Why you should read this article:

- To recognise the signs and symptoms of acute behavioural disturbance
- To learn about the pathophysiology of acute behavioural disturbance
- To understand the principles of assessment and management of people with acute behavioural disturbance

Acute behavioural disturbance: recognition, assessment and management

Matthew Peel

Citation
Peel MR (2022) Acute behavioural disturbance: recognition, assessment and management. Emergency Nurse. doi: 10.7748/en.2022.e2126

Peer review
This article has been subject to external double-blind peer review and checked for plagiarism using automated software

Correspondence
mattpeel@nhs.net
@mattpeel1980

Conflict of interest
None declared

Accepted
8 February 2022

Published online
March 2022

Abstract

Acute behavioural disturbance (ABD) is a clinical emergency which typically affects overweight men in their mid-thirties who chronically misuse illicit stimulants. People with ABD are most likely to be seen in police custody or emergency departments, therefore nurses working in these areas must be able to recognise the signs and symptoms and know how to respond appropriately. Presentation varies, but the signs and symptoms commonly include extreme agitation, hyperthermia, hostility and exceptional strength without fatigue. Further, it is important to recognise that people with ABD are at risk of developing metabolic acidosis, hyperkalaemia, rhabdomyolysis or disseminated intravascular coagulation. This article gives an overview of ABD and describes the main elements of management and treatment.

Author details

Matthew Peel, advanced clinical practitioner, Leeds Community Healthcare NHS Trust, Leeds, England

Keywords

aggression, control and restraint, emergency care, mental health, patients, patient behaviour, pre-hospital care, professional, substance misuse

Introduction

Acute behavioural disturbance (ABD) is a clinical emergency most likely to be seen in the emergency department (ED) or police custody suite in overweight men in their mid-thirties who chronically misuse illicit stimulants (Gonin et al 2018, Sliwicka et al 2019). It is not a diagnosis, but rather a spectrum of behavioural disturbance ranging from overt physical or verbal activity, where the person responds to verbal de-escalation techniques, to extreme and continuous aggression for which the person requires rapid tranquillisation (Paton et al 2019). Figure 1 illustrates the acute behavioural disturbance spectrum. In its most extreme form the condition is sometimes referred to as excited delirium syndrome (Royal College of Emergency Medicine (RCEM) 2022), however in the UK the preferred term is ABD.

This article discusses the more extreme part of the spectrum, which requires early recognition and intervention to prevent death. While ABD is relatively rare, the incidence is becoming more frequent and with greater recognition among the police there is a likelihood of increased hospital attendance of those presenting with the condition.

Acute behavioural disturbance

In 1985 the term 'excited delirium' was coined by doctors Wetlie and Fishbain who noted an increase in sudden deaths among cocaine users on the east coast of the US following rapid onset of agitation and violence for which they required restraint (Strommer et al 2020). Post-mortems noted non-lethal levels of cocaine and no anatomic cause of death (Strommer et al 2020). The term is controversial, in part because it has been used to explain the deaths of healthy young men during or immediately following police restraint (Sliwicka et al 2019). There have been suggestions that its use in this context is to 'cover up' excessive police force, therefore it has become a politically

charged term (Strommer et al 2020) which some major organisations, including the World Health Organization, the American Psychiatric Association and the American Medical Association, do not recognise (Gonin et al 2018).

In the UK the preferred term is acute behavioural disturbance (ABD) which is used to describe a life-threatening condition characterised by extreme physical agitation and altered mental status, which require recognition and treatment (Joint Royal Colleges Ambulance Liaison Committee and Association of Ambulance Chief Executives 2019, Royal College of Psychiatrists and Faculty of Forensic and Legal Medicine 2020, College of Policing 2021, RCEM 2022).

Wetli and Fishbain's (1985) initial definition of excited delirium described a state of extreme mental and physiological excitement characterised by extreme agitation, hyperthermia, hostility, exceptional strength and endurance without fatigue. ABD describes a combination of psychological agitation and severe metabolic and haemodynamic changes (Hall 2016) and it is this combination that poses the risk of sudden, unexpected collapse and death (RCEM 2022). The mortality rate is difficult to determine, in part because most of the literature on the topic relates to the most severe cases where an individual has died, but is believed to be less than 10% (Byard 2018).

Signs and symptoms and differential diagnoses

Signs and symptoms of ABD are listed in Box 1. The more signs and symptoms a person experiences, the greater the risk of developing complications and subsequent collapse or death.

ABD should be considered for any extremely aggressive individual, particularly when the aggression is associated with hyperthermia, apparent lack of fatigue and demonstration of excessive strength (Gonin et al 2018). One of the challenges of recognising the condition, however, is that the signs and symptoms overlap with those of other conditions, therefore there is a wide range of differential diagnoses (see Box 2).

It is essential to be able to differentiate between aggressive, violent individuals who are not experiencing ABD and those who are. Misidentification of ABD by police officers could result in the inappropriate transfer of violent or aggressive individuals to EDs and the 'medicalisation' of a police matter. Equally, nurses must be able to recognise and understand the signs and symptoms of ABD as this is a life-threatening condition for which patients require immediate treatment (RCEM 2022).

Pathophysiology

The pathophysiology of ABD is not fully understood, but it is a complicated physiological and psychological condition with multifactorial predisposing and stimulating factors (Baldwin et al 2018, Kunz et al 2021). Illicit substances, typically cocaine, are often reported as a cause (Byard 2018, Gerdtz et al 2020), however drug levels reported in people who develop ABD are similar to those in recreational users, therefore it cannot be attributed solely to drug use (Byard 2018). Drugs associated with ABD are shown in Box 3.

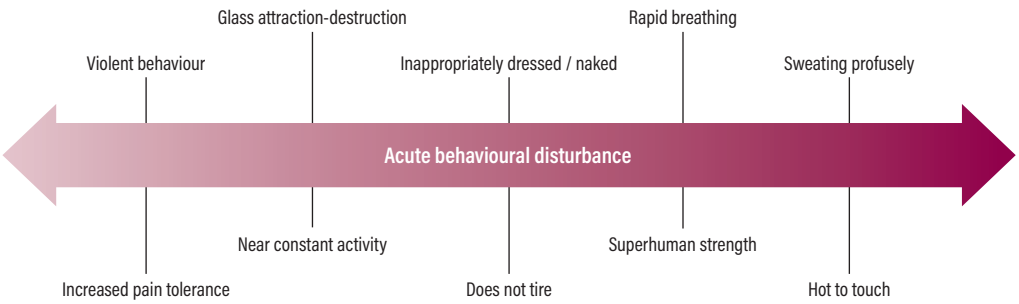
A common hypothesis for the pathophysiology of ABD is a hypercatecholaminergic state which relates to excessive levels of the body's catecholamines – adrenaline (epinephrine), noradrenaline (norepinephrine) and dopamine (Gonin et al 2018, Waugh 2018).

Adrenaline and noradrenaline are responsible for the sympathetic nervous system – 'fight or flight' – response to a perceived life-threatening situation (Peate and Nair

Key points

- People with ABD tend to present as extremely agitated, hyperthermic, hostile, exceptionally strong and without fatigue
- Assessment and management of patients with ABD is time critical but can be challenging because of the person's behaviours
- In police custody, the priority for management of individuals with ABD centres on containment, de-escalation and possible pre-rapid tranquillisation
- The priority for management of patients with ABD in the emergency department is rapid tranquillisation, cooling and fluid resuscitation

Figure 1. Acute behavioural disturbance spectrum



Matthew Peel

2015). The release of these chemicals leads to sympathetic nervous system overactivity, which results in increased heart rate, blood pressure, respiratory rate, blood flow to the muscles, sweating and dilation of the coronary arteries (Peate and Nair 2015, Levy and Gleeson 2017). In part, this overactivity and life-threatening 'fear' response accounts for the excessive strength and near-constant activity seen in people with ABD (Kunz et al 2021). According to this hypothesis, some individuals develop high levels of catecholamines as a response to stress, physical activity and/or stimulant use (Gonin et al 2018).

Dopamine is a major neurotransmitter (Waugh 2018) and increased levels are associated with symptoms of psychosis and hyperthermia (Baldwin et al 2018, Mash 2016). All stimulant drugs increase levels of dopamine therefore it is likely that ingestion of these, or ingestion combined with an individual's genetic susceptibility, or the effect of chronic stimulant misuse, results in unregulated dopamine levels (Mash 2016, Gonin et al 2018). This hyperdopaminergic state results in deterioration of a person's psychological state by increasing their agitation and paranoia (Mash 2016). This then leads to aggression which further increases adrenaline and noradrenaline levels through conversion of extreme emotional distress into autonomic toxicity (Mash 2016).

As the person's condition deteriorates they may develop hyperthermia, leading to further metabolic disturbance (Kunz et al 2021). It has been suggested that continuous physical activity, such as restlessness, agitation, running or fighting – or resisting restraint – can lead to life-threatening metabolic acidosis (Kunz et al 2021). When an individual is experiencing metabolic acidosis, they hyperventilate as a compensatory mechanism which reduces the carbon dioxide in the blood in an attempt to keep the blood pH as close to normal levels as possible. However, if the person becomes tired, or is restrained, the ability to hyperventilate may be impeded, resulting in uncompensated metabolic acidosis which can lead to cardiac arrest (Kunz et al 2021).

ABD has also been associated with withdrawal from or sudden cessation of illicit drugs (Corstens 2018, RCEM 2022), although importantly not always in people who are drug dependent. Corstens (2018), for example, detailed the case of a 51 year old man who took gamma hydroxybutyrate, a psychoactive drug also known as GHB, 'recreationally' for 10 days while on holiday, despite not normally taking the drug. He developed ABD shortly after returning from holiday, but his drug screen was negative.

Complications

Rhabdomyolysis, hyperkalaemia and disseminated intravascular coagulation are potential complications of ABD (RCEM 2022). Rhabdomyolysis occurs when there is extensive skeletal muscle injury caused by muscle overexertion; this releases myoglobin which in turn results in acute kidney injury (Yaqoob and Ashman 2017). The condition is characterised by massively elevated creatine kinase levels and results in hyperkalaemia and hypovolaemia (abnormally low extracellular fluid) (Yaqoob and Ashman 2017). It is suspected that the hyperthermia and near-constant physical

Box 1. Signs and symptoms of acute behavioural disturbance

- Hyperthermia or 'hot to touch'
- Does not tire
- Naked or inappropriately dressed
- Rapid breathing (tachypnoea)
- Tachycardia
- Profuse sweating
- Excessive strength and/or continues to struggle despite restraint
- Increased threshold and/or tolerance for pain
- Constant or near-constant activity
- Glass or mirror attraction and/or destruction
- Unresponsive to the presence of others (for example, police or security officers)
- Extremely aggressive and/or violent behaviour
- Symptoms of acute psychosis with fear of impending doom

(Jauchem 2011, Baldwin et al 2018, Faculty of Forensic and Legal Medicine 2019, Royal College of Emergency Medicine 2022)

Box 2. Differential diagnoses for acute behavioural disturbance

- Substance misuse (intoxication or withdrawal)
- Hypoglycaemia
- Neuroleptic malignant syndrome
- Heatstroke
- Serotonin syndrome
- Head injury
- Thyrotoxicosis and/or thyroid storm
- Seizures
- Sepsis
- Electrolyte abnormalities
- Hypoxia
- Akathisia (movement disorder)
- Psychiatric conditions
- Anticholinergic syndrome
- Brain tumour

(Byard 2018, Linder et al 2018, Faculty of Forensic and Legal Medicine 2019, Royal College of Emergency Medicine 2022)

activity combined with increased adrenaline has a role in skeletal muscle injury and rhabdomyolysis (Mash 2016).

Hyperkalaemia involves an elevated serum potassium level (≥ 5.4 mmol/l), which can lead to arrhythmias or cardiac arrest (Alfonzo et al 2020). Hyperkalaemia may result from rhabdomyolysis or from use of illicit drugs such as cocaine, methamphetamine or 3,4-methylenedioxymethamphetamine (MDMA) (Jauchem 2011).

Disseminated intravascular coagulation is a condition characterised by microvascular thrombosis, which typically affects the skin, brain and kidneys and can result in haemorrhage, which may be occult or frank (Murphy et al 2017). Disseminated intravascular coagulation results from hyperthermia or use of illicit drugs such as synthetic cathinones, N-methoxybenzyl (NBOMEs) or cocaine (Jauchem 2011, Scott-Ham and Stark 2016, Wills 2016, Zawilska et al 2020).

Management of individuals with acute behavioural disturbance in police custody

The College of Policing (2021) states that police officers who suspect that an individual has ABD should not bring them into custody. However, the condition may not be apparent immediately, so those experiencing ABD may have been brought into custody or their condition may deteriorate while in custody. The focus for nurses and other healthcare professionals working in police custody is to intervene at the early stages of ABD to try to prevent the person's condition from deteriorating (Faculty of Forensic and Legal Medicine 2019). Individuals with advanced ABD, or ABD that is unresponsive to oral lorazepam (see below), are not fit to be detained in custody and should be transferred to an ED (Faculty of Forensic and Legal Medicine 2019).

The Faculty of Forensic and Legal Medicine (2019) advocates a low threshold for suspecting ABD, in part because of the potential life-threatening complications and the limited healthcare resources available in police custody suites to manage these. It also states that immediate transfer to an ED is mandatory if an individual shows any of the signs illustrated in Figure 2.

Management of people with ABD in police custody is limited to de-escalation, containment, pre-rapid tranquillisation and transport to hospital (Faculty of Forensic and Legal Medicine 2019).

De-escalation

If the person is not exhibiting the signs illustrated in Figure 2, attempts should be made to try to de-escalate the person, identify a cause of their agitation and mitigate this cause if it is safe and appropriate to do so (Faculty of Forensic and Legal Medicine 2019). De-escalation can be carried out by a nurse or other healthcare professional, but if a police officer has established some rapport with the individual, then they might be the best person to do this. Mitigation might involve reassuring the person or adjusting restraints to make them more comfortable.

Containment

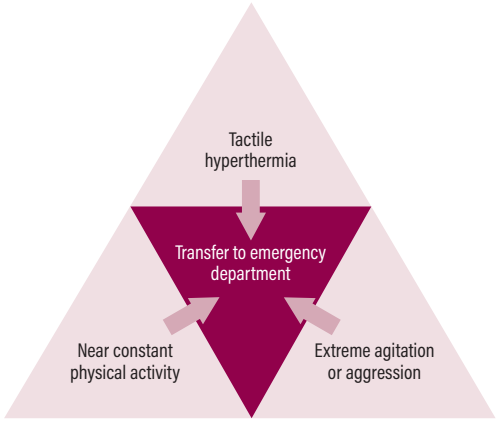
Containment rather than restraint is the most crucial intervention when managing agitated people in custody, given the dangers of restraint to the person concerned or to those restraining them. The main danger of restraint

Box 3. Drugs associated with acute behavioural disturbance

- Cocaine
- Methamphetamine
- Amphetamine
- Lysergic acid diethylamide (LSD)
- Phencyclidine (PCP)
- 3,4-methylenedioxymethamphetamine (MDMA), ecstasy
- Cannabis
- Synthetic cathinones
- Synthetic cannabinoids
- Synthetic psychedelics such as N-methoxybenzyl (NBOMe)
- Opioids

(Byard 2018, Gonin et al 2018, Strommer et al 2020)

Figure 2. Signs of acute behavioural disturbance that require immediate transfer of patient to an emergency department



Faculty of Forensic and Legal Medicine (2019)

is to the person concerned; if they continue to struggle alongside deteriorating agitation, this increases the release of catecholamines which in turn increases the risk of cardiac arrest (Mash 2016, Faculty of Forensic and Legal Medicine 2019, College of Policing 2021). Restraint by police must be reserved for a definitive objective, such as moving a person to a cell or exercise yard or transporting them to hospital (Faculty of Forensic and Legal Medicine 2019); restraining someone to stop them being violent, when containment is available, should be avoided at all costs (Faculty of Forensic and Legal Medicine 2019, College of Policing 2021). Custody officers may be concerned that containment might increase the risk of a person harming themselves, however it must be stressed that restraint is dangerous and has significant risks (Faculty of Forensic and Legal Medicine 2019, College of Policing 2021). People are unlikely to de-escalate while being restrained.

Custody can be an ideal environment for containment because the cells are relatively bare and without stimuli. The lights should be dimmed, and the person should be monitored via CCTV technology at a short distance from the cell to reduce their interaction with other people and to avoid deterioration in their agitation. If possible, the cell should be cooled to avoid the risk of over-heating; alternatively, the person could be contained in a secure exercise yard if they are sweating or hot to touch (Kent Police 2021).

The purpose of containment is to give the person a chance to de-escalate and provide time to arrange transport to a hospital if required. Ideally, an ambulance should take the person to hospital, but an alternative strategy is for the ambulance to follow a police van if the person remains very aggressive. A police van also offers an area of containment whereas in an ambulance the person might require restraint. If the person requires urgent transfer to hospital and an ambulance is not available, police should consider transporting the person using 'blue lights' (Faculty of Forensic and Legal Medicine 2019, College of Policing 2021).

Table 1. Summary of medicines used for pre-rapid tranquillisation

Drug	Route	Typical dose	Onset	Duration
Lorazepam	Oral	1-2mg	20-30 minutes	6-8 hours
Midazolam	Intranasal	5mg	3-5 minutes	30-60 minutes

(Vilke et al 2012, Faculty of Forensic and Legal Medicine 2019, NHS 2020)

Pre-rapid tranquillisation

If de-escalation fails, the Faculty of Forensic and Legal Medicine (2019) recommends administration of oral lorazepam, a benzodiazepine, for pre-rapid tranquillisation. The aim is three-fold; to reduce suffering and harm, reduce the risk of harm to others and facilitate transfer to hospital (Faculty of Forensic and Legal Medicine 2019). Administration of oral lorazepam may be achievable and appropriate at the lower end of the ABD spectrum, but those at the extreme end are unlikely to accept the medicine, and even if they do it is less likely to achieve the desired effect (Gonin et al 2018).

People at the extreme end of the ABD spectrum are most in need of pre-rapid tranquillisation to prevent further deterioration and to de-escalate them enough to facilitate safe transfer to an ED without the need for restraint. In this scenario, intranasal midazolam may be of benefit as it can enable rapid control of the person and has an adequate duration of action to facilitate safe transfer to an ED by ambulance (Hall 2016, Gonin et al 2018, Martel et al 2021). It is also non-invasive, painless and reduces stimuli and there is no risk of needlestick injury (Teleflex 2021). However, at present in the UK the Faculty of Forensic and Legal Medicine (2019) only recommends administration of oral lorazepam in police custody. Table 1 summarises the medicines used for pre-rapid tranquillisation.

Management of patients with acute behavioural disturbance in the emergency department

Patients who present to the ED with ABD are likely to be highly agitated and aggressive unless they have received pre-rapid tranquillisation before arriving. However, this is unlikely because those working in custody are limited to using only oral lorazepam (Faculty of Forensic and Legal Medicine 2019), while paramedics are only authorised to administer sedative agents in certain circumstances, for example for patients experiencing seizures or symptomatic cocaine toxicity (Joint Royal Colleges Ambulance Liaison Committee and Association of Ambulance Chief Executives 2019).

If not already present in the ED, police or security should be summoned to assist if needed. Consideration should be given to placing the patient in the safest area of the ED, ideally with 360° access to the bed and enough space for all those involved, such as nurses, doctors and police and/or security staff. Nurses

must also consider the security and welfare of other patients when deciding in which part of the ED to place the patient. Regardless of where the patient is placed, monitoring and resuscitation equipment must be available (RCEM 2022). Where possible, the lights should be dimmed and noise such as alarms, phones and voices should be reduced to avoid unnecessary stimuli which might increase the patient's agitation (Gonin et al 2018).

Assessment

Patients should be seen immediately by a senior clinician because of the potential life-threatening complications of ABD. Collateral history must be gathered from police, family or witnesses to establish the patient's behaviours and activities before the current episode (RCEM 2022). It is unlikely that a full history can be obtained from the patient while they remain agitated.

Assessment and monitoring depends initially on the patient's ability to cooperate, therefore some elements of the assessment may need to be reserved until rapid tranquillisation has been administered and taken effect

Box 4. Main elements of assessment and monitoring of patients who present with acute behavioural disturbance, once tranquillisation has enabled this

- Airway
- Breathing
  - Respiratory rate and pattern
  - Oxygen saturation
  - Chest auscultation
  - End-tidal carbon dioxide monitoring
- Circulation
  - Cardiac monitoring
  - Blood pressure
  - Capillary refill
  - 12-lead electrocardiogram
  - Arterial blood gas, including a point-of-care testing assessment of the metabolic state, lactate and haematological and electrolyte panel
  - Venous samples for formal laboratory testing, including full blood count, clotting screen, urea and electrolytes, troponin and creatine kinase
- Disability
  - Glasgow Coma Scale and sedation scoring
  - Pupillary response
  - Capillary blood glucose
  - Note degree and positioning of restraints (if in use)
- Exposure
  - Temperature
  - Head-to-toe examination
- Fluids
  - Fluid balance

(NHS England 2015, Royal College of Emergency Medicine 2022)

(Vilke et al 2012). Box 4 lists the main elements of assessment and monitoring of patients who present with ABD, once tranquillisation has enabled this.

Management

The recommended management of patients with ABD is to 'treat the triad' (see Figure 3) of symptoms – that is, agitation and exertion, acidosis and rhabdomyolysis and hyperthermia (Vilke et al 2012).

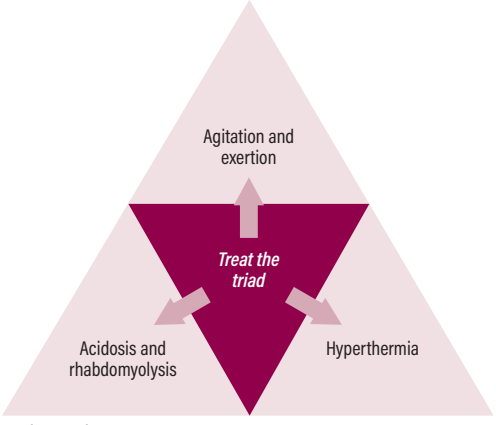
Agitation and exertion

Stopping the patient's agitation and continued exertion is the primary goal to enable further assessment and management and is essential before withdrawing physical restraints (Gonin et al 2018). Nurses should attempt to determine the duration of restraint used before the patient arrived in the ED and record this in the nursing notes.

Seclusion is not recommended – and is not available – in the ED, therefore patients with ABD often require rapid tranquillisation if de-escalation has failed (National Institute for Health and Care Excellence (NICE) 2015). NICE (2015) recommends administration of intramuscular (IM) rather than intravenous (IV) rapid tranquillisation except in exceptional circumstances, for example for people who are extremely aggressive, critically unwell or with established IV access. Additionally, IV access is likely to be difficult to obtain in a highly agitated and aggressive individual (RCEM 2022).

There is no ideal sedative agent to use for rapid tranquillisation because they all have benefits and drawbacks (RCEM 2020). NICE (2015) recommends IM lorazepam when there is little patient history available.

Figure 3. Management of patients with acute behavioural disturbance: 'treat the triad'



Matthew Peel

The benefits of IM lorazepam include a long half-life, a wide safety profile and a readily available reversal agent (flumazenil), as well as a record of common use and familiarity in the ED (Martel et al 2021, National Center for Biotechnology Information 2021, RCEM 2022). However, lorazepam has a slower and unpredictable onset time when administered IM, making titration difficult (RCEM 2022). Additionally, as a benzodiazepine lorazepam is associated with some respiratory depression, which may impede the person's ability to hyperventilate as a compensatory mechanism for metabolic acidosis (Linder et al 2018).

The RCEM (2022) recommends ketamine as a first-line agent for rapid tranquillisation. Some studies have shown that ketamine sedated 98% of patients with ABD effectively, while other benefits include rapid onset, a wide dose range that can deliver the desired effect with no toxic side-effects and consistent effects at predictable doses (Isoardi et al 2021, RCEM 2022). Ketamine also preserves airway reflexes and rarely affects the patient's respiratory effort (RCEM 2022). It can however inhibit the reuptake of catecholamines, further increasing the heart rate, blood pressure, cardiac output and myocardial oxygen demands (RCEM 2022). Ketamine has also been associated with more side effects than lorazepam, including hypersalivation, and has been shown to increase intubation rates (Linder et al 2018). Table 2 shows a summary of medicines used for rapid tranquillisation in the ED.

Regardless of the sedative used, oxygen should be administered, the patient should be monitored and their sedation score measured regularly using a validated sedation assessment tool (Calver et al 2011, RCEM 2022).

The RCEM (2022) recommends a safety brief to ensure everyone involved in the person's care, including police and security staff, is aware of the plan to deliver rapid tranquillisation. This is usually led by a senior ED clinician. The main elements include:

- Roles and responsibilities.
- Intended plan for rapid tranquillisation, including method of administration and what will happen post-administration.
- Anticipated problems and complications of rapid tranquillisation and how these will be managed.
- Restraint considerations.
- IV access plan.
- Plan for moving the patient to a resuscitation environment.
- Responsibility for decision to relax restraint.

Table 2. Summary of medicines used for rapid tranquillisation in the emergency department

Drug	Route	Typical dose	Onset (minutes)	Duration (minutes)
Lorazepam	Intramuscular	4mg	15-30	60-120
	Intravenous	2-4mg	2-5	60-120
Ketamine	Intramuscular	4-5mg/kg	3-5	60-90
	Intravenous	2-4mg/kg	1	20-30

(Hall 2016)

Hyperthermia

Patients who are hyperthermic (temperature > 37.7°C) should be passively cooled by removing their clothing and reducing the environmental temperature, aiming for normothermia (36.5°-37.5°C) (NICE 2013). Active cooling measures, such as administration of cooled IV fluids or placing ice packs in the axilla and groin areas, may be needed if the patient is critically ill, has an extremely high temperature (> 40.1°C) or is not responding to passive cooling techniques (Hughes and Cruickshank 2011). The patient's temperature should be monitored closely.

Acidosis and rhabdomyolysis

Patients will typically require fluid resuscitation to treat metabolic acidosis and reverse the dehydration and hypovolaemia caused by hyperthermia, hyperventilation and sweating (Vilke et al 2012). Fluid resuscitation is also a core treatment for rhabdomyolysis (Patel and Kadiyala 2019).

Conclusion

Although ABD is connected to the controversial term excited delirium, there is a consensus that the condition exists in the context of people who present as extremely agitated, hyperthermic, hostile, exceptionally strong and without fatigue. The assessment and management of patients with ABD is complex and time critical and can be more challenging because of the person's behaviours. Nurses must be conscious of the patient's safety as well as their own and that of other patients and colleagues. In police custody, the priority for management centres on containment rather than restraint and involves de-escalation and possible pre-rapid tranquillisation. In the ED, the priority for management is rapid tranquillisation, cooling and fluid resuscitation.

References

Alfonzo A, Harrison A, Baines R et al (2020) Clinical Practice Guidelines Treatment of Acute Hyperkalaemia in Adults. ukkidney.org/sites/renal.org/files/RENAL%20ASSOCIATION%20HYPERKALAEMIA%20GUIDELINE%202020.pdf (Last accessed: 18 March 2022.)

Baldwin S, Hall C, Blaskovits B et al (2018) Excited delirium syndrome (ExDS): situational factors and risks to officer safety in non-fatal use of force encounters. International Journal of Law Psychiatry. 60, 26-34. doi: 10.1016/j.ijlp.2018.06.011

Byard RW (2018) Ongoing issues with the diagnosis of excited delirium. Forensic Science, Medicine and Pathology. 14, 2, 149-151. doi: 10.1007/s12024-017-9904-3

Calver LA, Stokes B, Isbister GK (2011) Sedation assessment tool to score acute behavioural disturbance in the emergency department. Emergency Medicine Australasia. 23, 6, 732-740. doi: 10.1111/j.1742-6723.2011.01484.x

College of Policing (2021) Detention and Custody. Risk Assessment. www.app.college.police.uk/app-content/detention-and-custody-2/risk-assessment/#acute-behavioural-disturbance (Last accessed: 18 March 2022.)

Corstens D (2018) Excited delirium syndrome after withdrawal from 10 days long recreationally used GHB. Journal of Forensic and Legal Medicine. 54, 74-75. doi: 10.1016/j.jflm.2017.12.008

Faculty of Forensic and Legal Medicine (2019) Acute Behavioural Disturbance (ABD): Guidelines on Management in Police Custody. fflm.ac.uk/wp-content/uploads/2019/05/AcuteBehaveDisturbance_Apr19-FFLM-RCEM.pdf (Last accessed: 18 March 2022.)

Gerdtz M, Yap CY, Daniel C et al (2020) Prevalence of illicit substance use among patients presenting to the emergency department with acute behavioural disturbance: rapid point-of-care saliva screening. Emergency Medicine Australasia. 32, 3, 473-480. doi: 10.1111/1742-6723.13441

Gonin P, Beysard N, Yersin B et al (2018) Excited delirium: a systematic review. Academic Emergency Medicine. 25, 5, 552-565. doi: 10.1111/acem.13330

Hall CA (2016) Excited delirium. In Payne-James J, Byard R (Eds). Encyclopedia of Forensic and Legal Medicine. Volume 2. Second edition. Elsevier, London, 441-452.

Hughes T, Cruickshank J (2011) Adult Emergency Medicine at a Glance. Wiley-Blackwell, Chichester.

Isoardi KZ, Parker LE, Page CB et al (2021) Ketamine as a rescue treatment for severe acute behavioural disturbance: a prospective prehospital study. Emergency Medicine Australasia. 33, 4, 610-614. doi: 10.1111/1742-6723.13682

Jauchem JR (2011) Pathophysiologic changes due to TASER® devices versus excited delirium: potential relevance to deaths-in-custody? Journal of Forensic and Legal Medicine. 18, 4, 145-153. doi: 10.1016/j.jflm.2011.01.014

Joint Royal Colleges Ambulance Liaison Committee, Association of Ambulance Chief Executives (Eds) (2019) JRCALC Clinical Guidelines 2019. Class Professional Publishing, Bridgwater.

Kent Police (2021) Operational Partnerships – Acute Behavioural Disturbance SOP (043k). www.kent.police.uk/foi-ai/kent-police/Policy/operational-partnerships/acute-behavioural-disturbance-sop-o43k/ (Last accessed: 18 March 2022.)

Kunz SN, þórðardóttir S, Jonasson JG (2021) Arrest-related death on the basis of a drug-induced excited delirium syndrome. Journal of Forensic and Legal Medicine. 77, 102091. doi: 10.1016/j.jflm.2020.102091

Levy M, Gleeson H (2017) Endocrine disease. In Kumar P, Clark ML (Eds). Kumar & Clark's Clinical Medicine. Ninth edition. Elsevier, London, 1175-1240.

Linder LM, Ross CA, Weant KA (2018) Ketamine for the acute management of excited delirium and agitation in the prehospital setting. Pharmacotherapy. 38, 1, 139-151. doi: 10.1002/phar.2060

Martel ML, Driver BE, Miner JR et al (2021) Randomized double-blind trial of intramuscular droperidol, ziprasidone, and lorazepam for acute undifferentiated agitation in the emergency department. Academic Emergency Medicine. 28, 4, 421-434. doi: 10.1111/acem.14124

Mash DC (2016) Excited delirium and sudden death: a syndromal disorder at the extreme end of the neuropsychiatric continuum. Frontiers in Physiology. 7, 435. doi: 10.3389/fphys.2016.00435

Murphy M, Pasi K, Mead A (2017) Haematological disease. In Kumar P, Clark ML (Eds). Kumar & Clark's Clinical Medicine. Ninth edition. Elsevier, London, 515-581.

National Center for Biotechnology Information (2021) Lorazepam. pubchem.ncbi.nlm.nih.gov/compound/Lorazepam (Last accessed: 18 March 2022.)

NHS (2020) Lorazepam. www.nhs.uk/medicines/lorazepam/ (Last accessed: 18 March 2022.)

NHS England (2015) Patient Safety Alert. Stage One: Warning. The Importance of Vital Signs During and After Restrictive Interventions/Manual Restraint. www.england.nhs.uk/wp-content/uploads/2015/12/psa-vital-signs-restrictive-interventions-031115.pdf (Last accessed: 18 March 2022.)

National Institute for Health and Care Excellence (2013) Surgical Site Infection. Quality standard No. 49. NICE, London.

National Institute for Health and Care Excellence (2015) Violence and Aggression: Short-term Management in Mental Health, Health and Community Settings. NICE guideline No. 10. NICE, London.

Patel C, Kadiyala A (2019) BMJ Best Practice. Rhabdomyolysis. bestpractice.bmj.com/topics/en-gb/167 (Last accessed: 18 March 2022.)

Paton C, Adams CE, Dye S et al (2019) The pharmacological management of acute behavioural disturbance: data from a clinical audit conducted in UK mental health services. Journal of Psychopharmacology. 33, 4, 472-481. doi: 10.1177/0269881118817170

Peate I, Nair M (2015) Anatomy and Physiology for Nurses at a Glance. Wiley Blackwell, Oxford.

Royal College of Emergency Medicine (2020) Pharmacological Agents for Procedural Sedation and Analgesia in the Emergency Department. October 2020 (Revised). Best Practice Guideline. rcem.ac.uk/wpcontent/uploads/2021/10/Pharmacological_Agents_for_Procedural_Sedation_and_Analgesia_October_2020_Revised_230421.pdf (Last accessed: 18 March 2022.)

Royal College of Emergency Medicine (2022) Acute Behavioural Disturbance in Emergency Departments. Best Practice Guideline. rcem.ac.uk/wp-content/uploads/2022/01/Acute_Behavioural_Disturbance_Final.pdf (Last accessed: 18 March 2022.)

Royal College of Psychiatrists, Faculty of Forensic and Legal Medicine (2020) Detainees with Substance Use Disorders in Police Custody: Guidelines for Clinical Management (Fifth Edition). fflm.ac.uk/wp-content/uploads/2020/12/college-report-cr227.pdf (Last accessed: 18 March 2022.)

Scott-Ham M, Stark MM (2016) Substance misuse: legal highs. In Payne-James J, Byard R (Eds). Encyclopedia of Forensic and Legal Medicine. Volume 4. Second edition. Elsevier, London, 394-399.

Sliwicka O, Szatner K, Borowska-Solonynko A (2019) Three postmortem case reports of the excited delirium syndrome–a short comparison. Journal of Forensic Legal Medicine. 66, 134-137. doi: 10.1016/j.jflm.2019.06.013

Strommer EMF, Leith W, Zeegers MP et al (2020) The role of restraint in fatal excited delirium: a research synthesis and pooled analysis. Forensic Science, Medicine and Pathology. 16, 4, 680-692. doi: 10.1007/s12024-020-00291-8

Teleflex (2021) MAD Nasal™ Intranasal Mucosal Atomization Device*. www.teleflex.com/usa/en/product-areas/anesthesia/atomization/mad-nasal-device/index.html# (Last accessed: 18 March 2022.)

Vilke GM, Bozeman WP, Dawes DM et al (2012) Excited delirium syndrome (ExDS): treatment options and considerations. Journal of Forensic Legal Medicine. 19, 3, 117-121. doi: 10.1016/j.jflm.2011.12.009

Waugh A (2018) Ross and Wilson. Anatomy & Physiology in Health and Illness. Elsevier, London.

Wetli CV, Fishbain DA (1985) Cocaine-induced psychosis and sudden death in recreational cocaine users. Journal of Forensic Science. 30, 3, 873-880.

Wills S (2016) Extremes of temperature: hyperthermia. In Payne-James J, Byard R (Eds). Encyclopedia of Forensic and Legal Medicine. Volume 2. Second edition. Elsevier, London, 476-485.

Yaqoob M, Ashman N (2017) Kidney and urinary tract disease. In Kumar P, Clark ML (Eds). Kumar & Clark's Clinical Medicine. Ninth edition. Elsevier, London, 721-794.

Zawilska JB, Kacela M, Adamowicz P (2020) NBOMes-highly potent and toxic alternatives of LSD. Frontiers in Neuroscience. 14, 78. doi: 10.3389/fnins.2020.00078