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Emergency mental health presentations in children with autism spectrum disorder and attention deficit hyperactivity disorder

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## **Emergency mental health presentations in children with ASD and ADHD**

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This study has been undertaken on behalf of the Paediatric Research in Emergency Departments International Collaborative (PREDICT) network

### **Author contributions**

EB assisted in study conception, analysed the data, wrote the first draft and revised future drafts of the paper.

DS and AC conceived the study, extracted and analysed the data and revised the draft.

AH assisted in data extraction, data cleaning and training data extractors.

SC assisted in data analysis and revised the draft.

HH conceived the study, obtained ethics approval and revised the draft.

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Nil

### **Conflicts of interest**

None

**Key words:** emergency medicine, behavioural, psychiatry/mental health, autism spectrum disorder, attention deficit hyperactivity disorder

### **Abbreviations**

ADHD – attention deficit hyperactivity disorder

ASBD – acute severe behavioural disturbance

ASD – autism spectrum disorder

ATS – Australasian triage scale

CI – confidence interval

DHHS – department of health and human services

ED – emergency department

EMR – electronic medical record

ICD-10-AM – International Classification of Diseases, Revision 10, Australian Modification

IM – intramuscular

IQR – interquartile range

LOS – length of stay

MH – mental health

RR – relative risk

RCH – Royal Children's Hospital

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## **ABSTRACT**

### **Objective**

To characterize the key features and management of young people presenting to the emergency department (ED) with a mental health (MH) complaint and a known diagnosis of autism spectrum disorder (ASD) or attention deficit hyperactivity disorder (ADHD).

### **Study Design**

Retrospective review of all ED MH presentations in children aged 7-17 years, presenting over a 12-month period from the 1<sup>st</sup> of January 2018 to the 31<sup>st</sup> of December 2018, to the Royal Children's Hospital (RCH) in Melbourne, Australia.

### **Main outcome measures**

Univariate analyses were carried out to examine the relationship between an underlying diagnosis of ASD and/or ADHD and a number of key presentation variables. Relative risks (RRs) and 95% Confidence Intervals (CIs) were calculated for ED management outcomes.

### **Results**

There were 374 presentations in this cohort, representing 28% of the total MH presentations in 2018. The most common reason for presentation was acute severe behavioural disturbance (ASBD). Young people with ASD and ADHD were at increased risk of having an acute crisis team response activated (ASD RR 2.3, CI 1.6-3.3, ADHD RR 2.2, CI 1.2-4.1). Those with ASD were more likely to be physically restrained (RR 2.8, CI 1.7-4.6), be managed in seclusion (RR 3.3, CI 1.7-6.4) and to receive medication to assist with behavioural de-escalation (RR 2.8, CI 1.6-4.9).

### **Conclusions**

Children with ASD and/or ADHD represent one quarter of all children presenting to the ED with MH complaints. They experience high rates of ASBD. Future research is needed to co-design, implement, and evaluate better approaches for their management.

### **What is already known on this topic**

- The emergency department (ED) is a key point of contact for young people with mental health (MH) complaints
- Individuals with autism spectrum disorder (ASD) and/or attention deficit hyperactivity disorder (ADHD) have increased rates of psychiatric comorbidity and health service utilization compared to the general population

### **What this study adds**

- Young people with a diagnosis of ASD and/or ADHD make up a quarter of all children presenting to the ED with a MH complaint
- The most common reason for presentation across both of these cohorts is acute severe behavioural disturbance
- Young people with ASD and/or ADHD are more likely to have an acute crisis team response activated whilst they are in the ED

## **INTRODUCTION**

The emergency department (ED) is a key point of contact for young people with mental health (MH) conditions, due to their high level of distress and the difficulties that they face in accessing crisis support in the community. Over the past decade there has been a significant increase in paediatric MH presentations.<sup>1-2</sup> Despite the high prevalence of MH disorders and the increasing incidence of ED presentations, the characteristics and the management of these young people in the ED is poorly understood.

Autism spectrum disorder (ASD) and attention deficit hyperactivity disorder (ADHD) are two of the most prevalent MH conditions in the child and adolescent population worldwide.<sup>3 4</sup> A diagnosis of ASD, ADHD or both is associated with increased morbidity and health service utilization.<sup>3</sup> Individuals with ASD and ADHD have higher rates of comorbid psychiatric conditions compared with the general population.<sup>5 6</sup> However, research examining MH presentations to the ED in young people with an underlying diagnosis of either condition is limited.

This study aimed to describe the key characteristics and management of young people with a diagnosis of ASD and/or ADHD who presented to the ED with a MH complaint. By identifying important differences of these patients within the MH cohort, the authors sought to better inform the future care delivered to this vulnerable population in the ED.

## **METHODS**

## **Design and Setting**

A retrospective review of the electronic medical records (EMR) for all ED presentations with MH diagnostic codes, in children aged 7-17 years, presenting over a 12-month period from the 1<sup>st</sup> of January 2018 to the 31<sup>st</sup> of December 2018, to the Royal Children's Hospital (RCH) in Melbourne, Australia, was undertaken. This paper represents a planned sub-group analysis of the overall MH cohort.

RCH is a 385-bed tertiary paediatric hospital with an annual ED census of 85,347 children (2018) and is a designated MH facility under the Victorian MH Act, servicing a population of over 6 million people.<sup>7-8</sup> The MH service consists of the ED, a 16-bed adolescent (13-18 years) psychiatric inpatient unit and outpatient services. This study was approved by the RCH Human Research Ethics Committee (HREC QA/51710/RCHM-2019).

## **Study procedure**

A list of 66 mental health related International Classification of Diseases, Revision 10, Australian Modification (ICD-10) diagnostic codes was used to identify ED MH presentations for study inclusion (Supplementary Table 1). This list was designed to capture all MH presentations and therefore included all MH-specific diagnostic codes, as well as other diagnoses often associated with MH presentations e.g.: laceration of wrist, ingestion of foreign body. Each record identified through these ICD-10 codes was then manually reviewed by DS or AC to confirm that the presentation was MH-related. All presentations deemed as non-MH were excluded (Figure 1). For each presentation relevant demographic,

diagnostic and management data were extracted. Four data extractors were trained and an *a priori* developed coding dictionary was used to ensure consistency. Auditing was conducted throughout the data collection process by DS, AC and SMOD. Individual patient's data were reviewed at random to ensure that all data entered were correctly entered. Records in which there was uncertainty or discrepancy were also flagged for review and then resolved with senior authors.<sup>9</sup>

### **Identification of patients with ASD and/or ADHD**

During data collection, demographic and relevant background information was assessed. This included capturing underlying MH diagnoses such as ASD and ADHD. Any presentations in which ASD and/or ADHD were listed as an underlying MH diagnosis were identified and used to create the cohort examined in this study.

### **Statistical analysis**

Data were entered into an Excel database (Microsoft, Seattle, WA, USA), de-identified and then exported into Stata 16 for analysis (StatCorp, College Station, TX, USA). Univariate analyses were carried out to examine the relationship between an underlying diagnosis of ASD and/or ADHD and a number of key presentation variables. Relative risks (RRs) and 95% Confidence Intervals (CIs) were calculated. Four cohorts of patients were independently analysed: those without a diagnosis of ASD or ADHD, those with a diagnosis of ASD, those with a diagnosis of ADHD and those with a diagnosis of both ASD and ADHD.

### *Definitions*

- High acuity is defined as an Australasian Triage Scale (ATS) category of 1 or 2. An ATS category of 1 represents an immediately life-threatening condition requiring medical review on arrival, whilst an ATS category of 2 represents an imminently life-threatening condition or the need for time-critical treatment, requiring medical review within 10 minutes of arrival.<sup>10</sup>
- An “acute crisis team response” is an emergency alert used at RCH (locally this is referred to as a Code Grey) when a patient has escalating behaviour that poses a risk to themselves or others.<sup>11</sup> It results in a team of medical, nursing, security and allied health staff attending to provide urgent intervention to de-escalate the patient’s behaviour.
- Section 351 provides police with the power under the Victorian Mental Health Act to apprehend a person who appears to have a mental illness to prevent serious or imminent harm to them or others.<sup>12</sup> Following their apprehension, the person must be taken to a registered medical or mental health practitioner to be examined. This commonly involves the individual being brought to the ED for assessment.

## RESULTS

During 2018, there were 85,347 ED presentations across all age groups to the RCH ED. In children aged 7-17, there were 25,095 presentations, of which 1690 were MH related (7% of total ED presentations in the 7-17 age group). Within this group, 374 (28%) presentations had an underlying diagnosis of ASD or ADHD; 217 a diagnosis of ASD, 66 ADHD and 91 both ASD and ADHD (Figure 1).

The 1690 MH presentations were made up of 1071 individual patients when accounting for representations. The 217 ASD presentations were made up of 115 individual patients, the 66 ADHD presentations 48 individual patients and the 91 presentations of children with both ASD and ADHD 48 individual patients (Supplementary Table 2).

Compared to children without a diagnosis of ASD or ADHD, children with ASD, ADHD or both diagnoses were more likely to be male (ASD RR 1.4, CI 1.1-1.7; ADHD RR 1.9, CI 1.5-2.4; ASD & ADHD RR 2.3, CI 1.9-2.7) (Table 1).

Young people with a diagnosis of ADHD or both diagnoses were more likely to have an appointed guardian who was not their parent compared to the overall cohort (ADHD RR 2.8, CI 1.9-4.1; ASD & ADHD RR 1.7, CI 1.1-2.6) whilst those with a diagnosis of ASD were more likely to have their parent as their guardian (ASD RR 0.4, CI 0.2-0.7).

Compared to those with neither diagnosis, a higher proportion of children with ASD, ADHD and both diagnoses had received psychiatric care in the community prior to their presentation (ASD RR 1.2, CI 1.2-1.3; ADHD RR 1.2, CI 1.1-1.3; ASD & ADHD RR 1.3, CI 1.2-1.3).

Compared to those with neither condition, children with ADHD or both diagnoses were at increased risk of having ambulance or police transport to get to hospital (ADHD RR 1.5, CI 1.2-1.9; ASD & ADHD RR 1.5, CI 1.3-1.9). The ADHD

and ADHD/ASD cohorts were also at higher risk of being brought to hospital under a section 351 (ADHD RR 2.1, CI 1.4-3.3; ASD & ADHD RR 2.1, CI 1.4-3.0).

Children with known ASD presented with a higher acuity (RR 2.9, CI 1.8-4.5).

This same effect was not noted in the ADHD or dual diagnoses cohorts. ED length of stay was similar across the cohorts. Most patients arrived on a weekday, with 55% of presentations occurring after hours.

Overall in the ASD, ADHD and combined cohorts, acute severe behavioural disturbance (ASBD) was the most common reason for presentation to the ED, accounting for 38% (82), 41% (27) and 44% (40) of presentations, respectively (Figure 2). This is in contrast to the overall MH cohort where only 11% (149) presented with ASBD. In the combined ASD and ADHD cohort, self-poisoning and self-harm were also common reasons for presentation, accounting for 27% (25) of presentations. A high proportion of presentations across all three groups were as a result of suicidal ideation, with this being listed as the discharge diagnosis for 35% (76) of those in the ASD, 18% (12) in the ADHD and 24% (22) in the combined cohort.

Whilst in the ED, young people from the ASD cohort were at twice the risk of having an acute crisis team response activated (RR 2.3, CI 1.6-3.3). They were also significantly more likely to be physically restrained (RR 2.8, CI 1.7-4.6), be managed in seclusion (RR 3.3, CI 1.7-6.4) and to receive medication to assist with behavioural de-escalation (RR 2.8, CI 1.6-4.9). Sixteen percent had an acute crisis team response compared to seven percent in the cohort without ASD, nine

percent were physically restrained compared to three percent, six percent were managed in seclusion compared to two percent and seven percent received medications compared to three percent. The ADHD cohort was also at increased risk of having an acute crisis team response activated (RR 2.2, CI 1.2-4.1) but were not at increased risk of being managed in seclusion, being physically restrained or receiving medication (Table 2).

Admission rates were similar across the cohorts. More than 70% of patients across the ASD, ADHD and combined cohorts had community psychiatric follow up organised upon discharge and less than 5% in all three cohorts had no follow up arranged.

## **DISCUSSION**

This is the first study to outline the key features of children with a known ASD and/or ADHD diagnosis who presented to a paediatric emergency department with a MH presentation. Our data provide an overview of the important differences in these cohorts. These results will allow for management strategies to be designed to address these differences and therefore improve the care provided to these at-risk children in the ED.

Considering the community prevalence of both ASD (4%)<sup>13</sup> and ADHD (5%)<sup>14</sup> it is not surprising that there were a proportion of children within the MH cohort with these conditions. However, children with these diagnoses were significantly overrepresented, with 28% of patients in the MH cohort having either one or both diagnoses.

Young people with ASD or ADHD are more likely to utilize the ED for psychiatric conditions than the general population.<sup>15-16</sup> The number of visits for the same individual with a psychiatric presentation has also been demonstrated to be higher in those with ASD or ADHD.<sup>17</sup> This was mirrored in our study, which found that patients in the ASD, ADHD and combined cohorts were all more likely to present to the ED on multiple occasions.

In our study, the most common reason for presentation in the ASD and ADHD cohorts was acute severe behavioural disturbance (ASBD), which accounted for between 38-44% of presentations. This is consistent with previous research that demonstrated that in individuals with ASD presenting with a MH crisis, 33% of presentations were for aggression.<sup>18</sup>

Both ASD and ADHD are externalizing disorders, meaning that behavioural outbursts are more common when the child experiences a crisis.<sup>18</sup> Individuals with ASD have difficulty processing emotional stimuli and have limited social-communication skills.<sup>18-20</sup> Both physical and emotional stressors, such as pain, noise or anxiety may be expressed as disruptive or aggressive behaviour.<sup>19</sup>

Young people with ADHD have significant deficits in emotional regulation, poor coping strategies and disinhibition.<sup>21</sup> These features may explain why these individuals present more frequently to the ED with ASBD.

Our study demonstrated that individuals with ASD and ADHD had twice the risk of having an acute crisis team response activated whilst in the ED compared to

the overall MH cohort. The crisis team endeavor to attain rapid behavioural control in the least restrictive means possible. In practice, this means that non-pharmacological strategies such as verbal de-escalation are attempted first.<sup>22</sup> Only if these strategies fail, or if the young person is profoundly agitated, are medications or other restrictive interventions such as physical restraint or seclusion utilized.<sup>23 24</sup>

Both the ASD and ADHD cohorts had an increased rate of the crisis team being activated compared to the overall MH cohort. However, only individuals with ASD had an increased risk of requiring medications or having restrictive interventions used as part of their management. It can therefore be postulated that for individuals with ASD, the non-pharmacological techniques used were less effective in successfully de-escalating their behaviour, although there is no definitive evidence to support this. The management of children with ASBD and an underlying diagnosis of ASD needs to be modified to ensure that the de-escalation techniques used take into account the unique triggers for young people with ASD.

Children with ASD have a need for predictability and routine, and they are prone to sensory overload.<sup>20</sup> The ED is chaotic, unpredictable, noisy and extremely bright, all of which are likely to result in worsening agitation.<sup>19 20</sup> Ensuring that the time spent waiting in the ED for a medical and/or psychiatric review is minimized will reduce the likelihood of behavioural escalation for young people with ASD.<sup>20</sup>

If behavioural escalation does occur, verbal de-escalation is unlikely to be successful.<sup>19</sup> Involving parents or carers in the way in which the young person with ASD is managed, as well as providing a space designed to assist with sensory processing, has been shown to be helpful in reducing agitation and therefore the need for restrictive interventions or medication provision.<sup>19</sup>

Using the least restrictive measures possible for behavioural de-escalation is important as it improves the patient's autonomy and capacity to trust medical staff during future encounters. The use of physical restraint has also been strongly associated with psychological and physical morbidity including numerous deaths.<sup>23</sup> In our study, nine in every hundred children with ASD were physically restrained, compared to three in every hundred without an ASD diagnosis.

Although both of these rates are considerably lower than what has previously been reported in the psychiatric inpatient setting, where up to 29% of young people with mental health conditions were restrained, it is still concerning.<sup>24</sup> Therefore, a concerted focus on ways in which clinicians in the ED can reduce the use of these interventions in young people with ASD is valuable.

A number of adjustments should be considered to reduce the need for physical restraint. Early senior clinical review to determine whether ongoing physical restraint is required is essential. This is a challenging situation, where clinicians must weight up the patient's rights, autonomy and dignity; whilst ensuring they are protected from harm.<sup>25 26</sup>

If ongoing restraint is required and the patient has been brought to the ED in handcuffs by police, these must be removed as an early priority and replaced with the least restrictive mode of control that is deemed safe.<sup>25</sup> Any young person who is restrained needs continuous monitoring and clear documentation of the rationale relating to the reasons for restraint.<sup>25</sup> Other measures to de-escalate the patient should also be undertaken whilst the patient is restrained, including consideration of chemical restraint or provision of food, fluid or other items of comfort. Ongoing reassessment and withdrawal of restraint as soon as it is safe to do so should be the highest priority for staff involved with the care of the patient.<sup>25</sup>

This study has some limitations. As a retrospective study, a number of the data points collected were reliant on clinician documentation during the clinical encounter. However, we tried to optimize data collection by following recommended guidance.<sup>9</sup> This study was a single center study in a metropolitan tertiary paediatric ED, which may limit the generalizability of the results. Also, as our study excluded patients 6-years of age or younger, it is possible some MH presentations for younger children were missed.

This study suggests that there are key differences between the young people presenting with MH presentations to the ED with an underlying diagnosis of ASD and/or ADHD and those without. Further prospective interventional studies are warranted to provide strategies which will ensure that optimal psychiatric care is provided to these children both within the ED and upon their return to the community. Including ADHD and ASD as diagnoses in ED data sets would enable

more accessible case identification for further analysis of this vulnerable cohort of children without the need for time consuming and costly manual data extraction.

## **CONCLUSIONS**

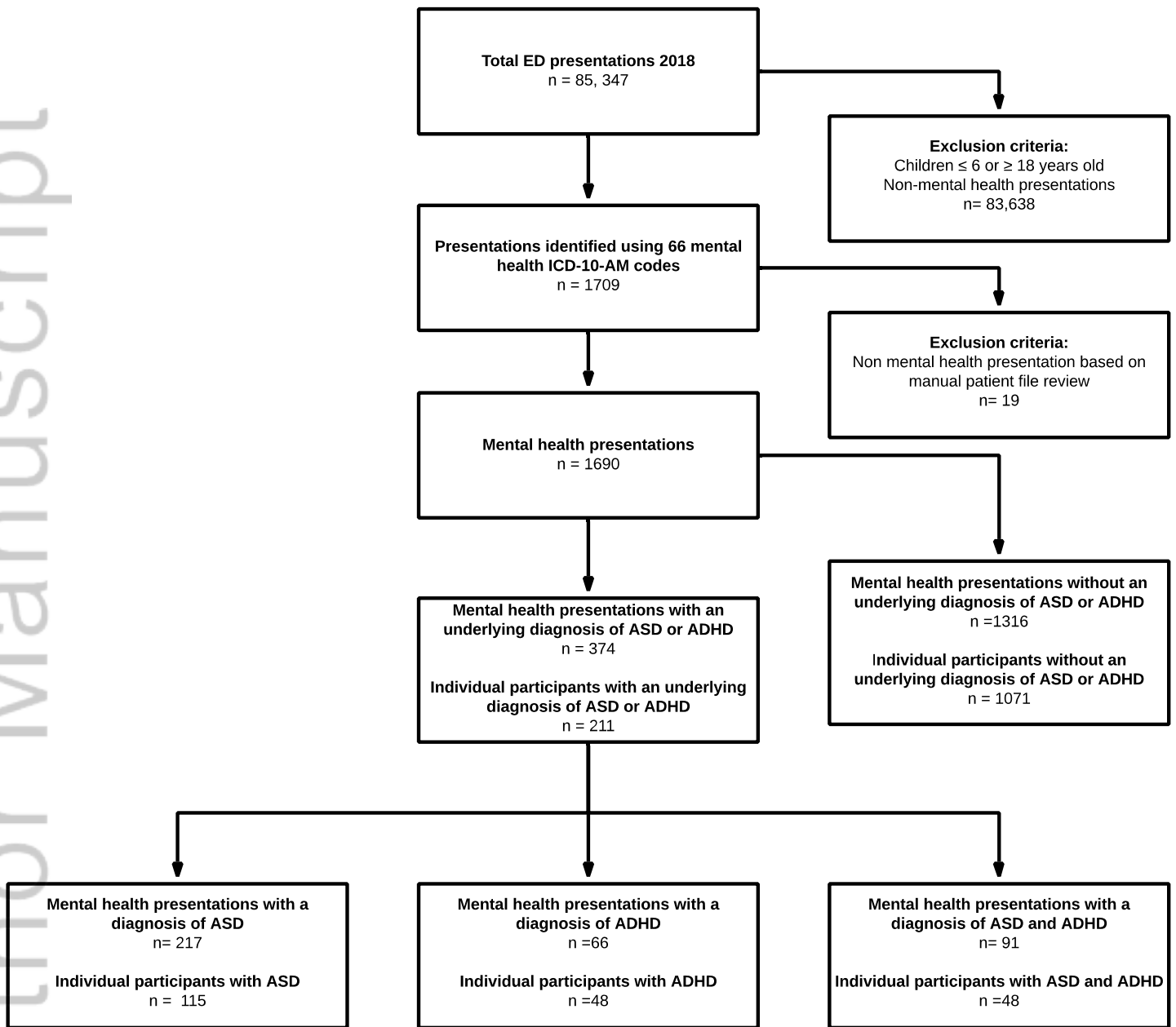
Children with an underlying diagnosis of ASD and/or ADHD represent more than one quarter of all children presenting to the ED with MH complaints. They experience high rates of ASBD and have higher acute crisis team utilization. Future research is needed to co-design, implement, and evaluate better approaches to managing these children in the ED and upon their return to the community, so as to reduce future need for ED care.

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**Figure 1: Flowchart identifying children and adolescents with underlying ASD and/or ADHD presenting to the ED with a MH presentation**



**Table 1: Demographic and presentation variables of children with ASD and/or ADHD presenting to ED with a MH condition**

	MH presentation with no underlying diagnosis of ASD/ADHD n = 1316		MH presentation with underlying diagnosis of ASD n= 217		Comparison to those with no ASD/ADHD diagnosis	MH presentation with underlying diagnosis of ADHD n= 66		Comparison to those with no ASD/ADHD diagnosis	MH presentation with underlying diagnosis of ASD and ADHD n= 91		Comparison to those with no ASD/ADHD diagnosis
	n	%	n	%	RR (95% CI)	n	%	RR (95% CI)	n	%	RR (95% CI)
<b>Sex</b>											
Female	937	71	131	60	M:F 1.4 (1.1-1.7) p = 0.001	30	45	M:F 1.9 (1.5-2.4) p<0.0001	32	35	M:F 2.3 (1.9-2.7) p<0.0001
Male	379	29	86	40		36	55		59	65	
<b>Age (years)</b>					RR (95% CI)			RR (95% CI)			RR (95% CI)
Median (IQR)	15 (13-16)		14 (11-15)			14 (11-15)			14 (13-15)		
<b>Guardianship</b>					RR (95% CI)						
Parent	1150	87	206	95	Non-parent:parent 0.4 (0.2-0.7) p=0.0008	44	67	Non-parent:parent 2.8 (1.9-4.1) p<0.0001	72	79	Non-parent:parent 1.7 (1.1-2.6) p=0.02
Non-parental guardianship	155	12	9	4		22	33		18	20	
Unknown	11	1	2	1		0	0		1	1	
<b>Prior psychiatric community care</b>					RR (95% CI)			RR (95% CI)			RR (95% CI)
Yes	986	75	199	92	Yes:No 1.2 (1.2-1.3) p<0.0001	57	86	Yes:No 1.2 (1.1-1.3) p=0.03	84	92	Yes:No 1.3 (1.2-1.3) p<0.0001
No	319	24	18	8		8	12		4	4	
Unknown	11	1	0	0		1	2		3	3	
<b>Arrival day</b>					RR (95% CI)			RR (95% CI)			RR (95% CI)
Weekday	1022	78	171	79	W'day:W'End 1.0 (0.9-1.1) p=0.71	53	80	W'day:W'End 1.0 ((0.9-1.2) p=0.61	66	73	W'day:W'End 0.9 (0.8-1.1) p=0.26
Weekend	294	22	46	21		13	20		25	27	

Arrival time	n	%	n	%	RR (95% CI)	n	%	RR (95% CI)	n	%	RR (95% CI)
Arrival in-hours (0800 - 1659)	600	46	96	44	In:After hours 1.0 (0.8-1.1) p=0.71	26	39	In:After hours 0.9 (0.6-1.2) p=0.32	40	44	In:After hours 1.0 (0.8-1.2) p=0.76
Arrival after-hours (1700- 0759)	716	54	121	56		40	61		51	56	
Means of arrival	n	%	n	%	RR (95% CI)	n	%	RR (95% CI)	n	%	RR (95% CI)
Private car / self / public transport	833	63	129	59	Amb/Police §: Private Transport 1.1 (0.9-1.3) p=0.28	30	45	Amb/Police §: Private Transport 1.5 (1.2-1.9) p=0.004	40	44	Amb/Police §: Private Transport 1.5 (1.3-1.9) p=0.0002
Ambulance	467	35	83	38		35	53		48	53	
Ambulance with police escort	3	0.2	1	1		0	0		1	1	
Police alone	13	1	4	2		1	2		2	2	
Brought to hospital under Section 351‡	n	%	n	%	RR (95% CI)	n	%	RR (95% CI)	n	%	RR (95% CI)
No	1153	88	188	87	Yes:No 1.1 (0.7-1.6) p=0.75	49	74	Yes:No 2.1 (1.4-3.3) p=0.001	68	75	Yes:No 2.1 (1.4-3.0) p=0.003
Yes	160	12	28	13		17	26		23	25	
Unknown	3	0.2	1	1		0	0		0	0	
Attended with	n	%	n	%	RR (95% CI)	n	%	RR (95% CI)	n	%	RR (95% CI)
Parent	1052	80	181	83	Parent:Other 1.0 (1.0 -1.1) p=0.23	36	55	Parent:Other 0.7 (0.6-0.9) p<0.0001	64	70	Parent:Other 0.9 (0.8-1.00) p=0.03
DHHS ¶/ social worker/psychologist	84	6	9	4		14	21		17	19	
Alone	88	7	7	3		7	11		5	5	
Friend	14	1	10	5		3	5		0	0	
Teacher	7	1	0	0		0	0		0	0	
Other/unknown	71	5	10	5		6	9		5	5	
Triage category (Cat)	n	%	n	%		RR (95% CI)	n		%	RR (95% CI)	
1	16	1	7	3	Cat1&2:Cat3-5 2.9 (1.8-4.5) p<0.0001	0	0	Cat1&2:Cat3-5 1.0 (0.4-2.3) p=0.93	1	1	Cat1&2:Cat3-5 0.6 (0.2-1.6) p=0.30
2	80	6	12	6		5	8		3	3	
3	840	64	153	71		47	71		80	88	
4	353	27	45	21		13	20		7	8	
5	27	2	0	0		1	2		0	0	

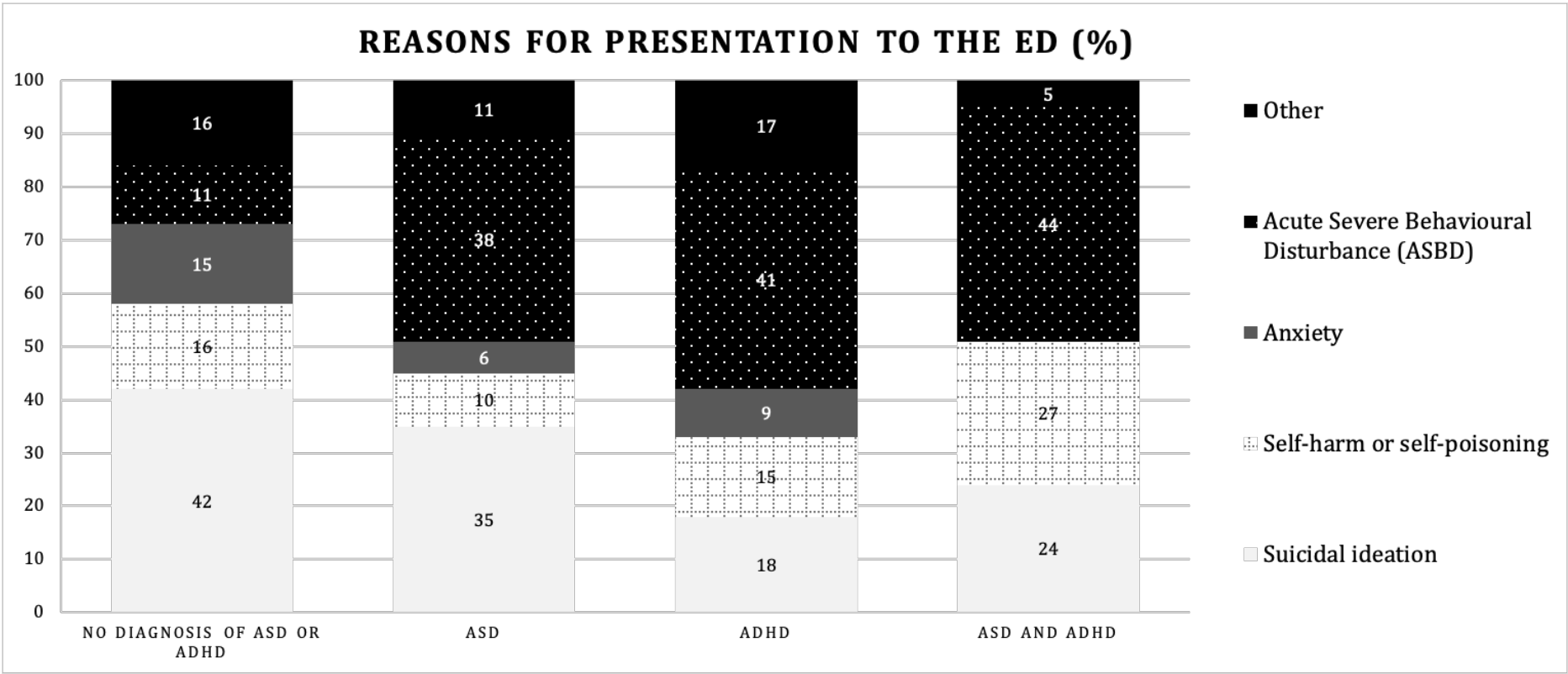
§ Routine data collection did not accurately reflect means of arrival; in particular, police escort was under-recorded. Hence, both ambulance and police arrivals were combined.

¶ Department of Health and Human Services (DHHS)

‡Victoria's Mental Health Act, Section 351 provides police with the power to apprehend a person who appears to have a mental illness to prevent serious or imminent harm to the person or others. Following their apprehension, they must arrange for the person to be taken to a registered medical practitioner or mental health practitioner to be examined. This commonly involved the individual being brought to the ED for assessment.

Abbreviations: MH = mental health, ASD = autism spectrum disorder, ADHD = attention deficit hyperactivity disorder, RR = relative risk, CI = confidence interval, IQR = interquartile range

**Figure 2: Reason for presentation to the ED as documented by Emergency Medical Staff**



± Other diagnoses include hallucinations, psychosis, bipolar disorder, emotional dysregulation, somatoform disorder, obsessive compulsive disorder, anorexia nervosa, crisis presentation and homicidal ideation.

**Table 2: Management and disposition variables of children with ASD and/or ADHD presenting to ED with a MH condition**

	MH presentation with no underlying diagnosis of ASD/ADHD n = 1316		MH presentation with underlying diagnosis of ASD n= 217		Comparison to those with no ASD/ADHD diagnosis	MH presentation with underlying diagnosis of ADHD n= 66		Comparison to those with no ASD/ADHD diagnosis	MH presentation with underlying diagnosis of ASD and ADHD n= 91		Comparison to those with no ASD/ADHD diagnosis
	n	%	n	%	RR (95% CI)	n	%	RR (95% CI)	n	%	RR (95% CI)
<b>Acute crisis team response</b>											
Yes	90	7	34	16	Yes: No 2.3 (1.6-3.3) p<0.0001	10	15	Yes: No 2.2 (1.2-4.1) p=0.01	7	8	Yes: No 1.1 (0.5-2.4) p=0.76
No	1226	93	183	84		56	85		84	92	
<b>Physical Restraint</b>											
Yes	44	3	20	9	Yes:No 2.8 (1.7-4.6) p=0.001	4	6	Yes:No 1.8 (0.7-4.9) p=0.24	4	4	Yes:No 1.3 (0.5-3.6) p=0.59
No	1272	97	197	91		62	94		87	96	
<b>Seclusion</b>											
Yes	24	2	13	6	Yes:No 3.3 (1.7-6.4) p=0.0002	2	3	Yes:No 1.7 (0.4-6.9) p=0.48	4	4	Yes:No 2.4 (0.9-6.8) p=0.09
No	1292	98	204	94		64	97		87	96	

Medication received £	n	%	n	%	RR (95% CI)	n	%	RR (95% CI)	n	%	RR (95% CI)
Yes	35	3	16	7	Yes:No 2.8 (1.6-4.9) p=0.003	4	6	Yes:No 2.3 (0.8-6.2) p=0.10	4	4	Yes:No 1.7 (0.6-4.6) p=0.33
No	1281	97	201	93		62	94		87	96	
Medication type	n	%	n	%	RR (95% CI)	n	%	RR (95% CI)	n	%	RR (95% CI)
Oral	19/35	54	11/16	69		3/4	75		2/4	50	
Intramuscular (IM)	16/35	46	5/16	31		1/4	25		2/4	50	
Disposition from emergency department	n	%	n	%	RR (95% CI)	n	%	RR (95% CI)	n	%	RR (95% CI)
Discharged (any location)	994	76	175	81	Admit: Discharge 0.8 (0.6-1.1) p=0.10	55	83	Admit: Discharge 0.7 (0.4-1.2) p=0.15	76	84	Admit: Discharge 0.7 (0.4-1.1) p=0.08
Admitted (any location)	322	24	42	19		11	17		15	16	
Primary follow-up arrangement for MH issue	n	%	n	%	RR (95% CI)	n	%	RR (95% CI)	n	%	RR (95% CI)
Community psychiatric services	849	65	154	71		48	73		68	75	
Private psychiatrist / counselor	170	13	18	8		2	3		4	4	
Paediatrician	87	7	22	10		3	5		8	9	
General Practitioner	84	6	3	1		3	5		0	0	
Transferred to another hospital	44	3	8	4		2	3		1	1	
None arranged	30	2	3	1		2	3		4	4	

Return to emergency department	20	2	5	2		3	5		2	2	
Unknown	32	2	4	2		3	5		4	4	

E These medications relate to those prescribed during an acute crisis team response to assist with behavioural control. They include benzodiazepines and antipsychotic medications.

Abbreviations: MH = mental health, ASD = autism spectrum disorder, ADHD = attention deficit hyperactivity disorder, RR = relative risk, CI = confidence interval, IQR = interquartile range

**Supplemental Table 1: List of 66 International Classification of Diseases, Revision 10, Australian Modification (ICD-10-AM) Diagnostic Codes used for patient inclusion**

<b>ICD-10-AM Mental Health Diagnostic Codes for patient inclusion</b>
Accidental drug overdose
Accidental paracetamol overdose
Acute anxiety
Acute depression
Acute drug overdose
Acute post-traumatic stress disorder
Acute stress disorder
Affective bipolar disorder
Anorexia
Anorexia nervosa
Anxiety disorder
Behaviour disorder
Behavioural disorder
Borderline personality disorder
Chronic depression
Depression with suicidal ideation
Destructive behaviour
Drug addiction
Drug dependence
Drug ingestion
Drug overdose, multiple drugs
Drug withdrawal
Drug-induced mental disorder
Emotional crisis
Emotional disorder
Emotionally unstable borderline personality disorder
Hallucination
History of self-harm
Hysteria
Intentional drug overdose
Intentional paracetamol overdose
Manic depression
Manic disorder
Mental and behavioural disorders due to use of alcohol, acute intoxication
Mental disorder
Mental health disorder
Multiple drug overdose
Non-accidental drug overdose
Overdose of medication
Overdose of psychotropic
Overdose of sedative or hypnotic
Overdose of tricyclic
Paracetamol overdose
Paracetamol overdose of undetermined intent
Persistent mood disorder
Post-traumatic stress disorder
Psychiatric disorder
Psychosomatic disease
Psychosomatic disorder
Reactive psychosis
Schizophrenia
Social problem
Somatoform disorder
Stress and adjustment reaction

Suicidal ideation Suicidal risk Suicidal thoughts Suicide by hanging Suicide ideation
<b>Additional ICD-10-AM Diagnostic Codes for patient inclusion</b>
Laceration of upper arm Laceration of wrist Forearm laceration Wrist laceration Ingestion of foreign body Swallowed foreign body

**Supplementary Table 2: Representation rates across the cohorts**

<b>Number of presentations per individual patient</b>	<b>No underlying diagnosis of ASD or ADHD</b>	<b>Diagnosis of ASD</b>	<b>Diagnosis of ADHD</b>	<b>Diagnosis of both ASD and ADHD</b>
1	887 (83%)	80 (70%)	34 (71%)	33 (69%)
2	110 (10%)	17 (15%)	11 (23%)	4 (8%)
3	26 (2%)	7 (6%)	0	3 (6%)
≥4	48 (5%)	11 (10%)	3 (6%)	8 (17%)
<b>Total presentations</b>	1071	115	48	48