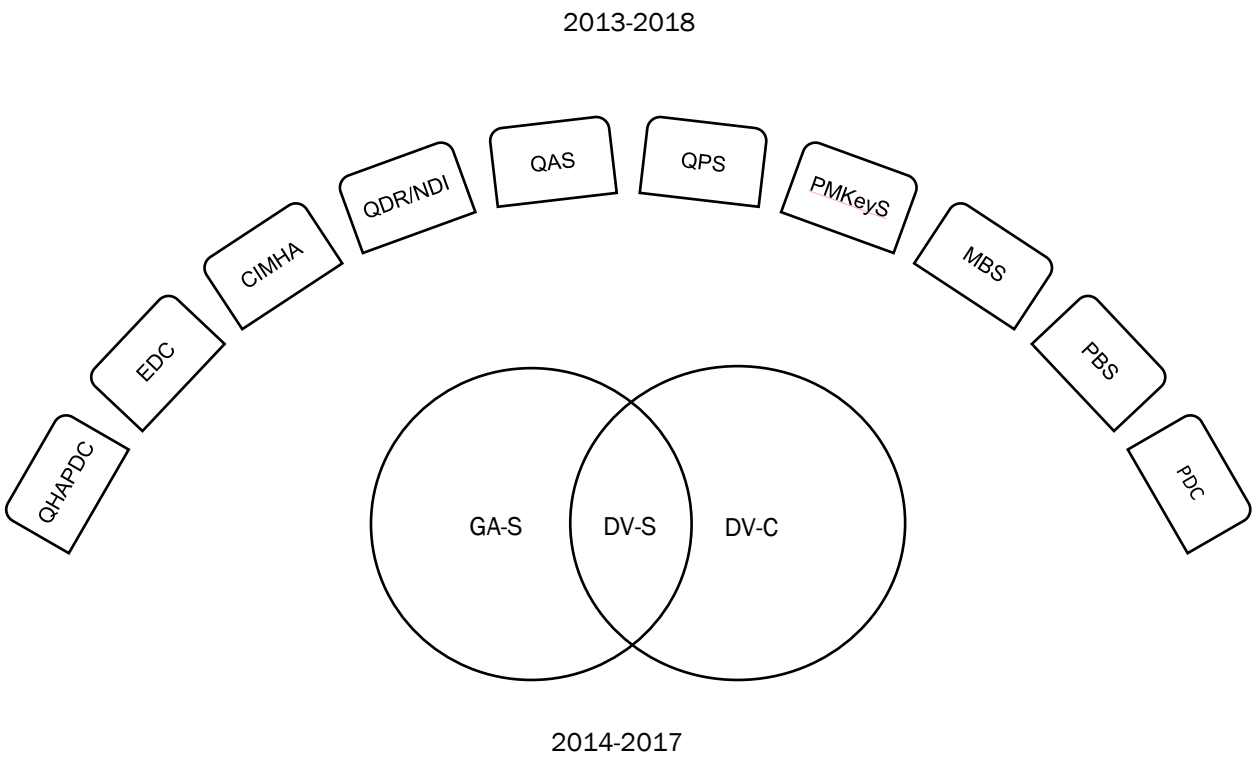


Figure 1 Structure of linked dataset GA-S: General Adults who experienced suicidality; DV-S: Veterans who experienced suicidality; Veteran comparator cohort; QHAPDC: Queensland Hospital Admitted Patients Data Collection; EDC: Emergency Department Collection; CIMHA: Consumer Integrated Mental Health Application; QDR/NDI: Queensland Death Register/National Death Index; QAS: Queensland Ambulance Service; QPS: Queensland Police Service; PMKeyS: Personnel Management Key Solution; MBS: Medicare Benefit Schedule; PBS: Pharmaceutical Benefits Scheme; PDC: Perinatal Data Collection.

4.6 Variables and analysis

This section provides a description of variables used, and analyses conducted. This description is structured according to the structure of findings subsequently presented in this report.

4.6.1 Rates of contact with police and paramedics

4.6.1.1 Variables used

- Count of individuals within the PiP cohort matched to PMKeyS record (n=1625).
- Count of individuals within the PiP cohort >17 years who did not match to PMKeyS record.
- Denominator for the veteran population was estimated by combining publicly available data for Queensland in ADF annual reports and Department of Veterans' Affairs (DVA) annual reports.[25-30] Data used for these calculations are shown in Appendix B.
- Denominator for the Queensland adult population is derived from the Australian Bureau of Statistics (ABS), with veterans subtracted. The average population over the three-years examined was calculated as 3,753,092.[31]

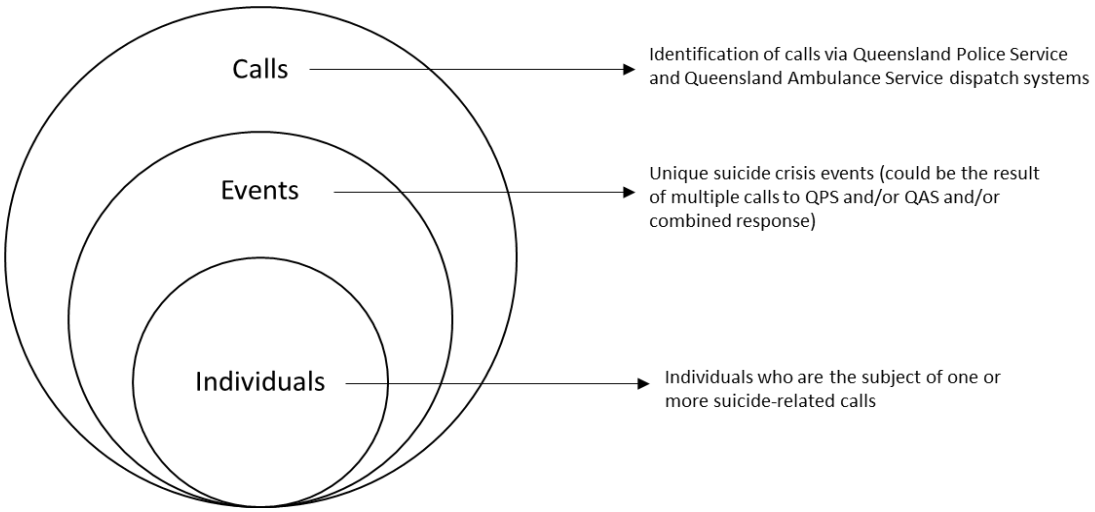
4.6.1.2 Analysis

- Counts to estimate contact rate by service status (current serving permanent; reserve, ex-serving any permanent; reserve only) were adjusted proportionally upwards to account for missing data due to incomplete PMKeyS data. Counts were averaged over a three-year period, and normalised to be expressed in length of time per contact with a single individual. Estimate was extrapolated to a national estimate using data shown in Appendix B.
- Odds ratio of a suicide related call relating to a person within the DV-S cohort is calculated in comparison to the GA-S.

4.6.1.3 Details

Individuals who comprise the dataset examined have been identified via Queensland Police Service and Queensland Ambulance Service dispatch systems (Figure 2). Due to limitations in Queensland Police Service calls data, all individuals identified in the dataset are linked to one or more calls, but not all calls data are linked to an individual record. Therefore, count data represent the *lower bound estimate* for this cohort.

Figure 2 Schema of data structure



4.6.2 Demographic variables and service characteristics

4.6.2.1 Variables used

- Data on age, sex, and Aboriginal and/or Torres Strait Islander identity used all available data across all linked datasets.
- Area of service and service status were accessed from PMKeyS.

4.6.2.2 Analysis

- Percentages calculated out of individuals for whom complete PMKeyS data are available (n=1168). Reason for exclusion of n=457 individuals was due to missing data on service status at time of index event.
- Odds ratios are calculated to examine differences between sexes and service status at time of index event.

4.6.2.3 Details

Demographic data (age, sex, Aboriginal and/or Torres Strait Islander identity) are aggregated across multiple datasets. Age is identified as the age of the individual at their index contact (first recorded contact with police or paramedics in study period), sex is identified as the mode (most common) entry, if there is a discrepancy. Aboriginal and/or Torres Strait Islander identity is identified based on any record identifying a person as being of Aboriginal and/or Torres Strait Islander background, the reason for this being known limitations in data collection that result in undercounting of individuals of Aboriginal and/or Torres Strait Islander cultural background.[32] Area of service and service status are as at an individual's index contact. Because the DV-C cohort does not, by definition, have an index contact, comparator data for age is as at a randomly selected timepoint over the three-year period in which the cohort was identified, service status and area of service is assessed as at the most recent date recorded.

4.6.3 Health characteristics

4.6.3.1 Variables used

- Hospital presentations and admissions, with ICD-10 code and date, identified within the EDC or QHAPDC.
- Diagnosis (ICD-10), provisional or confirmed, with date, identified within CIMHA.

4.6.3.2 Analysis

- Probable mental health diagnosis was estimated based on whether a person had *either* a mental health diagnosis recorded within CIMHA *or* both one or more MBS items billed for an identified mental health service and one or more PBS N-class (nervous system) medication. These are medicines relating to the nervous system, including pain relievers and drugs used to treat neurological and psychiatric conditions[33,34].
- Specific (or recorded) mental health diagnoses are identified based on diagnostic information in CIMHA as per groupings given below, based on mapping of ICD-10 to DSM-5.[35]
- ICD-10 physical health presentations are grouped by ICD-10 chapter and sub-chapter.
- Percentages calculated for DV-S cohort are out of the cohort with complete PMKeyS information (n=1168), unless noted otherwise.
- To quantify the level of physical health comorbidities, non-physical health conditions (i.e., F-coded – mental health – presentations from EDC and QHAPDC data) were excluded unless another diagnostic code was applied to the presentation as well. Z, U, and R coded presentations (factors influencing health status and contact with health services, codes for special purposes, and symptoms, signs and abnormal clinical and laboratory findings,

not elsewhere classified, respectively) were excluded from some analyses (unless another diagnostic code was applied to the presentation), as identified in text.

- Chi-squared tests of association were used to compare mental health diagnoses with the GA-S (matched) cohorts.
- Multivariable logistic regression was undertaken to examine associations with receiving a probable mental health diagnosis.
- Measurements of physical and mental health comorbidities use the estimate of a specific mental health diagnosis being recorded in CIMHA, and thus are conservative.

4.6.3.3 Details

For those with a CIMHA record, mental health diagnoses were classified as per the DSM-5.[35] A high level categorisation was applied distinguishing mental illnesses from substance related and addictive disorders, personality disorders, and neurodevelopmental and neurocognitive disorders. The grouping of mental illnesses includes: depressive disorders, anxiety disorders, trauma and stressor related disorders, schizophrenia spectrum and psychotic disorders, bipolar and related disorders, obsessive compulsive disorders, and other disorders not classified into the other aforementioned higher level categories. Substance use disorders group harmful use or dependence of any substance, while substance induced disorders group intoxication and withdrawal state. Comorbidities were included, such that each individual could be counted once per level in any category represented.

Comparative analysis with the DV-C cohort, for mental health and physical health characteristics resulting in hospitalisation, could not be conducted due to very low rates of contact by the DV-C cohort with public health services, resulting in negligible counts for many items.

4.6.4 Health services use

4.6.4.1 Variables used

Health services use data were extracted as follows:

- Hospital presentations and admissions, with ICD-10 code, and date identified within the EDC or QHAPDC.
- Provision of service, with date identified within CIMHA (Note: Provisions of service could include those where the consumer did not participate – i.e., the service provided for, or in reference to, a consumer did not require the consumer be present).
- Treating team, with date as identified in CIMHA.
- Billed items, with date as identified in MBS and PBS. PBS items are dated based on date of supply.

4.6.4.2 Analysis

- Health services contacts/use of services were measured per individual not per contact.
- Specific time limits in reference to the index contact were applied to analysis and are described in the text in reference to the specific analysis to which they apply, as the time limits applied varied. For example, some analysis pooled data across the full five-year period, while other analysis applied specific cut-offs (e.g., restricting to a standardised timeframe of between 12-months pre- and 12-months post- an index contact).
- Mental health services use was classified according to a taxonomy of services developed for this project (Figure 3).
- Percentages are calculated for DV-S out of the cohort with complete PMKeyS information (n=1168).

4.6.4.3 Details

The approach taken to developing the mental health taxonomy was informed by a combination of the following four elements:

1. The National Mental Health Service Planning Framework;[36,37] an agreed national taxonomy of mental health services across the range of service delivery, and other relevant documentation pertaining to mental health services delivered via federal funding mechanisms;
2. Review of relevant documentation pertaining to mental health services in Queensland;
3. Consultation with service and clinical experts; and
4. Available data within the Partners in Prevention dataset.

The research team developed and designed a hierarchical mental health service taxonomy (Figure 3) to classify mental health service delivery and use into homogeneous classes based on common clinical characteristics, service elements, team functions and activities and service features. The mental health service taxonomy framework is mapped from a system-level and describes and organises the range of public and private, federally funded and state-based mental health services. For the purposes of this analysis, presentations to an emergency department, to which an ICD-10 F code (mental health related) has been applied, have been classified as a 'public mental health service'.

As shown in Figure 3, the first level of the taxonomy splits the system according to public and private mental health service providers. With the exception of mental health related emergency department presentations and hospital inpatient admissions, classifications of services within the public mental health system were based on treating team information located within CIMHA. CIMHA is a repository of data regarding individuals who have contact with public mental health services within Queensland Health. Consequently, this database does not include data on contacts with private sector or community-based non-government organisations. However, public mental health services do include mental health services delivered in community settings (i.e., outreach services). As such, the taxonomy includes a category referred to as community-based mental health services as a subset of clinical ambulatory services. Table 1 provides examples of specific services mapped to elements of the public mental health service taxonomy.

Table 1 Public mental health service taxonomy categories with examples

Taxonomy second and third tier categories		Example services
Bed-based services	Hospital inpatient admitted	Acute Inpatient Units
	Residential care	Community Care Units
Clinical ambulatory	Community-based mental health services	Mobile Intensive Rehabilitation Team
		Homeless Health Outreach Team
	Hospital non-admitted/outpatient	Continuing Care Teams
		Day Programs
	Specialised assessment	Consultation Liaison Psychiatry Services
		Community Forensic Outreach Services

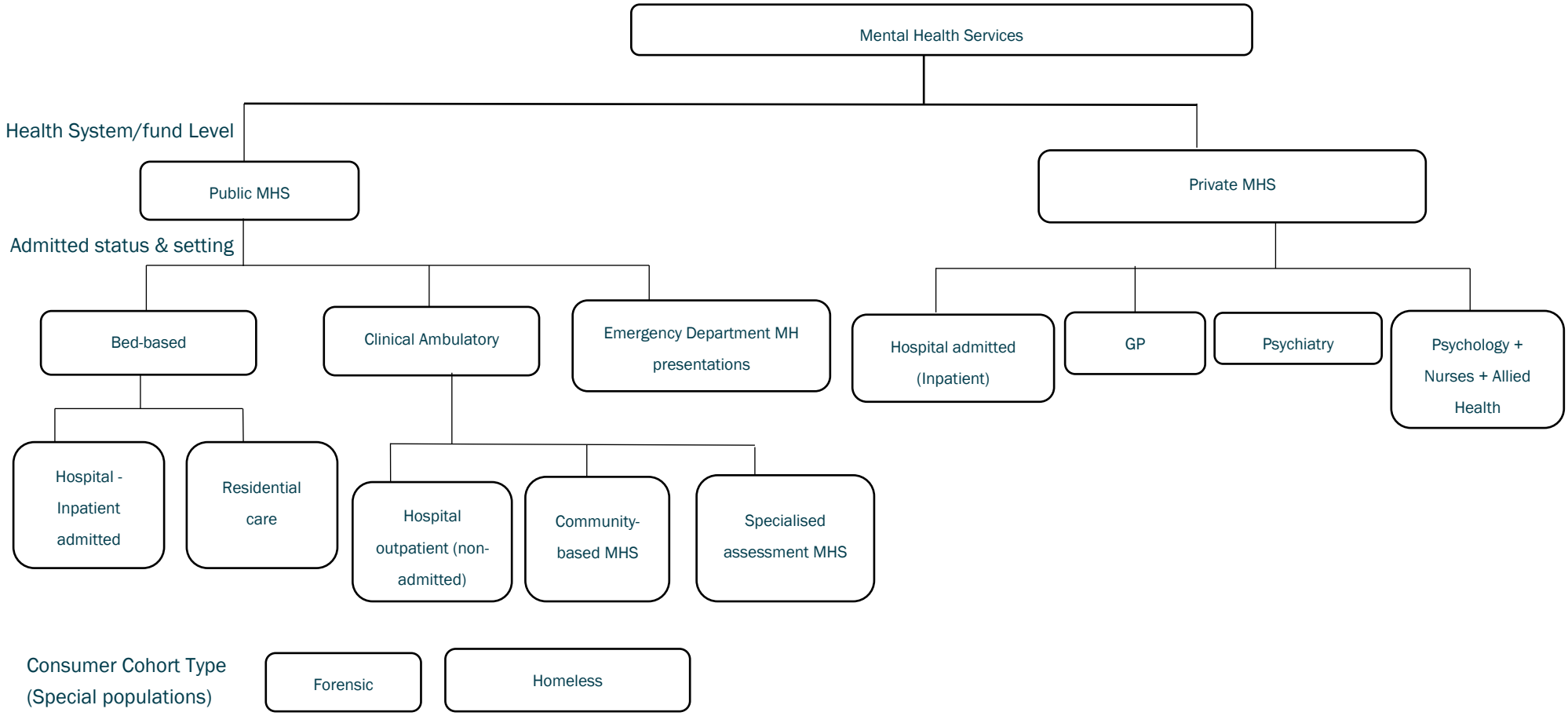


Figure 3 Mental health service taxonomy

4.6.5 Pharmaceuticals

4.6.5.1 Variables used

- PBS items, structured by body-system and subclasses, as specified by PBS, based on World Health Organization ATC classification system, with date of supply.[33,34]

4.6.5.2 Analysis

- Polypharmacy estimates concurrent use, following the method set out in the literature,[38-40] described further below.
- Chi-squared tests of association were calculated to compare DV-S and DV-C cohorts, as well as the DV-S|PTSD and DV-S|no PTSD sub-cohorts.
- Percentages are calculated for DV-S out of the cohort with complete PMKeyS information (n=1168).

4.6.5.3 Details

Polypharmacy was measured first by calculating each drug/medicines estimated period of exposure (EPE) time from the date of dispensing time to the point at which 75% of the sample had received a subsequent supply of the same medication. EPE's were estimated separately for the total DV-S, DV-C, and DV-S|PTSD cohorts. PTSD was identified via CIMHA, EDC and QHAPDC for this analysis. This is an established method, accounting for variability in adherence, dose changes, and seasonality.[38,40] Polypharmacy was then measured based on an estimated overlap in the EPE of at least two medicines of 14 days or more.[39,40] For the purposes of analysis contained here, medicines were grouped according to different classes, based on WHO/PBS classifications of body system and mode of action. Thus, estimates of polypharmacy reference the concurrent use of categories of medicines at the levels described. Polypharmacy of individual medicines is likely to be higher.

4.6.6 Mortality

4.6.6.1 Variables used

- Counts of death, due to any cause, and due to intentional self-harm, specifically, are based on National Death Index data.
- Denominator for DV-S cohort used in SMR is the total cohort identified via linkage to PMKeyS (n=1625).
- Denominator for the DV-S cohort used in the multivariable logistic regression is cohort for whom complete information is available (n=1168).
- Denominator for Queensland general adult population is derived from ABS.[31]

4.6.6.2 Analysis

- Odds ratio calculated to estimate odds of deaths due to intentional self-harm among DV-S versus GA-S cohort.
- Standardized Mortality Ratio (Appendix C), calculated for all-cause mortality.
- Multivariable logistic regression, examining demographic and occupational characteristics associated with death due to any cause. For this analysis deaths were censored to a 12-month period following the index event.

4.6.6.3 Details

We calculated SMRs, adjusting for age and sex for the four-year period between 2014 and 2017 (inclusive). The sample population size (i.e., DV-S cohort) used to estimate the expected deaths included the cumulative count of individuals from the previous years who did not die. For example, DV-S individuals who had an index contact in 2014 were counted again in the sample population size in 2015. Updates were made to age to be consistent with the current year (e.g., 2014 cohort had their age increase by one when calculating the 2015 cohort). The reference population size is the Queensland general population size each year (see Appendix C for further details).

4.7 Limitations

Key limitations to note are:

- Estimated counts of suicide crisis contacts should be considered conservative, due to known under-identification of individuals who had contact with police over the period examined. Additionally, known increases in demand for services over time would suggest that current contact rates are higher than during the study period. In the context of two calculations, however (the estimated odds ratio of suicide crisis contacts among DV-S versus GA-S populations and estimates of rates per 100,000 population), conservatism in the best estimate of the veteran population at the time period examined means that these two calculations may overestimate suicide crisis contacts. These are the only two known estimates in the analysis presented, that may be true overestimates. Further details are provided in Appendix B.
- There is a preponderance of current serving members of Army in Queensland, and analysis identified a significant association between Army service and a suicide related contact with police or paramedics in Queensland.[28-30] Additionally, higher rates of suicide-related ambulance attendances in Queensland have been noted.[41] This could suggest overestimation of the estimated rate per day on extrapolation to a nationwide estimate. However, this chance of overestimation is most likely offset by known undercounting of individuals who have police-related contacts. Additionally, the estimate provided does not include re-presentations, thus, the estimated contact rate per hour given in this report is highly likely to remain a conservative estimate of the contact rate of suicide related contacts between police, paramedics, and veterans.
- Specific mental health diagnoses are likely to include a proportionately higher identification of individuals with less common more serious mental illnesses and proportionately lower identification of individuals with more common mild-moderate conditions, due to the de facto separations of responsibilities inherent in the division of state and federally funded health services within Australia.
- There are no other known systematic biases within the data that would suggest limitations in validity of comparative analysis between groups.
- Health services use does not include use of services provided by Defence or veterans' services (e.g., Garrison Health or Open Arms) unless such services were delivered via a Medicare funded service or state-based hospital. Health services use data were requested from Department of Defence, but these data were not approved for release. The authors were advised that "Defence Health information is subject to an equitable duty of confidence. The duty obliges Defence to keep that health information confidential unless some exception to the duty can be established, such as consent. Defence members did not consent to Defence

disclosing their health information for use in the *Partners in Prevention* Study." Thus, use of psychological, counselling and allied health services is likely underestimated.

- Pharmaceutical use is measured based on evidence of supply of prescription medicines. It cannot be confirmed, based on our data, whether filled prescriptions were taken. It also cannot be determined from available data for what conditions medicines were prescribed.
- Analysis of polypharmacy for PTSD among the GA-S cohort was not conducted, and therefore comparison between the DV-S and GA-S PTSD cohorts is not possible.

4.8 Ethical and legislative clearances

This study is governed by approvals from Royal Brisbane and Women's Hospital Health Research Committee (HREC/17/QRBW/666), Queensland Police Service research committee (DOC17/1772716), Queensland Ambulance Service research committee (20170428-15A), Australian Institute of Health and Welfare (AIHW) (EO2019/2/1068), Department of Defence and Veterans' Affairs (DDVA) HREC (229-20), and Public Health Act Approval (ID:38704).

4.9 Funding acknowledgement

The initial Partners in Prevention study was funded by Queensland Health, under the auspices of the Suicide Prevention Health Taskforce. The extension of this study to the specific sub-cohort of veterans has been supported by the Defence Health Foundation, and the Royal Commission into Defence and Veteran Suicide.

5 Results

5.1 Cohort identification and contact rates

This section provides details regarding the process by which the cohort was identified and disaggregated and provides estimated suicide-related contact rates for veterans with police or paramedics, in comparison to civilian adults who had a suicide-related contact over the same period.

5.1.1 Cohort identification

Figure 4 provides an overview of how the DV-S cohort was derived from the existing Partners in Prevention cohort. Records were initially identified through linkage with PMKeyS as well as linkage with payment, billing, and Repatriation Pharmaceutical Benefits Scheme (RPBS) data. This initial search identified 2085 'defence-related individuals', i.e., veterans as well as widows and dependants. Individuals identified via RPBS or account class codes only were deemed to be widows or dependants and were excluded from the final sample. Of the remaining 1,625 individuals identified as having a PMKeyS record, complete information on service status at the time of an index police or paramedic contact to enable further analysis was identified for 1,168 individuals. The former figure is used to calculate rates of suicide crisis and mortality, while the latter figure (of complete records) is used throughout the remainder of the report.

5.1.2 Rates of suicide related contacts with police and paramedics

Estimates of the rates of suicide crisis presentations are provided in Table 2 for each sub-group, based on service status. The table highlights that police or paramedics in Queensland will engage with at least one new veteran in suicide crisis every 16 hours, on average. This rate does not account for contacts due to re-presentations by veterans. Rates are based on estimated counts, adjusted to account for missing PMKeyS data related to service status at the time of an index police or paramedic contact.

Figure 4 Cohort identification

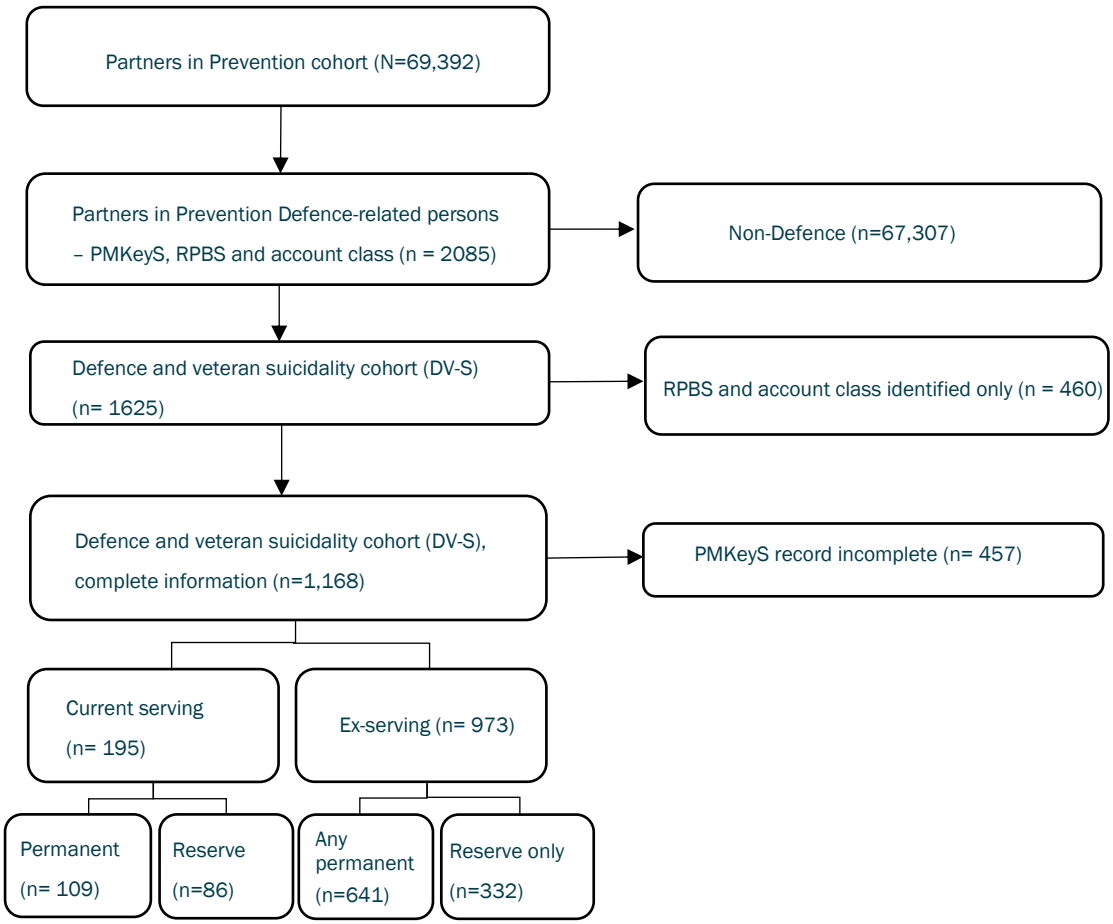


Table 2 Rates of contact with police or paramedics (adjusted for missing data)

Service phase	Counts (raw)	Counts (adjusted)	Unique individuals contacting (every *x* days)
Current serving (permanent)	109	152	1 every 7 days
Current serving (reserve)	86	120	1 every 9 days
Ex-serving (any permanent)	641	892	1 every 1 day
Ex-serving (reserve only)	332	462	1 every 2 days
Total	1,168	1,625	1 every 16 hours

Table 3 provides an estimate of the suicide crisis contact rate with police or paramedics for veterans experiencing suicidality per 100,000 in comparison to the civilian adult population who had a suicide related contact over the same period (i.e., per 100,000 veterans and per 100,000 civilian adults). Overall, individuals within the DV-S cohort were estimated to have 24% higher odds of having a suicide related police or paramedic contact than adults within the GA-S cohort.

Table 3 Estimated suicide crisis contact rate per 100,000 population

Year	DV-S	GA-S
2014	703	581
2015	594	501
2016	663	506
Average	653	529

5.2 Demographic and health characteristics

This section provides demographic and health characteristics for the DV-S cohort, with details of the DV-C cohort provided as a comparison, where possible. Comparison of mental health diagnoses and physical health problems are not shown for the DV-C cohort due to very low rates of contact with relevant health services by this cohort resulting in negligible treated prevalence for many conditions.

5.2.1 Demographic characteristics

Demographic characteristics for the DV-S cohort and 457 individuals excluded from further analysis, due to there being incomplete PMKeyS information, are provided. In Table 4, demographic characteristics for the DV-C cohort are not shown, because the matching process was designed to match the age and sex profile of DV-S and therefore do not differ significantly. Existence of a mental health record is provided for the DV-S cohort in comparison to the DV-C cohort. As shown in Table 4, the sample whose data were excluded from further analysis due to incomplete service status information tended to be older, and included a higher proportion of Aboriginal and/or Torres Strait Islander people. The excluded cohort also had overall lower contact with public mental health services (as measured by a documented provision of service within CIMHA). The most likely reason for the age difference relates to the timeframe over which the PMKeyS system has been in operation, with other differences likely to be related to features of service in different eras that correlate with age.

Table 4 Demographic profile of the DV-S cohort, with comparison to demographic profile of individuals with incomplete records.

Characteristic	DV-S	Individuals excluded due to incomplete PMKeyS information
Number of people	1168	457
Age, years (median)	41	48
Female	20.4% (n = 239)	21.4% (n = 98)
Male	79.6% (n = 929)	78.4% (n = 358)
Aboriginal and/or Torres Strait Islander background	8.2% (n = 96)	10.6% (n = 48)
CIMHA record	80.2% (n = 936)	72.4% (n = 331)

CIMHA: Consumer Integrated Mental Health Application

Table 5 provides a comparison of the areas of service of the DV-S versus DV-C cohorts. The DV-S cohort was characterised by an increased proportion of individuals associated with Army, and decreased proportion of individuals associated with Navy or Air Force, although the difference for Navy did not reach the threshold of statistical significance.

Table 5 Comparison of area of service DV-S compared to DV-C

Service	DV-S	DV-C	Test of association
Army	77.0% (n = 899)	72.5% (n = 3,768)	χ^2 (1,6362) = 9.35, p = 0.002
Navy	12.2% (n = 142)	14.5% (n = 752)	χ^2 (1, 6362) = 3.64, p = 0.056
Air Force	10.9% (n = 127)	13.0% (n = 674)	χ^2 (1, 6362) = 4.06, p = 0.044

Table 6 provides a comparison of the service status of the DV-S cohort at the time of their index contact with police or paramedics, in comparison to a randomly selected timepoint within the DV-C cohort. In comparison to the DV-C cohort, the DV-S cohort is characterised by a lower prevalence of ex-serving members overall, but a higher prevalence of those who were ex-serving with a record of permanent service. The DV-S cohort was also characterised by a higher prevalence of current-serving members relative to the DV-C cohort, particularly permanent current serving members. Further analysis, in relation to differences in service status by sex in relation to suicidality, are provided in Appendix D.

Table 6 Comparison of service status at time of index contact for DV-S compared to DV-C

Service status	DV-S	DV-C	Test of association
Ex-serving	**83.3% (n = 973)**	**92.0% (n = 4,778)**	**χ^2 (1,6362) = 81.87, p = <0.001**
Any permanent	65.9% (n = 641)	44.8% (n = 2,142)	χ^2 (1,6362) = 71.54, p = <0.001
Reserve only	34.1% (n = 332)	55.2% (n = 2,636)	χ^2 (1, 6362) = 190.09, p = <0.001
Current serving	**16.7% (n = 195)**	**8.0% (n = 416)**	**χ^2 (1, 6362) = 81.87, p = <0.001**
Permanent	9.3% (n = 109)	1.7% (n = 90)	χ^2 (1, 6362) = 179.24, p <0.001
Reserve	7.4% (n = 86)	6.3% (n = 326)	χ^2 (1, 6362) = 1.68, p = 0.194

5.2.2 Health characteristics

Health characteristics are described in relation to mental health profile and physical health conditions requiring hospitalisation, based on ICD-10 codes identified within administrative datasets as well as collateral MBS and PBS information where relevant.

5.2.2.1 Mental health characteristics

Specific diagnostic information was sourced from Queensland's public mental health database, CIMHA. Within the DV-S cohort, 80.1% (n=936) of individuals had a CIMHA record, and in total 51.6% (n=603) had at least one recorded mental health diagnosis (i.e., mental illness, substance related and addictive disorders, personality disorders, neurocognitive disorders, neurodevelopmental disorders). While it is not possible to establish the specific diagnosis of individuals who did not have contact with a public mental health service, an overall estimate was created through additionally identifying those who had a record of at least one mental health related MBS item and at least one prescription of an N Class (nervous system) medicine as having a probable mental health diagnosis. Combining this latter group with those who had a recorded CIMHA mental health diagnosis, we calculated an estimated prevalence of probable mental health diagnosis of 82.9% (n = 968) within the DV-S cohort, compared with 23.7% (n = 1,230) for the DV-C cohort. This indicated a markedly higher prevalence estimate for probable mental disorder among veterans who experienced suicidality (Appendix E).

Table 7 characterises the DV-S cohort who had a CIMHA record, in terms of specific mental health diagnoses, including documentation of comorbidities. The three most prevalent specific conditions, in descending order of prevalence were: depressive disorders, trauma disorders, and substance use disorders. Prevalence of specific mental health diagnoses are not shown for the DV-C group due to negligible rates for most conditions, linked to substantially lower contact with public mental health services (0.3% for DV-C compared to 80.1% for DV-S, as shown in Table 11.

Table 7 Mental health diagnoses among the DV-S cohort. Percentages are calculated with respect to those who had a contact with a public mental health service contact and the total cohort.

Category	DV-S/mental health service contact	DV-S/total cohort
Mental Illness	**54.4% (n = 527)**	**45.1% (n = 527)**
Trauma and stressor related disorders	29.1% (n = 282)	24.1% (n = 282)
Trauma disorders	25.1% (n = 243)	20.8% (n = 243)
Acute and other reactions to stress	6.7% (n = 65)	5.6% (n = 65)
Depressive disorders	26.1% (n = 253)	21.7% (n = 253)
Schizophrenia spectrum and other psychotic Disorders	13.3% (n = 129)	11.0% (n = 129)
Psychotic disorders, schizophrenia	10.0% (n = 97)	8.3% (n = 97)
Psychotic disorders, acute and transient	3.9% (n = 38)	3.3% (n = 38)
Psychotic disorders, substance induced	2.7% (n = 26)	2.2% (n = 26)
Psychotic disorders, other	2.5% (n = 24)	2.1% (n = 24)
Anxiety disorders	6.8% (n = 66)	5.7% (n = 66)
Bipolar and related disorders	6.6% (n = 64)	5.5% (n = 64)
Obsessive compulsive and related disorders	0.9% (n = 9)	0.8% (n = 9)
Other mental illnesses	1.3% (n = 13)	1.1% (n = 13)
Substance related and addictive disorders	**26.2% (n = 254)**	**21.7% (n = 254)**
Substance use disorders	22.1% (n = 214)	18.3% (n = 214)
Substance induced disorders	8.0% (n = 77)	6.6% (n = 77)
Other substance use disorders	4.2% (n = 41)	3.5% (n = 41)
Personality disorders	**15.6% (n = 151)**	**12.9% (n = 151)**
Borderline personality disorders	9.0% (n = 87)	7.4% (n = 87)
Other personality disorders	6.8% (n = 66)	5.7% (n = 66)
Antisocial personality disorders	3.6% (n = 35)	3.0% (n = 35)
Neurocognitive disorders	0.9% (n = 9)	0.8% (n = 9)
Neurodevelopmental disorders	0.6% (n = 6)	0.5% (n = 6)

We investigated factors associated with having a probable mental health diagnosis using a multivariable logistic regression (Table 8). The model indicates that experiencing suicidality, service status, and female sex were associated with having a probable mental health diagnosis. In particular, experiencing suicidality resulting in a police or paramedic contact (i.e., being in the DV-S cohort) was associated with having 20 times higher odds of having a probable mental health diagnosis in comparison to being a veteran who had not experienced suicidality resulting in police or paramedic contact. Being a current serving reserve or ex-serving member (either permanent or reserve only) was associated with increased odds of having a probable mental health diagnosis than being a current serving permanent member, with ex-serving members having the highest odds of a probable mental health diagnosis. Being female was also associated with increased odds of having a probable mental health diagnosis. Area of service and age were not found to be significantly associated with having a probable mental health diagnosis.

Table 8 Multivariable logistic regression of variables associated with having a mental health diagnosis

	Predictor	Odds ratio	95% Confidence Interval	p-value
Cohort				
	DV-C	ref*	-	-
	DV-S	20.3	16.9, 24.6	<0.001
Age		1.00	1.00, 1.01	0.15
Sex				
	Male	ref	-	-
	Female	1.66	1.44, 1.92	<0.001
Service status				
	Current serving permanent	ref	-	-
	Current reserve	2.87	1.81, 4.58	<0.001
	Ex-serving any permanent	5.51	3.76, 8.11	<0.001
	Ex-serving reserve only	5.60	3.80, 8.30	<0.001
Area of service				
	Army	ref	-	-
	Air Force	0.85	0.70, 1.02	0.084
	Navy	1.12	0.94, 1.34	0.2

**ref: reference. This is the reference category with respect to which subsequent odds ratios are calculated. For example, the interpretation for sex in the above model is "females had 1.66 times higher odds of having a probable mental health diagnosis than males".*

5.2.2.2 Physical health conditions

Table 9 shows the physical health conditions that resulted in a hospital presentation (including to an emergency department). Findings indicate high levels of physical health comorbidity in this cohort. The three most common disease categories identified for the DV-S cohort, were diseases of the digestive system, diseases of the musculoskeletal system and connective tissue, and diseases of the circulatory system. The DV-S and GA-S cohorts appeared relatively similar in profile in terms of hospital presentations. In comparison to the GA-S cohort, the DV-S cohort had slightly lower levels of physical health conditions by ICD-chapters, overall. However, the greatest difference was in relation to musculoskeletal conditions, where 33.9% of the DV-S cohort received at least one musculoskeletal related admission, compared to 23.9% of the matched GA-S cohort. Certain infectious and parasitic diseases were statistically significantly less prevalent among individuals in the DV-S cohort compared to the GA-S cohort. Comparisons with the DV-C cohort are not shown due to negligible presentations by this cohort, as further described in Table 11.

Table 9 Top 10 most common presentations among DV-S and GA-S (matched) cohorts, by ICD-10 chapter

ICD10 Chapter	DV-S % (n)	GA-S (matched) % (n)	Test of association
F01-F99: Mental, Behavioural and Neurodevelopmental disorders	78.9% (n = 922)	77.0% (n = 3546)	χ^2 (1,5772) = 1.85, p = 0.174
Z00-Z99: Factors influencing health status and contact with health services	77.2% (n = 902)	77.4% (n = 3562)	χ^2 (1,5772) = 0, p = 0.949
S00-T88: Injury, poisoning and certain other consequences of external causes*	67.5% (n = 788)	69.8% (n = 3215)	χ^2 (1,5772) = 2.34, p = 0.126
R00-R99: Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	65.1% (n = 760)	66.0% (n = 3039)	χ^2 (1,5772) = 0.32, p = 0.569
K00-K95: Diseases of the digestive system*	35.4% (n = 414)	35.9% (n = 1654)	χ^2 (1,5772) = 0.07, p = 0.786
U00-U85: Codes for special purposes	34.8% (n = 407)	33.5% (n = 1543)	χ^2 (1,5772) = 0.68, p = 0.410
M00-M99: Diseases of the musculoskeletal system and connective tissue*	33.9% (n = 396)	23.9% (n = 1102)	χ^2 (1,5772) = 47.66, p <0.001
I00-I99: Diseases of the circulatory system	23.3% (n = 272)	22.8% (n = 1050)	χ^2 (1,5772) = 0.10, p = 0.756
A00-B99: Certain infectious and parasitic diseases	22.9% (n = 268)	28.5% (n = 1311)	χ^2 (1,5772) = 14.06, p <0.001
E00-E89: Endocrine, nutritional and metabolic diseases	22.9% (n = 268)	24.6% (n = 1133)	χ^2 (1,5772) = 1.31, p = 0.252
G00-G99: Diseases of the nervous system	22.9% (n = 268)	18.5% (n = 851)	χ^2 (1,5772) = 11.58, p <0.001

**Further details on these chapters are provided in the report Appendix F*

Almost all (94%) of the DV-S cohort had at least one presentation for a physical health condition and 74% of the cohort experienced three or more physical health conditions, measured at ICD-10-chapter level, that resulted in a hospital presentation (Table 10).

Table 10 Number of physical health conditions resulting in presentation to a hospital

N. physical health conditions	DV-S % (n)
1	9.3% (n = 109)
2	11.1% (n = 130)
3+	73.9% (n = 863)
Total (any one or more)	94.3% (n = 1102)

Exactly one-half (50%) of the cohort had both a mental health diagnosis, recorded in CIMHA, and a record of at least one physical health related hospital presentation; this reduced to 43% when Z, U, and R chapters (factors influencing health status and contact with health services; codes for special purposes; and symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified, respectively) were excluded from the calculation. Details of prevalence of physical health conditions at subchapter level for selected common conditions (including injuries, digestive diseases, and musculoskeletal conditions) are provided in Appendix F.

5.3 Health service utilisation

This section provides an overview of health services use among individuals comprising the DV-S cohort. This includes detailed information and descriptive statistics on two main aspects:

1. Overall health services use
2. Specific use of mental health services

5.3.1 Overall health services use

Table 11 shows overall contact with services over the five-year period, 1 February 2013 – 31 January, 2018. Overall, the DV-S cohort was characterised by very high rates of public health services contact (public mental health services, emergency departments, and state-based hospitals – *NB: The QHAPDC collection includes private hospital admissions, however, state hospital admissions comprise the majority of admissions in this case*), in comparison to the DV-C cohort. In contrast, DV-S and DV-C cohorts displayed similarly high rates of use of Medicare funded services. A detailed breakdown of health services contacts for the DV-S cohort across time is provided in Appendix G and Appendix H. The absolute variation between the GA-S matched cohort and DV-S cohort, respectively, was between 1.8-2.1 percentage points higher for contacts with public mental health services, emergency departments and MBS funded services, and 2.1 percentage points lower for hospital admissions.

Standardising analysis to focus on the one-year period pre- and post- an index suicide related contact with police or paramedics for the DV-S cohort, it can be seen that contact with health services increased following a suicide-related contact with police or paramedics across every service type and time-period examined except for MBS funded services, where there was negligible change in cumulative health services use in the 12 months before compared to the 12 months after a suicide related contact with police or paramedics (Figure 5). Differences between the DV-S and GA-S cohorts were noted (Figure 6).

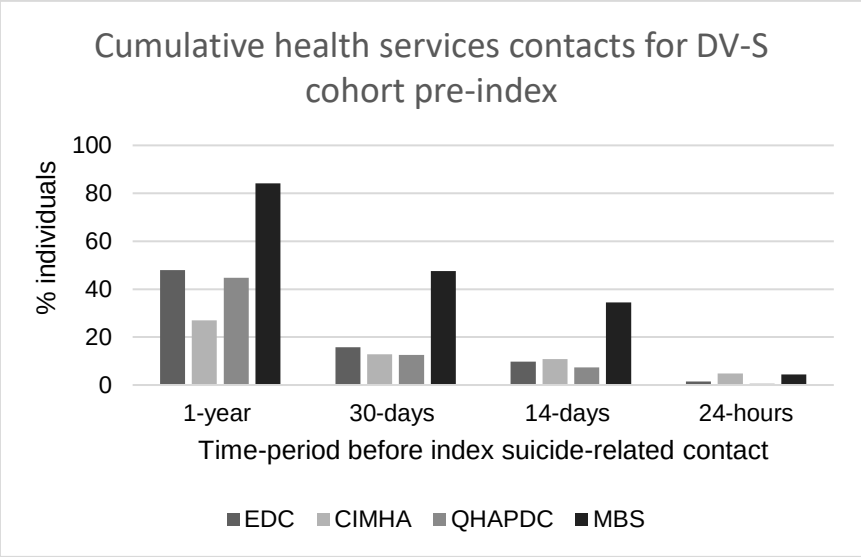
Table 11 Overall contact with services (five-year period)

Service	DV-S	DV-C	GA-S (matched)	Test of association
CIMHA	80.1% (n = 936)	0.3% (n = 16)	81.9% (n=3,772)	χ^2 (2, 10966) = 7362.89, p <0.001
EDC	94.9% (n = 1,108)	2.9% (n = 152)	96.5% (n=4,441)	χ^2 (2, 10966) = 9516.91, p <0.001
MBS	96.0% (n = 1,121)	94.0% (n = 4,880)	98.1% (n=4,518)	χ^2 (2, 10966) = 108.94, p <0.001
QHAPDC	86.0% (n = 1,004)	3.3% (n = 172)	83.9% (n=3,863)	χ^2 (2, 10966) = 7225.41, p <0.001

CIMHA: Consumer Integrated Mental Health Application; EDC: Emergency Department Collection; MBS: Medicare Benefits Schedule; QHAPDC: Queensland Hospital Admitted Patients Data Collection

Overall, findings show differences in health system response to the DV-S cohort in comparison to the GA-S cohort following a suicide related contact with police or paramedics. Specifically, in the one-year prior to an index contact, the DV-S cohort was characterized by overall lower rates of contact compared to the GA-S cohort with respect to emergency department, public mental health service and MBS funded contacts, but higher rates of contact than the GA-S cohort for hospital admissions. Following the index contact, however, differences in rates of contact between DV-S and GA-S cohorts with emergency departments and public mental health services showed slightly elevated levels of contact for the DV-S cohort in the 24 hours following an index contact. The differences in rates of contacts between DV-S and GA-S cohorts shrank overall in the one-year period following an index contact compared to the same period prior to an index contact. Differences in hospital admissions were higher for the DV-S cohort in the 30 days after an index contact, but showed lower overall difference in comparison to the GA-S cohort in the one-year period following an index contact in comparison to the same period prior to an index contact. Differences in rates of contact with MBS funded services appeared similar in the 30-day period pre- and post- an index contact, but there was an overall decrease in the difference between DV-S and GA-S cohorts of MBS contacts in the one-year period after an index contact in comparison to the one-year period prior. Exact values are shown in Appendix I.

Findings shown in Figure 7 indicate that the predominant pathway for health care for the DV-S cohort in the 24 hours following a contact with police or paramedics was to an emergency department, with contacts with emergency departments reducing rapidly over the course of the following month; this indicates low rates of re-presentation within the first 30-days following an index contact. Public mental health services were also shown to be engaged with individuals within the 24 hours and over the course of the following week, before reducing. Equally, the data indicate that if a hospital admission was to occur for an individual, it was most likely to occur directly following a police or paramedic contact, although reduction in admissions was not as steep as for emergency department presentations. MBS funded service contacts, however, showed a qualitatively different trend, with contacts being low in the 24 hours after a crisis event, and increasing steadily over the course of the subsequent month.



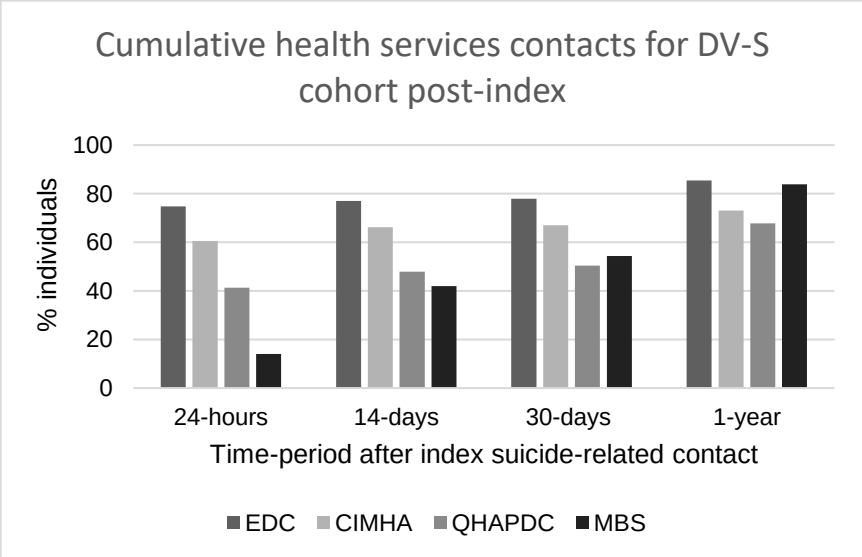
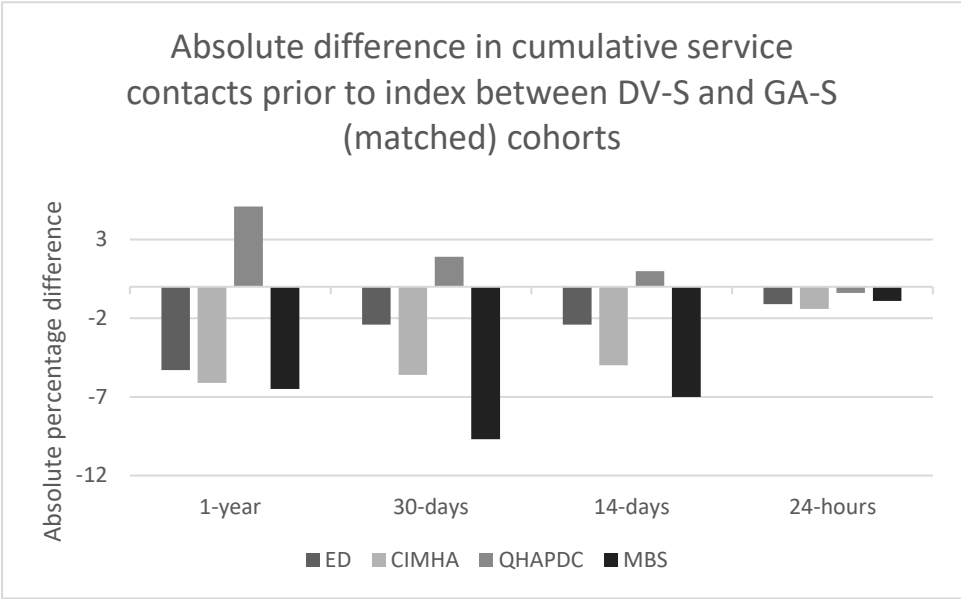


Figure 5 Cumulative health service contacts by service-type and timeframe before and after index suicide-related contact. Cumulative counts begin at the index event for both pre-index and post-index counts



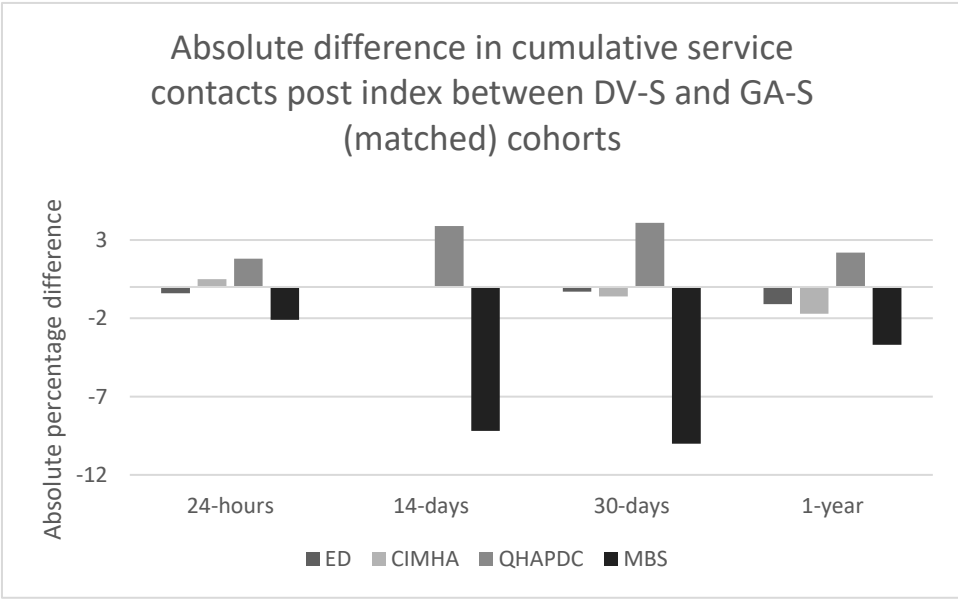


Figure 6 Absolute percentage differences in health service contacts before and after a suicide related contact with police and paramedics for DV-S and GA-S cohorts. Positive differences indicate higher rates of contact by the DV-S cohort, negative differences indicate higher rates of contact by the GA-S cohort.

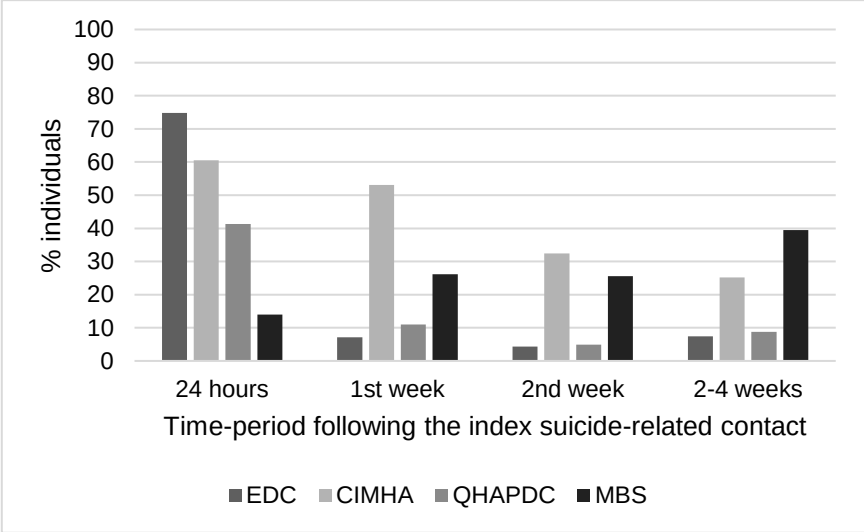


Figure 7 Exclusive health service contacts by service-type and timeframe after index suicide-related contact

Service contacts by individuals attenuated over the course of a month following a suicide-related contact for all service types except Medicare funded service types. In other words, of those who had a contact with a service in the 12-months following an index police or paramedic contact: 83% of individuals who were engaged by a public mental health service were engaged within 24 hours; 87% of individuals who were seen by an emergency department were seen within 24 hours; 61% of those who had a hospital admission were admitted within 24 hours; and 17% of those who used a Medicare funded service were seen within 24 hours (Figure 8).

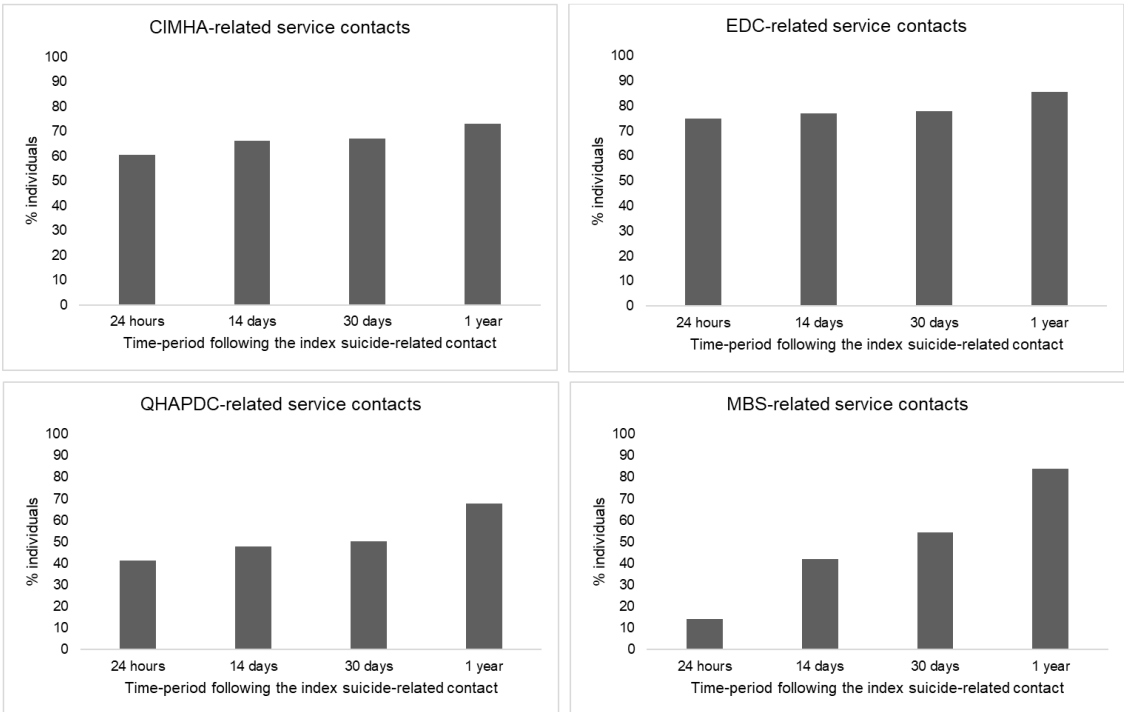


Figure 8 Cumulative number of health services contacts by service type over time following the index suicide-related contact

5.3.2 Mental health services use

Mental health service use was quantified based on the mental health taxonomy shown previously (Figure 3). For this analysis, relevant mental health service items from QHAPDC, MBS, CIMHA, and EDC are included (Table 12).

Table 12 Mental health services use for the DV-S cohort in the 12 months pre- and post- a suicide related police or paramedic contact.

		Contacts			
	% (n) DV-S	25th Percentile	Median	75th Percentile	IQR
Public MHS	**81.5% (n = 952)**	**9**	**22**	**56**	**47**
Bed-based	40.5% (n = 473)	1	3	8	7
Hospital-Inpatient admitted	39.7% (n = 464)	1	3	8	7
Residential care	2.3% (n = 27)	1	2	24	22
Clinical Ambulatory	74.7% (n = 873)	3	7	17	14
Hospital outpatient (non-admitted)	72.7% (n = 849)	3	5	12	9
Community-based MHS	53.8% (n = 628)	2	5	15	13
Specialised assessment MHS	64.4% (n = 752)	2	5	11	9
Mental health related ED presentations	60.2% (n = 703)	1	1	2	1
Other Public MHS	6.4% (n = 75)	1	2	5	4
Private MHS	**69.9% (n = 817)**	**2**	**6**	**14**	**12**
General Practitioner (GP)	53.0% (n = 619)	1	2	4	3
Psychiatry	22.5% (n = 263)	1	4	11	10
Psychology, Nursing + Allied Health	32.9% (n = 384)	2	5	9	7
Hospital admitted (inpatient)	19.0% (n = 222)	1	3	9	8

MHS: Mental health services. IQR: Interquartile range; ED; Emergency department. Summary statistics for contacts were calculated for those who had one or more contacts (i.e., minimum value for all contact types was 1). Calculations based on CIMHA data were limited to one provision of service per person per day.

Findings indicate substantial overlap in use of both public and private services (i.e., many individuals used both public and private services) within the 12-months pre- and post- a contact with police or paramedics by those in the DV-S cohort. Over 50% had a mental health related GP visit within the 12-month period before and after an index contact with police or paramedics, although this was less frequent than the 75% of individuals who had contact with a clinical ambulatory service provided by public mental health services. Correspondingly, the rate of mental health

hospitalisations within public mental health services was approximately double that of private inpatient services. Additionally, within this cohort, 15% (n = 171) had a contact with forensic mental health services, and 5% (n=54) had a contact with mental health services that service homeless populations.

Use of psychology and allied health services in the 12 months pre- and post- is provided in Table 12. Over the total five-year period, 44.9% (n=525) individuals in the DV-S cohort had at least one mental health related contact with a psychologist or allied health professional. For individuals with PTSD, specifically, 35.7% (n=102) over the five-year period, and 23.4% (n=67) in the 12 months pre- or post- an index contact had a mental health related contact with a psychologist or allied health professional.

Over the 12-month period pre- and post- an index police and paramedic contact 87.2% (n=1019) of individuals were prescribed an N class (nervous system) medication. No records of electroconvulsive therapy or transcranial magnetic stimulation were identified during this period.

5.4 Pharmaceutical prescriptions

This section provides an overview of pharmaceutical use in the DV-S cohort compared to the DV-C cohort, and GA-S cohort in some cases, including specific examination of polypharmacy. It includes specific analysis of the sub-cohort within DV-S of individuals with a recorded diagnosis of PTSD.

5.4.1 Overview

Table 13 and Table 14 provide an overview of prescriptions dispensed by ATC main class and third level,[33, 34] over the five-year period examined. Prescribing rates varied across the DV-S, GA-S (matched), and DV-C cohorts. Prescribing rates were consistently (i.e., exclusively) higher, by class, for the DV-S compared to the DV-C cohort. Differences between GA-S and DV-C cohorts showed generally (but not exclusively) higher rates of prescribing, by class, for the GA-S cohort. DV-S and GA-S cohorts prescribing rates varied by class, though prescribing rates for the DV-S cohort were more commonly higher than lower than for the GA-S cohort.

As shown in Table 14, rates of prescribing of N-class medicines were higher in the DV-S cohort, for every ATC level 3 category except medicines used to treat addictive disorders, compared to the GA-S (matched) cohort, and both the DV-S cohort and GA-S cohort had higher prescribing rates for every category of N-class medicine at the ATC level 3 compared to the DV-C cohort.

Table 15 provides additional detail on the most commonly prescribed individual medicines. Prescription of benzodiazepines, specifically, was higher in the DV-S cohort (67.2%; n= 784) in comparison to both the GA-S cohort (63.2%; n=2903) and DV-C cohort (20.0%; n=1043), respectively.

Table 13 Prescriptions dispensed to DV-S, GA-S (matched) and DV-C cohorts over 5-year period, grouped by ATC main class, with chi-squared test of association

ATC Main class	DV-S	DV-C	GA-S (matched)	Test of association
Class N: Nervous System	93.6% (n = 1,093)	59.6% (n = 3,097)	92.8% (n = 4,266)	χ^2 (2,10966) = 1709.64, p <0.001
Class J: Antiinfectives for Systemic Use	83.2% (n = 973)	74.4% (n = 3,860)	86.8% (n = 3,991)	χ^2 (2, 10966) = 244.26, p <0.001
Class M: Musculo-Skeletal System*	52.6% (n = 614)	35.8% (n = 1,858)	47.4% (n = 2,180)	χ^2 (2, 10966) = 189.04, p <0.001
Class A: Alimentary Tract and Metabolism	51.6% (n = 603)	32.4% (n = 1,682)	51.6% (n = 2,381)	χ^2 (2, 10966) = 417.21, p <0.001
Class C: Cardiovascular System	37.4% (n = 437)	18.8% (n = 979)	31.6% (n = 1,451)	χ^2 (2, 10966) = 288.81, p <0.001
Class D: Dermatologicals	25.6% (n = 298)	17.0% (n = 882)	23.2% (n = 1,073)	χ^2 (2, 10966) = 79.57, p <0.001
Class H: Systemic Hormonal Preparations, Excl. Sex Hormones and Insulins*	23.4% (n = 275)	17.8% (n = 925)	24.0% (n = 1,108)	χ^2 (2, 10966) = 62.41, p <0.001
Class S: Sensory Organs	22.8% (n = 265)	17.8% (n = 923)	26.4% (n = 1,220)	χ^2 (2, 10966) = 108.9, p <0.001
Class R: Respiratory System	22.4% (n = 261)	15.2% (n = 787)	28.0% (n = 1,286)	χ^2 (2, 10966) = 238.81, p <0.001
Class G: Genito Urinary System and Sex Hormones	19.8% (n = 231)	13.2% (n = 681)	12.4% (n = 574)	χ^2 (2, 10966) = 44.13, p <0.001
Class B: Blood and Blood Forming Organs	17.6% (n = 205)	9.4% (n = 486)	15.6% (n = 721)	χ^2 (2, 10966) = 111.91, p <0.001
Class L: Antineoplastic and Immunomodulating Agents	4.0% (n = 45)	2.8% (n = 142)	2.4% (n = 109)	χ^2 (2, 10966) = 7.87, p = 0.02
Class P: Antiparasitic Products, Insecticides and Repellents	2.4% (n = 29)	0.8% (n = 36)	3.6% (n = 171)	χ^2 (2, 10966) = 106.46, p <0.001
Class V: Various	1.6% (n = 17)	0.4% (n = 26)	1.0% (n = 46)	χ^2 (2, 10966) = 14.27, p <0.001

**Disaggregation of Class M and Class H medicines at ATC level 3 are provided in the report Appendix J*

Table 14 Prescriptions dispensed to DV-S and DV-C cohorts over five-year period, N-class medicines grouped by ATC third level, with chi-squared test of association

ATC Level 3	DV-S	DV-C	GA-S (matched)	Test of association
Antidepressants	80.8% (n = 943)	26.8% (n = 1,389)	74.4% (n = 3,419)	χ^2 (2,10966) = 2629.27, p <0.001
Opioids	66.4% (n = 777)	44.0% (n = 2,287)	63.6% (n = 2,931)	χ^2 (2, 10966) = 453.65, p <0.001
Anxiolytics	59.2% (n = 690)	14.2% (n = 742)	55.6% (n = 2,557)	χ^2 (2, 10966) = 2085.66, p <0.001
Antipsychotics	44.0% (n = 513)	5.0% (n = 265)	41.2% (n = 1,902)	χ^2 (2, 10966) = 2001.57, p <0.001
Hypnotics and Sedatives	38.2% (n = 446)	10.4% (n = 545)	28.8% (n = 1,331)	χ^2 (2, 10966) = 722.58, p <0.001
Other analgesics and Antipyretics	29.6% (n = 346)	10.4% (n = 538)	23.4% (n = 1,080)	χ^2 (2, 10966) = 406.86, p <0.001
Drugs used in addictive disorders	26.0% (n = 303)	8.0% (n = 416)	27.0% (n = 1,244)	χ^2 (2, 10966) = 657.7, p <0.001
Antiepileptics	21.6% (n = 251)	3.0% (n = 157)	17.2% (n = 795)	χ^2 (2, 10966) = 655.18, p <0.001
Antimigraine preparations	5.6% (n = 66)	2.4% (n = 119)	3.8% (n = 175)	χ^2 (2, 10966) = 40.61, p <0.001
Anticholinergic agents	4.4% (n = 52)	0.2% (n = 12)	4.2% (n = 195)	χ^2 (2, 10966) = 194.48, p <0.001
Psychostimulants, agents used for ADHD and nootropics	3.4% (n = 40)	0.8% (n = 37)	2.8% (n = 134)	χ^2 (2, 10966) = 78.09, p <0.001
Dopaminergic agents	1.6% (n = 18)	0.4% (n = 24)	0.8% (n = 41)	χ^2 (2, 10966) = 16.67, p <0.001

Table 15 Top 10 most commonly prescribed N class medicines for the DV-S cohort, with comparisons to GA-S (matched) and DV-C cohort

Drug name	DV-S	DV-C	GA-S (matched)	Test of association
Diazepam	56.6% (n = 661)	12.8% (n = 658)	52.4% (n = 2,408)	χ^2 (2, 10966) = 2006.55, p <0.001
Paracetamol + Codeine	48.8% (n = 570)	31.8% (n = 1,650)	50.0% (n = 2,302)	χ^2 (2, 10966) = 365.69, p <0.001
Oxycodone	39.4% (n = 460)	19.6% (n = 1,019)	35.2% (n = 1,625)	χ^2 (2, 10966) = 656.23, p <0.001
Temazepam	32.8% (n = 384)	9.6% (n = 501)	27.8% (n = 1,278)	χ^2 (2, 10966) = 654.95, p <0.001
Mirtazapine	32.4% (n = 378)	4.8% (n = 246)	26.8% (n = 1,235)	χ^2 (2, 10966) = 930.6, p <0.001
Quetiapine	29.2% (n = 340)	3.2% (n = 171)	23.4% (n = 1,080)	χ^2 (2, 10966) = 881.48, p <0.001
Escitalopram	26.8% (n = 314)	7.8% (n = 405)	22.4% (n = 1,027)	χ^2 (2, 10966) = 517.49, p <0.001
Tramadol	21.4% (n = 250)	10.0% (n = 522)	20.4% (n = 933)	χ^2 (2, 10966) = 416.07, p <0.001
Desvenlafaxine	20.8% (n = 244)	4.8% (n = 248)	15.4% (n = 707)	χ^2 (2, 10966) = 354.52, p <0.001
Venlafaxine	20.4% (n = 239)	3.6% (n = 181)	15.2% (n = 701)	χ^2 (2, 10966) = 434.62, p <0.001

5.4.2 Polypharmacy

5.4.2.1 DV-S cohort

Examining prescription dispensing across the ATC main level, 85% of individuals in the DV-S cohort had been supplied medications from across two or more classes concurrently over the period examined (Table 16). In comparison to the GA-S (matched) cohort, the DV-S cohort showed equivalent levels of polypharmacy overall. This finding was sustained for pair-wise comparisons of the DV-S and GA-S (matched) cohorts, none of which reached the threshold of statistically significant difference (Appendix K).

Table 16 Rates of polypharmacy, medicines grouped at ATC main level, five-year period

Number of medications (by type)	DV-S	DV-C	GA-S (matched)	Test of association
2	56.8% (n = 664)	45.2% (n = 2348)	58.3% (n=2684)	χ^2 (2, 10966) =180.17 , p <.001
3	15.2% (n = 178)	7.2% (n = 374)	14.8% (n=681)	χ^2 (2, 10966) =161.83 , p <.001
4+	13.0% (n = 152)	5.3% (n = 274)	11.9% (n=546)	χ^2 (2, 10966) =158.84 , p <.001
Total 2+	85.0% (n=994)	57.7% (n=2996)	85.0% (n=3911)	χ^2 (2, 10966) =1011.6 , p <.001

Focusing on N class medicines specifically, grouped at ATC third level, we found that the majority (68.2%) of the DV-S cohort had a record of concurrent prescription of two or more medicines grouped at this level (Table 17). In comparison to the GA-S (matched) cohort, DV-S showed higher rates of polypharmacy, for two or more medications and four or more medications (Appendix K).

Table 17 Rates of polypharmacy, N-class medicines grouped at ATC third level, five-year period

Number of medications (by type)	DV-S	DV-C	GA-S (matched)	Test of association
2	43.0% (n = 502)	14.9% (n = 775)	46.4% (n = 2135)	χ^2 (2, 10966)= 1212.28 , p <.001
3	11.9% (n = 139)	1.2% (n = 63)	10.1% (n = 466)	χ^2 (2, 10966)= 415.72 , p <.001
4+	13.3% (n = 155)	0.8% (n = 43)	7.0% (n = 322)	χ^2 (2, 10966)= 415.93 , p <.001
Total 2+	68.2% (n=796)	16.9% (n=881)	63.5% (n=2923)	χ^2 (2, 10966)= 2538.13 , p <.001

5.4.2.2 Prescriptions and polypharmacy among those with a PTSD diagnosis

Table 18 provides overall demographic characteristics of the DV-S cohort with and without PTSD, based on CIMHA, EDC and QHAPDC records. Age and sex characteristics did not appear different across these two sub-groups, however, the proportion of individuals identifying as an Aboriginal and/or Torres Strait Islander person was lower in the cohort of individuals with a PTSD diagnosis.

Table 18 Characteristics of individuals in the DV-S cohort with and without a recorded PTSD diagnosis

	DV-S with PTSD	DV-S without PTSD
Number of people	286	882
Age (median years)	39	41
Male	78.0% (n = 223)	80.0% (n = 706)
Female	22.0% (n = 63)	20.0% (n = 176)
Aboriginal and/or Torres Strait Islander	5.6% (n = 16)	9.1% (n = 80)

Among those within the DV-S cohort with a PTSD diagnosis, rates of prescribing and polypharmacy were higher than for the DV-S cohort. As shown in

Table 19, almost all individuals in the DV-S cohort with a diagnosis of PTSD had received a prescription of at least one antidepressant, 84% had received prescription of an anxiolytic, and over three-quarters had received at least one prescription for an opioid. Prescriptions of antipsychotic medications were also very high in this cohort.

Rates of benzodiazepine prescription among individuals within the DV-S cohort with a recorded diagnosis of PTSD was 88.4% (n=253). Table 20 shows the most commonly prescribed medicines within this sub-group.

Consistent with higher rates of prescribing were higher rates of polypharmacy, with 87% of the DV-S cohort with PTSD having a record of concurrent prescription of two or more medicines (Table 21).

Table 19 Prescriptions dispensed to the DV-S cohort with a PTSD diagnosis over five-year period, N-class medicines grouped by ATC third level.

ATC third level	DV-S|PTSD % (n)
Antidepressants	96.2% (n = 275)
Anxiolytics	83.6% (n = 239)
Opioids	76.2% (n = 218)
Antipsychotics	73.2% (n = 209)
Hypnotics and Sedatives	54.2% (n = 155)
Other analgesics and Antipyretics	44.8% (n = 128)
Antiepileptics	36.8% (n = 105)
Drugs used in addictive disorders	35.0% (n = 100)
Antimigraine preparations	9.8% (n = 28)
Anticholinergic agents	8.4% (n = 24)
Psychostimulants, agents used for ADHD and nootropics	6.6% (n = 19)

Table 20 Top 10 most prescribed N class medicines for DV-S\|PTSD sub-group, five-year period

N class medicine	DV-S|PTSD % (n)
Diazepam	82.2% (n = 235)
Oxycodone	56.6% (n = 162)
Paracetamol + Codeine	55.6% (n = 159)
Quetiapine	54.4% (n = 156)
Mirtazapine	48.4% (n = 138)
Temazepam	42.8% (n = 122)
Escitalopram	35.6% (n = 102)
Desvenlafaxine	32.4% (n = 93)
Duloxetine	31.2% (n = 89)
Oxycodone + Naloxone	30.4% (n = 87)

Table 21 Rates of polypharmacy for DV-S cohort with PTSD, N-class medicines grouped at ATC third level, five-year period

Number of medications (by type)	% (n)
2	43.0% (n = 123)
3	21% (n = 60)
4+	23.1% (n = 66)
Total 2+	87.1% (n=249)

5.5 Mortality

This section provides an overview of deaths occurring among those who had a police or paramedic contact during the study period (DV-S) in comparison to both the veteran comparator group (DV-C) and the group of civilian adults who had experienced suicidality (GA-S).

5.5.1 Mortality overview

Table 22 provides an overview of deaths that occurred over the period examined. It highlights that the DV-S cohort showed a lower prevalence of death, due to any cause, but a higher proportion of deaths due to intentional self-harm, specifically, than the GA-S cohort. Very low rates of death were identified within the DV-C cohort. Overall, those in the DV-S cohort had 16% higher odds than the GA-S cohort of dying due to intentional self-harm.

Table 22 Overview of deaths within the DV-S, DV-C and GA-S cohorts

	DV-S	DV-C	GA-S
Death due to any cause	5.2% (n=85)	0.8% (n=49)	6.4% (n=3783)
Death due to intentional self-harm	2.6% (n=42)	–	2.2% (n=1330)

Table 23 provides the five most common causes of death listed for the DV-S cohort (excluding death due to intentional self-harm). Note that deaths could have multiple causes assigned.

Table 23 Top 5 causes of death for the DV-S cohort, excluding death due to intentional self-harm, with comparison to DV-C and DV-S cohort % calculated out of total deaths

ICD10 Chapter	DV-S % (n)	DV-C % (n)	GA-S % (n)
S00-T88: Injury, poisoning and certain other consequences of external causes	64.7% (n = 55)	18.4% (n = 9)	48.5% (n = 1833)
F01-F99: Mental, Behavioural and Neurodevelopmental disorders	54.1% (n = 46)	16.3% (n = 8)	50.8% (n = 1922)
R00-R99: Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified	40.0% (n = 34)	-	28.7% (n = 1084)
I00-I99: Diseases of the circulatory system	27.1% (n = 23)	26.5% (n = 13)	32.6% (n = 1235)
C00-D49: Neoplasms	12.9% (n = 11)	61.2% (n = 30)	13.6% (n = 515)

5.5.2 Standardised mortality ratios

SMRs were estimated for all-cause mortality. The SMRs in the DV-S cohort highlight the high level of excess deaths in this cohort in comparison to the Queensland population over the period examined (Table 24). Specifically, the rate of death of the veteran cohort who experienced suicidality was nearly eight times that of the general population for males, and in excess of ten times for females.

Table 24 Estimated Standardised Mortality Ratios, all-cause mortality

Sex	SMR (95% CI)
Males	7.71 (5.93-9.49)
Females	11.23 (4.88-17.58)

5.5.3 Demographic factors associated with death

As shown in Table 25, modelling of death (due to any cause) as an outcome in relation to the demographic characteristics of sex, Aboriginal and/or Torres Strait Islander background, age, service status and area of service, identified only one statistically significant predictor. Being male was associated with increased odds of dying due to any cause.

Table 25 Multivariable logistic regression, examining demographic and occupational features associated with 12-month all-cause mortality for the DV-S cohort

	Predictor	Odds ratio	95% Confidence interval	p-value
Age		1.02	0.99, 1.06	0.2
Sex				
	Female	ref	-	-
	Male	3.57	1.26, 15.0	0.037
Cultural identity				
	Non-Aboriginal and/or Torres Strait Islander	ref	-	-
	Aboriginal and/or Torres Strait Islander	0.33	0.02, 1.56	0.3
Service status				
	Current permanent	ref	-	-
	Current reserve	1.09	0.24, 4.96	>0.9
	Ex-serving any permanent	0.61	0.21, 2.24	0.4
	Ex-serving reserve only	0.93	0.29, 3.62	>0.9
Area of service				
	Army	ref	-	-
	Air Force	1.18	0.33, 3.22	0.8
	Navy	1.69	0.59, 4.24	0.3

Table 26 provides details of service status at time of death among those who died for the DV-S and DV-C cohorts.

Table 26 Service status at time of death among those who died by any cause for DV-S and DV-C cohorts

Service status at time of death	DV-S % (n)	DV-C % (n)
Current serving	**8.2% (n = 7)**	**-**
Permanent	-	-
Reserve	-	-
Ex-serving	**52.9% (n = 45)**	**34.7% (n = 17)**
Involuntary Medical	11.8% (n = 10)	-
Other Involuntary	9.4% (n = 8)	-
Voluntary	31.8% (n = 27)	22.4% (n = 11)
Contractual/Administrative change	-	-
Unable to retrieve status	**38.8% (n = 33)**	**-**

'-' denotes suppression of numbers due to <6 deaths per cell

5.5.4 Temporal characteristics

Table 27 shows *when* deaths occurred following an index suicide related contact for the DV-S cohort. A substantial number of deaths occurred within the 24-hour period directly following an index event. However, over half the deaths occurred more than 29 days following an index suicide related contact with police or paramedics, within the study period (58.5%).

Table 27 Temporal characteristics of deaths with respect to index suicide related contact with police or paramedics

Death after index event	DV-S % (n)
≤24 hours	30.6% (n=26)
25 hours – 29 days	9.4% (n=8)
30 days – 365 days	30.6% (n=26)
> 1 year	29.4% (n=25)

Table 28 shows contact with health services, by type, in the 30 days prior to death, of those who died, disaggregated by time of death following the index event. It highlights that the most common health service contact type for those who died within 24 hours, was an MBS billing provider, predominately a general practitioner. All of those who died between one day and one month following an index suicide related contact, had a contact with an emergency department or hospital, while those who died one month or more following a suicide related contact had contacts across both MBS and hospital providers.

Table 28 Contact with health services, by type, in the 30 days prior to death, of those who died, disaggregated by time of death following index event.

Contact up to 30 days prior to death	Died ≤ 24 hours after index % (n)	Died 25hours - 29 days after index % (n)	Died 30 days - 365 days after index % (n)	Died > 1 year after index % (n)
MBS GP related	34.6% (n = 9)	-	50.0% (n = 13)	36.0% (n = 9)
MBS Other items	23.1% (n = 6)	-	53.8% (n = 14)	48.0% (n = 12)
ED/QHAPDC contact	-	100.0% (n = 8)	46.2% (n = 12)	56.0% (n = 14)
CIMHA	-	-	-	-

'-' denotes suppression of numbers due to <6 deaths per cell

6 Discussion

6.1 Rates of contact

Over the three-year period examined, 1625 veterans were identified as having had a suicide related engagement with police or paramedics in Queensland. The majority (83%) of the cohort was ex-serving at the time of an index contact and 17% were current serving. Veterans who came into contact with police or paramedics had a median age of 41 years at the time of an index suicide related contact, 80% were male and 8% were identified as Aboriginal and/or Torres Strait Islander. The most recent record of area of service was Army for 77% of the cohort.

Estimated rates of contact are conservative for three reasons, the first being limitations in identification of individuals, the second being likely increases in need and demand over time since the study period ended, and the third that our method counted individuals as at their first contact and thus did not account for re-presentations with police or paramedics. Nevertheless, we estimated that police and paramedics in Queensland respond to at least one new veteran every 16 hours, and one every four hours, nationally. While ex-serving members made up the majority of the cohort, we nevertheless identified that, over the study period, police or paramedics in Queensland responded to, on average, at least one new current serving permanent member every week.

When compared to the general adult population, we estimated that veterans in Queensland had 24% higher odds of having a suicide-related contact than other adults in the Queensland population.

These findings are consistent with previous evidence that indicates self-reported suicidality among veterans is higher than it is for the general population. Our study demonstrates that these experiences of suicidality are likely to translate into increased rates of suicide-related contacts with police or paramedics.[2-5]

6.2 Mental health and physical health problems

6.2.1 Mental health

Based on data available in Queensland's public mental health service database, CIMHA, as well as collateral information derived from MBS and PBS items, we estimated that 83% of the veteran cohort who were subject to a suicide related call to police or paramedics had a probable mental health diagnosis. By comparison, veterans who did not have a record of a suicide-related contact with police or paramedics, but were matched on age, sex, and Queensland postcode characteristics, showed considerably lower rates of probable mental health diagnosis (23.7%). Suicide-related contact with police or paramedics, sex, and service status were all associated with increased odds of having a probable mental health diagnosis.

Direct comparison between prevalence of mental health diagnosis between this study and the Transition and Wellbeing Research Programme[5] (Australia's largest study of mental health of veterans to date), is limited because

the measurement of mental health diagnosis differs between these studies in several ways. However, it appears that both studies point to similarly high levels of mental health diagnosis, and similar rates of identified PTSD.

The veteran cohort in our study showed very high rates of serious mental illnesses, particularly bipolar and related disorders, as well as schizophrenia spectrum and psychotic disorders. Prevalence of bipolar and related disorders did not vary significantly to those of other adults who were subject of a suicide-related call, while prevalence of schizophrenia spectrum and other psychotic disorders was lower among those within the veteran cohort in comparison to a matched cohort of adults who were also the subject of a suicide-related call. These disorders are known to be associated with suicidality and suicide;[1, 42] thus, one would expect high concentration within a cohort experiencing suicidality. When rates of these disorders are considered within the context of the veteran population of Queensland, it appears likely that the prevalence of these conditions among veterans are below the general population prevalence.[17]

6.2.2 Physical health and comorbidities

94% of the DV-S cohort had at least one physical health condition that had resulted in a presentation to a hospital or emergency department. The most common diseases experienced by veterans who experienced suicidality were digestive, musculoskeletal, and circulatory diseases and 50% of the cohort had a recorded mental health diagnosis in combination with at least one physical health related presentation. There was a high level of consistency between physical health conditions resulting in a hospital admission and the profile of prescribing of PBS items, where prescribing was significantly higher among veterans who experienced suicidality resulting in a police or paramedic cohort, in comparison to a sample of veterans who had not. The profile of physical health conditions resulting in hospitalisation among veterans who experienced suicidality also varied from findings on veterans identified through the National Health Survey (2020-2021); notably, lower rates of respiratory conditions but higher rates of digestive disorders were identified among the DV-S cohort.[8] The DV-S and GA-S cohorts appeared relatively similar in profile in terms of hospital presentations as well as overall polypharmacy.

There is increasing recognition of the association between mental health conditions and physical health conditions, and the contribution of this to a substantial life-expectancy gap among individuals with mental health diagnoses.[13, 43,44] Additionally, however, presence of physical health conditions is associated with suicidality and suicide death, independently of mental health diagnoses, with some evidence of a dose response relationship: as the number of physical health conditions increases so does the risk of suicidality and suicide death.[1, 14,44, 45] Addressing suicidality among veterans therefore necessitates an effective holistic response that addresses both physical and mental health treatment and care needs.

6.3 Health services utilisation

While this study did not include linkage to health services specific to current or ex-serving members of the ADF (e.g., Defence Health Services, Open Arms), high rates of health services utilisation were nevertheless evident among individuals who experienced suicidality resulting in a police or paramedic contact in comparison to veterans who did not. With the exception of MBS funded services (mostly general practitioner visits), which were accessed at approximately the same rate in the 12 months before and after an index suicide-related contact with police or

paramedics, and at similar rates among veterans who experienced suicidality versus those who did not, service use of public health services was much higher among veterans who experienced suicidality and increased markedly following a suicide related contact with police paramedics in the 24 hours, 7 days, one month and one year following contact in comparison to the same time period before a suicide-related contact. Moreover, the majority of individuals seen by a state-based service over the following 12 months were engaged within 24 hours of their index contact.

High rates of mental health services use indicated that many veterans who experienced suicidality used both public and private mental health services, with higher rates of engagement with public mental health services evident in this cohort across the range of ambulatory and inpatient services in the 12 months pre- and post- an index contact.

It was noted that following a suicide related contact with police or paramedics there was a prompt response across the health system. However, the pattern of health care contacts prior to an index event suggests primary care as a key setting for initiating conversations and responses to prevent escalation, relating to evident physical, as well as mental health care needs.

Findings presented can attest to the number and type of contacts an individual may have with the health system, however, it cannot confidently assess quality of treatment provided or whether the 'dose' of treatment received was sufficient to provide therapeutic benefit. However, the findings presented in the following section highlight probable under use of evidence-based psychological therapies, while at the same time there was extensive use of prescribed medication.

6.4 Polypharmacy

High rates of prescribing were evident among veterans who experienced suicidality, particularly among individuals within the cohort who were identified as having a diagnosis of PTSD. Pair-wise comparisons showed that the DV-S cohort demonstrated higher rates of polypharmacy of N-class medicines than the matched GA-S cohort. Specifically, 87% of the cohort had been prescribed an N class (nervous system) medication in the 12 months pre- or post- an index suicide related contact. High rates of antidepressant (81%), opioid (66%) and anxiolytic (59%) prescribing were evident, although data are not available as to the condition(s) for which these were prescribed. By contrast, the cohort of veterans without a record of a suicide related contact with police or paramedics had far lower rates of prescribing of all aforementioned medicines (antidepressant (26.8%), opioid (44%) and anxiolytic (14.2%)). Furthermore, 69% of the veteran cohort who experienced suicidality had a record of concurrent prescription of two or more medication types. Almost all individuals with a diagnosis of PTSD had at least one N class medication prescribed, with 96% having had an antidepressant prescribed, 84% having an anxiolytic prescribed, 76% having at least one opioid prescription and 54% having a hypnotic or sedative prescribed. In contrast, only 10.4% of veterans without a record of suicidality had a record of a prescription of hypnotics or sedatives over the period examined. Rates of anxiolytic, hypnotic and sedative prescribing among the DV-S cohort (both with and without PTSD) was higher than have been reported in published studies of veterans from Australia, and internationally.[46,47] Finally, 87% of individuals with a diagnosis of PTSD had a record of concurrent prescription of two or more medication types.

Current Australian guidelines for treatment of PTSD, developed by Phoenix Australia, provide conditional recommendation for select antidepressants for the treatment of PTSD, and thus high rates of antidepressant prescribing among those with PTSD is to be expected.[48] High rates of prescribing of benzodiazepines, however, are

of concern in light of evidence that they may not be beneficial and may in fact be harmful for individuals with PTSD.[49] At the same time, contact with psychology or allied health services was well below prescribing rates for mental health conditions, and lower again among those with a PTSD diagnosis, even though psychological therapies are first line treatments for PTSD.[49] It should be noted, however, that psychology and counselling services delivered by Open Arms or Defence Health Service are not included in these counts.

6.5 Death

An examination of Standardised Mortality Ratios highlighted excess mortality among veterans who were the subject of a suicide related call to police or paramedics in comparison to the general adult population of Queensland (i.e., in comparison to population benchmarks). Moreover, 31% of those who died, died within 24 hours of a suicide related contact. Further examination of the specific characteristics of presentations and cause of death, as well as pattern of health care utilisation in the preceding week, of those who died within 24 hours, is warranted to identify key targets for responses that may be lifesaving. Equally, further detailed examination of the pathways and presentations of individuals who died at one month and between one month and one year following a suicide related contact with police or paramedics, may help identify opportunities for engagement and improved outcomes.

6.6 Summary

Veterans are at higher risk of a suicide related contact with police or paramedics than the general adult population. Those who are subject to a suicide related contact are also at increased risk of dying due to any cause.

Prevalence of both mental and physical health conditions were more common among veterans who had experienced suicidality than those who did not. It is possible that the combined experience of multiple physical and mental morbidities contributes to suicidal distress.

Substantial use of civilian (public and private) services was evident among veterans who experienced a suicide-related contact with police or paramedics. In particular, many received responses from a range of public health services within 24 hours of a crisis.

High rates of mortality within the 24 hours following a suicide related police or paramedic contact highlights the critical importance of crisis prevention, service collaboration and also training of first responders. The critical role of general practitioners and Medicare funded providers is also apparent. They are more likely to be in contact with those at high risk of crisis and death prior to the crisis, compared with public health sector providers and thus can play a key role in prevention.

High rates of medication prescribing combined with low rates of recorded use of psychological services are of concern. Noting limitations in data linkage that excluded Defence and veteran delivered psychological and counselling services, this finding warrants further investigation in order to examine if veterans are receiving the most effective and appropriate evidence-based treatment while ensuring safe use of medications.

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Appendices

Appendix A – Data Linkage: Ethical and legal explainer

Data linkage involves the transfer of two types of data:

1. Identifying data (names, addresses, date of birth etc.; hereafter 'identifying data') about individuals. This information is transferred between entities, including third-parties that do not include the research team, to generate a unique ID that can be used for the purposes of data linkage; and
2. De-identified content data (e.g., relevant data about an individual; hereafter 'content data') which is securely transferred to the research team using the unique ID that has been generated for the purposes of the study, which allows researchers to link together individual level data across datasets, without requiring the identifying data themselves.

Four key processes that are relevant to ensuring the secure and ethical management of data and the protection of individuals' privacy, are summarised below. These are:

1. Privacy Act and consent
2. Separation principle
3. Statistical disclosure control
4. Data management

1) Privacy Act and Consent

Research studies often require that researchers obtain "free and prior informed consent" from an individual prior to using their data for the purposes of research. Where it is possible, this should occur. However, the National Health and Medical Research Council (NHMRC) recognises that there are situations where this is not possible. In this situation, and consistent with the Australian Privacy Principles, a waiver of consent can be granted by an NHMRC registered Human Research Ethics Committee (HREC) under sections 95 and 95a of the Privacy Act 1988.[50]

According to the National Statement on Ethical Conduct in Human Research published by the NHMRC, a waiver of consent can be obtained by researchers for a project "where it is impracticable to obtain an individual's explicit consent to the use of their information and the purpose of the research cannot be served by using non-identifiable information". The present study includes approvals for a waiver of consent from two NHMRC registered HREC's: the Royal Brisbane and Women's HREC (EC00172) and the Department of Defence and Veterans' Affairs HREC (EC00460). It has had additional review, with respect to Australian Privacy Principles, by the Australian Institute of

Health and Welfare research committee. To waive the requirement for consent, a responsible HREC must be satisfied that the following criteria are met:

a. involvement in the research carries no more than low risk to participants. ['Low risk research' describes research in which the only foreseeable risk is one of discomfort, i.e. mild inconvenience or disruption.]

b. the benefits from the research justify any risks of harm associated with not seeking consent [as above, by definition, the risk of harm for this study must be low or negligible.]

c. it is impracticable to obtain consent (for example, due to the quantity, age or accessibility of records)

d. there is no known or likely reason for thinking that participants would not have consented if they had been asked [this criterion applies a 'reasonable person' test i.e., it does not account for people who may have idiosyncratic reasons for not wishing to participate in research.]

e. there is sufficient protection of their privacy

f. there is an adequate plan to protect the confidentiality of data

g. in case the results have significance for the participants' welfare there is, where practicable, a plan for making information arising from the research available to them (for example, via a disease-specific website or regional news media) [this is mostly applicable to studies using biospecimens that could identify disease or disease risk]

h. the possibility of commercial exploitation of derivatives of the data or tissue will not deprive the participants of any financial benefits to which they would be entitled [not applicable to the present study]

i. the waiver is not prohibited by State, federal, or international law.[51]

2) Separation Principle

One of the key ways that data linkage studies can be carried out in a way that preserves an individual's privacy is through upholding the separation principle. The separation principle is a mechanism to protect the privacy of individuals by separating identifying information from content data of interest to the researcher. The separation principle ensures that researchers will only have access to de-identified data and at no point in time will they have access to identifying information that could directly identify an individual whose data are being used. This principle works by using an intermediary, in this case a specialist department (e.g., the Australian Institute of Health and Welfare Data Integration Service Centre), to handle identifying information (such as name, address, date of birth) that are required to undertake linkage, and then applying a linkage key which is transferred back to each respective agency in order for that agency to supply content data to researchers that is linked at the individual level but fully de-identified (i.e. stripped of names and addresses, but still containing age information). A visualisation of this principle is given in Figure 9.

Organisation A's data

	A	B	C	D	E	F	G
1	Person	First name	Last name	Gender	Diagnosis		
2	1	John	Smith	M	Depression		
3	2	Olivia	Brown	F	Anxiety		
4							

What Organisation A sends to linkage agency

	A	B	C	D	E
1	Person	First name	Last name	Gender	
2	1	John	Smith	M	
3	2	Olivia	Brown	F	
4					

What linkage agency sends back to Organisation A

	A	B	C	D	E
1	Person ID	Linkage Key			
2	1	9567263			
3	2	4727326			
4					

What researcher receives from Organisations A, B ...

	A	B	C
1	ID	Gender	Diagnosis
2	4727326	F	Anxiety
3	9567263	M	Depression
4			

	A	B	C
1	ID	Gender	ADF?
2	4727326	F	Y
3	9567263	M	N
4			

	A	B	C
1	ID	Gender	Service use
2	4727326	F	Y
3	9567263	M	Y
4			

Figure 9 Depiction of data linkage process employing principle of separation

3) Statistical Disclosure Control

Another mechanism for preserving individual privacy is statistical disclosure control. Statistical disclosure control mechanisms protect the identities of individuals from being inadvertently disclosed, by ensuring that published findings do not inadvertently reveal the identity of any study participants who may possess unusual combinations of characteristics. This can happen in situations where individuals have rare combinations of characteristics (e.g., postcode and cultural background) that could make them identifiable to others even without a name being given. In this project, we will follow best practice statistical disclosure control techniques, as stipulated by the Australian Bureau of Statistics,[52] which include rules for suppressing publication of count or percentage data when numbers are very small.

4) Data Management

Secure storage of data protects privacy, through restricting access to unit record information and reducing risks of data breaches. This is managed, through use of the SURE platform.[53] SURE is a Secure Unified Research Environment, mandated for use by the Australian Institute of Health and Welfare (AIHW) for the secure storage of AIHW data. Access to SURE is strongly authenticated and requires a username, password and use of one-time access codes provided by an authentication token (Yubikey) issued to SURE users. Data are stored centrally on servers housed in a secure data centre within Australia. No data are stored on a researcher's local computing environment except where already permitted by the data custodian. The only way for a file to enter or leave SURE is via the Curated Gateway. All inbound and outbound files are subject to review as they pass through the Curated Gateway before they can be accessed within the SURE facility or downloaded to a user's local computing environment. In particular, this review ensures that researchers cannot download unit record information, and that the only information downloaded from the SURE platform is statistical analysis or aggregate information (e.g., counts and percentages), compliant with statistical disclosure control procedures.

SURE is accredited and regularly audited under ISO27001:2013v.[53] SURE is hosted in a tier-3+ (i.e. most secure available) data centre in Sydney that is also used by some of Australia's leading telecommunications, government and financial institutions. The data centre is a member of the Australian Government Data Centre Facilities Panel. SURE servers are housed in dedicated, locked cabinets. Premises-wide security measures include 24 hour staffed security surveillance, intruder resistance at all levels and strict physical access controls including access control lists. Regular backups of data stored in the SURE facility are made using 2 processes. Firstly, disk-to-disk backups are made at the SURE facility. Additionally, data is copied off in encrypted form to tapes that are rotated offsite. Data taken off-site is strongly encrypted using 256-bit Advanced Encryption Standard and stored in a secure facility.

Appendix B – Selection of veterans denominator

The denominator for the veteran population of Queensland was estimated by combining publicly available data for Queensland in ADF annual reports and Department of Veterans' Affairs (DVA) annual reports.[25-30] Data were extracted from these reports to align with the study period over which the cohort was defined (1 February, 2014 – 31 January, 2017), however, differences in reporting periods (e.g., Financial Year based reporting) meant this alignment is not exact. This method of estimating the veteran population is subject to known undercounting of ex-serving members. The Queensland veteran population is estimated as n=82449, the average across the three years examined. This estimate is used specifically to calculate the odds ratio of suicide related contacts among the DV-S compared to GA-S cohort, given in section 5.1. It is also used to estimate the call rate per 100,000 in Table 2. Given the population estimate used is known to undercount the veteran population, it is likely that the odds ratio overestimates the difference between veteran and adult civilian cohorts. However, it should be noted that the estimated numerator is also a known undercount and will thus mitigate this limitation with respect to call rates per 100,000. The data provided in Table 29 has also been used to extrapolate the estimated overall contact rate per hour from a Queensland state-based estimate to a national estimate. This was done by calculating the average Queensland veteran population estimate as a proportion of the average total population estimate for Australia. Unlike the previously mentioned estimates of the odds ratio and call-rate, the extrapolation of the call rate per hour to a national estimate is not considered to be subject to known systematic biases, as it is based on the relative population of Queensland as a proportion (27%) of the total veteran population of Australia, rather than reliant on absolute population counts.

Table 29 Defence workforce by State/Territory

Year	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Overseas	Total
2013 Financial Year (FY) -14 FY										
Current										
Permanent Forces										
Navy	6495	1544	927	84	2209	19	668	1533	282	13761
Army	5919	3342	11236	1434	849	68	3280	2639	278	29045
Air Force	4753	986	3013	1941	367	7	979	1927	257	14230
Reserve Forces										
Navy	1376	531	782	196	869	165	147	1039	4	5109
Army	3842	2604	3285	1219	1537	442	595	1020	2	14546
Air Force	1078	383	1182	416	279	51	119	865	0	4373
Ex-serving										

Service Pensioners	39848	27067	33870	12957	14826	4691	432	1641	-	135332
Disability Pensions	28257	18020	30195	7185	9927	3144	699	2879	–	100306
Total	**91568**	**54477**	**84490**	**25432**	**30863**	**8587**	**6919**	**13543**	**823**	**316702**
2014 FY-15 FY										
Current										
Permanent Forces										
Navy	6894	1580	834	103	2230	15	598	1538	157	13949
Army	5452	3218	12069	1386	864	68	3124	2746	266	29193
Air Force	4716	976	2974	2008	357	7	962	1979	283	14262
Reserve Forces										
Navy	1291	543	732	226	811	133	131	1049	4	4920
Army	3482	2446	3179	1117	1500	451	518	889	3	13585
Air Force	1171	378	1255	426	291	55	124	951	1	4652
Ex-serving										
Service Pensioners	36796	24999	32042	11915	13874	4269	398	1572	–	125865
Disability Pensions	26502	16859	29484	6866	9515	3005	672	2827	–	95730
Total	**86304**	**50999**	**82569**	**24047**	**29442**	**8003**	**6527**	**13551**	**715**	**302156**
2015 FY-16 FY										
Current										
Permanent Forces										
Navy	6741	1590	797	174	2320	14	573	1654	160	14023
Army	5428	3209	12394	1476	864	70	3248	2711	272	29672
Air Force	4635	974	3101	2013	320	7	963	2008	319	14340
Reserve Forces										
Navy	824	337	413	131	355	88	76	916	7	3147
Army	3454	2444	3214	1159	1494	433	427	918	3	13546

Air Force	1143	390	1334	450	282	48	120	997	1	4765
Ex-serving										
Service Pensioners	33955	23098	30301	11136	13085	3957	391	1508	–	117431
Disability Pensions	24873	15856	28734	6577	9236	2905	674	2758	–	91613
Total	**81053**	**47898**	**80288**	**23116**	**27956**	**7522**	**6472**	**13470**	**762**	**288537**

Appendix C – Standardised Mortality Ratio

Purpose

The purpose of Standardised mortality ratios (SMRs) is to provide a standardized way to assess and compare mortality patterns in two populations. SMRs adjust for differences in the age and gender distribution of a population, allowing meaningful comparisons of mortality counts to be made against a reference population. This method enabled the research team to compare mortality in the DV-S cohort to the Queensland population. Due to low counts, SMRs are estimated for all-cause mortality.

Calculating SMR (indirect method)

1. Obtain (a) population size and (b) observable number of suicide deaths in reference population to calculate the crude mortality rate

$$Crude\ Mortality\ Rate = \frac{Total\ number\ of\ death\ in\ population}{Population\ size}$$

2. Identify the age distribution of males and females in the reference population.
3. Estimate the expected number of deaths in each age group by multiplying the (a) age group's population size and the (b) crude mortality rate
4. Calculate the SMR by dividing the observable number of deaths in the study population by the sum total of all expected deaths

$$Standardised\ Mortality\ Ratio\ (SMR) = \frac{\text{Number of Observed Deaths}}{\text{Number of Expected Deaths}}$$

Interpretations

- SMR < 1.0 = there were fewer than expected deaths in the study population
- SMR = 1.0 = the number of observed deaths equals the number of expected deaths in the study population
- SMR >1.0 = there were more than expected deaths in the study population
- SMRs are not comparable across reference populations.
- Confidence intervals can be used to establish whether there is a statistically significant difference between populations.

Reference population

Comparison has been made to the Queensland general population for all-cause mortality rates.

Appendix D – Odds ratios comparing sex and service status in DV-S versus DV-C cohorts

Odds ratios were calculated to further examine suicidality according to service status and suicide related contacts. Overall, veterans who were current serving had higher odds of having a suicide related contact with police or paramedics than those who were ex-serving (OR=2.30, 95% confidence interval 1.9-2.79). Equivalently, veterans who were ex-serving had lower odds of having a suicide related contact with police or paramedics than those who were current serving (OR=0.43, 95% confidence interval 0.35-0.54).

Examination of service status by sex identified that both males and females who were current serving had higher odds of having a suicide related contact with police or paramedics than those who were ex-serving. For males, the odds ratio was 1.92 (95% confidence interval 1.57-2.36) and for females the odds ratio was 5.03 (95% confidence interval 3.26-7.75). Noting that the confidence intervals of these two odds ratios do not overlap, it can be said that there is a statistically significant difference based on sex. In other words, while both males and females who were current serving had higher odds of having a suicide related contact with police or paramedics, females had significantly higher odds than males.

Table 30 provides further granularity by specific service status, disaggregated by those who were classified as ex-serving with any record of permanent service, those who were ex-serving with record of reserve service only, those who were current serving permanent and those who were current serving reserve. Odds ratios are calculated between those in the DV-S and DV-C cohorts, and between those with the service status identified, and all other service status types. Those who were ex-serving with any record of permanent service, and those who were current serving permanent members, had higher odds of a suicide related contact with police or paramedics than other service status types. Ex-serving reserve only members were less likely to have a suicide related contact with police or paramedics than other service status types. There was no statistically significant difference in the odds of current serving reserve members having a suicide related contact with police or paramedics. Among the service status types with elevated odds, odds were highest overall for those who were current serving permanent members at the time of a suicide related contact.

Table 30 Odds ratios of suicide related contact with police or paramedics, by service status

Service status	DV-S	DV-C	Odds ratio	95% Confidence interval
Ex-serving any permanent	54.9% (n = 641)	41.2% (n = 2142)	1.73	1.49 - 2.01
Ex-serving reserve only	28.4% (n = 332)	50.8% (n = 2636)	0.39	0.33 - 0.45
Current serving permanent	9.3% (n = 109)	1.7% (n = 90)	5.84	4.36 - 7.82
Current serving reserve	7.4% (n = 86)	6.3% (n = 326)	1.19	0.92 - 1.53

Table 31 provides further disaggregation of service status by sex. In reference to the overall profile (above), three findings deviated from the overall profile when findings were disaggregated. Specifically, current serving reserve only females had higher odds of a suicide related contact with police or paramedics. This differed significantly from males who had non-significantly different odds of a suicide-related contact with police or paramedics. Ex-serving females with a record of any permanent service did not have statistically significantly different odds of having a suicide related contact with police or paramedics. It is important to remember that attribution of statistical significance relates to sample size.

Table 31 Odds ratios of suicide related contact with police or paramedics, by service status and sex

Sex	Service status	DV-S	DV-C	Odds ratio	95% Confidence interval
Male					
	Ex-serving any permanent	56.0% (n = 520)	39.9% (n = 1626)	1.91	1.66 - 2.21
	Ex-serving reserve only	28.0% (n = 260)	51.0% (n = 2078)	0.37	0.32 - 0.44
	Current serving permanent	9.1% (n = 85)	1.9% (n = 76)	5.30	3.85 - 7.28
	Current serving reserve	6.9% (n = 64)	7.2% (n = 292)	0.96	0.72 - 1.27
Female					
	Ex-serving any permanent	50.6% (n = 121)	44.1% (n = 468)	1.30	0.98 - 1.72
	Ex-serving reserve only	30.1% (n = 72)	51.4% (n = 545)	0.41	0.3 - 0.55
	Current serving permanent	10.0% (n = 24)	1.3% (n = 14)	8.35	4.25 - 16.4
	Current serving reserve	9.2% (n = 22)	3.2% (n = 34)	3.06	1.76 - 5.34

Appendix E – Mental health disorders among a general adult comparator cohort

Table 32 Mental health disorders in the DV-S versus a (matched) GA-S cohort. Percentages are calculated out of the total number of individuals in each respective cohort

Category	DV-S	GA-S	Test of association
Mental Illness	**45.1% (n = 527)**	**47.4% (n = 2,181)**	**χ^2 (1,5772) = 1.81, p = 0.179**
Trauma and stressor related disorders	24.1% (n = 282)	18.8% (n = 864)	χ^2 (1,5772) = 16.59, p = <0.001
Trauma disorders	20.8% (n = 243)	15.2% (n = 700)	χ^2 (1,5772) = 20.97, p = <0.001
Acute and other reactions to stress	5.6% (n = 65)	5.9% (n = 270)	χ^2 (1,5772) = 0.1, p = 0.748
Depressive disorders	21.7% (n = 253)	21.5% (n = 990)	χ^2 (1,5772) = 0.01, p = 0.938
Schizophrenia spectrum and other psychotic disorders	11.0% (n = 129)	17.5% (n = 804)	χ^2 (1,5772) = 27.85, p = <0.001
Psychotic disorders Schizophrenia	8.3% (n = 97)	13.3% (n = 614)	χ^2 (1,5772) = 21.37, p = <0.001
Psychotic disorders, acute and transient	3.3% (n = 38)	4.7% (n = 215)	χ^2 (1,5772) = 4.13, p = 0.042
Psychotic disorders, substance induced	2.2% (n = 26)	5.3% (n = 245)	χ^2 (1,5772) = 19.26, p = <0.001
Psychotic disorders, other	2.1% (n = 24)	1.5% (n = 68)	χ^2 (1,5772) = 1.63, p = 0.201
Anxiety disorders	5.7% (n = 66)	6.5% (n = 300)	χ^2 (1,5772) = 1.03, p = 0.309
Bipolar and related disorders	5.5% (n = 64)	5.8% (n = 268)	χ^2 (1,5772) = 0.14, p = 0.706
Obsessive compulsive and related disorders	0.8% (n = 9)	0.9% (n = 41)	χ^2 (1,5772) = 0.05, p = 0.827
Other mental illness	1.1% (n = 13)	1.3% (n = 59)	χ^2 (1,5772) = 0.1, p = 0.752
Substance related and addictive disorders	**21.7% (n = 254)**	**30.5% (n = 1,406)**	**χ^2 (1,5772) = 34.72, p = <0.001**
Substance use disorders	18.3% (n = 214)	27.0% (n = 1,242)	χ^2 (1,5772) = 36.54, p = <0.001
Substance induced disorders	6.6% (n = 77)	9.8% (n = 450)	χ^2 (1,5772) = 10.99, p = <0.001
Other substance use disorders	3.5% (n = 41)	4.5% (n = 209)	χ^2 (1,5772) = 2.14, p = 0.144
Personality Disorder	**12.9% (n = 151)**	**15.3% (n = 705)**	***χ^2 (1,5772) = 4.01, p = 0.045***
Borderline personality disorders	7.4% (n = 87)	7.9% (n = 363)	χ^2 (1,5772) = 0.19, p = 0.664
Other personality disorders	5.7% (n = 66)	7.2% (n = 330)	χ^2 (1,5772) = 3.12, p = 0.077
Antisocial personality disorders	3.0% (n = 35)	4.0% (n = 184)	χ^2 (1,5772) = 2.29, p = 0.131
Neurocognitive disorders	0.8% (n = 9)	0.8% (n = 39)	χ^2 (1,5772) = 0.01, p = 0.939
Neurodevelopmental disorders	0.5% (n = 6)	3.1% (n = 141)	χ^2 (1,5772) = 23.37, p = <0.001

Appendix F – Physical health conditions resulting in presentations to hospital or emergency department, selected subchapters

Table 33 ICD-10 S00-T88: Injury poisoning and certain other consequences of external causes, five-year period

ICD-10 S00-T88, sub-chapters	DV-S % (n)
Poisoning by, adverse effect of and underdosing of drugs, medicaments and biological substances	29.4% (n = 343)
Injuries to the head	18.8% (n = 219)
Injuries to the wrist, hand and fingers	18.3% (n = 214)
Injuries to the abdomen, lower back, lumbar spine, pelvis and external genitals	11.4% (n = 133)
Injuries to the ankle and foot	11.1% (n = 130)
Complications of surgical and medical care, not elsewhere classified	11.0% (n = 128)
Injuries to the knee and lower leg	10.1% (n = 118)
Toxic effects of substances chiefly nonmedicinal as to source	9.8% (n = 115)
Injuries to the elbow and forearm	8.4% (n = 98)
Injuries to the thorax	7.8% (n = 91)
Injuries to the shoulder and upper arm	5.9% (n = 69)
Other and unspecified effects of external causes	4.8% (n = 56)
Injuries involving multiple body regions	4.5% (n = 53)
Injuries to the neck	4.5% (n = 53)
Injuries to the hip and thigh	4.0% (n = 47)
Injury of unspecified body region	1.8% (n = 21)
Effects of foreign body entering through natural orifice	1.7% (n = 20)
Certain early complications of trauma	1.5% (n = 18)
Burns and corrosions of external body surface, specified by site	1.5% (n = 17)
Injuries involving multiple body regions	0.9% (n = 11)
Injury of unspecified body region	0.9% (n = 11)
Burns and corrosions of multiple and unspecified body regions	0.9% (n = 10)
Burns and corrosions confined to eye and internal organs	0.6% (n = 7)

Table 34 K00-K95: Diseases of the digestive system, five-year period

ICD-10 K00-K95 sub-chapters	DV-S % (n)
Other diseases of intestines	16.3% (n = 190)
Diseases of esophagus, stomach and duodenum	14.6% (n = 171)
Diseases of oral cavity and salivary glands	6.7% (n = 78)
Other diseases of the digestive system	5.7% (n = 66)
Disorders of gallbladder, biliary tract and pancreas	4.4% (n = 51)
Hernia	4.4% (n = 51)
Diseases of liver	2.8% (n = 33)
Diseases of peritoneum and retroperitoneum	1.8% (n = 21)
Diseases of appendix	1.5% (n = 17)
Noninfective enteritis and colitis	1.2% (n = 14)

Table 35 M00-M99: Diseases of the musculoskeletal system and connective tissue, five-year period

ICD-10 M00-M99 subchapters	DV-S % (n)
Other dorsopathies	17.7% (n = 207)
Other joint disorders	13.2% (n = 154)
Other soft tissue disorders	9.2% (n = 108)
Osteoarthritis	4.4% (n = 51)
Disorders of synovium and tendon	2.4% (n = 28)
Inflammatory polyarthropathies	2.1% (n = 25)
Spondylopathies	2.1% (n = 24)
Disorders of muscles	1.6% (n = 19)
Chondropathies	1.5% (n = 18)
Other osteopathies	1.5% (n = 17)
Deforming dorsopathies	1.1% (n = 13)
Disorders of bone density and structure	0.9% (n = 11)
Infectious arthropathies	0.7% (n = 8)
Systemic connective tissue disorders	0.5% (n = 6)

Appendix G – Health services contacts over time, exclusive counts

Table 36 Exclusive counts of health services use by time period. Table shows the counts of the DV-S cohort who had contact with each health service in the time period relative to their index event. Individuals were counted once, and once only, in each time period in which they had a service contact.

Time period	CIMHA	EDC	MBS	PBS	QHAPDC
Over 365 days before	20.5% (n = 239)	39.3% (n = 459)	78.9% (n = 921)	75.4% (n = 881)	35.8% (n = 418)
31-365 days before	21.9% (n = 256)	41.4% (n = 484)	82.4% (n = 962)	81.0% (n = 946)	40.8% (n = 476)
15-30 days before	7.8% (n = 91)	7.1% (n = 83)	31.7% (n = 370)	38.1% (n = 445)	6.5% (n = 76)
8-14 days before	6.8% (n = 79)	4.5% (n = 53)	21.8% (n = 255)	24.8% (n = 290)	3.8% (n = 44)
2-7 days before	8.0% (n = 93)	5.1% (n = 59)	20.1% (n = 235)	22.7% (n = 265)	4.4% (n = 51)
1 day before	4.8% (n = 56)	1.5% (n = 18)	4.4% (n = 51)	4.7% (n = 55)	0.5% (n = 6)
1 day after	60.5% (n = 707)	74.8% (n = 874)	14.0% (n = 164)	12.5% (n = 146)	41.3% (n = 482)
2-7 days after	53.1% (n = 620)	7.1% (n = 83)	26.2% (n = 306)	28.4% (n = 332)	11.0% (n = 129)
8-14 days after	32.4% (n = 379)	4.3% (n = 50)	25.6% (n = 299)	26.6% (n = 311)	4.9% (n = 57)
15-30 days after	25.2% (n = 294)	7.4% (n = 87)	39.5% (n = 461)	43.9% (n = 513)	8.8% (n = 103)
31-365 days after	38.4% (n = 449)	46.2% (n = 540)	82.6% (n = 965)	84.7% (n = 989)	45.4% (n = 530)
Over 365 days after	27.5% (n = 321)	43.6% (n = 509)	78.4% (n = 916)	82.7% (n = 966)	42.6% (n = 498)

Appendix H – Health service contacts over time, cumulative

Table 37 Cumulative count of health services use by time period

Time period	CIMHA	EDC	MBS	PBS	QHAPDC
Over 365 days before	36.6% (n = 427)	63.4% (n = 741)	89.6% (n = 1,047)	89.6% (n = 1,046)	59.0% (n = 689)
365 days before	27.0% (n = 315)	47.9% (n = 560)	84.1% (n = 982)	83.2% (n = 972)	44.8% (n = 523)
30 days before	12.8% (n = 150)	15.7% (n = 183)	47.5% (n = 555)	54.2% (n = 633)	12.6% (n = 147)
14 days before	10.8% (n = 126)	9.8% (n = 114)	34.4% (n = 402)	39.6% (n = 462)	7.4% (n = 87)
7 days before	9.3% (n = 109)	6.2% (n = 73)	22.3% (n = 261)	25.9% (n = 302)	4.9% (n = 57)
1 day before	4.8% (n = 56)	1.5% (n = 18)	4.4% (n = 51)	4.7% (n = 55)	0.5% (n = 6)
1 day after	60.5% (n = 707)	74.8% (n = 874)	14.0% (n = 164)	12.5% (n = 146)	41.3% (n = 482)
7 days after	64.9% (n = 758)	76.0% (n = 888)	32.5% (n = 380)	35.8% (n = 418)	46.1% (n = 538)
14 days after	66.2% (n = 773)	77.0% (n = 899)	42.0% (n = 491)	48.0% (n = 561)	47.9% (n = 560)
30 days after	67.0% (n = 783)	77.9% (n = 910)	54.3% (n = 634)	62.2% (n = 726)	50.4% (n = 589)
365 days after	73.0% (n = 853)	85.5% (n = 999)	83.8% (n = 979)	86.6% (n = 1,012)	67.8% (n = 792)
Over 365 days after	76.2% (n = 890)	89.8% (n = 1,049)	90.7% (n = 1,059)	92.6% (n = 1,082)	75.8% (n = 885)

Appendix I – Differences in cumulative service contacts pre and post an index contact between DV-S and GA-S (matched) cohorts

Table 38 Absolute differences in health services contacts between DV-S and GA-S cohorts.

Health services contact type	Time period	Before/After index	DV-S (%)	GA-S (matched) (%)	Absolute difference (GA-S – DV-S)
EDC	1-year	Pre index contact	63.4	68.7	-5.3
CIMHA	1-year	Pre index contact	36.6	42.7	-6.1
QHAPDC	1-year	Pre index contact	58.8	53.7	5.1
MBS	1-year	Pre index contact	89.6	96.1	-6.5
EDC	30-days	Pre index contact	15.6	18	-2.4
CIMHA	30-days	Pre index contact	12.8	18.4	-5.6
QHAPDC	30-days	Pre index contact	12.3	10.4	1.9
MBS	30-days	Pre index contact	47.4	57.1	-9.7
EDC	14-days	Pre index contact	9.7	12.1	-2.4
CIMHA	14-days	Pre index contact	10.8	15.8	-5
QHAPDC	14-days	Pre index contact	7.4	6.4	1
MBS	14-days	Pre index contact	34.3	41.3	-7
EDC	24-hours	Pre index contact	1.5	2.6	-1.1
CIMHA	24-hours	Pre index contact	4.8	6.2	-1.4
QHAPDC	24-hours	Pre index contact	0.5	0.9	-0.4
MBS	24-hours	Pre index contact	4.4	5.3	-0.9
EDC	24- hours	Post index contact	74.7	75.1	-0.4
CIMHA	24-hours	Post index contact	60.5	60	0.5
QHAPDC	24-hours	Post index contact	41.3	39.5	1.8
MBS	24-hours	Post index contact	14	16.1	-2.1

EDC	14-days	Post index contact	76.9	76.9	0
CIMHA	14-days	Post index contact	66.2	66.2	0
QHAPDC	14-days	Post index contact	47.9	44	3.9
MBS	14-days	Post index contact	42	51.2	-9.2
EDC	30-days	Post index contact	77.8	78.1	-0.3
CIMHA	30-days	Post index contact	67	67.6	-0.6
QHAPDC	30-days	Post index contact	50.4	46.3	4.1
MBS	30-days	Post index contact	54.3	64.3	-10
EDC	1-year	Post index contact	89.7	90.8	-1.1
CIMHA	1-year	Post index contact	76.2	77.9	-1.7
QHAPDC	1-year	Post index contact	75.8	73.6	2.2
MBS	1-year	Post index contact	90.7	94.4	-3.7

Appendix J – PBS prescribing, selected ATC level 3 disaggregation

Table 39 PBS M class medicines prescribed to DV-S cohort, ATC Level 3, five-year period

M class medicines - ATC Level 3	DV-S % (n)
Antiinflammatory and Antirheumatic Products, Non-steroids	50.6% (n = 591)
Antigout preparations	4.2% (n = 50)
Muscle relaxants, centrally acting agents	2.8% (n = 31)
Specific Antirheumatic Agents	0.8% (n = 8)

Table 40 10 most prescribed M class medicines - DV-S cohort, five-year period

M class medicine	DV-S % (n)
Ibuprofen	20.0% (n = 235)
Meloxicam	18.0% (n = 209)
Celecoxib	13.6% (n = 160)
Diclofenac	11.6% (n = 135)
Naproxen	10.0% (n = 118)
Indometacin	5.6% (n = 67)
Baclofen	2.8% (n = 31)
Colchicine	2.8% (n = 31)
Allopurinol	2.6% (n = 30)
Mefenamic Acid	0.8% (n = 11)
Piroxicam	0.8% (n = 10)

Table 41 PBS H class medicines prescribed to DV-S cohort, ATC Level 3, five-year period

H class medicines - ATC Level 3	DV-S % (n)
Corticosteroids for Systemic Use, Plain	20.6% (n = 242)
Thyroid Preparations	4.0% (n = 45)

Table 42 Most commonly prescribed H class medicines in DV-S cohort, five-year period

H class medicine	DV-S % (n)
Prednisolone	13.6% (n = 158)
Prednisone	7.6% (n = 88)
Methylprednisolone	4.4% (n = 52)
Triamcinolone	4.0% (n = 45)
Levothyroxine	3.6% (n = 43)
Dexamethasone	2.0% (n = 24)
Betamethasone Acetate + Betamethasone Sodium Phosphate	1.2% (n = 13)

Appendix K – Polypharmacy supplementary analysis

Table 43 Pair-wise comparison of polypharmacy for DV-S and GA-S (matched) cohorts, grouped at ATC Main level, five-year period

Number of medications by type	DV-S	GA-S (matched)	Test of association
2	56.8% (n = 664)	58.3% (n=2684)	X^2 (1 , 5772) = 0.74 , p 0.389
3	15.2% (n = 178)	14.8% (n=681)	X^2 (1 , 5772) = 0.11 , p 0.735
4+	13.0% (n = 152)	11.9% (n=546)	X^2 (1 , 5772) = 1.06 , p 0.303
Total 2+	85.0% (n=994)	85.0% (n=3911)	X^2 (1 , 5772) = 0.01 , p 0.931

Table 44 Pair-wise comparison of polypharmacy for DV-S and GA-S (matched) cohorts, grouped at ATC third level, five-year period

Number of medications by type	DV-S	GA-S (matched)	Test of association
2	43.0% (n = 502)	46.4% (n = 2135)	X^2 (1 , 5772) = 4.19 , p 0.041
3	11.9% (n = 139)	10.1% (n = 466)	X^2 (1 , 5772) = 2.96 , p 0.086
4+	13.3% (n = 155)	7.0% (n = 322)	X^2 (1 , 5772) = 47.59 , p <.001
Total 2+	68.2% (n=796)	63.5% (n=2923)	X^2 (1 , 5772) = 8.63 , p 0.003