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Home • 2014 • July • Excited Delirium and the Dual Response: Preventing In-Custody Deaths

Excited Delirium and the Dual Response: Preventing In-Custody Deaths

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Excited delirium syndrome (ExDS) is a serious and potentially deadly medical condition involving psychotic behavior, elevated temperature, and an extreme fight-or-flight response by the nervous system. Failure to recognize the symptoms and involve emergency medical services (EMS) to provide appropriate medical treatment may lead to death. Fatality rates of up to 10 percent in ExDS cases have been reported.[1] In addition to the significant morbidity and mortality associated with unrecognized ExDS, a substantial risk for litigation exists. These patients often die within 1 hour of police involvement. One study showed 75 percent of deaths from ExDS occurred at the scene or during transport.[2] Law enforcement organizations should take steps to increase officer awareness of ExDS and its symptoms and develop procedures to engage the medical community when identified. Without placing themselves or others at a greater risk for physical harm, officers must be able to rapidly detect symptoms of ExDS and immediately engage EMS for proper diagnosis and medical treatment. Failure to do so may prove fatal.

Historical Data and Cases Reviewed

Reports of presentations consistent with ExDS have occurred for more than 150 years. In 1849 Dr. Luther Bell, a psychiatrist in Massachusetts, described an acute exhaustive mania (Bell's Mania) in which patients developed hallucinations, profound agitation, and fever, which often were followed by death.[3] A decrease in reports occurred in the 1950s that coincided with the advent of antipsychotic medications and then an increase again in the 1980s likely secondary to widespread cocaine

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In Depth

Featured Articles

- **Criminal Investigative Analysis: Skills, Expertise, and Training (Part Two of Four)**
- **Excited Delirium and the Dual Response: Preventing In-Custody Deaths**
- **Perspective**
To Protect and Serve: A Vision for Law Enforcement
- **Officer Survival Spotlight**
Arrest Situations: Understanding the Dangers
- **Leadership Spotlight**
Your Leadership is Your Life Story (Part One of Two)

Bulletin Highlights



Bulletin Honors: Florida Sheriff's Law Enforcement Memorial



Bulletin Reports: Probation and Parole in the United States

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Dorchester, MA

St. Louis, MO

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use. At that time, there were several reports in which an intoxicated person or an individual with mental illness exhibited aggression, hallucinations, and insensitivity to pain; was physically restrained (often in a prone position); and then died in custody.

In the last 20 years, law enforcement officers have seen this syndrome repeatedly. Several cases were outlined by a special panel review on ExDS at Penn State.[4]

Excited Delirium-Associated Death after

Handcuffing/Hog-tying: In October 2005 a West Palm Beach, Florida, police officer found a shirtless and distraught man stumbling on the road and attempting to stop vehicles. Told to relax, the man kept gesticulating wildly with vehicles stopping to avoid him. After a struggle the officer placed the man in a prone position and handcuffed him. Other officers arrived, helped move the man out of the street, and further restrained him by hog-tying his legs and hands. The man later became unconscious. Responding paramedics failed to resuscitate him. The chief medical examiner for Palm Beach County determined the cause of death was "sudden respiratory arrest following physical struggling restraint due to cocaine-induced ExDS."

Excited Delirium-Associated Death after Major Physical Struggle:

A panel member who also serves as a Vancouver Police Department sergeant related the case of officers responding to a male subject who had a knife in a street confrontation. A foot chase ensued with police grounding the subject and multiple officers restraining him. The sergeant stated, "The subject was so resistive and so strong that he lifted five officers off of him at one point." After a protracted struggle, the subject suddenly was quiet, went into cardiac arrest, and died at the scene. The subject suffered from mental illness and had alcohol and marijuana in his system. An autopsy concluded the subject died from choking due to the officer's restraint, and the coroner ruled the death accidental.

Excited Delirium-Associated Death after TASER Use: According to press reports, Dallas, Texas, police found a 23-year-old male subject in his underwear, screaming and holding a knife on a neighbor's porch on April 24, 2006. The man refused English and Spanish instructions and came at the officers with the knife. One officer fired a TASER, which failed to connect. A second shot did, causing electrical shock. A third was reportedly fired. After being handcuffed on an ambulance backboard, the subject stopped breathing and was pronounced dead at a hospital. The Dallas County medical examiner attributed the death to "excited delirium."

Excited Delirium-Associated Death with No Police Presence: Certainly, the cases cited in the 1849 paper by Dr. Luther Bell in the *Journal of Insanity* had no police presence. Most recently, a case occurred involving an Anderson University basketball player. An Anderson County, Indiana, coroner "said [the man] had complained of cramps and vision problems just before he collapsed on a campus basketball court September 30 and had an 'extremely elevated body temperature' when he was rushed to the emergency room of AnMed Health Medical Center. The man's death days later was caused by 'acute drug toxicity with ExDS that led to multiple organ failure.'"[5]

Further, an expert panel convened by the American College of Emergency Physicians recognized ExDS as a unique clinical syndrome amenable to early therapeutic interventions.[6] This article provides a scientific background for ExDS, outlines risk factors, clarifies identification of the syndrome based on common signs and symptoms, and discusses control and sedation of affected individuals.

Medical Background

The mechanism in which ExDS occurs is complex and not fully understood; however, recent research has provided greater insight. Although cocaine use is associated with ExDS, postmortem cocaine levels in those who have died after ExDS are similar to those of recreational cocaine users and lower than individuals who have died from heart attacks or other non-ExDS causes after cocaine use.[7] These findings suggest that cocaine intoxication alone does not cause ExDS. Further, a degree of cellular or genetic susceptibility may exist that leads some cocaine users to develop ExDS while others do not. Researchers began to explore other mechanisms for ExDS, and the central dopamine theory emerged as a leading hypothesis.

Dopamine is a neurotransmitter with many functions. It plays a role in the brain's perception of reward and temperature regulation. Increased dopamine levels result in fast heart rates, feelings of euphoria, and hallucinations. Highly addictive drugs, specifically cocaine and methamphetamine, increase the level of dopamine in the brain. Schizophrenia also results in elevated levels of dopamine in the brain, and antipsychotics work to treat hallucinations by blocking dopamine on a cellular level. In chronic cocaine abusers who have died of ExDS, research has shown a loss of a crucial protein that eliminates dopamine from the brain. This loss results in increased dopamine levels and chaotic signaling in the brain. The elevated dopamine levels help explain some of the similarities between ExDS and schizophrenia (e.g., hallucinations, paranoia), but they do not account for the high rates of sudden cardiac arrest seen in the former but not the latter.

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Risk Factors Associated with Excited Delirium Syndrome

Males (average age 36)
Stimulant drug use
<ul style="list-style-type: none"> ▪ Cocaine and to a lesser extent methamphetamine, PCP, and LSD
Chronic users after an acute binge
Preexisting psychiatric disorder
<ul style="list-style-type: none"> ▪ Schizophrenia, bipolar disorder

Clinical Presentation

The clinical presentation of excited delirium has distinct and recognizable features. Much of what is used to identify excited delirium both on the street and in the hospital is based on case reports that have identified common clinical features, patient behaviors, and historical factors. In 2009 the American College of Emergency Physicians Task Force on Excited Delirium established that both delirium (e.g., acute confusion, hallucinations, and disorientation that is rapid in onset and may fluctuate in intensity) and an excited or agitated state must be present to consider ExDS.[8] Previously published cases identified common sequences of events, typically involving "acute drug intoxication or a history of mental illness, a struggle with law enforcement, physical or noxious chemical control measures or electrical control device (ECD) application, sudden and unexpected death, and an autopsy which fails to reveal a definite cause of death from trauma or natural disease." [9]

ExDS subjects typically are males around the age of 30, and most have a history of psychostimulant use or mental illness (see table 1). Law enforcement agents or EMS personnel often are called to the scene because of public disturbances, agitation, or bizarre behaviors. Subjects are usually violent and combative with hallucinations, paranoia, or fear. Additionally, subjects may demonstrate profound levels of strength, resist painful stimuli or physical restraint, and seem impervious to self-inflicted injuries. This information becomes particularly important to law enforcement personnel who may use techniques intended to gain control and custody of subjects through physical means, chemical agents, or ECDs. During initial assessment patients often are noted to have elevated body temperatures, fast heart rates, rapid breathing, elevated blood pressures, and sweaty skin.

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Certain medical conditions have presented similarly to ExDS, including low blood sugar, thyroid abnormalities, and decompensated psychiatric illness. Methamphetamine, cocaine, PCP, and bath salt intoxication are associated with ExDS, but not every intoxicated individual develops it. Intoxication without ExDS will lack elevated body temperatures and certain laboratory abnormalities, such as metabolic acidosis. Severe sweating, a clue that a patient has an elevated temperature, combined with hallucinations always should prompt a consideration of ExDS. Differentiating ExDS from other medical causes or uncomplicated intoxication can prove difficult, but a prudent course is to assume the worst and bring patients to the hospital via EMS for evaluation by a physician.

Treatments

When subjects are identified as potentially exhibiting excited delirium, rapid control of the situation and timely execution of medical evaluation are important. Protocols vary by region according to local EMS policies and in many cases are driven by consensus opinions. Subjects with excited delirium often do not respond to verbal redirection. Additionally, attempts at physical control may not be as effective given extreme levels of strength and resistance to painful stimuli. Ongoing physical struggle can worsen a subject's innate fight-or-flight system, which can raise a patient's temperature, cause changes in the body's acid-base balance, and increase the risk of sudden death.

Medications are required to sedate ExDS patients to expedite the medical evaluation, decrease their fight-or-flight response, and avoid further harm to both the subject and those involved in the patient's care. Several classes of medications are available, as well as different routes of administration, including intranasal, intramuscular, and intravenous. Advanced life support EMS personnel capable of cardiac monitoring, advanced airway management, and medical resuscitation should be present at the time of administration. Common medications include benzodiazepines (e.g., lorazepam, midazolam, diazepam), antipsychotics (e.g., haloperidol, droperidol, olanzapine, ziprasidone), and the dissociative agent ketamine. Benzodiazepines are very safe but are limited by varying dose requirements from patient to patient, as well as variable time until adequate sedation. Antipsychotics often are more useful in subjects presenting with acute exacerbations of psychiatric illness but are plagued by warnings about potential cardiac side effects and prolonged time until onset.

Ketamine is a unique medication that may play a larger role in the initial treatment of patients with excited delirium. It is characterized by a rapid onset of action (less than 5 minutes), stable effects on blood pressure, consistent ability to provide

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adequate sedation, and, in general, it maintains the subject's ability to breathe. Potential side effects include hallucinations and confusion as the medication wears off (10 to 20 percent of adults 30 to 120 minutes after administration), vocal cord spasm, and increased salivation. A recent study published by Regions Hospital EMS in St. Paul, Minnesota, reviewed 13 cases between April and December 2011 where ketamine was administered prior to hospital arrival for excited delirium.[10] This review further supports ketamine as an effective prehospital treatment of the ExDS patient. Peak sedation was achieved in less than 5 minutes in 11 of 13 cases. Moderate or deeper sedation was achieved in 12 of 13 patients. However, ketamine is a powerful medication, and ExDS is a life-threatening condition. Three patients developed low oxygen saturations. Two required endotracheal intubation, and one was assisted with a bag-valve mask. Three patients experienced emergent reactions, two of which were successfully treated with low doses of benzodiazepines. There were no deaths.

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Conclusion

In summary, excited delirium is becoming increasingly recognized as an important medical emergency encountered in the prehospital environment. Law enforcement agencies should undertake a concerted effort to increase awareness among officers of ExDS to include information to help identify symptoms and to establish protocols to engage the medical community. Armed with this information, officers will be in a better position to engage EMS for an urgent evaluation, treatment, and transport to the hospital. Using teamwork to safely and efficiently control these patients will lead to improved outcomes. Promising research is being conducted regarding the underlying mechanisms of this disease, as well as new methods of treatment, including ketamine, which may improve the ability to care for these patients.

Endnotes

[1] M.D. Sztajnkrycer and A.A. Baez, "Cocaine, Excited Delirium, and Sudden Unexpected Death," *EMS World*, April 2005 (updated January 11, 2011), <http://www.emsworld.com/article/article.jsp?id=1863> (accessed April 30, 2014).

[2] D.L. Ross, "Factors Associated with Excited Delirium Deaths in Police Custody," *Modern Pathology* 11 (1998): 1127–1137.

[3] L. Bell, "Acute Exhaustive Mania," *American Journal of Psychiatry* (October 1849).

[4] Information regarding these cases is derived from the National Institute of Justice Weapons and Protective Systems Technologies Center, "Special Panel Review of Excited Delirium, December 2011," <https://www.justnet.org/pdf/ExDS-Panel-Report-FINAL.pdf> (accessed April 14, 2014).

[5] As reported by N. Mayo, *Independent Mail* (November 15, 2011).

[6] American College of Emergency Physicians Excited Delirium Task Force, "White Paper Report on Excited Delirium Syndrome, September, 10, 2009: Report to the Council and Board of Directors on Excited Delirium at the Direction of Amended Resolution 21(08)," <http://www.fmhac.net/Assets/Documents/2012/Presentations/KrelsteinExcitedDelirium.pdf> (accessed April 14, 2014).

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[8] American College of Emergency Physicians Excited Delirium Task Force.

[9] American College of Emergency Physicians Excited Delirium Task Force.

[10] A.M. Burnett, J.G. Salzman, K.R. Griffith, B. Kroeger, and R.J. Frascione, "The Emergency Department Experience with Prehospital Ketamine: A Case Series of 13 Patients," *Prehospital Emergency Care* 16 (2012):1-7.

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