

ORIGINAL ARTICLE

Behavioural emergencies in a paediatric hospital environmentMarijke Mitchell ^{1,2,3,4}, Fiona Newall ^{1,2,3,5} and Katrina Williams ^{2,4}¹Neurodevelopment & Disability, Nursing Research, Royal Children's Hospital, Departments of ²Paediatrics, ³Nursing, The University of Melbourne,³Murdoch Children's Research Institute and ⁴Department of Paediatrics, Monash University, Monash Children's Hospital, Melbourne, Victoria, Australia

Aim: Aggression and high-risk behaviours triggered by children in paediatric hospitals are increasing globally. There is a paucity of research describing behavioural emergencies in paediatric acute care settings.

Methods: We conducted a 1-year retrospective study of behavioural emergencies that triggered an emergency response team attendance in a quaternary paediatric hospital.

Results: In 2018, 218 children triggered 1050 behavioural emergencies, which utilised 386 h of the emergency response team time. Thirty-three (15%) children triggered more than five activations each (range 6–272) and nearly half (16) were children with autism spectrum disorder or intellectual disability. More than 80% of children who triggered an emergency team response also had at least one psychiatric co-morbidity.

Conclusions: Behavioural emergencies, by definition, put staff, children or their families at risk. They occur frequently in hospital with some children repeating these behaviours despite allocation of resources and expertise. New approaches to prevention and amelioration are needed.

Key words: adolescent; aggression; behaviour; child; hospital; paediatric.

What is already known on this topic

- 1 Aggression and high-risk behaviours are increasing in paediatric acute care settings with a paucity of research describing these events.
- 2 High-risk behaviours are common in children with autism with or without intellectual disability and can be magnified in the hospital setting.
- 3 Acute care paediatric staff report a lack of confidence managing aggression in children, especially those with autism and complex communication needs.

What this paper adds

- 1 This study analysed 1050 aggressive paediatric emergencies in a quaternary, paediatric hospital. Hospital response teams spent a total of 23 183 min (386 h) responding to behavioural emergencies in the 12-month period.
- 2 Children with autism or intellectual disability accounted for 44% of all incidents. Children who had diagnoses of anxiety, depression or ADHD or history of aggression or self-harm were most at risk of behavioural emergencies.
- 3 Understanding the characteristics of children who trigger an emergency response to their behaviour will assist in planning strategies to prevent and ameliorate these behaviours, on the path to increasing patient safety, reducing trauma and optimising the child and family's health-care experience.

Aggression demonstrated by children in paediatric hospitals, while not well described, is rapidly increasing globally.¹ In Australia, one major paediatric teaching hospital reported close to 1700 aggressive incidents in 2019, which triggered a hospital emergency response.² One-third of these events were triggered by children with autism spectrum disorder (ASD).

High-risk or aggressive behaviours have been reported in up to two-thirds of children with ASD and intellectual disability (ID).³ Admission to hospital can trigger the behaviours or increase their intensity or frequency and can result in what we will term 'behavioural emergencies'. Aggression and high-risk behaviours are a child's way of communicating frustration and fear. These behaviours result in significant safety risks to themselves, their family, hospital staff and other inpatients. They also result in delayed treatment, prolonged procedure times, increased health-care costs and poorer health outcomes.⁴

Aggressive behaviour can be one of the most debilitating comorbidities for children with ASD and ID. Children with ASD and ID often have very complex communication needs, are required to interact with many more people than they would

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Table 1 Characteristics of children triggering a Code Grey† emergency response in 2018‡

		All children (N = 218)	Children without ASD or ID (N = 122)	Children with ASD and/or ID (N = 96)
Gender, n (%)	Male	102 (46.8)	41 (33.6)	61 (63.5)
	Female	116 (53.2)	81 (66.4)	35 (36.5)
Age, mean (SD)		13.7 (2.87)	14.3 (2.43)	12.9 (3.07)
Age, years, n (%)	6–10	38 (17.4)	11 (9.0)	27 (28.1)
	11–15	117 (53.7)	70 (57.4)	47 (49.0)
	16–18	63 (28.9)	41 (33.6)	22 (22.9)
Intellectual disability, n (%)		55 (25.1)	-	55 (57.3)
	Mild	14 (6.4)	-	14 (14.6)
	Moderate	5 (2.3)	-	5 (5.2)
	Severe	7 (3.2)	-	7 (7.3)
	Unknown	29 (13.2)	-	29 (30.2)
Known psychiatric comorbidities and other relevant diagnoses, n (%)§	≥ 1	183 (83.9)	102 (83.6)	80 (83.3)
	Anxiety	78 (35.8)	46 (37.7)	32 (33.3)
	Depression	59 (27.1)	43 (35.2)	16 (16.6)
	ADHD	46 (21.1)	11 (9.0)	35 (36.5)
	OCD	11 (5.0)	4 (3.3)	7 (7.3)
	ODD	20 (9.2)	11 (9.0)	9 (9.4)
	Bipolar	8 (3.7)	3 (2.5)	5 (5.2)
	Psychosis	24 (11.0)	14 (11.5)	10 (10.4)
	BPD	29 (13.3)	24 (19.7)	5 (5.2)
	Schizophrenia	5 (2.3)	4 (3.3)	1 (1.0)
	Anorexia nervosa	13 (6.0)	12 (9.8)	1 (1.0)
	Gender dysphoria	4 (1.8)	3 (2.5)	1 (1.0)
	Self-harm	75 (34.4)	53 (43.4)	22 (22.9)
Suicidal ideation	94 (43.1)	65 (53.3)	29 (30.2)	
Previous admissions since July 2016 mean (SD)		2.26 (6.8)	3.06 (8.8)	1.2 (2.3)
Previous history of aggression, n (%)		143 (65.6)	69 (56.6)	74 (77.1)
Aggressive behaviours documented on EMR problem list or as an alert on EMR, n (%)		50 (22.9)	16 (13.1)	34 (35.4)
Number of Code Greys activated per patient, n (%)	1	120 (55.0)	66 (54.1)	53 (55.2)
	2–5	66 (30.3)	39 (32.0)	27 (28.1)
	6–10	21 (9.6)	9 (7.4)	12 (12.5)
	11–20	8 (3.7)	6 (4.9)	2 (2.1)
	>20	4 (1.8)	2 (1.6)	2 (2.1)

† Code Grey refers to unarmed confrontation including actual or potential violent, aggressive, abusive or threatening behaviour for which initial verbal de-escalation procedures have failed resulting in activation of a hospital emergency response.

‡ Data analysed at time of first Code Grey activation for all patients.

§ Some patients had more than one comorbidity.

ADHD, attention deficit hyperactivity disorder; ASD, autism spectrum disorder; BPD, borderline personality disorder; EMR, electronic medical record; ID, intellectual disorder; OCD, obsessive compulsive disorder; ODD, oppositional defiance disorder.

prefer, have difficulty reading and interpreting social cues and if non-verbal, have increased difficulty in communicating effectively with health-care staff. Parental concern about how their child will react in the hospital environment is great with negative experiences having the potential to have long-term impacts on the child and family.

Preventing and managing behavioural emergencies may be beyond the usual scope of the acute health-care provider as their training focusses on recognising and responding to clinical deterioration rather than emotional deterioration.^{5,6} Paediatric acute health care is a complex specialty encompassing children with a

wide range of developmental levels who operate within an array of unique family-centred care systems. Staff need many and varied skills and strategies that can be adapted to effectively interact with the spectrum of ages, developmental stages, neurodiversity and parental/carer involvement experienced in the acute paediatric setting.

Patient and staff safety can be compromised if staff are not confident or competent in managing aggressive outbursts. Understanding how often children trigger behavioural emergencies as an indicator of a health-care response being needed and the context and characteristics of the children who trigger them will

Table 2 Characteristics of Code Grey† incidents triggered by children

		All incidents (N = 1050)	Incidents involving children without ASD or ID (N = 709)		Incidents involving children with ASD and /or ID (N = 341)	
			Unplanned Code Grey	Planned Code Grey‡	Unplanned Code Grey	Planned Code Grey
Parents present, n (%)§	Yes	330 (31.4)	84 (11.8)	32 (4.5)	123 (36.1)	91 (26.7)
	No	720 (68.6)	181 (25.5)	412 (58.1)	81 (23.8)	46 (13.5)
Location, n (%)	Medical wards	507 (48.3)	81 (11.4)	331 (46.7)	35 (10.3)	60 (17.6)
	Emergency department	277 (26.4)	105 (14.8)	41 (5.8)	98 (28.7)	33 (9.7)
	Mental health unit	169 (16.1)	49 (6.9)	60 (8.5)	33 (9.7)	27 (7.9)
	Other clinical area	33 (3.1)	6 (0.8)	3 (0.4)	16 (4.7)	8 (2.3)
	Surgical wards	29 (2.8)	9 (1.3)	6 (0.8)	8 (2.3)	6 (1.8)
	Non-clinical area	22 (2.1)	10 (1.4)	0	10 (2.9)	2 (0.6)
	Outpatient clinics	11 (1.0)	4 (0.6)	2 (0.3)	4 (1.8)	1 (0.3)
	PICU/NICU	2 (0.2)	1 (0.1)	1 (0.1)	0	0
	Day of week, n (%)	Sunday	132 (12.6)	37 (5.2)	64 (9.0)	20 (5.9)
	Monday	153 (14.6)	42 (5.9)	65 (9.2)	30 (8.8)	16 (4.7)
	Tuesday	158 (15.0)	40 (5.6)	58 (8.2)	35 (10.3)	25 (7.3)
	Wednesday	158 (15.0)	35 (4.9)	56 (7.9)	41 (12.0)	26 (7.6)
	Thursday	148 (14.1)	34 (4.8)	65 (9.2)	30 (8.8)	19 (5.6)
	Friday	147 (14.0)	44 (6.2)	54 (7.6)	30 (8.8)	19 (5.6)
	Saturday	154 (14.7)	33 (4.7)	82 (11.6)	18 (5.3)	21 (6.2)
Time of day, hours, n (%)	24:00–03:59	58 (5.5)	26 (3.7)	15 (2.1)	12 (3.5)	5 (1.5)
	04:00–07:59	89 (8.5)	18 (2.5)	61 (8.6)	9 (2.6)	1 (0.3)
	08:00–11:59	197 (18.8)	34 (4.8)	82 (11.6)	37 (10.9)	44 (12.9)
	12:00–15:59	261 (24.9)	61 (8.5)	101 (14.2)	58 (17.0)	41 (12.0)
	16:00–19:59	249 (23.7)	63 (8.9)	112 (15.8)	50 (14.7)	24 (7.0)
	20:00–23:59	161 (15.3)	50 (7.1)	64 (9.0)	29 (8.5)	18 (5.3)
	Not known	35 (3.3)	13 (1.8)	9 (1.3)	9 (2.6)	4 (1.2)
	Duration, min, mean (SD)		23.5 (21.1)	25.1 (29.7)	23.7 (14.5)	22.9 (21.1)
Duration, min, n (%)	0–9	116 (11.0)	48 (6.8)	18 (2.5)	35 (10.3)	15 (4.4)
	10–19	398 (37.9)	96 (13.5)	161 (22.7)	76 (22.3)	65 (19.1)
	20–29	248 (23.6)	37 (5.2)	143 (20.2)	36 (10.6)	32 (9.4)
	30–39	127 (12.1)	27 (3.8)	70 (9.9)	22 (6.5)	8 (2.3)
	40–49	40 (3.8)	13 (1.8)	17 (2.4)	8 (2.3)	2 (0.6)
	50–59	23 (2.2)	8 (1.1)	6 (0.8)	6 (1.8)	3 (0.9)
	>60	34 (3.2)	14 (2.0)	9 (1.3)	8 (2.3)	3 (0.9)
	Not known	64 (6.1)	22 (3.1)	20 (2.8)	13 (3.8)	9 (2.6)
	Trigger for aggression occurred while in hospital, n (%)	Yes	896 (85.3)	204 (28.8)	421 (59.4)	148 (43.4)
Hospital-related triggers for aggression, n (%)	Staff interaction	550 (52.4)	115 (16.2)	342 (48.2)	45 (13.2)	48 (14.1)
	Medical procedure	441 (42)	70 (9.9)	321 (45.3)	18 (5.3)	32 (9.4)
	Environment	150 (14.3)	62 (8.7)	24 (3.4)	43 (12.6)	21 (6.2)
	Pt required toileting	88 (8.4)	14 (2.0)	73 (10.3)	0	1 (0.3)
	Skin integrity checks	37 (3.5)	7 (1.0)	30 (4.2)	0	0
	Pain	7 (0.7)	3 (0.4)	0	2 (0.6)	2 (0.6)
	Interaction with another patient	6 (0.6)	2 (0.3)	1 (0.1)	2 (0.6)	1 (0.3)
	Not known	94 (9.0)	21 (3.0)	11 (1.6)	47 (13.8)	15 (4.4)
Interventions, n (%)	Physical restraint	505 (48.1)	109 (15.4)	270 (38.1)	89 (26.1)	37 (10.9)
	Verbal de-escalation	302 (28.8)	116 (16.4)	57 (8.0)	90 (26.4)	39 (11.4)
	Chemical restraint	237 (22.6)	74 (10.4)	39 (5.5)	88 (25.8)	36 (10.6)
	Escort	125 (11.9)	34 (4.8)	26 (3.7)	42 (12.3)	23 (6.7)
	Seclusion	84 (8.0)	20 (2.8)	4 (0.6)	43 (12.6)	17 (5.0)
	Security on standby	72 (6.9)	3 (0.4)	11 (1.6)	16 (4.7)	42 (12.3)
	Skin checks	56 (5.3)	11 (1.6)	45 (6.3)	0	0

(Continues)

Table 2 (Continued)

	All incidents (N = 1050)	Incidents involving children without ASD or ID (N = 709)		Incidents involving children with ASD and /or ID (N = 341)	
		Unplanned Code Grey	Planned Code Grey‡	Unplanned Code Grey	Planned Code Grey
Distraction	15 (1.4)	1 (0.1)	1 (0.1)	12 (3.5)	1 (3.2)
Low stimulus environment	12 (1.1)	5 (0.7)	0	7 (2.1)	0

† Code Grey refers to unarmed confrontation including actual or potential violent, aggressive, abusive or threatening behaviour for which initial verbal de-escalation procedures have failed resulting in activation of a hospital emergency response.

‡ Planned Code Grey refers to an unarmed threat that is known in advance and an intervention pre-empted.

§ At time of activation.

NICU, neonatal intensive care unit; PICU, paediatric intensive care unit.

enable targeted clinical strategies and staff training approaches to be developed to ensure patients are treated safely and with dignity while meeting their clinical needs.

Methods

We conducted a 1-year retrospective study of behavioural emergencies, known as ‘Code Grey’ emergencies, that occurred at a quaternary paediatric hospital from 1 January 2018–31 December 2018. Code Grey, an emergency response code used in some Australian hospitals, refers to unarmed aggression and is activated when an individual fails to respond to initial diffusing mechanisms implemented by staff. The Code Grey response team composition was static during the study period and consisted of the Code Grey Coordinator or after-hours Hospital Manager (Lead); security staff; registered nurses from three response wards and local ward staff. Aggression from children or adults can involve actual or potential violence or threatening behaviours, which create a risk to themselves or the health and safety of nearby individuals. A ‘Planned Code Grey’ is initiated by staff, following a risk-based assessment, for assistance with a scheduled event, such as medical procedure or assessment. The activation of a clinically and security-trained team prior to escalation of aggressive behaviours, through early intervention, may prevent a behavioural emergency or reduce the severity.

A complete list of Code Grey activations for the study period with patient medical record numbers was obtained from hospital administration. Each Code Grey was reviewed by the same study investigator, to ensure consistency of data entry, via the electronic medical record to determine patient diagnosis, reason for activation, location, behaviour triggers, clinical interventions and outcome. Data were stored in a REDCap™ database and analysed using the Stata statistical software package. Ethical approval was received from the institution’s Human Research Ethics Committee (HREC: 37142).

Patient diagnosis of ASD or ID was confirmed if the electronic medical record patient problem list included DSM-IV and DSM-5 diagnoses of either autism, autism spectrum disorder or intellectual disability. Medical referral letters, correspondence and admission and discharge notes were also reviewed to identify and

confirm ASD or ID when not included on the patient’s problem list.

Results

In total, there were 1119 incidents, which activated a hospital response. Children were responsible for activating 1050 (94%) incidents. Of the 218 children who triggered aggressive incidents, 33 (15%) triggered more than five activations each (range 6–272) with 16 children with either ASD or ID in this group (Table 1). Three children were responsible for a combined total of 459 activations (43.7%).

Of the 218 children whose behaviour triggered a hospital emergency response, their age ranged from 6 to 18 years (mean 13.7). One-quarter (55, 25.1%) had an intellectual disability with a mean age of 12.9 years. Eighty-four percent of children who triggered Code Greys also had at least one psychiatric co-morbidity. Children with ASD or ID, who also had anxiety, depression or ADHD, were at greater risk for having behavioural emergencies in hospital than children with ASD or ID that did not. Children with previous or current diagnoses of self-harm or suicidal ideation were also at greater risk.

The hospital environment, interaction with hospital staff and the necessity for medical procedures were the main stressors for all children (Table 2). In almost 20% of children with ASD or ID, the antecedent for high-risk behaviour was not obvious. Previous history of aggressive behaviour was common in children who activated Code Greys. Children with ASD or ID were almost three times as likely to have an aggression history recorded on their medical record. Parental presence at the bedside for children with ASD or ID did not reduce the risk for high-risk behaviours. Code Grey activations were evenly spread across the days of the week (132–158 per day) with the lowest number occurring on a Sunday. Behavioural emergencies were most prevalent from 1200 to 2000 h. Hospital emergency response activations, while least prevalent from midnight until 0800, still accounted for 147 (14%) events during this time. The most common behavioural management interventions utilised were physical restraint (48.1%), verbal de-escalation (28.8%) and chemical restraint (22.6%). The mean response duration for each incident was 23.5 min. Hospital response teams (including a minimum of

6–8 staff members) spent a total of 23, 183 min (386 h) responding to behavioural emergencies in the 12-month period.

Discussion

These data highlight the high burden of aggression in acute paediatric care, including children with autism. Most health-care providers in acute care hospitals are not mental health clinicians and report a lack of confidence in managing aggression, especially in children with complex communication needs.⁷ Child and family distress, injury, prolonged medical procedures, reluctance to access future medical care and staff burn-out can result from suboptimal management and frequent episodes of externalising behaviour.⁸ The economic burden due to repeated attempts at medical procedures, increased staff mobilised to de-escalate and prevent aggressive behaviour, combined with decreased capacity to provide usual health-care services is important to consider.⁹

This study identifies the need for a tailored emergency response and training approach for managing aggression in patients with autism spectrum disorder and intellectual disability as children with ASD and ID accounted for 44% of all behavioural emergencies in the study hospital in 2018. In recent years, researchers internationally have also described the frequency of episodes of agitation for children with ASD during admission to hospital. Hazen *et al.*⁵ in the US reported 18% of patients with ASD demonstrated agitation during admission to a paediatric medical ward. Thom *et al.*¹⁰ building on the findings of this study provide recommendations for the provision of care to children with autism in hospital to prevent high-risk behaviours: more detailed admission history focussing on the child's individual ASD profile; individualised approaches to communication and sensory needs; and best practice care pathways and provision of training and resources to hospitalists. In order for children at high-risk for behavioural emergencies to be treated safely and with dignity in the acute care hospital environment, staff need to understand predictors and risk-factors for aggression, employ communication techniques that are individualised and suitable for the developmental level of the child and have access to training that allows development of confidence and competence in de-escalation and aggression prevention techniques.

Behavioural response teams as a strategy to manage behavioural emergencies have been described for psychiatric settings,^{11,12} adult emergency departments,^{13,14} and adult medical and surgical wards.¹⁵ There is, however, a paucity of research describing and evaluating the impact of behavioural response teams in the paediatric setting. Since Hopper *et al.*'s¹⁶ description of their development and implementation of a formal hospital system of aggression management in a paediatric setting in Australia in 2006, this is the first study to provide an update of aggressive incidents in the same hospital. What has transpired in the 12 years since implementation of this aggression management team is a yearly increase in aggressive incidents requiring a hospital emergency response, from 75 child triggered events during 14-months, to 1050 in a 12-month period in 2018. This increase has implications for staff training, patient and staff safety, staffing, organisational response mechanisms and provision of care. Changes in the context of behavioural emergencies challenge historical approaches and are needed to positively influence organisational strategy and training curriculum redesign.

A fit for purpose behavioural emergency response team whose composition can adapt according to the characteristics of the child triggering the behavioural emergency, and support first line clinical staff, may be a useful response model. Previous models with a 'one size fits all' approach may not have the expertise to manage the wide range of characteristics of children who trigger behavioural emergencies, and the specific skill set required to work effectively with each child. Children with psychiatric diagnoses may benefit from a response team that includes mental health clinicians. Children with a neurodevelopmental disability who trigger behavioural emergencies may benefit from a team that includes medical, nursing and allied health staff with neuro-disability expertise. Tailored rapid response teams for behavioural emergencies have been used with success in non-psychiatric settings.^{15,17,18}

Hospitals are unfamiliar and unpredictable environments with many necessary investigations and treatments causing pain and anxiety. It is, therefore, not expected that all high-risk behaviours are preventable or that the path to incident reduction, amelioration and best care will be straightforward. For each child at each time point that could result in a high-risk behaviour, there is an interplay of provider systems issues (environment, staff confidence/ skill, procedures, pain, multiple care teams) and patient system issues (sensory processing difficulties, communication issues, unfamiliar experiences/environments). A dynamic mix of clinical staff with variable levels of experience and training in behavioural emergencies further complicates the landscape and makes prediction of a successful outcome for each child difficult. A fast-paced clinical environment, where clinical emergencies can occur at any time and require prompt identification and management from multiple clinical team members, makes it difficult for clinicians to notice subtle changes in behaviour from other patients who may be escalating to a behavioural emergency. Further work on predicting, identifying and ameliorating aggressive behaviours in the acute paediatric setting is warranted.

A limitation of this study is that accurate baseline data are not available for the total number of children with ASD who accessed care for the study period. This study employs descriptive analysis to present the context and one organisation's response to aggressive incidents. Greater detail and consistency in documentation of aggressive instances in the patient medical record would allow more sophisticated analysis and enhance clinical communication on the path to best care and should be addressed at a local level. More detailed profiles for children with ASD/ID to include sensory sensitivities, previous aggression history and behavioural management approaches could facilitate early identification of risk factors for aggression and provide a plan of care for each health-care interaction. Listening to and working with children with autism and their parents/carers to identify challenges and develop ways to ameliorate barriers to care is important. Preventative measures that address both hospital and patient systems issues need to be implemented to ensure maximum effect and provide suitable hospital environments in the same way that has been done, for example, with autism-friendly approaches.^{19–21} In summary, this study provides a snapshot of aggressive incidents at one Australian quaternary paediatric hospital. A larger, multi-site study with international collaboration would give greater clarity to this global issue.

Conclusion

These data highlight hospital and patient characteristics that are high risk for aggression indicating important focus areas for greater emphasis on pre-presentation profiling of children, custom-built staff training and improved approaches to make the experience of care more 'friendly' to all children. The development of training programs that maximise staff confidence in managing aggression may increase patient safety, reduce trauma and optimise the child and family's health-care experience and should be a priority care area.

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