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Descriptive Analysis Of Mental Health-Related Presentations To Emergency Medical Services

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ORIGINAL CONTRIBUTIONS

DESCRIPTIVE ANALYSIS OF MENTAL HEALTH-RELATED PRESENTATIONS TO EMERGENCY MEDICAL SERVICES

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ABSTRACT

Objective: In many developed countries, a lack of community-based mental health services is driving increased utilization of emergency medical services (EMS). In this descriptive study, we sought to describe the demographic and clinical characteristics of mental health-related EMS presentations in Victoria, Australia. **Methods**: A retrospective observational study of EMS presentations occurring between January and December 2015. Computer Aided Dispatch and electronic patient care record data were extracted from an electronic data warehouse. Characteristics of EMS-attended mental health presentations were described and compared to other EMS-attended patients using descriptive statistics. **Results**: Of the total 504,676 EMS attendances, 48,041 (9.5%) were mental health presentations. In addition, 4,708 (6.6%) cases managed by a paramedic or nurse via the EMS secondary telephone triage service also involved mental health complaints. EMS-attended mental health patients were younger and more often female compared to other patients attended by EMS. Most mental health patients were transported to hospital (74.4%); however, paramedics provided treatment to significantly fewer mental health patients compared to other EMS-attended patients (12.4% vs. 50.3%, $p < 0.001\%$). The majority of mental health patients (76.8%) had a documented mental health history. Social or emotional issues were the most common presentation in mental health patients aged ≤15 years (19.1%); whereas, for patients aged ≥65 years, anxiety was the most common clinical presentation (41.2%). For patients undergoing secondary triage, 52.5% were frequent callers or anxiety presentations. A total of 27.7% of triaged patients were referred to an alternative service, while 24.6% were managed under an existing care plan. **Conclusion**: Mental health-related cases represent one in ten EMS attendances in Victoria. A large proportion of mental health presentations receive little intervention by EMS, and could benefit from community-based services provided by mental health clinicians. **Key words:** emergency medical services; mental health; prehospital

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INTRODUCTION

Mental disorders are highly prevalent globally, with 29% of the population expected to experience a mental health disorder in their lifetime (1). Individuals in the community who experience mental health-related problems need help and support to access the right care at the right time (2). However, globally there is a substantial gap between the demand for, and availability of, mental health services (3–5). For example, in high income countries, the World Health Organization (WHO) have estimated that between 35% and 50% of people living with serious mental disorders do not receive needed mental health services (6).

Locally and internationally, the shortfall in mental health services is likely to have influenced an increase in the utilization of emergency medical service (EMS) care (4), (7–10). Although EMS are the first point of call for patients with out-of-hospital health emergencies, it is unclear whether EMS provides the most appropriate response with respect to the clinical needs and outcomes of mental health patients (7,10,11). Furthermore,

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there is a paucity of scientific research that explores the involvement of EMS in mental health-related emergencies.

In this study, we sought to describe emergency mental health-related presentations to EMS in Victoria, Australia over a 12-month period, including current demand patterns, clinical profiles, and prehospital-related interventions in this population.

METHODS

Study Design

We conducted a retrospective observational study of all EMS presentations and secondary telephone triage events occurring between January and December 2015. Inter-hospital transfers and attendances where a mental health issue was secondary to a physical complaint were excluded. The collection and use of data for this study was exempt from ethical review by Monash University Human Research Ethics Committee.

Setting

The state of Victoria, Australia is populated by almost 6 million residents. Ambulance Victoria is the sole provider of EMS in the state. The EMS system is two-tiered, including Advanced Life Support and Intensive Care paramedics. Calls to EMS in Victoria undergo primary triage using the Medical Priority Dispatch System (MPDS) Version 12.2, a commercial medical triage system. Calls are categorized according to the chief complaint (e.g., chest pain, psychiatric problem) based on responses to key questions and then prioritized according to a dispatch matrix. An emergency ambulance is dispatched to cases triaged as life threatening or serious medical emergencies, while lower acuity cases, which may benefit from a service other than an emergency ambulance, are transferred to the Ambulance Victoria secondary triage service. In addition, other emergency services, such as police or fire resources, can be simultaneously dispatched with an emergency ambulance to prespecified MPDS determinant codes, as determined by Ambulance Victoria (e.g., for threatening mental health patients).

The secondary triage service uses the Care Enhance Call Center triage (CECC) system to triage patients and operates 24 hours a day, 7 days a week. Telephone advice is provided by an experienced nurse or paramedic who follows condition-specific questioning algorithms to better understand the patient's presenting problem and arrange the most suitable healthcare (12). The secondary triage may result in transfer back to an emergency ambulance, referral to an alternative service provider such as a locum doctor, nurse, Crisis Assessment and Treatment Team (CATT) or non-emergency patient transport (usually for medical transfers or appointments), or provision of self-care advice (12).

Data Sources

Data for this study were extracted from Ambulance Victoria's data warehouse. The database includes various sources of data, including in-field, secondary triage, and Computer Aided Dispatch records. In-field patient and treatment data are recorded by paramedics using a computer tablet at the conclusion of each case, which produces an electronic patient care record and then synchronizes with the data warehouse (13).

Case Ascertainment and Definition

Emergency Cases

In the prehospital setting, there are no universally accepted criteria for identifying mental health-related presentations. As such, the definitions used in this study were developed *a posteriori*. Cases were considered mental health-related if one or more of the following conditions were present in the patient care record: A mental health issue was identified as the cause of the presenting problem where the final paramedic assessment was mental health-related (e.g., anxiety, depression, emotional distress), specific mental health-related management was provided (e.g., mental health risk assessment), psychiatric services were present on scene, the billing type indicated a mental health case or the case description indicated a mental health issue. The remaining emergency cases were considered "other emergency cases."

EMS-attended mental health cases were categorized into one of eight clinical classifications. Psychosis: cases with an unspecified psychiatric episode; Anxiety: cases with anxiety or panic attack, or patients who present with manifestations of anxiety (e.g., hyperventilation); Suicide/suicidal ideation: cases with suicidal ideation or suspected attempted/actual suicide (e.g., hanging); Social/emotional problems: cases with emotional, behavioral or social problems; Substance abuse: cases involving alcohol, drugs or overdose secondary to a mental health issue; Self-harm/self-harm ideation: cases with self-harm ideation or injuries arising from such behavior; Mood disturbances: cases with mood disturbances (e.g., depression, bipolar disorder); Other: cases that are not classified in the aforementioned categories (e.g., cognitive impairment).

Cases involving more than one clinical presentation (e.g., anxiety and mood disturbance) were categorized by the most "dominant" feature of the presentation. Clinical classifications used in this report are specific to EMS data and may therefore differ

from definitions used by other health or psychiatric services.

Mental health history was determined from prehospital patient care records and classified as Psychiatric, Substance abuse, or Neuro-cognitive history. Psychiatric cases included those with common mental disorders (e.g., anxiety, bipolar, depression, schizophrenia); Substance abuse cases included those that involved alcohol, drugs, or overdose; and Neuro-cognitive cases included those that involved diseases affecting the brain (e.g., acquired brain injury, Alzheimer's disease, dementia).

A "Compulsory patient" refers to a patient that refuses or is unable to consent to treatment as a result of their mental illness and is therefore subject to an Assessment Order by an authorized psychiatrist (14). An ambulance paramedic is authorized to transport a compulsory patient for treatment and must always transport a patient if their medical needs can only be met by an ambulance service (15). Furthermore, if the patient requires sedation or the use of bodily restraints, they must be transported by ambulance or non-emergency patient transport accompanied by authorized personnel (e.g., ambulance paramedic, registered nurse or registered medical practitioner) (15).

Secondary Triage

For cases undergoing secondary triage, mental health cases were identified based on the clinical guideline determined from the condition-specific questioning algorithm. The mental health-related clinical guidelines were grouped into 11 categories: frequent caller, anxiety, schizophrenia, depression/mood, confusion, substance abuse, suicide, bipolar, sleep disorder, eating disorder, and conduct disorder.

Statistical Analyses

Continuous data are described using medians and interquartile ranges (IQR). Comparisons were made using the Mann Whitney-U and Kruskal Wallis tests, as appropriate. Categorical data are summarized using counts and percentages, with comparisons made using the χ^2 test. All statistical analyses were conducted using SPSS Version 23.0 for Windows (SPSS Inc., Chicago, IL), and a two-sided p-value less than 0.05 was considered statistically significant.

RESULTS

A total of 526,862 patients were attended by EMS in Victoria over the 12-month study period. After excluding inter-hospital transports, the study included a total of 504,676 emergency attendances, of which 48,041 (9.5%) were mental health-related and 456,635 were other presentations (Figure 1). In addition, 71,069 cases underwent secondary triage during the study period with 4,708 (6.6%) cases triaged under a mental health-related guideline and 66,361 other secondary triage guidelines.

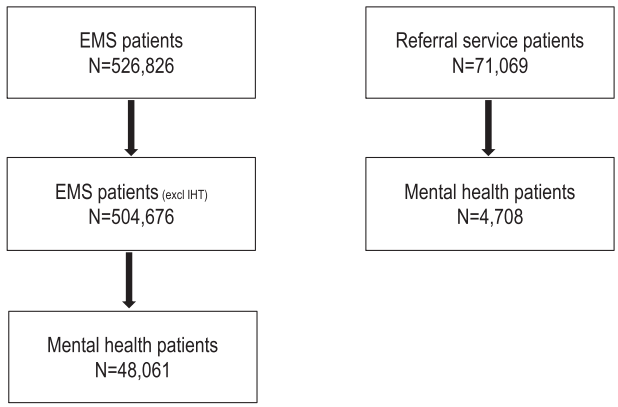

FIGURE 1. EMS-attended and secondary triage patients in 2015. Patients may appear in both the primary and secondary triage categories. Abbreviations: IHT = *inter-hospital transfer*.

Characteristics of Mental Health-Related EMS Attendances

The characteristics of EMS-attended cases are presented in Table 1. For mental-health patients, the median age was 37 years (IQR 25–51) and 56.6% were female. EMS-attended mental health patients were younger and more often female compared to other patients attended by EMS (all $p < 0.001$). A total of 74% of mental health patients were transported to hospital; however, paramedics provided treatment to significantly fewer mental health patients than other EMS-attended patients (12.4% vs. 50.3%, $p < 0.001$). Mental health cases had a higher overall median response time (16.9 minutes vs. 13.1 minutes) and higher Police attendance (27.0% vs. 5.6%) compared to other EMS-attended cases ($p < 0.001$ for both). The majority of mental health patients (76.8%) had a paramedic documented mental health history. The three most common MPDS triage categorizations of EMS-attended mental health cases were: classifications related to a mental health problem (46.8%), overdose/poisoning (13.7%), and chest pain (6.6%).

The mental health presentation of EMS-attended patients according to age category is presented in Figure 2. Social or emotional issues were the most common presentations for mental health patients aged ≤15 years (19.1%), while for patients aged ≥65 years anxiety was most common (41.2%). Self-harm/self-harm ideation and suicide/suicidal ideation presentations declined with increasing age. Self-harm or self-harm ideation patients were most likely to receive active intervention by paramedics (39.5%). Patients with anxiety (5.9%) or social/emotional problems

TABLE 1. Characteristics EMS-attended cases

Characteristic	All EMS cases	EMS mental health cases	Other EMS cases	P-value
Number of cases, *n*	504,676	48,041	456,635	—
Age, median (IQR)	58 (33, 78)	37 (25, 51)	61 (35, 79)	<0.001
Age category, *n* (%)				
≤ 15 years	41,852 (8.4)	2,078 (4.3)	39,774 (8.8)	<0.001
16–39 years	115,776 (23.1)	23,843 (50.0)	91,933 (20.3)	<0.001
40–64 years	128,736 (25.7)	15,625 (32.8)	113,111 (25.0)	<0.001
≥ 65 years	214,295 (42.8)	6,140 (12.9)	208,155 (45.6)	<0.001
Female, *n* (%)	261,544 (51.9)	27,134 (56.6)	234,410 (51.5)	<0.001
Private residence, *n* (%)	329,552 (65.3)	31,980 (66.6)	297,572 (65.2)	<0.001
Mental health problem identified in the EMS call, *n* (%)	25,257 (5.0)	22,473 (46.8)	2,784 (0.6)*	<0.001
Police at scene, *n* (%)	38,646 (7.7)	12,954 (27.0)	25,692 (5.6)	<0.001
Transported to hospital, *n* (%)	391,341 (77.5)	35,744 (74.4)	355,597 (77.9)	<0.001
Treated by paramedics, *n* (%)	235,614 (46.7)	5,941 (12.4)	229,673 (50.3)	<0.001
Transported and treated, *n* (%)				
Transported and not treated	172,073 (34.1)	30,346 (63.2)	141,727 (31.0)	<0.001
Transported and treated	219,268 (43.4)	5,398 (11.2)	213,870 (46.8)	<0.001
Not transported and not treated	96,989 (19.2)	11,754 (24.5)	85,235 (18.7)	<0.001
Not transported and treated	16,346 (3.2)	543 (1.1)	15,803 (3.5)	<0.001
Case times, median (IQR)				
Response time	13.4 (9.3, 22.9)	16.9 (10.8, 29.9)	13.1 (9.2, 22.2)	<0.001
Time critical	10.9 (8.3, 14.8)	11.3 (8.4, 15.5)	10.8 (8.2, 14.8)	<0.001
Urgent	20.9 (13.7, 33.1)	21.8 (14.4, 35.0)	20.7 (13.6, 32.7)	<0.001
Non-urgent	43.1 (28.6, 66.1)	47.6 (32.4, 74.5)	42.6 (28.3, 65.3)	<0.001
Scene time	20.0 (13.1, 31.5)	17.6 (9.8, 33.0)	20.2 (13.4, 31.4)	<0.001
Transport time	18.9 (11.7, 28.6)	17.0 (10.5, 26.5)	19.0 (11.8, 28.7)	<0.001
Total case time	95.0 (70.6, 120.4)	89.8 (66.0, 117.1)	95.5 (71.2, 120.8)	<0.001

*Patients did not meet the mental health case inclusion criteria as mental health was not the primary reason for paramedic attendance.
Proportions exclude missing data. Abbreviations: IQR = *interquartile range*.

(4.8%) were least likely to be treated and transported to hospital.

Psychosis and suicide/suicidal ideation were the most common presentations recognized during the MPDS triage process (72.0% and 70.8%), while anxiety was least likely to be recognized (6.2%). Mental health cases that were identified at the point of call had greater Police (41.5% vs. 14.2%, $p < 0.001$) and CATT (6.3% vs. 1.8%, $p < 0.001$) attendances, when compared to cases not identified at the point of call.

The majority of EMS-attended mental health patients (84.2%) were seen once over the 12-month period; however, there were 88 patients (representing 4.2% of mental health-related cases) attended by EMS more than 12 times during the year.

Compulsory patients represented 10.1% of all EMS-attended mental health cases. When compared to non-compulsory patients, compulsory patients more frequently presented with psychosis and suicide/suicidal ideation, but had fewer episodes of anxiety or substance abuse.

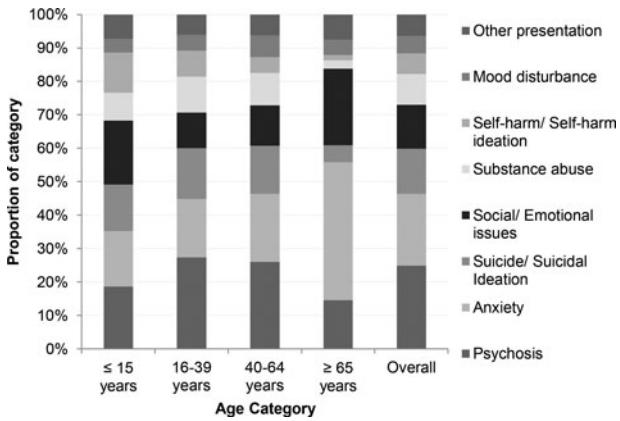

FIGURE 2. Emergency mental health presentations by age category.

Characteristics of Secondary Triage Patients

Table 2 shows the characteristics of patients undergoing secondary triage. The mental health-related patients were younger than other patients undergoing secondary triage (48 years, IQR 36–62 vs. 62 years, IQR 36–79, $p < 0.001$). A total of 27.7% of triaged patients were referred to an alternative service, while 24.6% were managed under an existing care plan. Frequent caller and anxiety presentations represented over half (52.5%) of the mental health-related calls undergoing secondary triage (Figure 3).

DISCUSSION

This study provides a description of the clinical profile, demand patterns and care provided to mental health patients accessing EMS. Mental health cases accounted for 9.5% of the EMS-attended caseload in Victoria,

TABLE 2. Characteristics of secondary triage cases

Characteristics	All secondary triage cases	Mental health secondary triage cases	Other secondary triage cases	P-value
Number of cases, *n*	71,069	4,708	66,361	—
Age, median (IQR)	60 (36, 79)	48 (36, 62)	62 (36, 79)	<0.001
Age category, *n* (%)				
≤ 15 years	5,297 (7.5)	48 (1.0)	5,249 (7.9)	<0.001
16–39 years	15,014 (21.1)	1,506 (32.0)	13,508 (20.4)	<0.001
40–64 years	18,384 (25.9)	2,114 (44.9)	16,270 (24.5)	<0.001
≥ 65 years	32,294 (45.5)	1,040 (22.1)	31,254 (47.2)	<0.001
Session outcome, *n* (%)				
Emergency ambulance response	21,197 (29.8)	1,364 (29.0)	19,833 (29.9)	0.18
Referred to alternative service provider	38,067 (53.6)	1,305 (27.7)	36,762 (55.4)	<0.001
Managed as per existing care plan	1,255 (1.8)	1,160 (24.6)	95 (0.1)	<0.001
Telephone advice only	10,550 (14.8)	879 (18.7)	9,671 (14.6)	<0.001

Proportions exclude missing data. Abbreviations: IQR = *interquartile range.*

Australia, and 6.6% of the secondary triage caseload. EMS was predominantly utilized as a transport mechanism for mental health patients, with only one in 8 patients receiving treatment by paramedics.

Our study provides insight into the clinical needs of mental health patients accessing prehospital emergency care. Two key patient cohorts were evident in our study. First, we identified a small group of mental health patients who were dependent on emergency medical treatment and transportation, including those with psychosis, self-harm/self-harm ideation, suicide/suicidal ideation, or substance abuse presentations. These patients are often compulsory patients and are attended by EMS, mental health crisis services and Police resources, thus having a large impact on the emergency system. Interestingly, our study indicated Police were 5 times more likely to attend mental health-related patients than other EMS-attended cases. In addition to impacting the emergency system, patients who are compulsorily transported to hospital under the Mental Health Act are also highly dependent on hospital intervention (16). A recent study conducted in Australia described the clinical presentations of patients presenting to an Emergency Department under the Mental Health Act. In that study, suicidal ideation, intoxication, and agitation requiring chemical sedation were the most common clinical presentations (16).

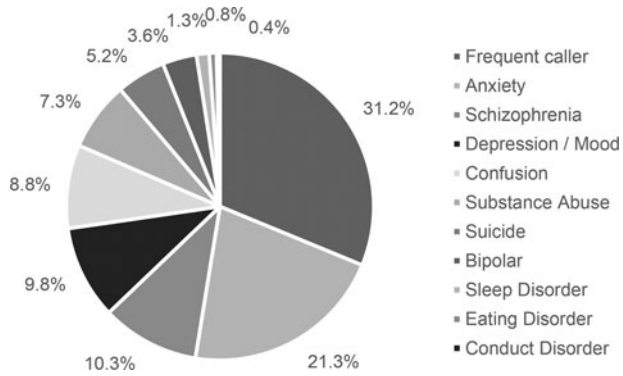

FIGURE 3. Secondary triage guidelines.

Second, the vast majority of mental health patients access EMS with clinical presentations that require few prehospital clinical interventions and these patients are often transported to hospital for further assessment. These patients typically present with anxiety, social emotional, or mood disturbance mental health problems. In our study, less than half of the patients presenting with anxiety or social emotional problems were transported to hospital by an emergency ambulance, with fewer than 10% of these patients requiring treatment by paramedics.

Although EMS play an integral role in the care of all mental health patients, there is growing interest in utilizing alternative models of care which improve community access to specialized mental health services to provide the most appropriate care (7,10,11) For instance, mental health nurses have been introduced in call-taking centers in some ambulance services in England (17,18). These services are available 24 hours a day, 7 days a week to provide a thorough telephone-based mental health assessment, and if required provide access to the most appropriate community-based care (17,18). Preliminary findings from one alternative care model piloted in Yorkshire, England showed that mental health nurses in the emergency call-taking center reduced ambulance response rates by more appropriately triaging mental health patients, only sending an emergency ambulance when clinically appropriate (18).

Additionally, in North America multi-agency mobile mental health response teams are in operation, with mental health clinicians providing initial advice on the phone (19). However, if the need is more urgent, a mental health clinician is dispatched with the EMS clinician to better assess and treat the patient (19). Similarly, an ambulance trust in England is piloting a mobile mental health response team staffed by a paramedic, mental health clinician, and a police officer to provide a specialized response to mental health

patients (20,21). A Canadian study has also evaluated a multi-agency mobile mental health response team, reporting partnerships between EMS, police, and mental health services improved response times and increased the number of patients accessing the service (22). Furthermore, patients in contact with the service were more likely to seek subsequent treatment (22).

Similar strategies have been trialed in Australia. A mobile mental health ambulance has been trialed in the state of New South Wales, where a mental health nurse and specialist paramedic co-respond to specific mental health-related cases (23). The multi-disciplined team provides increased assessment and referral skills in the prehospital setting, allowing patients to be referred to general practitioners or transported directly to mental health facilities, thereby reducing unnecessary transportation to hospital Emergency Departments (23). In Victoria, efforts have been made to improve the accuracy of ambulance dispatch decisions for mental health patients. Many mental health patients identified at the point of call are now directed for secondary triage so that they benefit from alternative services that can better meet their clinical needs. Furthermore, transfer of these cases to secondary triage is expected to decrease demand on EMS and act as an effective means of better addressing the needs of patients.

Importantly, access to secondary triage is dependent on accurate identification of the mental health issue during the initial emergency call. However, only 46.8% of mental health patients in our study had their condition identified during the EMS call. In particular, for patients presenting with anxiety, mental health issues were recognized during the call in only 6.2% of cases. Whilst a plausible explanation may be that patients describe the physical symptoms of anxiety to the call-taker (e.g., shortness of breath), accurate recognition of the patient's condition during the EMS call is an important step towards facilitating the right care for patients. Our analysis suggests that the majority of patients with anxiety did not require any treatment or transport by paramedics. As such, early identification of the patient condition, and referral to an appropriate health service, may have allowed patients access to more appropriate and timely care.

Our study has a number of limitations. First, there is no standardized template for identifying mental health presentations in the prehospital setting. Our inclusion criteria were devised *a posteriori*, and largely based on the preliminary assessment of paramedics. It is possible that some cases may have been misclassified or missed in the development of the inclusion criteria, and this would underestimate the number of mental health patients in our sample. Finally, the search strategy used to identify mental health presentations was not consistent across EMS-attended and secondary triage cases, and this may result in inconsistencies in case capture.

CONCLUSION

Mental health-related cases represent one in 10 EMS attendances in Victoria and are highly heterogeneous in terms of clinical presentations. It is evident that a small proportion of patients requires emergency crisis treatment, placing a large burden on emergency services, including ambulance, police, and mental health services. In comparison, the majority of mental health patients present with relatively non-serious conditions and could benefit from alternative services provided by mental health clinicians in the community. Paramedics often lack the specialist mental health skills required to manage these presentations in the community, and this could lead to an increase in emergency department presentations. Identification of mental health patients at the time of call could also help target patients who would benefit from community mental health services.

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