

Chapter 2

Medical Overview of Sudden In-Custody Deaths

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Because of the large number of individuals who are in the custody of law enforcement at any one time, deaths of individuals can occur and should be expected. Estimates regarding the exact numbers of custody deaths vary, but roughly occur at a rate of 0.1 per 100,000 of the total population of citizens in a given community (1). When these deaths are studied, well over half that occur in custody are attributable to natural causes (2–5). These natural causes are primarily from heart disease, other atherosclerotic diseases, seizure disorders, and alcohol and drug abuse. A large proportion of the remaining deaths in custody are the result of suicide or homicidal and unintentional lethal acts of violence (2). In many of these cases, the victim is simply found dead in the jail cell and a clear cause of death can be determined at the scene or on autopsy.

The sudden, unexpected death of an individual in custody during or immediately following combative confrontation with law enforcement personnel represents an entirely different matter. In general terms, *sudden death* has been defined and applied to the unexpected cardiac deaths of individuals who were in a stable medical condition less than 24 hours previously with no evidence of a noncardiac cause (6). Although sudden in-custody deaths are similar in presentation, the cause of death is often unclear. In many cases, these individuals are of a younger age and may not have a significant past history of prior illness or an underlying medical condition when compared with individuals who die of

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natural causes (2). These sudden, unexpected deaths often occur during arrest or soon after confrontation with law enforcement and early on in the course of the individual's custody (1).

These types of sudden in-custody deaths share a number of similarities and patterns that have been termed the *in-custody death syndrome*. First, individuals are often in a state of combative agitation and delirium, which precipitates the response of law enforcement. This state can occur as a result of stimulant and other recreational drug abuse, mental illness, or other unknown causes. Second, these individuals are involved in a violent confrontation with law enforcement in which various force methods, restraint, and so-called "less lethal" technologies are used in an attempt to subdue these individuals. Third, the death is commonly described as an acute event in which the individual suddenly becomes "quiet," "calm," and unresponsive. At that time, the individual is noted to be apneic (not breathing), pulseless, and in a state of cardiopulmonary arrest, for which resuscitation efforts are ultimately futile.

Fourth, on autopsy, there is often no clear cause on pathological examination of the body to explain the sudden, precipitous death that occurred. Medical examiners are left to theorize about the potential contributors to the cause of death, including the individual's underlying medical condition (i.e., evidence of cardiac or pulmonary disease such as cardiomegaly), the acute state of the individual (i.e., acute psychosis or drug-induced state), and law enforcement use of force and restraint methods (i.e., neck restraint, less lethal weapons used). As a result of the complicated and less-than-absolute determination of cause of death, controversy can arise in which law enforcement and excessive-use-of-force methods are ultimately blamed for the demise of the individual.

Although these cases are of obvious importance to law enforcement, the sudden in-custody death syndrome is also of great interest to the medical community, not just from an academic standpoint, but also from a practical nature in terms of preventing these deaths and recognizing and caring for individuals at risk. Paramount to the evaluation of this syndrome is a number of key, critical questions that this text examines. First, what is our medical understanding and knowledge regarding the pathophysiology of sudden in-custody death syndrome and the state of current research on this topic? Second, are there identifiable risk factors such as drug use, acute psychosis, or other characteristics that can help identify individuals who are at risk? Third, what is the role of use-of-force methods, restraint, and less lethal technologies in these cases? Fourth, what is the epidemiology not only behind these sudden in-custody death cases, but also law enforcement use of force in general, and violent injury and use of emergency medical and psychiatric care for the similar, more numerous incidents that do not result in sudden death in our communities?

THIS TEXT

The next few chapters address the myriad medical and physiology issues surrounding the sudden in-custody death syndrome. The authors for these chapters come from a wide spectrum of medical specialties, including emergency medicine, prehospital care, pulmonary and critical care medicine, forensic pathology, and toxicology. The authors are leading experts in their fields and are widely hailed as the premiere investigators of the specific issues relating to sudden in-custody death syndrome that they address. These chapters include a discussion of important medical definitions related to this syndrome, including the epidemiology of sudden in-custody deaths; the physiological and pathophysiological considerations when evaluating this phenomenon; the risk factors and common patterns seen in these cases, such as the role of illicit drugs; the role of use of force, restraint, and less lethal technologies in these cases; and a discussion of the importance of conducting a thorough and complete medical investigation into these cases.

The next three chapters deal specifically with the role of restraint and restraint methods in the sudden in-custody death syndrome. In the first chapter (Chapter 3), Dr. Gary Vilke, an emergency medicine physician with experience in prehospital care, discusses the long history, physiology, and impact of neck restraint holds. Although long used in martial arts, the neck hold came under increasing scrutiny as a potential cause of sudden in-custody deaths in the 1980s (7). Dr. Vilke discusses the anatomy and physiology of the neck, and the impact of various law enforcement neck holds including the bar hold, carotid sleeper hold, and shoulder pin restraint and their potential to cause significant or lethal injury.

In Chapter 4, Dr. Tom Neuman, an emergency medicine physician and pulmonary/critical care medicine specialist, discusses the role of restraint body position, such as the prone and hobble position, and whether these positions have any adverse physiology effects, including the potential to cause asphyxiation or death by respiratory compromise. Dr. Neuman reviews the numerous case reports and reviews, as well physiological studies investigating the positional asphyxia theory as it applies to restraint (8). In addition, Dr. Neuman discusses other factors potentially related to restraint body position, including the role of weight force, ventilatory capacity and oxygen consumption, and cardiac physiology.

In Chapter 5, Dr. Elizabeth Laposata, a forensic pathologist and the chief medical examiner for Rhode Island, discusses the role of restraint stress and sudden death. Physical restraint, in and of itself, produces numerous physiological changes, including activation of the acute stress response, that may play a role in precipitating or putting persons at risk for sudden death. Dr. Laposata reviews the neuroendocrine physiology associated with the acute stress

response, including the “fight-or-flight” sympathetic “catecholaminergic rush” response, and its potential role in sudden cardiac death. Dr. Laposata also discusses the interaction between psychological and physiological stress response and how these factors may play a role in the sudden deaths of individuals who are restrained.

The next two medical chapters address the role of illicit drugs and the syndrome of excited delirium in association with these sudden in-custody deaths. These individuals come into contact with law enforcement as a result of their violent, combative, and agitated behavior. Most commonly, this excited delirium state is a result of illicit drug abuse, primarily cocaine, but also methamphetamine, LSD, PCP, and other stimulants. This state can occur with drug use, underlying psychiatric illness, or an acute psychotic break.

In Chapter 6, Dr. Aaron Schneir and Richard F. Clark, emergency medicine physicians and toxicologists, review the role of illicit drug use in sudden in-custody deaths (1,9). Drs. Schneir and Clark discuss the epidemiology of drug use and sudden death, particularly focusing on the role of stimulant abuse, and review current animal and human studies investigating the effects of these drugs. They review the physiological effects including cardiac dysfunction, metabolic derangements such as metabolic acidosis and hyperkalemia (elevated potassium levels), hyperthermia, and seizures, all of which may play a role in precipitating sudden death. Finally, Drs. Schneir and Clark discuss forensic drug testing for these illicit drug, as well as treatment for those who have suffered a life-threatening ingestion of these agents.

In Chapter 7, Dr. Charles Wetli, a forensic pathologist and a chief medical examiner in New York, reviews the fascinating etiology and physiology of the syndrome described as *excited delirium* (also known as *agitated delirium* [10]). Dr. Wetli discusses the history of this syndrome, previously known by a variety of names including “Bell’s mania,” “lethal catatonia,” “acute exhaustive mania,” and “malignant catatonia” to name a few, and discusses the potential relationship between excited delirium and other syndromes such as neuroleptic malignant syndrome. He reviews the clinical presentation of excited delirium and the potential pathophysiological mechanism behind the syndrome, including its similarities and difference from cocaine and other stimulant drug overdoses. Finally, Dr. Wetli presents a number of different case examples to illustrate this syndrome and its important role in sudden in-custody death syndrome.

Chapter 8 discusses so-called use of “less lethal” force weapons and technologies and their potential association with sudden in-custody death cases. Dr. Christian Sloane, an emergency medicine physician, and Dr. Gary

Vilke review these technologies, particularly focusing on oleoresin capsicum aerosol “pepper spray” and the taser electronic shock weapon. They discuss reports of sudden in-custody deaths associated with the use of these technologies and the current scientific research assessing the safety of less lethal weapons in humans. In particular, the chapter focuses on the effect of oleoresin capsicum on respiratory physiology and taser shock on cardiac function in humans.

Chapter 9 discusses the important issue of forensic investigation by the medical examiner into cases of sudden in-custody deaths. The chapter is authored by Dr. Vincent Di Maio, a world-renowned forensic pathologist and medical examiner, who is the editor-in-chief of the *American Journal of Forensic Medicine and Pathology*. In this chapter, Dr. Di Maio reviews the key aspects of the medical examination and forensic investigation into sudden in-custody deaths, discussing the pearls and potential pitfalls of determining and certifying the cause of death in these cases.

Whereas the chapters just discussed focus on the medical issues associated with the sudden in-custody death syndrome, later chapters in this text address epidemiological case examples, administrative and policy relevancy, and liability issues that all touch on the myriad medical issues and questions surrounding these deaths.

Ultimately, sudden in-custody death syndrome continues to be of great interest to a wide variety of diverse medical and health disciplines and specialties. Emergency physicians and field medical personnel regularly care for victims (including the involved individual, law enforcement officers, and bystanders) resulting from these types of incidents. Forensic pathologists and medical examiners often must make difficult interpretations as to the cause of death and injury in these cases. Medical administrators of jails, prisons, and mental health care facilities are interested in understanding the risks and preventing the occurrence of the sudden death syndrome in their facilities. Psychiatrists and toxicologists have great interest in understanding the pathophysiology and medical care needs for individuals who present with acute psychosis as a result of underlying mental disability or illicit drug use. Similarly, epidemiologists will be interested in the occurrence of these types of incidents and their associated patterns in our communities. Finally, public health disciplines and violence prevention advocates will be interested in addressing the issues that can arise in these cases in terms of reducing risk of violence and fatalities caused by the individual as well as by the potential use of excessive force by law enforcement. We hope this text begins to shed greater scientific and medical light, knowledge, and understanding of these events for all who are interested.

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