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Special

REPORT



# Special Panel Review of Excited Delirium

December 2011

This report is submitted as a result of work completed under National Institute of Justice Cooperative Agreement Award No. 2010-IJ-CX-K005.

PENNSSTATE



**Special Panel Review of Excited Delirium**

Less-Lethal Devices Technology Working Group  
NIJ Weapons and Protective Systems Technologies Center

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**Report Editor**

*Lieutenant Colonel Edward L. Hughes*

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Institute for Non-Lethal Defense Technologies  
Applied Research Laboratory  
The Pennsylvania State University

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**Special Panel Review of Excited Delirium**

Less-Lethal Devices Technology Working Group  
NIJ Weapons and Protective Systems Technologies Center

Institute for Non-Lethal Defense Technologies  
Applied Research Laboratory  
The Pennsylvania State University

## Executive Summary

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This report constitutes the proceedings of a meeting of a special panel convened by the Weapons and Protective Systems Technologies Center (WPSTC) to examine the subject of Excited Delirium Syndrome (ExDS) and the interventions being cooperatively developed by the law enforcement and medical communities.

The purpose of the meeting was to examine the phenomenon of “excited delirium” and its association with the use-of-force in general and the use of CEDs in particular. Additionally, the panel was to review, discuss, and examine related medical and other first responder protocols. The immediate objectives of the meeting were to (1) assess the current body of knowledge regard in excited delirium, (2) determine whether or not existing protocols appear to mitigate the phenomenon, and (3) identify the research questions that might remain.

The long-range goal for the panel is to arrive at some consensus on a set of interventions that ideally (1) would reduce the likelihood of sudden and unexpected in-custody deaths and (2) would not be harmful in any case, as well as to (3) identify and qualify [characterize] the associated risks.

### Excited Delirium – Does it Exist?

There is not yet a common definition of ExDS nor has its incidence been precisely quantified across the United States, but there are growing efforts to document and report cases regardless of outcome.

The panel examined the issue of ExDS from the law enforcement and medical perspectives. Neither community has a universal view of ExDS. However, many regard it as a very real problem.

Medical authorities – and not just those on the panel – confirm law enforcement’s views regarding the existence and peril of ExDS. Although there is some disagreement on what it should be called or how it should be categorized and accounted for in medicine, **the consensus of this panel is that it certainly exists as a syndrome.** Moreover, the possibility of resultant sudden death renders it a medical emergency, requiring immediate attention. This necessitates a coordinated response among the criminal justice and medical communities.

### Excited Delirium – Do Response Protocols Work?

The panel examined protocols, primarily considering those implemented in Lenexa, Kansas and Seattle, Washington, as they could be defended and examined in detail during the proceedings. Additionally, the panel considered information available from other jurisdictions and obtained from recent studies. Not surprisingly there were many similarities and few substantive differences.

Perhaps the most important aspect of these early and pilot protocols is the cooperative nature of the response and the requisite training. First, and foremost, these situations are treated as a medical crisis, not a criminal situation. This changed thinking in some communities and has led to the development of innovative cooperative responses to ExDS cases. These communities no longer see only law enforcement responding. All of the protocols involve a coordinated response by dispatchers, law enforcement, paramedics, and emergency department medical staff.

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While the panel acknowledged response protocols will continue to evolve and improve with experience and research, **the consensus of the panel is that overall, these response protocols are appropriate.** In the long run, they may prove to be insufficient, but they will likely do no harm. The general response measures include:

- ❖ Clear *identification* of ExDS cases based on common signs and symptoms (indicators) of the syndrome;
- ❖ Rapid *control* of the individual with adequate law enforcement personnel;
- ❖ *Sedation* by emergency medical personnel immediately after the subject is under police control;
- ❖ *Transport* of the subject to a medical facility for follow-up treatment and evaluation; and documenting the case.

**It is also the consensus of the panel that use of signs and symptoms based on medical literature provides law enforcement with more comprehensive criteria for determining a medical emergency; uniform criteria for agencies implementing such protocols across jurisdictional boundaries; and better defensibility.**

Documentation of ExDS cases should be done by emergency medical personnel and law enforcement and embedded in their existing reporting systems (including photos, video, audio, detailed reports, and supervisor response).

**The consensus of this panel is that the detailed documentation practices included in the Seattle and Lenexa protocols serve as models for other communities.** They are vital to better understanding the syndrome and improving the collective responses. **The implemented protocols appear to have prevented fatalities and the panel consensus is that this will likely continue.** Whether use of these protocols will reduce lawsuits is uncertain, but they will likely help agencies defend against them, especially if they adhere to a policy of copious documentation – both at the scene and at autopsy.

### Excited Delirium – What Work Remains?

However, **there are still questions that remain that can be addressed through broader acceptance of the syndrome, systematic documentation by first responders, and continued research.** Additionally, **endorsement by the National Institute of Justice is important in generating wider acceptance in the first responder communities and the general public.**

**The panel recommends the establishment of a responsible coordinating agent within the federal government.** Specifically, the NIJ could assign an office or program manager that would be responsible to coordinate research efforts across the federal government. Maintaining focus on the objectives of this research will require dedicated stewardship. Specific research recommendations are contained in Section 3.

# Introduction

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## Background

The Department of Justice, Office of Justice Programs (OJP) created four Technology Centers of Excellence in 2007 to serve as specialized criminal justice technology resources for law enforcement and other criminal justice practitioners. Each Center provides expertise in specific technology areas and helps introduce law enforcement technologies into practice within the criminal justice community.

The Pennsylvania State University was designated the Weapons and Protective Systems Technologies Center (WPSTC) to support OJP efforts to enhance the safety of law enforcement and corrections officers. These efforts include introducing into practice safer, more effective less-lethal devices. One of the important roles of the Centers is to assist the NIJ in identifying criminal justice technology requirements by coordinating and conducting Technology Working Groups (TWGs) and conducting focused studies. In the Spring of 2008, the Less-Lethal Devices TWG generated a requirement for post-incident protocols related to the use of conducted energy devices:

There is a need for recommended post-incident protocols specifically when Conducted Energy Devices (CED) are deployed. These include procedures that facilitate the analysis of fluids on CED darts/probes and EMT [Emergency Medical Services – EMS] response (including for excited delirium or in-custody death syndrome) to reduce subject risk.

Although this requirement was deleted the following Spring (2009), it was resurrected in the Fall of 2010 as a high priority requirement:

The TWG membership would like to move forward to review the work on medical and law enforcement response to excited delirium. The goal should be to develop a guideline that takes advantage of the current body of knowledge and the experiences [of first responders] and make that available to law enforcement and corrections in the form of a recommended guideline.

“The goal should be to develop a guideline that takes advantage of the current body of knowledge and the experiences...”

In order to better develop a path forward, the WPSTC convened a panel of expert medical and law enforcement practitioners to examine the subject of ExDS and the interventions being cooperatively developed by the law enforcement and medical communities. The meeting was conducted in Seattle, Washington in April 2011.

## Purpose

The purpose of the meeting was to examine the phenomenon of “excited delirium” and its association with the use-of-force in general and the use of CEDs in particular. Additionally, the panel was to review, discuss, and examine related medical and other first responder protocols. The long-range goal for the panel remains to arrive at some consensus on a set of interventions that ideally (1) would reduce the likelihood of sudden and unexpected in-custody deaths and (2) would not be harmful in any case, as well as to (3) identify and qualify [characterize] the associated risks.

## Panel Objectives

The immediate objectives of the April workshop, which is the subject of this report, were to (1) assess the current body of knowledge regard in excited delirium, (2) determine whether or not existing protocols appear to mitigate the phenomenon, and (3) identify the research questions that might remain.



## Perspectives

As one might expect, there are differing perspectives regarding excited delirium or excited delirium syndrome (ExDS).

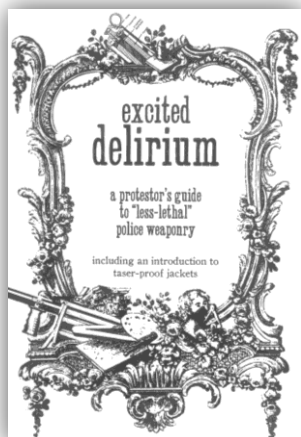
### ***One Perspective – Criminal Justice Practitioners***

For over two decades, law enforcement and corrections officers have increasingly reported encounters with subjects who are incoherent, naked or seem insufficiently clothed (subjects often have elevated body temperatures), and acting in an agitated and non-purposeful destructive manner such as smashing glass and/or windshields. Police report that such individuals have been unresponsive to verbal directions to stop such behavior and attempts to restrain them have been met with seemingly super-human resistance. According to one study, an average of four officers has been required to subdue such individuals, with a range of between three and six officers having been reported.<sup>1</sup> During the struggle or shortly thereafter, some individuals have suddenly died. In one retrospective study of subjects restrained, 18 (nearly 10%) suddenly, and unexpectedly, died (78% had a stimulant in their systems).<sup>2</sup> In subsequent investigations of in-custody deaths, medical examiners and law enforcement officers have increasingly suggested that these subjects were suffering from a syndrome called “excited delirium,” believed to be related to chronic drug abuse (with acute intoxication) and/or mental illness (with acute exacerbation).

### ***Another Perspective – Human Rights Advocates***

Claims regarding individuals experiencing ExDS have been met with varying degrees of skepticism, however. Some have argued that ExDS is a cover up for police brutality. “Most of the people who die in police custody die not from drugs or some mysterious syndrome but from police abuse,” stated Van Jones of Ella Baker Human Rights Center, San Francisco, 1999.<sup>3</sup> Others argue that ExDS is a *TASER*® *International*-manufactured cover up (Figure 1). “...Canadian law enforcement and [their] American brothers and sisters have been brainwashed by companies like *TASER*® *International* and the Institute for the Prevention of In-Custody Deaths,” stated Michael Webster, former prison psychologist and non-medical presenter in the 2008 Canadian Braidwood investigation.<sup>4</sup> It is important to point out here that the first contemporary use of the term “excited delirium” is credited to Miami medical examiners in 1985 – eight years before the founding of *TASER*® *International*.

Others maintain that ExDS does not exist at all. “I know of no reputable medical organization – certainly not the AMA (American Medical Association) or the APA (American Psychological Association) – that recognizes ExDS as a medical or mental-health condition,” stated Eric Balaban of the American Civil Liberties Union (ACLU) in



**Figure 1 – A Protestor’s Guide states, “Of course, TASER International and the police refuse to acknowledge that stun guns kill people. Instead, they point to a fictional disorder that they call ‘excited delirium’...”**

<sup>1</sup> Matthew D. Sztajnkrzyer, MD, PhD, & Amado A. Baez, MD, MSc, “Cocaine, Excited Delirium and Sudden Unexpected Death,” *EMS World*, April 2005 (updated January 11, 2011).

<sup>2</sup> Samuel J. Stratton, Christopher Rogers, Karen Brickett, Ginger Gruzinski, “Factors Associated with Sudden Death of Individuals Requiring Restraint for Excited Delirium,” *American Journal of Emergency Medicine*, Vol 19, No 3, May 2001.

<sup>3</sup> As attributed to Van Jones by Dr Chris Hall, Dr Chris Hall, briefing entitled, “Excited Delirium Panel Workshop,” April 12, 2011, slide entitled, “Public conjecture on excited delirium...”

<sup>4</sup> Testimony of Dr Michael Webster, “In the Matter of the Thomas R. Braidwood, q.c., Commissions of Inquiry under the *Public Inquiry Act*, SBC 2007, c. 9,” May 13, 2008, p. 24

2007. This view was echoed by Canadian Justice Thomas R. Braidwood in 2008: "It is, in my view, not helpful to characterize people displaying these behaviours as suffering from 'excited delirium.' Doing so implies that 'excited delirium' is a medical condition or diagnosis, when mental health professionals uniformly reject that suggestion."<sup>5</sup> The Braidwood report, however, merely summarizes proffered expert testimony and makes no effort to weigh the science for or against this syndrome. Moreover, while this might be the opinion of the ACLU and Justice Braidwood, it is important to point out that the fact that the AMA and APA having no official position regarding ExDS is not the same as officially stating that it does not exist. These communities do, in fact, recognize the diagnoses of "Delirium NOS" and "Psychosis NOS," which ExDS would fall under.<sup>6,7</sup>

...the fact that the AMA and APA having no official position regarding ExDS is not the same as officially stating that it does *not* exist.

### **The Consequences**

These differing perspectives have made the disposition of resulting lawsuits very lengthy, costly, and with much controversy – at times undermining public confidence in law enforcement. Moreover, they have added to the polarization and mutual mistrust of these two communities (perhaps most notably criminal justice practitioners and human rights groups) and have inhibited objective assessments of ExDS to determine if it is a real syndrome, and if so, what might be done to prevent, or reduce the likelihood of, death.

### **The Formation of the Panel**

At the direction of the Less-Lethal Devices TWG, and under the supervision of the NIJ Program Manager for Less-Lethal Devices, Mr. Joe Cecconi, the WPSTC at Penn State invited a diverse group of law enforcement personnel, medical practitioners, and researchers to participate as panel members to examine ExDS (ExDS). Lieutenant Colonel Edward Hughes (USA-Ret), the Less-Lethal Devices Program Coordinator for WPSTC served as the panel coordinator, facilitator, and report editor.

### **Panel Preparation**

Prior to convening, panel members were provided with the following read-ahead material:

- ❖ The Panel background, purpose, and goals as well as the objectives of the meeting.
- ❖ Asia Takeuchi, MD, Terence L. Ahern, BA, Sean O. Henderson, MD, "Excited Delirium," *Western Journal of Emergency Medicine*, Volume XII, no. 1, February 2011, pp 77-83.
- ❖ Gary M. Vilke, MD, Mark L. DeBard, MD, Theodore C. Chan, MD, Jeffrey D. Ho, MD, Donald M. Dawes, MD, Christine Hall, MD, MSC, Michael D. Curtis, MD, Melissa Wysong Costello, MD, Deborah C. Mash, PHD, Stewart R. Coffman, MD, Mary Jo McMullen, MD, Jeffery C. Metzger, MD, James R. Roberts, MD, Matthew D. Sztajnkrcer, MD, PHD, Sean O. Henderson, MD, Jason Adler, MD, Fabrice Czarnecki, MD, MA, MPH, Joseph Heck, DO, and William P. Bozeman, MD, "Excited Delirium Syndrome (EXDS): Defining Based on A Review of the Literature," *The Journal of Emergency Medicine*, February 2011, pp. 1–9.

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<sup>5</sup> Justice Thomas R. Braidwood, Thomas R. Braidwood, QC, Commissions of Inquiry, Part 9, 2008.

<sup>6</sup> NOS – Not Otherwise Specified.

<sup>7</sup> Dr. Jeffrey D. Ho, comments on draft report provided on 11/27/2011.

## Special Panel Review of Excited Delirium

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### Panel Members

Panel members were selected based on their recognized expertise in law enforcement, less-lethal devices, emergency medicine, forensics, psychiatry, and medical research.

#### MEMBERS PRESENT AT MEETING

Dr. Cindy Bir (Wayne State Univ)  
Officer Tom Burns (Seattle Police Dept)  
Dr. Bill Bozeman (Wake Forest Univ)  
Dr. David Carlbom (A/Med Dir, Seattle FD)  
Dr. Michael T. Compton (G Wash Univ)  
Dr. Donald Dawes (Univ of Louisville/SBPD)\*  
Dr. Andrew Dennis (Cook Cty Sheriff's Dept)  
Ms. Theresa G. DiMaio (Forensic Nurse)  
Dr. Vincent J.M. DiMaio (Forensic Pathologist)  
Sgt Fred Farris (Lenexa, Kansas Police Dept)  
Dr. Chris Hall (Vancouver Island Hlth Auth)  
Dr. Richard Harruff (Chief ME, King County)  
Sgt Joel Johnston (Vancouver Police Dept)  
Dr. Steven Karch (Pathologist/Toxicologist)  
Sgt Brian Muller (LA County Sheriff's Dept)  
Dr. W. Bosseau Murray (Penn State-Anesthesia)  
Officer Chris Myers (Seattle Police Dept)  
Dr. Jason Payne-James (UK-Forensic Phys)  
Dr. Darrell L. Ross (Valdosta State Univ)  
Dr. Gary Vilke (Univ of CA San Diego)  
Dr. Kent E. Vrana (Penn State-Pharmacology)  
Sgt Don Whitson (Fort Collins Police Dept)  
Mr. Rick Wyant (Washington State Patrol)

#### OTHERS PRESENT AT MEETING

LTC Ed Hughes (Penn State Univ)  
Deputy Chief Clark Kimerer (Seattle PD)  
Capt Jonathon Larson (Seattle FD)  
Col Andy Mazzara (Dir, WPSTC Penn State)  
Ms. Lynn McIntyre (Dir, Wash Crime Lab)  
Mr. Norman Nedell (Medic One, Seattle FD)  
Dr. Mary Williams (American Systems/JNLWD)\*

#### OTHER PANEL MEMBERS NOT PRESENT\*\*

Mr. Joseph Cecconi (NIJ – US Dept of Just)  
Dr. Ted Chan (Univ of California San Diego)  
Dr. John D'Andrea (Naval Med Res Unit)  
Dr. Jeffrey Ho (Hennepin Cty Med Ctr; MCSO)\*  
Dr. James Jauchem (AFRL-Human Perf Wing)  
Dr. Kelly Karpa (Penn State-Pharmacology)  
Dr. William Kraemer (Univ of Connecticut)  
Dr. Deborah Mash (University of Miami)  
Mr. Graham Smith (UK- Home Office CAST)  
Dr. Matt Sztajnkrzyer (Mayo Clinic)  
Dr. Michael Copass (Univ of Washington)

*\* SBPD is the Santa Barbara Police Department (California), JNLWD is the DoD Joint Non-Lethal Weapons Directorate, MCSO is the Meeker County Sheriff's Office, Minnesota.*

*\*\* Participated via teleconference, preliminary and post-meeting discussions, and/or report review*

### Panel Session Agenda

Lieutenant Colonel Hughes opened the meeting and Ms. Lynn McIntyre, Director of the Washington State Crime Lab provided welcoming remarks. Colonel Hughes then facilitated introductions of those present, and provided guidance regarding the Panel's objectives. The following presentations were then made by panel members before adjourning for the day:

- ❖ An Overview of Excited Delirium by Dr. Chris Hall
- ❖ Experiences with Excited Delirium by Sergeant Joel Johnston
- ❖ Pharmacodynamics of Methamphetamine/Cocaine Exposure by Dr. Kent E. Vrana
- ❖ Cardiac Pathology by Dr. Steven Karch
- ❖ Excited Delirium by Dr. Deborah Mash (presented by Dr. Steven Karch)
- ❖ The Interface Between Schizophrenia and Violence by Dr. Michael Compton
- ❖ Mental Illness: Crisis Intervention for Police Officers by Dr. Michael Compton

After reconvening on the second day, Deputy Chief Clark Kimerer of the Seattle Police Department provided welcoming remarks shortly followed by additional presentations:

- ❖ ECG Changes due to Extreme Exercise, Stress Hormones Changes due to Extreme Exercise, and Sudden Unexpected Death in Epilepsy by Dr. Bosseau Murray
- ❖ Experiences with Excited Delirium/Interventions (Seattle) by Officer Tom Burns
- ❖ Emergency Medical Experiences with Excited Delirium Cases by Captain Jonathon Larson, Seattle Fire Department and Dr David Carlbom, Assistant Medical Director, Seattle Fire Department
- ❖ Response to Excited Delirium Syndrome: Training Program for Police, Fire and EMS by Sergeant Fred Farris

The panel then deliberated with Colonel Hughes facilitating the discussion until adjournment at 1700 on 13 April 2011. The following sections represent the panel's discussions and consensus conclusions.

**Special Panel Review of Excited Delirium**

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## Section 1: Excited Delirium – Does it Exist?

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There is not yet a common definition of ExDS nor has its incidence been precisely quantified across the United States, but there are growing efforts to document and report cases regardless of outcome. This section describes portions of the panel discussions that endeavored to assess the current body of knowledge regarding ExDS from a number of perspectives including law enforcement and corrections officers; paramedics; emergency department staff; psychiatrists; and medical examiners as well as researchers in pharmacology, cardiology, sudden death, stress physiology, forensics, and less-lethal technologies.

### A Law Enforcement View of Excited Delirium

The panel initially examined the issue of ExDS from the law enforcement perspective. The law enforcement and corrections communities do not have a universal view of ExDS. However, many agencies regard it as a very real problem. When relating ExDS to those who have not seen it, law enforcement officers often provide examples and show videos of individuals with the signs and symptoms they believe, when taken together, constitute an identifiable syndrome. While difficult to define, ExDS is generally composed of a varying combination of cardinal features.

#### *Observed Indicators*

When restraining individuals with signs and symptoms of ExDS, some have suddenly died, regardless of the form of restraint used. The commonalities in such cases appear to be extreme physical agitation or stress, followed by calming, then death. The Seattle Police Department describes ExDS as “a state of extreme mental and physiological excitement, characterized by extreme agitation, hyperthermia, hostility, exceptional strength, and endurance without apparent fatigue.”<sup>8</sup> The Department attributes occurrence to an underlying medical condition/crisis, likely caused by either chronic or acute use of illicit drugs and/or mental illness.<sup>9</sup> In the Department’s training video on “Excited Delirium,” police officer and panel member, Chris Myers, states, “We are seeing a lot of cocaine out there, a lot of methamphetamine and those seem to be the primary culprits. The other factor is mental illness. It can be stimulant drugs, mental illness, or a combination of the two.”<sup>10</sup>

Some law enforcement agencies presume that an individual displaying certain signs and symptoms is suffering from ExDS. The compilation of signs and symptoms has been based on their experiences with similar cases, as well as those shared by other agencies.

#### *Association with Use-of-Force*

Law enforcement officers have attempted to restrain individuals showing signs and symptoms of ExDS, particularly to prevent them from harming themselves, others, and/or property.

The law enforcement and corrections communities do not have a universal view of excited delirium. However, many agencies regard it as a very real problem.

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<sup>8</sup> Seattle Police Department definition from training literature provided by Officer C. Myers.

<sup>9</sup> Seattle Police Department video, entitled “Excited Delirium”

<sup>10</sup> Seattle Police Department video, entitled “Excited Delirium”

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In a Canadian study, over one million police-public interactions were investigated:

Of the 698 encounters involving use of force, 24 (3.4%) probable ExDS cases were identified based upon the presence of perceived abnormal behavior and at least six of the 10 potential clinical criteria for ExDS. Eighteen (2.7%) of the cohort manifested seven or more features, including tactile hyperthermia.<sup>11</sup>

Although these cases are rare, officers often encountered resistance of “exceptional strength and endurance.”<sup>12</sup> During or after attempted restraint, some individuals have suddenly died. As Dallas police Senior Corporal Cotner stated in the previously cited press report, “one minute, a person is fighting and screaming; the next minute, he's dead.”<sup>13</sup> Stratton et al., stated that one sign of impending cardiopulmonary arrest while restrained from ExDS is cessation of struggle against restraints.<sup>14</sup> Death typically occurs within one hour of first contact with police, and more than 75 percent who die, do so either at the scene or during initial transport, according to a 1998 study [Ross, D.L.]<sup>15</sup> cited by Matthew D. Sztajnkrycer, MD, PhD, and Amado A. Baez, MD, MSc.<sup>16</sup>

Deaths from ExDS occur even with no police presence, but they are much less sensational and, therefore, often not newsworthy.

In the aftermath, many focus on the means of restraint as the possible cause of death, as exemplified by the news headline, “TASERS Implicated in ExDS Deaths.”<sup>17</sup> However, after critics blamed a particular restraint for an unexplained death in 1982, “police tactics were changed, but the death rate did not,” stated panel member and Seattle police officer, Tom Burns.<sup>18</sup> Law enforcement officers point out that ExDS-associated deaths have occurred after the application of a variety of restraints had been employed, implying that they can occur despite what restraint might be used – or whether one is used at all and suggesting that the means of restraint has little or nothing to do with the subject’s ultimate demise. It is also important to note that law enforcement presence is not a dependent variable for death due to ExDS. Deaths from ExDS occur even with no police presence, but they are much less sensational and, therefore, often not newsworthy. This has led to the mistaken impression that ExDS associated death only

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<sup>11</sup> Christine Hall, Butler C, Kader A, et al. “Police use of force, injuries and death: prospective evaluation of outcomes for all police use of force/restraint including conducted energy weapons in a large Canadian city,” *Academy of Emergency Medicine*, 2009;16:S198-9.

<sup>12</sup> Matthew D. Sztajnkrycer, MD, PhD, & Amado A. Baez, MD, MSc, “Cocaine, Excited Delirium and Sudden Unexpected Death,” *EMS World*, April 2005 (updated January 11, 2011) <http://www.emsworld.com/article/article.jsp?id=1863>.

<sup>13</sup> Laura Sullivan, “TASERS Implicated in Excited Delirium Deaths,” *National Public Radio*, February 27, 2007, <http://www.npr.org/templates/story/story.php?storyId=7622314>.

<sup>14</sup> Samuel J. Stratton, Christopher Rogers, Karen Brickett, Ginger Gruzinski, “Factors Associated with Sudden Death of Individuals Requiring Restraint for Excited Delirium,” *American Journal of Emergency Medicine*, Vol 19, No 3, May 2001.

<sup>15</sup> Ross D.L., “Factors associated with excited delirium deaths in police custody.” *Mod Pathol* 11: 1127-1137, 1998.

<sup>16</sup> Matthew D. Sztajnkrycer, MD, PhD, & Amado A. Baez, MD, MSc, “Cocaine, Excited Delirium and Sudden Unexpected Death,” *EMS World*, April 2005 (updated January 11, 2011) <http://www.emsworld.com/article/article.jsp?id=1863>.

<sup>17</sup> Laura Sullivan, “TASERS Implicated in Excited Delirium Deaths,” February 27, 2007 <http://www.npr.org/templates/story/story.php?storyId=7622314>

<sup>18</sup> Rick Wyant and Tom Burns, brief entitled “Excited Delirium: The First Response,” undated, slide entitled “In-Custody Death History.”

occurs when law enforcement is present and restraining someone.<sup>19</sup> The following are examples:

- ❖ *Excited Delirium-Associated Death after Pepper Spray.* Officer Burns described the December 1998 case of a partially naked, 35-year man, who was running in the street, swinging at cars. After police had arrived, the unrestrained man accepted ambulance transport for medical/psychiatric evaluation. However, while enroute the man went into a rage, struggling with medical personnel and police using pepper spray. He died at the hospital.<sup>20</sup> Notably, the medical examiner reportedly determined the cause of death to be "cardiac arrest, precipitated by the restraint procedures that were employed."<sup>21</sup>
- ❖ *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, handcuffing him. Other officers arrived, helping move the man out of the street, further restraining him, by hog-tying his legs and hands. The man later became unconscious. Responding paramedics failed to resuscitate him.<sup>22</sup> The chief medical examiner for Palm Beach County determined that the cause of death was "sudden respiratory arrest following physical struggling restraint due to cocaine-induced ExDS."<sup>23</sup>
- ❖ *Excited Delirium-Associated Death after Major Physical Struggle.* Panel member and Vancouver Police Sergeant Joel Johnston related the case of police 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 subject] was so resistive and so strong that he lifted five officers off of him at one point," stated Sergeant Johnston. After a protracted struggle, the subject suddenly was quiet and went into cardiac arrest, dying at the scene. The subject suffered from mental illness, and had alcohol and marijuana in his system.<sup>24</sup> An autopsy concluded the subject died from choking due to the officer's restraint and the Coroner ruled the death accidental.

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<sup>19</sup> Dr. Jeffrey D. Ho, comments on draft report provided on 11/27/2011.

<sup>20</sup> Seattle Police officer, Tom Burns, recorded Excited Delirium Panel, 12 April 2011. Also, Rick Wyant and Tom Burns, brief entitled "Excited Delirium: The First Response," undated, slide entitled "History."

<sup>21</sup> Mike Romano, "Death by Pepper Spray?" Seattle Weekly, February 17, 1999.

<sup>22</sup> The case as well as video were presented by Seattle police officer, Tom Burns, recorded panel proceedings, 13 April 2011.

<sup>23</sup> Order Denying Plaintiff's Motion for Summary Judgment and Granting Defendants' Motions for Summary Judgment, U.S. District Court for the Southern District of Florida, Lewis vs. City of West Palm Beach, et al., Case No. 06-81139-Civ, 2008 U.S. Dist. Lexis 21587, March 18, 2008, Decided. Daniel T. K. Hurley, U.S. District Judge.

<sup>24</sup> Sergeant Joel Johnston, recorded panel proceedings, 12 April, 2011. Sergeant Joel Johnston, Vancouver Police Department, "Excited Delirium Update: Canadian Policing Perspective," April 12 & 13 2011, slide 17.



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Officers often do not immediately recognize the condition and without immediate medical intervention, the likelihood of death is high.

- ❖ *Excited Delirium Associated Death after TASER Use.* According to press reports, Dallas 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.<sup>25</sup> Refusing English and Spanish instructions, the man came at the officers with the knife. One officer fired a TASER, which failed to connect. A second shot did, causing electrical shock.<sup>26</sup> 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."<sup>27</sup>
- ❖ *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.<sup>28</sup> Most recently, there is the case of the Anderson University basketball player. Anderson County Coroner Greg Shore "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,' Shore said."<sup>29</sup>

A common trait in these and other similar fatalities appears to be extreme physical exertion and/or stress experienced by the individual. Officer Burns describes other commonalities associated with these fatalities culminating in what has been termed a "period of peril" whereby the struggle ceases and the subject appears calm.<sup>30</sup> All resistance and exertion has stopped. Yet peak levels of catecholamines are reached not during the physical activity but in those 2 to 5 minutes after cessation of the activity and may reach ten times base levels.<sup>31</sup> At the same time, potassium levels drop dramatically – at times to hypokalemic levels. Both of these conditions predispose subjects to development of cardiac arrhythmias. Officers often do not immediately recognize the condition and without immediate medical intervention, the likelihood of death is high.<sup>32</sup>

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<sup>25</sup> Laura Sullivan, "TASERs Implicated in Excited Delirium Deaths," National Public Radio, April 24, 2006.

<sup>26</sup> WBAP News, "Suspect Dies After Multiple TASER Shocks," <http://www.wbap.com/article.asp?id=205922>.

<sup>27</sup> Laura Sullivan, "TASERs Implicated in Excited Delirium Deaths," National Public Radio, April 24, 2006.

<sup>28</sup> Luther V. Bell, "On a Form of Disease resembling some advanced stages of mania and fever, but so contradistinguished from any ordinarily observed or described combination of symptoms, as to render it probable that it may be an overlooked and hitherto unrecorded malady," *American Journal of Insanity*, October 1894.

<sup>29</sup> As reported by Nikie Mayo in the *Independent Mail* on November 15, 2011.

<sup>30</sup> Joel E. Dimsdale, L. Howard Hartley, Timothy Guiney, Jeremy N. Ruskin, David Greenblatt, "Post Exercise Peril – Plasma Catecholamines and Exercise," *Journal of the American Medical Association*, February 3, 1984 (Vol 251, No 5).

<sup>31</sup> *ibid.*

<sup>32</sup> Seattle police officer Tom Burns, recorded panel proceedings, 13 April 2011. Rick Wyant and Tom Burns, brief entitled "Excited Delirium: The First Response," undated, slide entitled "Period of Peril."

### ***The Scope of the Problem***

The exact incidence of ExDS [within the US] is “impossible to determine,” stated the 2009 Excited Delirium Task Force, commissioned by the American College of Emergency Physicians (ACEP).<sup>33</sup> However, the following are scattered compilations and estimates of ExDS cases in the US:

- ❖ Since 2008, the Police Department of Seattle (population of approximately 600,000) has documented 61 cases of ExDS.<sup>34</sup>
- ❖ From the first reports of ExDS-associated deaths in the early 1980s until 2005, more than 130 cases of fatal, cocaine-associated ExDS were reported in medical and forensic literature, according to Sztajnkrzyer and Baez.<sup>35</sup>
- ❖ An estimated 250 patients die in the United States each year from ExDS, about eight to 14 percent of those who experience the syndrome, says Dr. Mark L. DeBard, a professor of emergency medicine at Ohio State University College of Medicine and chairman of the Excited Delirium Task Force.<sup>36</sup> One suspects, however, that the number of cases is much higher as one report describes findings in 100 cases.<sup>37</sup>
- ❖ Stratton, et al., reported 214 cases of ExDS recorded by the Los Angeles County Sheriff’s Department (LASD) over a six year period.<sup>38</sup> This area includes a population of over three million directly protected citizens in Los Angeles County.

In Canada, Vancouver Police Sergeant Joel Johnston reported colleagues encountering subjects as early as 1991 with, what would later be recognized as, signs and symptoms of ExDS. Today, his patrol area is in Vancouver’s Downtown Eastside, an area rampant with drug use and mental illness (frequently in combination) – a “Petri dish” for ExDS.<sup>39</sup> His description of clear signs and symptoms of ExDS match those observed by many US law enforcement.<sup>40</sup>

In the 1950s, the largest psychiatric institutions in the United States were state mental hospitals housing upwards of 5,000 patients at a time. Today, they are our city and

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<sup>33</sup> ACEP Excited Delirium Task Force, “White Paper Report on Excited Delirium Syndrome,” September 10, 2009.

<sup>34</sup> Rick Wyant and Tom Burns, brief entitled “Excited Delirium: The First Response,” undated, slide 27.

<sup>35</sup> Matthew D. Sztajnkrzyer, MD, PhD, & Amado A. Baez, MD, MSc, “Cocaine, Excited Delirium and Sudden Unexpected Death,” *EMS World*, April 2005.

<sup>36</sup> This is attributed to Dr Mark L. DeBard by Lisa Hoffman, “ACEP Recognizes Excited Delirium as Unique Syndrome,” *Emergency Medicine News*, November 2009.

<sup>37</sup> Deborah C. Mash, Linda Duque, John Pablo, Yujing Qin, Nikhil Adi, W. Lee Hearn, Bruce A. Hymab, Steven B. Karch, Henrik Druid, Charles V. Wetli, “Brain Biomarkers for Identifying Excited Delirium as a Cause of Sudden Death,” *Forensic Science International*, 14 May 2009.

<sup>38</sup> Samuel J. Stratton, Christopher Rogers, Karen Brickett, Ginger Gruzinski, “Factors Associated with Sudden Death of Individuals Requiring Restraint for Excited Delirium,” *American Journal of Emergency Medicine*, Vol 19, No 3, May 2001.

<sup>39</sup> Sergeant Joel Johnston, recorded panel proceedings, 12 April 2011.

<sup>40</sup> These features were stated by Sergeant Joel Johnston, Vancouver Police Department, “*Excited Delirium Update: Canadian Policing Perspective*,” April 12, 2011, slide 16.

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“You look at the cases, you change the names, places and dates, and you see the same symptoms.”

county jails, as Dr. Michael Compton of George Washington University pointed out.<sup>41</sup> Persons with persistent mental illness once treated in long-term care facilities are now placed on antipsychotic medications and released into the community to be treated on an outpatient basis. Once released, there is no way to ensure they self-medicate.<sup>42</sup> Police officers, however, receive very little (if any) training regarding mental illnesses; yet, in many ways, often become *de facto* mental health providers.<sup>43</sup>

Beyond the United States and Canada, cases have been reported in Australia,<sup>44</sup> Japan,<sup>45</sup> and the United Kingdom.<sup>46</sup> As Canadian emergency physician, medical researcher, and panel member, Dr. Chris Hall states, “you look at the cases, you change the names, places and dates, and you see the same symptoms.”<sup>47</sup>

Canada, in particular, has been a leader in documenting ExDS cases. In 1998, the Ontario Coroner’s Office published a retrospective study of 21 cases of fatal ExDS, between 1988 and 1995, in the province of Ontario, with 18 of the deaths actually occurring in police custody.<sup>48</sup> Over the last five years, Calgary police have documented the presence or absence of such signs and symptoms in over 1.8 million police interactions, stated panel member, Dr. Hall. Of the 1,269 encounters involving use of force, 37 were with subjects presenting six or more signs and symptoms of ExDS and of these, 15 showed 9-10 signs and symptoms.<sup>49</sup>

### The Costs

Law enforcement agencies – within the US and other countries – have dealt with ExDS cases for well over two decades. As a result, they have become increasingly aware of the signs and symptoms, the tactical dilemma it poses for their officers, and ultimately, its consequences. Moreover, many agencies have come to regard ExDS as a medical crisis first, requiring a coordinated medical and law enforcement response. The costs of ignoring the problem are significant.

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<sup>41</sup> Dr. Michael Compton, recorded panel proceedings, 12 April 2011.

<sup>42</sup> Theresa G. DiMaio (Author) and Vincent J.M. DiMaio M.D., “Excited Delirium Syndrome: Cause of Death and Prevention,” CRC Press, 2006, Boca Raton, FL. Pg 17.

<sup>43</sup> Dr. Michael Compton, recorded panel proceedings, 12 April 2011.

<sup>44</sup> “Corruption and Crime Commission, “The Use of TASER® Weapons by the Western Australia Police: A Summary Report,” October 2010, p. 23.

<sup>45</sup> Y Bunai, K Akaza, WX Jiang, A Nagai, “Fatal hyperthermia associated with excited delirium during an arrest,” *Legal Medicine Tokyo*, May 19, 2008

<sup>46</sup> “Family’s warning after ‘excited delirium’ death,” <http://www.shropshirestar.com/news/2011/07/07/familys-warning-after-excited-delirium-death/>, *Shropshire Star* 7th July 2011

<sup>47</sup> As attributed to Dr Chris Hall by Daryl Slade, “‘Excited delirium’ very real, MD says,” *Calgary Herald*, August 26, ‘Excited delirium’ very real, MD says’, 2011. <http://www2.canada.com/calgaryherald/iphone/news/latest/story.html?id=5310862>.

<sup>48</sup> Sgt Darren Laur, “Victoria Police Department Excited Delirium and its Correlation to Sudden and Unexpected Death Proximal to Restraint: *A Review of the Current and Relevant Medical Literature*,” November 2004.

<sup>49</sup> Dr Chris Hall, recorded panel proceedings, 12 April 2011. Also, Dr Chris Hall, briefing entitled, “Excited Delirium Panel Workshop,” April 12, 2011, slides entitled, “Heat: Restraint” and “Is >6 concomitant features the case definition?”

- ❖ *Loss of Life.* Certainly, in the view of law enforcement, the greatest cost of ignoring this problem is the loss of life.
- ❖ *Personal Toll on Law Enforcement Officers.* Any time that an individual dies, the officer involved suffers personally – and often severely. “These guys went through hell,” stated Seattle police officer, Tom Burns, referring to the officers directly involved in the 1998 case in Seattle.<sup>50</sup> Such cases also produce general frustration within law enforcement organizations. Officers must prevent individuals with ExDS from harming life and property. In doing so, there is a significant risk of in-custody death, or what is perceived to be a “no-win situation,” as Sergeant Johnston stated.
- ❖ *Extensive Investigations.* Investigations inevitably result when death occurs in police custody. However, ExDS deaths have sometimes resulted in multiple investigations. One notable case was separately investigated by the FBI, the Justice Department’s Civil Rights Division, and the NAACP.<sup>51</sup>
- ❖ *Years of Costly Litigation.* According to one study cited by Sztajnkrycer and Baez, seven of 11 cases of fatal ExDS led to wrongful-death lawsuits against the agencies involved.<sup>52</sup> Such litigation often lasts for years. After the previously mentioned death in West Palm Beach in 2005, the family of the subject pursued a lawsuit against police, appealing to the US Supreme Court, which refused to examine the case in February 2010.<sup>53</sup>
- ❖ *Diminished Public Confidence in Law Enforcement.* “Media is selling this as a problem with police tactics,” stated Officer Burns.<sup>54</sup> Public doubt in law enforcement is reflected and/or created by such sensationalist news headlines, as “Death by Excited Delirium: Diagnosis or Cover-up?”<sup>55</sup> and “Deaths in Custody: Excited Delirium or Excessive Force?”<sup>56</sup>

Any time that an individual dies, the officer involved suffers personally – and often severely.

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<sup>50</sup> Seattle Police Officer Tom Burns, recorded HEAP proceedings 13 April 2011

<sup>51</sup> Matthew D. Sztajnkrycer, MD, PhD, & Amado A. Baez, MD, MSc, “Cocaine, Excited Delirium and Sudden Unexpected Death,” *EMS World*, April 2005 (updated January 11, 2011). <http://www.emsworld.com/article/article.jsp?id=1863>.

<sup>52</sup> Matthew D. Sztajnkrycer, MD, PhD, & Amado A. Baez, MD, MSc, “Cocaine, Excited Delirium and Sudden Unexpected Death,” *EMS World*, April 2005 (updated January 11, 2011) <http://www.emsworld.com/article/article.jsp?id=1863>.

<sup>53</sup> Warren Richey, “Supreme Court rejects suit that argued excessive force by police,” *Christian Science Monitor*, February 22, 2010, <http://www.csmonitor.com/USA/Justice/2010/0222/Supreme-Court-rejects-suit-that-argued-excessive-force-by-police>

<sup>54</sup> Rick Wyant and Tom Burns, brief entitled “Excited Delirium: The First Response,” undated, slide entitled “In-Custody Death History.”

<sup>55</sup> Laura Sullivan, “Death by Excited Delirium: Diagnosis or Cover-up?” National Public Radio, February 26, 2007, <http://www.npr.org/templates/story/story.php?storyId=7608386>

<sup>56</sup> Tom Zeller Jr, “Deaths in Custody: Excited Delirium or Excessive Force?” New York Times, February 27, 2007, <http://thelede.blogs.nytimes.com/2007/02/27/deaths-in-custody-excited-delirium-or-excessive-force/>

“The consensus view of the panel’s medical experts is that this syndrome is indeed real.”

## A Medical View of Excited Delirium

The consensus view of the panel’s medical experts is that this syndrome is indeed real. That view is also shared by the National Association of Medical Examiners (NAME), the American College of Emergency Physicians (ACEP), and other medical experts who consider it an altered mental state falling on a continuum of delirium. It is also a syndrome – a cluster of recognizable signs and symptoms – indicating an underlying disorder. It is often associated with sudden death although there are many cases annually that are successfully treated where the subject does not die. Causes for the syndrome are not well understood, but are believed to be linked with drug use, mental illness, certain metabolic disorders, and alterations of brain neurochemistry. While its existence has been accepted by several medical experts, there may be several reasons why it has not been more widely accepted. These include a 30-year gap in occurrence (likely due to the invention of antipsychotic medication for treatment of institutionalized patients) and slow recognition (and that some observations made by first responders and emergency medical personnel have been too lightly dismissed). Confusion over appropriate naming has also been an issue.

The lack of broader acceptance has also been attributed to the sporadic nature of the events, the decentralized policing and medical record systems in the United States, the unavailability of information due to legal suits and HIPPA<sup>57</sup> rules, the controversial nature of death in custody without clear anatomic findings at autopsy, and the interdisciplinary nature of the syndrome (medical examiner, law enforcement, emergency medical service, and emergency medicine).

While NAME and ACEP now recognize ExDS, the American Medical Association (AMA) and American Psychiatric Association (APA) have no official position. This appearance of conflict may not serve the public well. “If a police chief does not have [or appear to have] the backing of the medical community, as much as he can understand it, basically it goes nowhere,” stated National Institute of Justice’s Mr. Joe Cecconi.<sup>58</sup> Any perceived conflict, however, is less about a contrary view and more about semantics. For instance, the AMA and the APA do recognize the existence of the diagnostic terms in the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) “Delirium (due to exogenous toxic substances, F06), Delirium of mixed origin (F05.8), and Delirium, unspecified (F05.9)” any of which this body’s definition of ExDS fits into quite well.<sup>59</sup> However, the exact terminology “Excited Delirium” is not found in the ICD-10. This is analogous to the term “Crib Death” that is found in extensive use by numerous experts and organizations that are focused on the tragic phenomenon also known as “Sudden Infant Death Syndrome” (SIDS). Crib Death as a syndrome or diagnosis is absent from the ICD-10 but SIDS is present. That the exact phrase of “Crib Death” is absent does not mean that it does not exist.<sup>60</sup>

### ***Excited Delirium – It Exists***

Referring to the question of the existence of ExDS, Dr. Christine Hall, panel member and Canadian emergency medical physician, stated emphatically during her presentation

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<sup>57</sup> Health Insurance Portability and Accountability Act of 1996.

<sup>58</sup> Mr Joe Cecconi, recorded panel proceedings, 13 April 2011.

<sup>59</sup> International Classification of Disease Codes, ICD-10.

<sup>60</sup> Dr. Jeffrey D. Ho, comments on draft report provided on 11/27/2011.

that “It exists.”<sup>61</sup> “And, ICD-9 [International Statistical Classification of Diseases and Related Health Problems] and ICD-10 have all of these codes for delirium, delirium drug-induced, delirium agitation, [and] psycho-motor excitement. Call it what you will, it exists.” It is also the expert medical opinion of others. For example, Dr. Asia Takeuchi, et al., writes “ExD is a unique medical issue characterized by the acute onset of agitation, aggression, distress, and possibly sudden death.”<sup>62</sup> ACEP’s Excited Delirium Task Force, found “that ExDS is a unique syndrome.”<sup>63</sup> Referring to ExDS, Dr. Hall further commented that “...it was not made up by cops.”<sup>64</sup>

#### *Altered Mental Status*

Excited Delirium Syndrome “...has generally been used to describe patients displaying altered mental status with severe agitation and combative or assaultive behavior,” wrote panel member and emergency physician, Dr. Gary Vilke, et al.<sup>65</sup>

This was further detailed by Dr. Hall, describing delirium in general as “a state of altered level of consciousness with impairment of cognition AND perception”<sup>66</sup> “... You get funny input from your senses and you can’t think your way out of it.”<sup>67</sup> “The term ‘excited delirium’ has been used to refer to a subcategory of delirium,” wrote Dr. Vilke, et al.<sup>68</sup> This was again explained by Dr. Hall. Delirium is a “spectrum of activities,” as she stated. One end of the delirium spectrum is represented by the “quiet sedated guy, who is laying there delirious and not very busy.” At the other end of the spectrum “is the agitated, incoherent, combative guy, who is in the throes of delirium trauma.”<sup>69</sup> ExDS is at the latter end of this spectrum.

#### *Underlying Disorder*

Delirium, in general, “is not a diagnosis of its own,” but rather indicates “an underlying disorder,” stated Dr. Hall.<sup>70</sup> Referring to the causes of ExDS, panel member and Chair of Penn State’s Department of Pharmacology, Dr. Kent Vrana stated, “I suspect there are going to be many pathways to [ExDS].”<sup>71</sup> “There is not [necessarily] going to be ‘a disease,’” stated Dr. Vrana, referring to ExDS, “but it [(ExDS)] manifests itself as a

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<sup>61</sup> Dr Chris Hall, recorded panel proceedings, 12 April 2011.

<sup>62</sup> Asia Takeuchi, MD, Terence L. Ahern, BA, Sean O. Henderson, MD, “Excited Delirium,” *Western Journal of Emergency Medicine*, Volume XII, no. 1, February 2011, pp 77-83.

<sup>63</sup> ACEP Excited Delirium Task Force, “White Paper Report on Excited Delirium Syndrome,” September 10, 2009, p. 4.

<sup>64</sup> Dr Chris Hall, recorded panel proceedings, 23 April 2011.

<sup>65</sup> Gary M. Vilke, et. al., “Excited Delirium Syndrome (EXDS): Defining Based on A Review of the Literature,” *The Journal of Emergency Medicine*, February 2011, p. 1.

<sup>66</sup> Dr Chris Hall, brief entitled, “Excited Delirium Panel Workshop Seattle, Washington, slide 8, entitled “Delirium.”

<sup>67</sup> Dr Chris Hall, recorded panel proceedings, 12 April 2011.

<sup>68</sup> Gary M. Vilke, et. al., “Excited Delirium Syndrome (EXDS): Defining Based on A Review of the Literature,” *The Journal of Emergency Medicine*, February 2011, p. 1.

<sup>69</sup> Dr Chris Hall, recorded panel proceedings, 12 April 2011.

<sup>70</sup> Dr Chris Hall, recorded panel proceedings, 12 April 2011.

<sup>71</sup> Dr. Kent Vrana, recorded panel proceedings, 13 April 2011.

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“[ExDS] may be identified by the presence of a distinctive group of clinical and behavioral characteristics.”

syndrome,”<sup>72</sup> meaning that it will present itself as several clinically recognizable features, signs, and symptoms.

While ExDS may be considered only a syndrome and not a specific disease, identifiable neurochemical abnormalities are always identified when sought. Measureable changes in dopamine transporters and sigma receptors have always been found when the brains of these individuals are examined. But examination is so uncommon, that this knowledge has not been widely disseminated.<sup>73</sup>

Excited delirium syndrome “may be identified by the presence of a distinctive group of clinical and behavioral characteristics,” reported the ACEP Excited Delirium Task Force.<sup>74</sup> Signs and symptoms of ExDS were compiled from medical literature by the Task Force, matching many of those observed by law enforcement officers in the field.

### **Sudden Death**

Delirium has been long been associated with sudden death. In 1849, Dr. Luther Bell, a psychiatrist at Massachusetts’ McLean Asylum for the Insane, described a clinical condition in which approximately 30 violent and aggressive patients suddenly died.<sup>75</sup> It eventually became known as acute exhaustive mania or “Bell’s Mania” the signs and symptoms of which are thought to be similar to those of ExDS.<sup>76</sup> More recently, the British Columbia Medical Association published that “hospital mortality rates skyrocket” with perioperative (period around surgery) delirium.<sup>77</sup>

While the degree to which ExDS ends in sudden death is unknown, some have estimated its occurrence. “A small percentage of patients with ExDS progress to sudden cardiopulmonary arrest and death,” wrote Dr. Vilke, et al. They also stated that “a published observational study [Stratton, et al.] suggests that the incidence of death among patients manifesting signs and symptoms that may be consistent with ExDS is less than ten percent.”<sup>78</sup> As previously mentioned, Dr. Mark L. DeBard, Chairman of the Excited

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<sup>72</sup> Dr. Kent Vrana, recorded panel proceedings, 13 April 2011.

<sup>73</sup> Deborah C. Mash, Linda Duque, John Pablo, Yujing Qin, Nikhil Adi, W. Lee Hearn, Bruce A. Hymab, Steven B. Karch, Henrik Druid, Charles V. Wetli, “Brain Biomarkers for Identifying Excited Delirium as a Cause of Sudden Death,” *Forensic Science International*, 14 May 2009.

<sup>74</sup> ACEP Excited Delirium Task Force, “White Paper Report on Excited Delirium Syndrome,” September 10, 2009, p. 4.

<sup>75</sup> Luther V. Bell, “On a Form of Disease resembling some advanced stages of mania and fever, but so contradistinguished from any ordinarily observed or described combination of symptoms, as to render it probable that it may be an overlooked and hitherto unrecorded malady,” *American Journal of Insanity*, October 1894.

<sup>76</sup> Theresa G. DiMaio (Author) and Vincent J.M. DiMaio M.D., “Excited Delirium Syndrome: Cause of Death and Prevention,” CRC Press, 2006, Boca Raton, FL. Pp 7-8.

<sup>77</sup> This is attributed to Dr Chris Hall, recorded panel proceedings, 12 April 2011. She stated, “The B.C. Medical Association just published an article in our little journal about the hazards of perioperative in delirium and that in the hospital mortality rates skyrocket...”

<sup>78</sup> Gary M. Vilke, et. al., “Excited Delirium Syndrome (EXDS): Defining Based on A Review of the Literature,” *The Journal of Emergency Medicine*, February 2011, p. 3.



Delirium Task Force, estimates that about eight to 14 percent of those who experience the syndrome die.<sup>79</sup>

Postmortem assessments have provided some information on ExDS fatalities. The profile of individuals having died after ExDS was described by Dr. Vilke, et al.: “More than 95% of all published fatal cases involve men at a mean age of 36 years.”<sup>80</sup> The ExDS fatalities have been summarized by Dr. Asia Takeuchi, et al:

It appears that in all cases, victims died of either respiratory arrest or fatal cardiac dysrhythmia. Diagnoses were supported by postmortem exams showing pulmonary and cerebral edema with nonlethal self-inflicted injuries. The few who live long enough to be hospitalized often succumb to disseminated intravascular coagulation, rhabdomyolysis and renal failure. These fatal cardiopulmonary changes are thought to be the result of increased catecholamine stress on the heart, myocardial hypertrophy, microangiopathy and fatal arrhythmias. The proposed cause of these changes is debated.<sup>81</sup>

The hypothesis of chronic stress leading to deleterious anatomic changes of the heart (e.g., left ventricular hypertrophy) with an increased incidence of mortality during some episodes of acute stress from extreme exercise, has several corollaries in a variety of medical conditions. Furthermore, as a general principle, “sudden death is not tied to one type of disease,” stated panel member and medical researcher, Dr. W. Bosseau Murray. It can also be, in certain cases, attributed to stress on top of an underlying, but unknown (in the sense of “not yet diagnosed”) medical condition, such as cardiac anatomic or conduction abnormalities. “People with a higher degree of chronic stress (with long term higher levels of catecholamines) tend to have higher mortality rates during acute episodes of severe stress,” stated Dr. Murray. “There are some people with a chronic heart condition who have a daily risk of dying given episodes of severe exercise and/or stress.”<sup>82</sup>

Dr. Murray provided epilepsy as one example. Those with epilepsy have a four-fold increase in incidence of death, compared to the rest of the population.<sup>83</sup> Epileptic seizures produce a stress similar to exercise or a physical struggle. While such sudden deaths are *attributed* to cardiac deaths, the exact mechanisms, pathways, and causes are unknown. For instance, while the syndrome called SUDEP (sudden death during epilepsy) might explain some of the sudden deaths, it is not the mechanism in all such deaths. A second example is the sudden death that has also occurred with subclinical hyperthyroidism and the consequent long term increase in the effects of catecholamines.<sup>84</sup>

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<sup>79</sup> This is attributed to Dr Mark L. DeBard by Lisa Hoffman, “ACEP Recognizes Excited Delirium as Unique Syndrome, *Emergency Medicine News*, November 2009.

<sup>80</sup> Gary M. Vilke, et. al., “Excited Delirium Syndrome (EXDS): Defining Based on A Review of the Literature,” *The Journal of Emergency Medicine*, February 2011, p. 3.

<sup>81</sup> Asia Takeuchi, MD, Terence L. Ahern, BA, Sean O. Henderson, MD, “Excited Delirium,” *Western Journal of Emergency Medicine*, Volume XII, no. 1, February 2011, pp 77-83.

<sup>82</sup> All information in this paragraph is from Dr Bosseau Murray, recorded panel proceedings, 13 April 2011 and subsequent discussions with Dr. Steven Karch.

<sup>83</sup> Study conducted over 40 years in Finland as published in the *New England Journal of Medicine* (Dec 2010) and reported in *Science News*, January 29, 2011.

<sup>84</sup> All information in this paragraph is from Dr Bosseau Murray, recorded panel proceedings, 13 April 2011 and subsequent discussions with Dr. Steven Karch.



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### ***Pathophysiology***

The actual pathophysiology of ExDS is complex and poorly understood. Generally, it is associated with drug use; psychiatric illness; metabolic disorders; and/or intra-cerebral events.<sup>85</sup>

“The majority of [ExDS] cases involve stimulant abuse, most commonly cocaine, although methamphetamine, PCP, and LSD have also been described,” wrote Dr. Vilke, et al. “As more attention is drawn to ExDS as a recognized entity, it is likely that other drugs of abuse may be identified as also etiologic,” as they further stated. Other such drugs possibly causing ExDS (variants of excitement and delirium) are:

- ❖ Phencyclidine, benzoyllecgonine, marijuana, lithium, methylphenidate HCl, haloperidol, lidocaine, and valproic acid;<sup>86</sup>
- ❖ Some Over-the-Counter Drugs: These include dimenhydrinate and diphenhydramine;
- ❖ Tricyclic antidepressants (TCAs);<sup>87</sup> and
- ❖ Methylenedioxypropylamphetamine, the most commonly identified active ingredient in “bath salts.” “It is smoked, mixed with food, or injected,” stated Dr. Hall. The effects are prolonged with methamphetamine use and have been reported to last as long as three days.<sup>88</sup> In late April 2011, panel member, Sergeant Don Whitson of the Fort Collins, Colorado Police Department, reported that two individuals appeared to have experienced ExDS after ingesting bath salts (and variants thereof).<sup>89</sup>

*The Perfect Storm.* Excited delirium syndrome is perhaps more aptly described as a confluence of events caused by psychoactive stimulant abuse. This description is based on research conducted on the pharmacodynamics (what drugs do to the body) and pharmacokinetics (what the body does with these drugs) of cocaine and methamphetamines. These two drugs differ in structure and composition and their effects and half-lives differ, pointed out Dr. Kent Vrana, Chair of Department of Pharmacology at Penn State’s College of Medicine. Their effects and half-lives also differ. Notably, the effects of methamphetamines last longer – about 4.5 hours compared to one hour for cocaine.<sup>90</sup> On the other hand, the drugs have similar underlying mechanisms of action (which are also shared with other stimulant/psychoactive – legal and illegal – drugs).

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<sup>85</sup> These possible causes are from Dr Chris Hall, brief entitled, “Excited Delirium Panel Workshop Seattle, Washington,” slide 31, entitled “Excited delirium: understanding physiology/ differential diagnoses.”

<sup>86</sup> Dr Kent E. Vrana; Elliot S. Vesell, Professor and Chair of Pharmacology; Annie Sopic, PharmD Candidate; Dr Kelly Karpa, Associate Professor of Pharmacology, brief entitled, “Pharmacokinetics and Pharmacodynamics of Methamphetamine and Cocaine,” 12 April 2011.

<sup>87</sup> These possible causes are from Dr Chris Hall, brief entitled, “Excited Delirium Panel Workshop Seattle, Washington,” slide 31, entitled “Excited delirium: understanding physiology/ differential diagnoses”

<sup>88</sup> Dr Chris Hall, recorded panel proceedings, 23 April 2011.

<sup>89</sup> Sergeant Don Whitson, email dated, 28 April 2011.

<sup>90</sup> Dr Kent E. Vrana; Elliot S. Vesell, Professor and Chair of Pharmacology; Annie Sopic, PharmD Candidate; Dr Kelly Karpa, Associate Professor of Pharmacology, brief entitled,

For instance, both prevent catecholamine uptake to a similar degree and both affect dopamine metabolism. Further, published research shows that most of the surplus catecholamine circulating after the use cocaine (and presumably methamphetamine) is norepinephrine overflow from the heart, not epinephrine from the adrenal glands (which may be minimal).<sup>91</sup>

Both of these drugs also have three common characteristics, causing a “perfect storm” in terms of ExDS, hypothesized Dr. Vrana:<sup>92</sup>

- ❖ Behavioral effects necessitating police and medical intervention;
- ❖ Physical restraint because of unresponsive and uncontrollable behavior;
- ❖ A surge of catecholamine "fight-or-flight" hormones released by the adrenal glands in response to stress, seemingly contributing to superhuman strength and endurance.

“These pathophysiological responses, when expressed on an underlying genetic predisposition to cardiac arrhythmias, may precipitate sudden cardiac death,” Dr. Vrana also stated.<sup>93</sup> Interesting is the increasing focus on channelopathies, particularly those that control the entrance and exit of calcium from the cells with each heartbeat or nerve impulse.

*Underlying Cardiac Abnormalities.* Prior chronic drug use may predispose individuals to sudden death in the event of physical stress. “Cocaine and methamphetamine cause concentric enlargement of the heart,” stated panel member and cardiac researcher, Dr. Steven Karch. “Concentric enlargement of the heart makes it electrically unstable and prone to arrhythmias,” Dr. Karch further elaborated. Cocaine and methamphetamine result in the buildup of “perivascular fibrosis,” which is essentially scar tissue in the heart. Thus, when individuals engage in some physical stress requiring increased cardiac output, the intramyocardial vessels that run through their hearts have reduced abilities to do so, because they are encased in the equivalent of “concrete or elastic bands,” as Dr. Karch phrased it. Also, this scar tissue “does not conduct electricity at all. Depolarization will occur and it will hit this scar tissue, and bounce right off. Pretty soon you'll have electrical chaos,” stated Dr. Karch.<sup>94</sup>

*Psychiatric Illness.* “Ten to twenty percent of the excited delirium cases are purely psychiatric,” estimated panel member and medical examiner, Dr. Vincent DiMaio.<sup>95</sup> “The literature on ExDS frequently cites abrupt cessation of psychotherapeutic medications

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“Pharmacokinetics and Pharmacodynamics of Methamphetamine and Cocaine,” 12 April 2011, slide 30 entitled, “Stimulant Comparison.”

<sup>91</sup> Steven B. Karch, “Stimulant abuse and sudden cardiac death,” in Kroll MW and Ho JD, editors, *TASER®conducted electrical weapons: physiology, pathology, and law*. New York: Springer Science+Business Media; 2009.

<sup>92</sup> Dr Kent Vrana, recorded panel proceedings, 13 April 2011.

<sup>93</sup> Also, Dr Kent E. Vrana, Elliot S. Vesell Professor and Chair of Pharmacology; Annie Sopic, PharmD Candidate; Dr Kelly Karpa, Associate Professor of Pharmacology, brief entitled, “Pharmacokinetics and Pharmacodynamics of Methamphetamine and Cocaine,” 12 April 2011, slide 32 entitled, “Working Hypothesis.”

<sup>94</sup> All information in this paragraph is from Dr Steven Karch, recorded panel proceedings, 12 April 2011.

<sup>95</sup> Dr. Vincent DiMaio, recorded panel proceedings, 12 April 2011.

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as a cause,” wrote Dr. Vilke, et al. “Less commonly, persons with new-onset psychiatric disorder, particularly those with manic or psychotic features, will present with ExDS.”<sup>96</sup> Of those psychiatric-related ExDS cases, “it’s nearly always those suffering schizophrenia,” stated panel member and forensic nurse, Theresa DiMaio.<sup>97</sup> To some degree, it is because of dopamine errors in the brain, similar to those experienced by cocaine users.<sup>98</sup> Another factor was explained by Dr. DiMaio:

Norepinephrine (catecholamine, “fight or flight” hormone) and epinephrine (adrenaline) levels in patients suffering schizophrenia are elevated. So, they are starting at a higher plateau than the general population. In addition, when they are stimulated, their reaction to a stimulus – psychological, physical, or even chemical – is to put out even higher levels of norepinephrine and epinephrine than in the general population.<sup>99</sup> It is important also to note that plasma catecholamine concentrations in those afflicted with schizophrenia are under direct genetic control which means that genetic polymorphisms could certainly play a role in the occurrence of ExDS.<sup>100</sup>

*Metabolic Disorders.* “Diabetic hypoglycemic reactions have been associated with outbursts of violent behavior and an appearance of intoxication,” wrote Dr. Vilke, et al.<sup>101</sup> Also, “thyroid storm may contribute to excited delirium,” stated Dr. Vrana.<sup>102</sup> Dr. Hall also pointed out that alcohol withdrawal may contribute as well.<sup>103</sup>

*Intra-cerebral Events.* Intra-cerebral hemorrhaging and encephalitis have also been associated with violent outbursts.<sup>104</sup> These events are surely rare when compared to the known neurochemical alterations seen in the brains of chronic stimulant abusers.<sup>105</sup>

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<sup>96</sup> Gary M. Vilke, et al., “Excited Delirium Syndrome (EXDS): Defining Based on A Review of the Literature,” *The Journal of Emergency Medicine*, February 2011, p. 5.

<sup>97</sup> Ms. Theresa DiMaio, recorded panel proceedings, 12 April 2011.

<sup>98</sup> Dr Chris Hall, brief entitled, “Excited Delirium Panel Workshop Seattle, Washington,” slide 37, entitled “Mental Illness.”

<sup>99</sup> Dr. Vincent DiMaio, recorded panel proceedings, 12 April 2011.

<sup>100</sup> Mercedes Zumárraga, Ricardo Dávila, Nieves Basterrecheb, Aurora Arruea, Biotza Goienetxeab, María I. Zamalloa, Leire Erkorekac, Sonia Bustamantec, Lucía Inchaustic, Miguel A. González-Torresc, José Guimónd, “Catechol O-methyltransferase and monoamine oxidase A genotypes, and plasma catecholamine metabolites in bipolar and schizophrenic patients,” *Neurochemistry International*, Volume 56, Issues 6–7, May–June 2010, Pages 774–779.

<sup>101</sup> Gary M. Vilke, et al., “Excited Delirium Syndrome (EXDS): Defining Based on A Review of the Literature,” *The Journal of Emergency Medicine*, February 2011, p. 5

<sup>102</sup> Dr Kent E. Vrana; Elliot S. Vesell, Professor and Chair of Pharmacology; Annie Sopic, PharmD Candidate; Dr Kelly Karpa, Associate Professor of Pharmacology, brief entitled, “Pharmacokinetics and Pharmacodynamics of Methamphetamine and Cocaine,” 12 April 2011.

<sup>103</sup> These possible causes are from Dr Chris Hall, brief entitled, “Excited Delirium Panel Workshop Seattle, Washington,” slide 31, entitled “Excited delirium: understanding physiology/differential diagnoses.”

<sup>104</sup> These possible causes are from Dr Chris Hall, brief entitled, “Excited Delirium Panel Workshop Seattle, Washington,” slide 31, entitled “Excited delirium: understanding physiology/ differential diagnoses.”

<sup>105</sup> Dr. Steven Karch comments on draft report provided on 11/10/2011.

### **Wider Acceptance in the Medical Community**

As previously discussed, the American Psychiatric Association (APA) has not recognized ExDS, nor is it mentioned in its *Diagnostic and Statistical Manual of Mental Disorders*. Moreover, the term is not in the World Health Organization's *International Classification of Diseases* (ICD-9). The panel attributed a number of contributing factors.

- ❖ *Thirty-Year Gap in Occurrence.* As mentioned, in 1849 Dr. Bell characterized the violent and aggressive mania of psychiatric patients, who often died. However, a 30-year gap in its occurrence was addressed by both the DiMaio text and Vilke et al:

The incidence of the problem behaviors and sudden death described in the 1800s seemed to decline drastically by mid-1950s. This has been largely attributed to the advent of modern antipsychotic pharmaceutical therapy used for these patients with severe behavior issues. In the 1980s, there was a dramatic increase in the number of reported cases with behavior similar to an uncontrolled psychiatric emergency. Whereas some seemed to be unchecked psychiatric disease, most of these cases were found to be associated with the introduction and abuse of cocaine in North America.<sup>106, 107</sup>

- ❖ *Decline in Mental Institutions.* One of the unintended consequences of the decline of state mental institutions has been that these patients have effectively been “moved from mental hospitals (housing upwards of 5,000 at a time) to our city and county jails,” Dr. Compton pointed out. Persons with persistent mental illness once treated in long-term care facilities are now treated on an outpatient basis, placed on antipsychotic medications, and released into the community. There is no effective way to ensure they self-medicate.
- ❖ *Slow Recognition.* The term “excited delirium” was coined in 1985 by C.V. Wetli and D. A. Fishbain in their publication, “Cocaine-induced psychosis and sudden death in recreational cocaine users.”<sup>108</sup> Only in recent years has it been accepted by portions of the medical community.

One of the unintended consequences in the decline of state mental institutions ... has been that these patients have effectively been “moved from mental hospitals ... to our city and county jails.”

- ❖ *Observed Primarily by First Responders.* While most syndromes present themselves to physicians, Dr. Vrana stated that symptoms of ExDS are “a series of behaviors and characteristics that manifest themselves with the law enforcement folks.”<sup>109</sup> This was further reinforced by panel member and practicing psychiatrist, Dr. Michael T. Compton:

...one domain or cluster of signs/symptoms in schizophrenia would include aggression, hostility, and agitation. In my world, those are fairly rare...In the world of law enforcement officers, this is very different. They are more likely to see this cluster of signs/symptoms just because of the nature of their work.<sup>110</sup>

- ❖ *Idiomatic Arguments.* What matters most to first responders (including law enforcement) is what *something is*, not what *something is called*. “For more than 150 years,

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<sup>106</sup> Theresa G. DiMaio (Author) and Vincent J.M. DiMaio M.D., “Excited Delirium Syndrome: Cause of Death and Prevention,” CRC Press, 2006, Boca Raton, FL. Pp 7-8.

<sup>107</sup> Gary M. Vilke, et. al., “Excited Delirium Syndrome (EXDS): Defining Based on A Review of the Literature,” *The Journal of Emergency Medicine*, February 2011, p. 3.

<sup>108</sup> Gary M. Vilke, et. al., “Excited Delirium Syndrome (EXDS): Defining Based on A Review of the Literature,” *The Journal of Emergency Medicine*, February 2011, p. 3.

<sup>109</sup> Dr Kent Vrana, recorded panel proceedings, 13 April 2011.

<sup>110</sup> Dr Michael Compton, recorded panel proceedings, 12 April 2011.

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What matters most to first responders is what *something is*, not what *something is called*.

there have been case reports that do not use the exact term ‘excited delirium,’ yet describe a similar constellation of symptoms and features,” wrote Dr. Vilke et al.<sup>111</sup> The panel also noted the different terms for describing the signs/symptoms associated with ExDS. “When [medical practitioners] talk about ‘excited delirium,’ it’s the same thing that [psychiatrists] call an ‘acute psychotic episode,’” stated Dr. DiMaio.<sup>112</sup> “What we are doing here is interchanging delirium and acute psychosis,”<sup>113</sup> continued forensic consultant, Dr. Jason Payne-James of the United Kingdom. Also, panel member and psychiatrist, Dr. Michael T. Compton stated, “Clearly, we are talking about the same phenomenon, but psychiatrists in an in-patient psychiatric setting typically do not use the term ‘excited delirium.’ We call it ‘acute psychotic agitation.’”<sup>114</sup>

In post meeting discussions, Dr. Matthew Sztajnkrzyer was not convinced that the two are inter-changeable. He argued that they represent very different entities which should not be confused. “Delirium refers to waxing and waning in consciousness, and reflects an underlying medical condition. Psychosis is a loss of reality and reflects a psychiatric condition. The key point is that delirium has an underlying, possibly treatable medical cause that must be found. Delirium is a medical/organic emergency while psychosis is a psychiatric/functional emergency. The management is very different. An antipsychotic would be the treatment of choice for acute psychosis but may be harmful for ExDS. Likewise, missing thyroid storm or hypoglycemia and assuming simply a functional psychosis would be harmful.”<sup>115</sup>

Additionally, present medical literature uses different terms for signs/symptoms associated with ExDS. The *Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition* has multiple references to delirium and agitation. The *International Classification of Diseases* also contains the following codes, which match the signs/symptoms of ExDS:<sup>116</sup>

- 296.00S Manic Excitement
- 293.1J Delirium of Mixed Origin
- 292.81Q Delirium, drug induced
- 292.81R Delirium, induced by drug
- 307.9AD Agitation
- 780.09E Delirium
- 799.2AM Psychomotor Excitement
- 799.2V Psychomotor Agitation
- 799.2X Abnormal Excitement

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<sup>111</sup> Gary M. Vilke, et. al., “Excited Delirium Syndrome (EXDS): Defining Based on A Review of the Literature,” *The Journal of Emergency Medicine*, February 2011, p. 2

<sup>112</sup> Dr. Vincent DiMaio, recorded panel proceedings, 12 April 2011.

<sup>113</sup> Dr. Jason Payne-James, recorded panel proceedings, 12 April 2011.

<sup>114</sup> Dr Michael Compton, recorded panel proceedings, 12 April 2011.

<sup>115</sup> Dr. Matthew Sztajnkrzyer comments on draft report provided on 11/10/2011.

<sup>116</sup> This was stated by Dr Chris Hall, brief entitled, “Excited Delirium Panel Workshop Seattle, Washington,” slide 9, entitled “Excited Delirium.” It was also stated Gary M. Vilke, et. al., “Excited Delirium Syndrome (EXDS): Defining Based on A Review of the Literature,” *The Journal of Emergency Medicine*, February 2011, p. 3.

## **Conclusion**

Medical authorities – and not just those on the panel – confirm law enforcement’s views regarding the existence and peril of ExDS. Although there is some disagreement on what it should be called or how it should be categorized and accounted for in medicine, the consensus of this panel is that it certainly exists as a syndrome. Moreover, the possibility of resultant sudden death renders it a medical emergency, requiring immediate attention. This necessitates a coordinated response among the criminal justice and medical communities.

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## Section 2: Excited Delirium – Do Response Protocols Work?

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### General

In referring to ExDS and how to best respond, Mr. Joe Cecconi of the National Institute of Justice stated, “My goal is to come up with a recommended response – especially for how law enforcement should respond. If we can recommend only guidelines that might yield a treatment in the future, then that fits in well within this program.”<sup>117</sup> This section describes portions of the panel discussions that reviewed some of the existing response protocols and determine whether or not they appear to mitigate the phenomenon.

### Significance

Protocols for treating ExDS were described in the 2009 *White Paper Report on Excited Delirium Syndrome* by the American College of Emergency Physicians’ Excited Delirium Task Force. That task force included many of the current panel members. The current NIJ Panel assessment of implemented protocols is significant for the following reasons:

- ❖ It was a broad interdisciplinary assessment of protocols currently in use by experts in emergency medicine, medical research (cardiology, pharmacology, pathology, stress physiology, and psychiatry), forensics, and law enforcement; and
- ❖ It was conducted under the auspices of the National Institute of Justice. Speaking from a local law enforcement perspective, panel member, and Lenexa, Kansas Police Sergeant Fred Farris stated, “The stamp from NIJ goes a long way in terms of credibility.”<sup>118</sup>

### Review of Selected Protocols

The panel examined protocols, primarily considering those implemented in Lenexa, Kansas and Seattle, Washington, as they could be defended and examined in detail during the proceedings. Additionally, the panel considered information available from other jurisdictions and obtained from recent studies. Not surprisingly there were many similarities and few substantive differences.

### **Bottom Line – Saving Lives**

Police Departments represented at the panel meeting reported that these protocols have helped save the lives of individuals with ExDS. Officer Burns cited two individuals who survived after being treated as described in the Seattle protocol.<sup>119</sup> Seattle is now documenting these “saves” as part of its reporting systems. Sergeant Farris showed a video of an individual with ExDS surviving after a combined medic and law enforcement response in Lenexa, Kansas.

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<sup>117</sup> Mr. Joe Cecconi, recorded panel proceedings, 13 April 2011.

<sup>118</sup> Sergeant Fred Farris, recorded panel proceedings, 13 April 2011.

<sup>119</sup> The two individuals surviving excited delirium were cited by Rick Wyant and Tom Burns, brief entitled “Excited Delirium: The First Response,” undated, slides 30-31 entitled, “Success through Cooperation”



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“ExDS is a medical problem masquerading as a police call.”

Additionally, such initiatives have gained international attention, even though the evidence is largely based on anecdotal evidence and case events. After an individual with ExDS died in UK police custody, his family publicly stated “more could have been done to prevent Jason’s death, whether that be through proper recognition of the symptoms and potential life threatening effect of a potential ExDS scenario and/or speedier action to summon medical assistance.” The family also stated, “The American and Canadian authorities are far more advanced in dealing with excited delirium...”<sup>120</sup> While this statement is certainly debatable with regard to a broad national approach, there are jurisdictions in both countries that appear to be further advanced in their understanding of how to best deal with these situations.

### ***Coordinated and Cooperative Effort***

Perhaps the most important aspect of these early and pilot protocols is the cooperative nature of the response and the requisite training. First, and foremost, these situations are treated as a medical crisis, not a criminal situation. “[The subjects] are acting out, they are violent, it looks like it’s a hard core, law enforcement problem,” stated panel member and Seattle police officer, Chris Myers, referring to first impressions of individuals with ExDS.<sup>121</sup> However, as stated by panel member and Vancouver Police Sergeant Joel Johnston, “ExDS is a medical problem masquerading as a police call.”<sup>122</sup> Sergeant Farris added, “This is medical crisis with a priority over criminal behavior.”

This changed thinking in some communities and has led to the development of innovative cooperative responses to ExDS cases. These communities no longer see only law enforcement responding. The first response is really a multi-disciplinary effort.<sup>123</sup>

Some communities have protocols enabling coordinated response training with dispatchers, emergency medical personnel, as well as law enforcement. Such protocols have been reported in Dallas, Texas;<sup>124</sup> Lenexa, Kansas; Miami-Dade County, Florida;<sup>125</sup> San Jose, California;<sup>126</sup> Seattle, Washington; and the State of Wisconsin Department of

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<sup>120</sup> “Family’s warning after ‘excited delirium’ death,” 7 July 2011, <http://www.shropshirestar.com/news/2011/07/07/familys-warning-after-excited-delirium-death/>

<sup>121</sup> Seattle Police Department, “Excited Delirium” training video, 2007. Can be viewed at <http://blutube.policeone.com/videos/931151440001-excited-delirium-discussion-and-explanation/>

<sup>122</sup> Sergeant Joel Johnston, recorded panel proceedings, 12 April, 2011. Sergeant Joel Johnston, Vancouver Police Department, “*Excited Delirium Update: Canadian Policing Perspective*,” April 12, 2011, slide

<sup>123</sup> Officer Tom Burns, recorded panel proceedings, 13 April 2011

<sup>124</sup> Tom Zeller, “Deaths in Custody: Excited Delirium or Excessive Force?” *New York Times*, February 27, 2007, <http://thelede.blogs.nytimes.com/2007/02/27/deaths-in-custody-excited-delirium-or-excessive-force/>

<sup>125</sup> David Kleinman, NREMT-P, “Excited Delirium,” *EMS World*, March 2009 (**Updated:** January 12th, 2011) [http://www.emsworld.com/print/EMS-World/Excited-Delirium/1\\$9165](http://www.emsworld.com/print/EMS-World/Excited-Delirium/1$9165),

<sup>126</sup> *Policeone.com* “A look at San Jose PD’s new excited delirium protocol,” June 11, 2007, (from *Force Science News*) <http://www.policeone.com/edp/articles/1269555-A-look-at-San-Jose-PDs-new-excited-delirium-protocol/>

Corrections.<sup>127</sup> Such protocols are also seen as having broad applicability. “The hope is that this training will be provided through the regional training academy and available to all LEOs (law enforcement organizations) in the county,” states Sergeant Farris, referring to Lenexa, Kansas and the surrounding Johnson County.<sup>128</sup> Training in such protocols has also been reported in the Calgary Police Service, Halifax Regional Police, Royal Canadian Mounted Police, Ontario Provincial Police, Ontario Police College, Edmonton Police Service, and Vancouver Police Department, and various ExDS training programs across Canada.<sup>129, 130</sup> All of the protocols involve a coordinated response by dispatchers, law enforcement, paramedics, and emergency department medical staff.

## Assessment of Selected Protocols

The common protocol steps – *identify* ExDS, rapidly *control*, *sedate* and *transport* to a medical facility – generally adhere to the *White Paper Report on Excited Delirium Syndrome* by the American College of Emergency Physicians’ Excited Delirium Task Force. While the panel acknowledged response protocols will continue to evolve and improve with experience and research, the consensus of the panel is that overall, these response protocols are appropriate. In the long run, they may prove to be insufficient, but they will likely do no harm. Departments have also established documentation practices for these protocols, not described in the *White Paper*, but which this panel also recommends.

- ❖ Clear *identification* of ExDS cases based on common signs and symptoms (indicators) of the syndrome;
- ❖ Rapid *control* of the individual with adequate law enforcement personnel;
- ❖ *Sedation* by emergency medical personnel immediately after the subject is under police control;
- ❖ *Transport* of the subject to a medical facility for follow-up treatment and evaluation; and documenting the case.

During a two-week period following the meeting, the panel arrived at a general consensus for a quick reference card for first responders that includes these steps (Figure 2).

### Identify

The goal of the identification portion of these protocols is the “recognition of common signs/symptoms (indicators) of ExDS [in a subject],” stated Sergeant Farris. Thus, most protocols require likely first responders to be trained to recognize its signs and symptoms. When receiving calls, dispatchers are trained to ask key questions to determine if an individual is exhibiting any signs and symptoms of ExDS. If it is

<sup>127</sup> A video of Wisconsin Corrections apparent protocol for excited delirium can be viewed at “Excited Delirium” by Gary Klugiewicz, <http://blutube.policeone.com/police-cool-stuff-videos/935675120001-excited-delirium/>

<sup>128</sup> Sergeant Fred Farris, recorded panel proceedings, 13 April 2011.

<sup>129</sup> Daryl Slade “Excited delirium’ now part of Calgary police training,” *Calgary Herald*, August 24, 2011 <http://www.calgaryherald.com/Excited+delirium+part+Calgary+police+training/5301614/story.html#ixzz1WBRLvq00>

<sup>130</sup> Sergeant Joel Johnston, Vancouver Police Department, briefing entitled, “Excited Delirium Update: Canadian Policing Perspective,” April 12, 2011, slide 13.

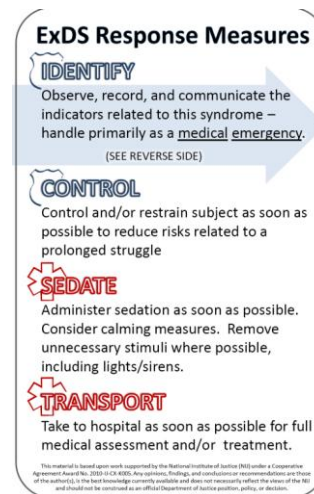


Figure 2 – Quick Reference Card developed by panel (side 1).

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suspected, dispatchers will simultaneously contact fire department/paramedic representatives who ask medical questions. Together, they determine if a joint response is necessary. Time is obviously crucial to this process. Dispatchers also will relay critical information to law enforcement officers responding to the incident.

Law enforcement officers are trained to distinguish between rowdy bar behavior – regarded as relatively self-controlled and modifiable – and ExDS, seen as uncontrolled/unresponsive behavior. “We are not expecting officers to become diagnosticians or medics,” stated Officer Myers, “but we do want [police officers] to be familiar with the different signs and symptoms of ExDS, as a medical crisis.” Officers are trained to assess from a relatively safe distance, and if they suspect an ExDS case, call for paramedics and law enforcement back up. While there are some differences in the indicators used by different jurisdictions, most of these differences are not substantive (see Table 2-1).

Lenexa <sup>131</sup>	Vancouver <sup>132</sup>	Seattle <sup>133</sup>
<ul style="list-style-type: none"> <li>❖ Violent resistance/struggling</li> <li>❖ Extreme aggression toward objects</li> </ul>	<ul style="list-style-type: none"> <li>❖ Extremely aggressive or violent behaviour</li> <li>❖ Constant or near constant physical activity</li> </ul>	<ul style="list-style-type: none"> <li>❖ Extreme agitation, disorientation</li> <li>❖ Violence toward others</li> <li>❖ Bizarre and/or aggressive behavior</li> </ul>
<ul style="list-style-type: none"> <li>❖ Inappropriate shedding of clothing</li> <li>❖ Profuse sweating</li> <li>❖ Hyperthermia</li> <li>❖ High core body temp</li> </ul>	<ul style="list-style-type: none"> <li>❖ Naked or inappropriately clothed for environment</li> <li>❖ Profuse sweating</li> </ul>	<ul style="list-style-type: none"> <li>❖ Hyperthermia (overheating), sweating, seeking water, inappropriate or no clothing</li> </ul>
	<ul style="list-style-type: none"> <li>❖ Superhuman strength</li> <li>❖ Does not appear to tire despite heavy physical exertion</li> </ul>	<ul style="list-style-type: none"> <li>❖ Unexpected physical strength</li> </ul>
<ul style="list-style-type: none"> <li>❖ Self inflicted injuries</li> </ul>	<ul style="list-style-type: none"> <li>❖ Tolerant to pain</li> <li>❖ Subject does not respond to police presence</li> </ul>	<ul style="list-style-type: none"> <li>❖ Insensitivity to pain</li> </ul>
<ul style="list-style-type: none"> <li>❖ Talking incoherently</li> <li>❖ Screaming</li> <li>❖ Yelling</li> <li>❖ Paranoia</li> </ul>	<ul style="list-style-type: none"> <li>❖ Rapid breathing</li> </ul>	<ul style="list-style-type: none"> <li>❖ Shouting or keening (animal noises)</li> <li>❖ Panic</li> <li>❖ Lid lift (eyes wide open)</li> <li>❖ Paranoia</li> </ul>
<ul style="list-style-type: none"> <li>❖ Dilated pupils</li> <li>❖ Skin discoloration</li> </ul>	<ul style="list-style-type: none"> <li>❖ Attraction to or destruction of glass or reflective objects</li> </ul>	<ul style="list-style-type: none"> <li>❖ Sudden tranquility</li> </ul>

**Table 2-1. A Comparison of ExDS Indicators from existing protocols.**

<sup>131</sup> Sergeant Farris, brief entitled, “Response to Excited Delirium Syndrome: Training Program for Police, Fire and EMS. Lenexa, Johnson County, Kansas, undated, slide entitled, “Training.”

<sup>132</sup> Sergeant Joel Johnston, , “Excited Delirium Update: Canadian Policing Perspective,” April 12 & 13 2011, slide 16.

<sup>133</sup> These are from the Seattle Police Department, “Excited Delirium” training video, 2007.

The 2009 *White Paper Report on Excited Delirium Syndrome* recommends that “[law enforcement officers] should be trained to recognize and manage subjects with ExDS.”<sup>134</sup> In keeping with this recommendation, the Seattle and Lenexa Police Departments train officers and dispatchers to recognize ExDS signs/symptoms. Also, these departments have correctly coordinated police and emergency medical responses for such cases. The panel provides the following:

- ❖ Use signs/symptoms (indicators) based on those in the medical literature.<sup>135</sup> As mentioned, Seattle and Lenexa, Kansas police departments provide signs/symptoms generally, but not uniformly, matching those found in the medical literature. For example, keening – unintelligible, animal-like noises – is not found in the medical literature, but is included in Seattle’s signs/symptoms. It is the consensus of the panel that use of signs/symptoms based on medical literature provides law enforcement with more comprehensive criteria for determining a medical emergency; uniform criteria for agencies implementing such protocols across jurisdictional boundaries; and better defensibility. Following the meeting, the panel arrived at a general consensus for a revised list of indicators (below) for the quick-reference card (Figure 3).

- Extremely aggressive or violent behavior
- Constant or near constant physical activity
- Does not respond to police presence
- Attracted to/destructive of glass/reflective
- Attracted to bright lights/loud sounds
- Naked/inadequately clothed
- Attempted “self-cooling” or hot to touch
- Rapid breathing
- Profuse sweating
- Keening (unintelligible animal-like noises)
- Insensitive to/extremely tolerant of pain
- Excessive strength (out of proportion)
- Does not tire despite heavy exertion

- ❖ Recognize that indicators (signs/symptoms) will not present uniformly. While all protocols should have a uniform list of indicators, individuals with ExDS will not uniformly exhibit them. As explained by Dr. Vilke, et al:

“Due to varied underlying medical conditions that may generate ExDS, there is also variation in the specific symptom cluster [cluster of signs]. As in any disorder that affects mental status, there is no assumption that each subject’s presentation will have the same clinical presentation however, all patients with ExDS present delirious with evidence of psychomotor and physiologic excitation.”<sup>136</sup>

<sup>134</sup> ACEP Excited Delirium Task Force, *White Paper Report on Excited Delirium Syndrome*, p. 9.

<sup>135</sup> The signs/symptoms are based on medical literature are: extremely aggressive or violent behavior, constant/near constant physical behavior, unresponsive to police presence, attracted to glass and reflections, attempting destruction, attracted to bright lights and loud sounds, naked or inadequately clothed, hot to the touch and attempted self cooling, profuse sweating, rapid breathing, keening – unintelligible, animal-like noises, extremely intolerant of pain, excessive and seemingly disproportionate strength, untiring despite heavy exertion.

<sup>136</sup> Gary M. Vilke, et. al., “Excited Delirium Syndrome (EXDS): Defining Based on A Review of the Literature,” *The Journal of Emergency Medicine*, February 2011, p. 5.

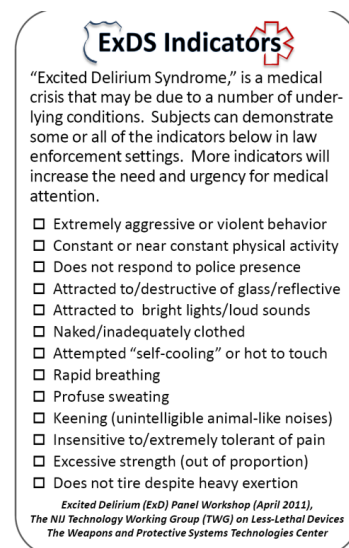


Figure 4– Quick Reference Card developed by panel (side 2).

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### **Control**

In these protocols, control at the scene is accomplished by law enforcement. There is growing recognition that ultimately, medical intervention will be needed for subjects experiencing ExDS. Law enforcement must facilitate this medical intervention, particularly if such individuals are violent. At the scene, Seattle police officers are instructed to do the following:

- ❖ *Ensure Adequate Back-up.* Prior to arrival of paramedics, officers may attempt to de-escalate, using verbal techniques, stated Officer Burns.<sup>137</sup> This often means reducing or eliminating unnecessary visual and aural stimuli, such as warning lights and sirens. Also, officers are instructed to “get as much back up as you can to approach this person safely,” stated Officer Myers states in the training video.<sup>138</sup> A goal is “adequate [police presence] to handle the incident,” also stated Sergeant Farris.<sup>139</sup> However, if the individual “is endangering others you are going to have to go in,” pointed out Officer Myers.<sup>140</sup>
- ❖ *Gain Rapid Control.* At some point, law enforcement officers will “need rapid and overwhelming tactics to gain control,” stated Sergeant Farris.<sup>141</sup> “The idea is that we want to use enough control tactics to bring this person under control as quickly as possible. That way we can get the person restrained and delivered to medical intervention,” stated Officer Myers. At the same time, “your goal is to restrain the person with the minimum amount of fight. The more they fight, the greater the chance for a negative outcome,” he said.<sup>142</sup> A conducted energy device is a fast way to restrain an individual with ExDS, pointed out Lenexa and Seattle police officers.<sup>143</sup> “While the TASER is cycling, have somebody restrain him and deliver him to medics, if medics are present,” stated Officer Myers.<sup>144</sup>
- ❖ *Ensure Breathing.* While the individual is restrained and until the individual is transferred to medical care, law enforcement officers should not hinder the subject’s ability to breathe. This may include placing them in a recovery position and not subjecting their thorax to unnecessary weight. By definition, they will be metabolically acidotic from the intense exertion that they have been demonstrating. This exertion will often continue while in handcuffs and the tendency may be for officers to try to keep them pinned to the ground or against some type of solid object until EMS arrives to take over. The problem with this is that the primary

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<sup>137</sup> Rick Wyant and Tom Burns, brief entitled “Excited Delirium: The First Response,” undated, slide entitled, “Intervention.” Also, slide entitled, “First Responder.”

<sup>138</sup> Seattle Police Department, “Excited Delirium” training video, 2007.

<sup>139</sup> Sergeant Farris, brief entitled, “Response to Excited Delirium Syndrome: Training Program for Police, Fire and EMS. Lenexa, Johnson County, Kansas, undated, slide entitled, “The Goal.’

<sup>140</sup> Seattle Police Department, “Excited Delirium” training video, 2007.

<sup>141</sup> Sergeant Farris, brief entitled, “Response to Excited Delirium Syndrome: Training Program for Police, Fire and EMS. Lenexa, Johnson County, Kansas, undated, slide 15.

<sup>142</sup> Seattle Police Department, “Excited Delirium” training video, 2007.

<sup>143</sup> Seattle Police Department, “Excited Delirium” training video, 2007. Also, Sergeant Farris, brief entitled, “Response to Excited Delirium Syndrome: Training Program for Police, Fire and EMS. Lenexa, Johnson County, Kansas, undated, slide 15.

<sup>144</sup> Seattle Police Department, “Excited Delirium” training video, 2007.

method for a subject in this situation to buffer the build-up of metabolic acid is to be able to breathe at a faster rate and deeper volume than usual. Anything that might restrict this could potentially make this condition worse and if the acidotic condition reaches a certain threshold, the subject will have a cardiopulmonary arrest.<sup>145</sup> “Assign someone to watch and monitor subject’s face,” stated Officer Burns. This is intended to detect if the individual is becoming unconscious. “Be prepared to initiate resuscitation efforts,” stated Sergeant Farris, which includes airway management, cardiopulmonary resuscitation (CPR), and/or automated external defibrillator (AED).<sup>146</sup> “...Take the handcuffs off the subject prior to CPR,” stated Officer Burns.<sup>147</sup> If officers are gasping for air after a struggle and the subject is breathing calmly and easily, this may indicate that a subject is in jeopardy.

The Seattle and Lenexa protocols consider adequate back-up for police, rapidly controlling the subject, and transitioning the subject to emergency medical care. These practices are in keeping with the findings of the 2009 *White Paper Report on Excited Delirium Syndrome*:

In subjects who do not respond to verbal calming and de-escalation techniques, control measures are a prerequisite for medical assessment and intervention. When necessary, this should be accomplished as rapidly and safely as possible. Recent research indicates that physical struggle is a much greater contributor to catecholamine surge and metabolic acidosis than other causes of exertion or noxious stimuli. Since these parameters are thought to contribute to poor outcomes in ExDS, the specific physical control methods employed should optimally minimize the time spent struggling, while safely achieving physical control. The use of multiple personnel with training in safe physical control measures is encouraged.<sup>148</sup>

Additionally, protocols should use sound practices based upon lessons that have been learned, including consideration for the use of appropriate less-lethal devices that do not exacerbate the situation, the subject’s ability to breathe, subject monitoring for consciousness, and preparation for resuscitation. The consensus of the panel is that the control step outlined above (and its considerations) is a critical element of the protocol and is reasonable and often necessary in order to provide the subject with the greatest chance of survival.

### **Sedate**

All of the protocols require that emergency medical personnel respond to the scene quickly to determine if the individual is in medical crisis, and if so, accept transfer from police. Also, these protocols often (not universally) allow emergency medical personnel to sedate if they determine an individual likely has ExDS. This will most often require law enforcement assistance in maintaining control. “In order for [medics] to sedate [the subjects], [police] are going to have to restrain [subjects]. [The medics] are going to need a limb, holding it still long enough to inject a sedative,” stated Officer Myers.<sup>149, 150</sup>

The consensus of the panel is that the control step ... is a critical element of the protocol and is reasonable and often necessary in order to provide the subject with the greatest chance of survival.

<sup>145</sup> Dr. Jeffrey D. Ho, comments on draft report provided on 11/27/2011.

<sup>146</sup> Sergeant Farris, brief entitled, “Response to Excited Delirium Syndrome: Training Program for Police, Fire and EMS. Lenexa, Johnson County, Kansas, undated, slide 15.

<sup>147</sup> Rick Wyant and Tom Burns, brief entitled “Excited Delirium: The First Response,” undated, slide entitled, “Lessons Learned.”

<sup>148</sup> ACEP Excited Delirium Task Force, White Paper Report on Excited Delirium Syndrome.

<sup>149</sup> Seattle Police Department, “Excited Delirium” training video, 2007

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In Lenexa, Kansas, emergency medical personnel may administer a 10mg *intranasal* dose of midazolam [trade name Versed<sup>®</sup>]. If the individual is still combative after ten minutes, medics may repeat the same dose. If the individual expels the intranasal dose or attempts to bite, medics may administer an *intramuscular* injection 5mg dose of midazolam. If medics can do an *intravenous* injection and the individual is combative, they may administer a 2-5 mg dose of midazolam, repeating every five minutes until adequate sedation is achieved.<sup>151</sup> The Minneapolis protocols, which the ACEP Task Force examined and supported, advocate for use of IM Ketamine as the ideal sedative, which has fewer complications than Versed (a respiratory depressant). They have over 10 years of experience with this in their system.<sup>152</sup>

Sedation by emergency medical personnel, as soon after police control as possible, is consistent with the findings of the 2009 *White Paper Report on Excited Delirium Syndrome*, which stated:

After adequate physical control is achieved, medical assessment and treatment should be immediately initiated...Most authorities, including this Task Force, posit the beneficial use of aggressive chemical sedation as first-line intervention.<sup>153</sup>

The *White Paper* views sedation as treating agitation associated with ExDS. It does not prescribe a specific medication, but rather offers several, which are found in Annex A of this report. In addition, the *White Paper* also shows medications being used by those communities treating ExDS, the majority using midazolam. The *White Paper* also states the following with regards to sedative doses:

[Recommended] doses are based upon consensus opinion. The actual effective dose of all suggested medications is unknown due to a paucity of research. Because these agents have respiratory and cardiovascular effects, continuous monitoring of both should be performed as soon as feasible whenever parenteral sedation is administered. When appropriate safety systems are in place, one should be aware of manufacturers suggested dosing recommendations for other uses, but be prepared to use clinically effective doses for the management of this condition.<sup>154</sup>

This panel concurs with the findings of the Task Force regarding sedation.

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<sup>150</sup> [Editor's note: Intranasal administration and other alternative methods of administration are becoming available. Intranasal action is often slower and thus may have other challenges operationally.]

<sup>151</sup> Sergeant Farris, brief entitled, "Response to Excited Delirium Syndrome: Training Program for Police, Fire and EMS. Lenexa, Johnson County, Kansas, undated, slide entitled, "Medical Protocol."

<sup>152</sup> Dr. Jeffrey D. Ho, comments on draft report provided on 11/27/2011.

<sup>153</sup> ACEP Excited Delirium Task Force, *White Paper Report on Excited Delirium Syndrome*, p 14.

<sup>154</sup> ACEP Excited Delirium Task Force, *White Paper Report on Excited Delirium Syndrome*, p 17. The following communities use Midazolam: Miami, FL; Nashville, TN; Columbus, OH; and Clark County (Las Vegas) NV. Minneapolis, MN uses Ketamine. Rochester, MN uses Lorazepam.



### **Transport**

Transporting the subject to a medical facility is accomplished by emergency medical personnel as soon as possible, so that the individual receives a follow-up medical evaluation and any necessary treatment.<sup>155</sup>

The Seattle and Lenexa protocols appropriately call for transport of ExDS cases to a medical facility for follow-up evaluation and treatment. However, briefings did not detail emergency department preparations and practices for such cases. As panel member and nurse Theresa DiMaio stated, “Many emergency room nurses will not know about excited delirium.”<sup>156</sup> Therefore, knowledge of ExDS is needed for evaluation and treatment at a medical facility, as well.

Upon arrival at a medical facility/emergency department, subjects presenting with suspected ExDS should be managed as recommended by the *White Paper* and Dr. Vilke et al. These include:

*Acidosis.* This is the buildup of acid in the body, possibly leading to coma or death. Law enforcement and on-scene medics in the Seattle and Lenexa, Kansas, protocols recognize acidosis as a component of ExDS. Notably, police follow the findings of the *White Paper*: “Control measures that might interfere with ventilation should be avoided.” Emergency room personnel should also be aware of acidosis as a component of ExDS, as well as the *White Paper’s* recommended treatment:

“If [ExDS is] suspected based on the clinical situation or physical examination, fluid resuscitation with intravenous fluids is prudent. In severe cases, sodium bicarbonate may be used either empirically or based on laboratory results revealing significant acidosis. Controversy exists regarding empiric use of sodium bicarbonate; the efficacy of supplemental sodium bicarbonate is unknown, and has not been supported as routine therapy for the metabolic acidosis of cardiac arrest.”<sup>157</sup>

The panel recognizes that this may be harmful if the subject/patient is hypokalemic, although this will not likely be the case if profoundly acidotic.

*Hyperthermia.* This is a dangerously high body temperature. Treatment may be initiated upon observation, though confirmation through “core temperature measurement is preferred,” states the *White Paper*. It further recommends:

Basic cooling methods include removal of clothing and placement in a cool environment. Active external cooling may be initiated, with misting of water on exposed skin, providing air flow to enhance evaporative cooling, and placement of ice packs at the neck, axillae, and groin. Rapid cooling by infusion of cold saline IV has been shown to be effective in a number of other settings and can also be used. Care must be taken to avoid treatment “overshoot” leading to hypothermia.

Once the patient is stabilized in the ED (emergency department) or hospital setting, additional measures may be considered. In refractory or severe cases, immersion in cool water can rapidly reduce core body temperature, though this may present some difficulty with monitoring and treatment. A variety of external and internal temperature control devices are now available and may also be considered. If NMS [neuroleptic

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<sup>155</sup> Seattle Police Department, “Excited Delirium” training video, 2007.

<sup>156</sup> Ms Theresa G. DiMaio, recorded panel proceedings, 12 April 2011.

<sup>157</sup> Excited Delirium Task Force, *White Paper Report on Excited Delirium Syndrome*, p. 16.



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malignant syndrome] or malignant hyperthermia is suspected, dantrolene may be indicated.<sup>158</sup>

*Rhabdomyolysis*. This is the breakdown of muscle fibers resulting in the release of muscle fiber contents (myoglobin) into the bloodstream. This may be harmful to the kidney and may result in kidney damage. Consequently, the White Paper recommends, that rhabdomyolysis be “initially managed by fluid administration and urine alkalization with sodium bicarbonate.”<sup>159</sup>

### **Document**

Documentation of ExDS cases should be done by emergency medical personnel and law enforcement and embedded in their existing reporting systems. Lenexa has “stressed the importance of extensive documentation of the incident to include **photos, video, and audio** as well as detailed **reports** and supervisor response.”<sup>160</sup> In Seattle, emergency medical personnel conduct **audio recordings of the proceedings**. These “paint a fuller picture” of the event as Officer Burns pointed out.<sup>161</sup> Seattle police also complete a **computer-based ExDS report**.<sup>162</sup> They “include as many of the ExDS factors ... as possible,” Officer Myers instructs. “The key one that is going to help us in determining what kind of medical crisis this person was suffering from is going to be body temperature. The body temperature is one of the key indicators that seems to differentiate ExDS from other drug-related medical crises,” as Officer Myers also stated.<sup>163</sup> This documentation has several uses, to include:

- ❖ Improving our understanding of the syndrome and improving responses;
- ❖ Serving as training and evaluation tools;<sup>164</sup>
- ❖ Evidence that can assist in follow-on investigations;<sup>165</sup>
- ❖ Litigation management;<sup>166</sup> and
- ❖ Identifying individuals with ExDS histories.<sup>167</sup>

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<sup>158</sup> Excited Delirium Task Force, *White Paper Report on Excited Delirium Syndrome*, p. 16.

<sup>159</sup> Excited Delirium Task Force, *White Paper Report on Excited Delirium Syndrome*, p. 16.

<sup>160</sup> Sergeant Farris, brief entitled, “Response to Excited Delirium Syndrome: Training Program for Police, Fire and EMS. Lenexa, Johnson County, Kansas, undated, slide 25.

<sup>161</sup> Rick Wyant and Tom Burns, brief entitled “Excited Delirium: The First Response,” undated, slide entitled, “Medical Monitoring.”

<sup>162</sup> Rick Wyant and Tom Burns, brief entitled “Excited Delirium: The First Response,” undated, slides 21-3, entitled “Computer Assistance.”

<sup>163</sup> Seattle Police Department, “Excited Delirium” training video, 2007.

<sup>164</sup> Rick Wyant and Tom Burns, brief entitled “Excited Delirium: The First Response,” undated, slide entitled, “Medical Monitoring.”

<sup>165</sup> Seattle Police Department, “Excited Delirium” training video, 2007.

<sup>166</sup> Sergeant Farris, brief entitled, “Response to Excited Delirium Syndrome: Training Program for Police, Fire and EMS. Lenexa, Johnson County, Kansas, undated, slide 16.

<sup>167</sup> Chris Myers, Tom Burns, Review of appropriate information to be gained from EMS (litigation control) to include statements made by subject, core body temperature records, vital signs, and medications.

### Forensic Pathology

Despite the best efforts of first responders, it is likely that there will continue to be deaths resulting from ExDS. “Some patients who develop ExDS and go into cardiac arrest will not be resuscitated,” stated Dr. Vilke et al., and that has been observed by emergency physicians “even when the cardiopulmonary arrest occurs in the setting of a well-staffed and well-equipped hospital emergency department (ED).” “In the absence of clearly stated case definitions and prospective clinical studies, treatment of ExDS remains largely speculative,” stated Dr. Vilke et al.<sup>168</sup>

As early as 1996, considerations regarding the determination of the cause and manner of death in ExDS were identified by Dr. Deborah Mash and others in the *American Journal of Emergency Medicine*.<sup>169</sup> Similarly, they were addressed in 2006 by Theresa DiMaio in *Excited Delirium Syndrome: Cause of Death and Prevention*.<sup>170</sup> This text discusses the investigation, autopsy, and toxicology as well as the certification of death. Moreover, these issues, as well as care recommendations for treatment, diagnosis, and loss limitation can be found in several editions of *Karch's Pathology of Drug Abuse*.<sup>171</sup> Takeuchi et al., found that in all these cases, it appeared that victims died of either respiratory arrest or fatal cardiac dysrhythmia. Diagnoses were supported by postmortem exams showing pulmonary and cerebral edema with non-lethal self-inflicted injuries. The few who live long enough to be hospitalized often succumb to disseminated intravascular coagulation, rhabdomyolysis and renal failure. These fatal cardiopulmonary changes are thought to be the result of increased catecholamine stress on the heart, myocardial hypertrophy, micro-angiopathy and fatal arrhythmias. The proposed cause of these changes is debated.<sup>172, 173</sup>

As the National Association of Medical Examiners (NAME) now recognizes ExDS, the path to broader acceptance and standardized procedures and training in this community has begun.

While the *White Paper* very generally addresses documentation of ExDS cases, it does not address it in the same detail as the Seattle and Lenexa protocols. The consensus of this panel is that the detailed documentation practices included in these protocols serve as models for other communities. They are vital to better understanding the syndrome and improving the collective responses.

As early as 1996, considerations regarding the determination of the cause and manner of death in ExDS were identified by Dr. Deborah Mash and others in the *American Journal of Emergency Medicine*.

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<sup>168</sup> Gary M. Vilke, et. al., “Excited Delirium Syndrome (EXDS): Defining Based on A Review of the Literature,” *The Journal of Emergency Medicine*, February 2011, p. 6.

<sup>169</sup> Charles V. Wetli, Deborah Mash, Steven B. Karch, Cocaine-associated agitated delirium and the neuroleptic malignant syndrome, *American Journal of Emergency Medicine*, Volume 14, Issue 4, Pages 425-428, July 1996.

<sup>170</sup> Theresa G. DiMaio (Author) and Vincent J.M. DiMaio M.D., “Excited Delirium Syndrome: Cause of Death and Prevention,” CRC Press, 2006, Boca Raton, FL. Pp 75-81.

<sup>171</sup> Steven B. Karch and Olaf Drummer, *Karch's Pathology of Drug Abuse*. Fourth Edition, CRC Press, Taylor & Francis Group, Boca Raton, FL, December 15, 2008.

<sup>172</sup> Charles V. Wetli, Deborah Mash, Steven B. Karch, Cocaine-associated agitated delirium and the neuroleptic malignant syndrome, *American Journal of Emergency Medicine*, Volume 14, Issue 4, Pages 425-428, July 1996.

<sup>173</sup> Asia Takeuchi, MD, Terence L. Ahern, BA, Sean O. Henderson, MD, “Excited Delirium,” *Western Journal of Emergency Medicine*, Volume XII, no. 1, February 2011, pp 77-83.

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### Conclusion

The implemented protocols appear to have prevented fatalities and the panel consensus is that this will likely continue. Whether use of these protocols will reduce lawsuits is uncertain, but they will likely help agencies defend against them, especially if they adhere to a policy of copious documentation – both at the scene and at autopsy. However, there are still questions that remain that can be addressed through broader acceptance of the syndrome, systematic documentation by first responders, and continued research. Additionally, endorsement by the National Institute of Justice is important in generating wider acceptance in the first responder communities and the general public.

## Section 3: Excited Delirium – What Work Remains?

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This section reflects panel discussions that addressed the work that remains – particularly with regard to research. The panel provided recommendations to improve the understanding of ExDS and lead to a common treatment. These recommendations encompass terminology, research, education, and stakeholder endorsement.

### Terminology

#### *Excited Delirium Syndrome*

The panel agreed upon “An altered mental state with impaired cognition and perception, and severe psycho-motor agitation” as an acceptable definition for ExDS.<sup>174</sup> There was some debate regarding whether or not changing the “excited delirium” name might garner broader support in the medical community while addressing the existing public perceptions. A similar debate occurred in the Task Force that produced the *White Paper Report on Excited Delirium Syndrome*.<sup>175</sup> However, this panel, like the Task Force, concluded that the name “excited delirium syndrome” has gained acceptance in law enforcement and some aspects of the medical community. Moreover, a new name would be a step backwards in terms of recognition, pointed out Sergeant Fred Farris.<sup>176</sup>

#### *ExDS Steps and Indicators*

The panel arrived at a general consensus for the basic steps for first responders in dealing with ExDS cases (Identify, Control, Sedate, and Transport – and documentation). The indicators below are based on findings in the medical literature and have been reproduced on the quick reference card agreed upon by the panel. They should be uniformly used by those communities addressing ExDS. As mentioned, these may not present themselves uniformly, due to varied underlying medical conditions that may generate ExDS. As panel member and medical researcher, Dr. Chris Hall stated, “the more signs and symptoms, the higher the risk” of ExDS and its consequences. Some signs and symptoms are more significant, and more common, than others. As previously mentioned, the panel arrived at a general consensus for a quick-reference card for first responders that includes a revised list of indicators.

### Research

The goal of these research recommendations is to advance our understanding of ExDS in order to improve the capability of first responders and provide better response and treatment than perhaps exists today. Tangentially, it may also help guide the use of control measures, first responder tactics, and even “the development [and improvement] of less lethal/non-lethal weapons,” as panel member Dr. Mary Williams pointed out.<sup>177</sup> In addition to the efforts described below, the panel recommends the establishment of a responsible coordinating agent within the federal government.

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<sup>174</sup> This definition was provided primarily by Dr. Chris Hall, with input from panel members. Recorded panel proceedings, 13 April 2011.

<sup>175</sup> ACEP Excited Delirium Task Force, *White Paper Report on Excited Delirium Syndrome*, p. 4.

<sup>176</sup> Sergeant Fred Farris, recorded panel proceedings, 12 April 2011.

<sup>177</sup> Dr Mary Williams, recorded panel proceedings, 13 April 2011.

The panel recommends the establishment of a responsible coordinating agent within the federal government.

Specifically, the NIJ could assign an office or program manager that would be responsible to coordinate research efforts across the federal government (other stakeholders such as HHS, DHS, and DoD-AMEDD).<sup>178</sup> Maintaining focus on the objectives of this research will require dedicated stewardship. Such an agent must ensure coordinated efforts, continuously identify and address gaps in research, and be an effective advocate for funding critical efforts by multiple agencies. The agent must guide the research to a workable solution.

#### **Conduct an Epidemiological Study**

How a problem is addressed is influenced by how it is defined. Excited delirium syndrome has not yet been adequately defined. More specifically, it lacks a case definition, describing what is unusual about the disease/syndrome in terms of the population segment affected, timelines, etc. Such definition is needed to focus efforts “leading to any further mitigation of this phenomenon.” The value of such a study was pointed out by Dr Hall: “It will give us a case definition.”<sup>179</sup> Some related epidemiology studies have been conducted.<sup>180</sup> She further pointed out that such an epidemiological study is being conducted in Canada, involving several cities, and that a similar study should be conducted in the US.<sup>181</sup> In addition to better defining those at risk, such an epidemiological study may provide a statistical presentation of indicators, insights into why some die and others survive, morbidity and mortality, and improvement to interventions.<sup>182</sup> A case definition would ultimately guide research and future treatment.

#### **Investigate Excited Delirium Fatalities in Psychiatric Patients**

There is a tendency for researchers to focus on drug-related ExDS cases, because there are seemingly more of these cases, relative to those in the psychiatric population. However, “Some of the answers in research,” stated Theresa DiMaio, “lie with psychiatric patients. That’s where it (ExDS) originates.” She also pointed out that they are a “much cleaner case, because they are not on cocaine or methamphetamine and yet they have the same presentation and manic behavior.”<sup>183</sup> Information on ExDS fatalities in psychiatric patients may be available from medical examiners, as they are required to investigate such sudden deaths.<sup>184</sup>

#### **Collect and Assess Data on Excited Delirium Cases**

*Fatalities.* This effort may provide insights into causes of death and biomarkers of this syndrome. Data could come from accredited medical examiners, who are required to keep blood samples after post-mortem exams, as well as their reports. Data should be

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<sup>178</sup> HHS is the US Department of Health and Human Services, DHS is the US Department of Homeland Security, and DoD-AMEDD is the US Dept of Defense Army Medical Department.

<sup>179</sup> Dr Chris Hall, recorded panel proceedings, 13 April 2011.

<sup>180</sup> A. James Rutenber, Janet Lawler-Heavner, Ming Yin, Charles V. Wetli, W. Lee Hearn, and Deborah C. Mash, “Fatal Excited Delirium Following Cocaine Use: Epidemiologic Findings Provide New Evidence for Mechanisms of Cocaine Toxicity,” *Journal of Forensic Science*, 1997;42(1):25-31.

<sup>181</sup> Dr Chris Hall, recorded panel proceedings, 13 April 2011.

<sup>182</sup> The benefits of epidemiology were summarized from several panel members’ comments.

<sup>183</sup> Ms Theresa DiMaio, recorded panel proceedings, 12 April 2011.

<sup>184</sup> Dr Vincent DiMaio, recorded panel proceedings, 13 April 2011.

collected only on those clearly determined to be ExDS cases. In addition to ExDS fatalities in psychiatric patients, this effort is likely to focus on cocaine-related ExDS fatalities. “The largest group is chronic cocaine users,” stated panel member and cardiac researcher, Dr. Steven Karch who, in a recent study of the neurochemical changes in 100 decedents, found that 96 were cocaine users and four were methamphetamine abusers. None were known to have had previous psychiatric hospitalization.<sup>185</sup>

*Survivors.* “You are only going to learn so much from the dead,” stated Dr. DiMaio.<sup>186</sup> This effort should seek interviews and blood samples from consenting ExDS survivors. “There may be something different about those who survive ExDS,” stated Dr Hall.<sup>187</sup>

*Compare Assessments.* This was proposed by panel member and medical researcher, Dr. Kent Vrana. “One approach would be to identify and characterize those individuals who display cardinal signs and symptoms of ExDS, but do not die. These characteristics could then be compared with those of ExDS fatalities. The numbers are going to be much smaller, but we can create a list of potential risk factors.”<sup>188</sup> This is a further argument for genetic testing, in particular, a Genome Wide Association Study (GWAS) of the two groups.

#### ***Investigate a Genetic Predisposition for Excited Delirium***

“If we could just collect small amounts of tissues or blood,” stated Dr. Vrana, “then we could ask the question is there an underlying polymorphism (genetic variation) or polymorphisms that associate?”<sup>189</sup> “You have to deal with the genetic predisposition,” stated Dr. DiMaio.<sup>190</sup> Dr. Vrana proposed a possible investigative approach. Once polymorphisms were identified from the blood/tissue samples, they could be genotyped with statistical analysis following. “The [research] question is,” stated Dr. Vrana, “do you find **channelopathy polymorphisms** in ExDS related deaths versus a suitably matched population?”<sup>191</sup>

#### ***Research the Pathophysiology of Excited Delirium***

“We do not know the acute physiology of ExDS subjects. We need to get a better understanding of their physiologic and metabolic state,” stated panel member and medical researcher, Dr. William Bozeman.<sup>192</sup> This understanding is key to treating ExDS and possibly preventing deaths. In order to achieve this understanding, “What you want to do is go down to the mechanisms,” stated Dr. DiMaio.<sup>193</sup> As Dr. Karch also added, “You are talking about major molecular research.”<sup>194</sup>

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<sup>185</sup> Dr Steven Karch, recorded panel proceedings, 13 April 2011.

<sup>186</sup> Dr Vincent DiMaio, recorded panel proceedings, 13 April 2011.

<sup>187</sup> Dr Chris Hall, recorded panel proceedings, 13 April 2011.

<sup>188</sup> Dr. Kent Vrana, recorded panel proceedings, 13 April 2011.

<sup>189</sup> Dr. Kent Vrana, recorded panel proceedings, 12 April 2011.

<sup>190</sup> Dr Vincent DiMaio, recorded panel proceedings, 13 April 2011.

<sup>191</sup> Dr. Kent Vrana, recorded panel proceedings, 13 April 2011.

<sup>192</sup> Dr William Bozeman, recorded panel proceedings, 13 April 2011.

<sup>193</sup> Dr Vincent DiMaio, recorded panel proceedings, 13 April 2011.

<sup>194</sup> Dr Steven Karch, recorded panel proceedings, 13 April 2011.

One of the key research goals should be to pursue an acceptable model for ExDS.

### ***Pursue a Model for Excited Delirium***

One of the key research goals should be to pursue an acceptable model for ExDS. “I don’t think we will get any answers until we get a chronic model,” stated Dr. Karch.<sup>195</sup> This may be problematic and will certainly be expensive. It is not that difficult to study the long term affects of cocaine and methamphetamine in animals, but whether it will prove possible to cause ExDS is not clear. What is clear is that both the heart and brain must be studied, which eliminates the porcine model (the conduction system of their hearts is too dissimilar from humans) though the rabbit model would reflect the cardiac changes and be directly relevant to humans (same conduction system). Proteomics and more routine pathology methods might provide very useful information.

The preferred study for the changes that have already been proven to occur in human brains would be best studied in a primate model, particularly one using the techniques of functional magnetic resonance imaging (MRI). However, these studies are very expensive and require specialized skills. In spite of the difficulties, this approach merits serious consideration as it may well be that death in these cases is a function of some, yet to be identified, mind-body connection.

### **Best Practices and Training**

Efforts to further mitigate ExDS over the long term will require a concerted effort, coordinated and guided by an appropriate federal agent. In the meantime, mitigating this phenomenon will depend on using best known practices to treat it – which, while somewhat speculative, appear to have achieved some success. This near-term mitigation also depends on increasing awareness of ExDS and promulgating these best known practices to treat it.

“Give us something we can use now,” stated Lenexa, Kansas Police Sergeant Fred Farris, referring to first responders’ immediate needs to treat ExDS cases. “We need an end product that we can work with while you are doing the research to find a way to stop it.”<sup>196</sup> Further amplifying this immediate need for treatment, panel member and Seattle police officer Chris Myers stated, “translate it into something a federal judge can understand.”<sup>197</sup> The Panel, therefore, recommends the following for treating ExDS until research can provide further information:

While ExDS is likely to be observed initially by police, “this is a clinical entity that can enter the ED [emergency department] from any source (EMS [emergency medical services], law enforcement, ED triage, etc),” states the 2009 *White Paper*. Thus, law enforcement, paramedics, and hospital emergency departments should be capable of identifying the syndrome recognizing that the identifiers will not present uniformly. In order to move this effort forward, therefore, the panel recommends:

#### ***Survey Local Law Enforcement Organizations***

A survey of local law enforcement jurisdictions should be completed through the National Institute of Justice to determine community awareness of ExDS and its risks, training and policies in dealing with it, and protocols to treat it. Selection of jurisdictions should be inclusive of large and small departments, urban and rural settings, and small

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<sup>195</sup> Dr Steven Karch, recorded panel proceedings, 13 April 2011.

<sup>196</sup> Sergeant Fred Farris, recorded panel proceedings, 13 April 2011.

<sup>197</sup> Officer Chris Myers, panel proceedings, 13 April 2011.

jails as well as larger federal correctional institutions. Consideration should be given to size, location, and population demographics.

### ***Develop Educational Outreach Programs***

The panel recommends that NIJ pursue an effort to gather and review best practices for developing an ExDS response program that might serve as a framework for jurisdictions across the country. These coordinated response programs will require policy guidelines, techniques and procedures, planning considerations, training components (police, paramedic, emergency room, dispatcher, administration), and community outreach. The goal should be to make ExDS and its treatment known to all first responders and the communities they serve. The components of these best practices should be general enough that it allows communities to adapt them to local needs.

### **Stakeholder Endorsement**

The panel recommends that the *National Institute of Justice* endorse and electronically post this Panel's Report along with the *2009 White Paper*. This endorsement will help gain acceptance of ExDS and its treatment throughout the criminal justice community.

Consistent with the panel recommendation to establish a responsible coordinating agent at the Federal Level, that agent (and this panel) should seek support from national research organizations. "If we are going to get molecular answers we are going to have to go through national institutes," stated Dr. Karch.<sup>198</sup> Additionally, other stakeholder groups should be included to ensure transparency and maintain open lines of communication. Moreover, taking research to a solution for ExDS will require considerable funding – which will likely entail a cooperative resourcing effort among federal stakeholders. The panel, therefore, recommended pursuing support from the following national research and other stakeholder organizations:

- ❖ American College of Emergency Physicians (ACEP);
- ❖ American Medical Association (AMA);
- ❖ American Psychiatric Association;
- ❖ American Psychological Association (APA);
- ❖ Center for Disease Control and Prevention (CDC);
- ❖ Center for Orphan Drug Research;
- ❖ National Alliance on Mental Illness (NAMI);
- ❖ National Association of EMS Physicians (NAEMSP);
- ❖ National Association of Medical Examiners (NAME);
- ❖ National Institute of Drug Abuse (NIDA);
- ❖ National Institutes of Health, possibly its Office of Rare Diseases Research;
- ❖ International Association of Chiefs of Police (IACP);
- ❖ National Sheriffs Association (NSA);
- ❖ National Tactical Officers Association (NTOA);
- ❖ US Department of Defense Joint Non-Lethal Weapons Program (JNLWP).
- ❖ American Civil Liberties Union (ALCU);
- ❖ Amnesty International (AI);
- ❖ International Committee of the Red Cross (ICRC);

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<sup>198</sup> Dr Steven Karch, recorded panel proceedings, 13 April 2011.



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NIJ Weapons and Protective Systems Technologies Center

## Appendix

### Sedation Agents for ExDS-type symptoms

Taken from Table 5 in 2009 *White Paper Report on Excited Delirium Syndrome* by the American College of Emergency Physicians' Excited Delirium Task Force

Class	Agent (Trade Name)	Available Routes	Dosing (mg)*	Onset (min)	Duration (min)
Midazolam (Versed)		IN	5	3-5	30-60
		IM	5	10-15	120-360
		IV	2 - 5	3-5	30-60
Lorazepam (Ativan)		IM	4	15-30	60-120
		IV	2 - 4	2-5	60-120
Diazepam (Valium)		IM	10	15-30	15-60
		IV	5 - 10	2-5	15-60
†Haloperidol (Haldol)		IM	10– 20	15	180-360
		††IV	5 – 10	10	180-360
†Droperidol (Inapsine)		IM	5	20	120-240
		IV	2.5	10	120-240
Ziprasidone (Geodon)		IM	10– 20	10	240
Olanzapine (Zyprexa)		IM	10	15-30	24 hrs
Ketamine (Ketaset, Ketalar)		IM	4-5 mg/kg	3-5	60-90
		IV	2 mg/kg)	1	20-30

IN: Intranasal; IM: Intramuscular; IV: Intravenous

\* Typical adult dosing for severe agitation.

† The Food and Drug Administration has issued “Black Box” warnings regarding potential serious adverse effects (QT prolongation and torsades de points) with these agents. Clinicians should use their clinical judgment regarding the risk / benefit ratio on a case by case basis.

†† Though widely used in clinical practice, haloperidol is not FDA approved for intravenous administration.

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