Chapter 11

Deaths in Custody

Richard Shepherd

1. INTRODUCTION

The forensic physician will, in all probability, have to deal with a death in police custody at some point in his or her career. This chapter aims to provide a broad basis for the understanding of the disease processes and the mechanisms that may lead to death and also to provide some understanding of the current thinking behind deaths associated with restraint.

2. DEFINITION

In considering any death associated with detention by officials of any state, caused by whatever means, each state will define, according to its own legal system, the situations that are categorized as being “in custody” (1). The worldwide variations in these definitions have caused, and continue to cause, considerable confusion in any discussion of this subject. For the purposes of this chapter, “in custody” relates to any individual who is either under arrest or otherwise under police control and, although similar deaths may occur in prison, in psychiatric wards, or in other situations where people are detained against their will, the deaths specifically associated with police detention form the basis for this chapter.

It is important to distinguish between the different types of custodial deaths because deaths that are related to direct police actions (acts of commission) seem to cause the greatest concern to the family, public, and press. It is also important to remember that police involvement in the detention of individuals
extends beyond direct physical contact and includes a “duty of care” to that individual, and “lack of care” may be termed “acts of omission.” Lack of police action, or “care,” has also been responsible for deaths in custody. These acts are considerably harder to define and perhaps sometimes result from the police being placed in, or assuming, a role of caring (e.g., in states of alcoholic intoxication or acute psychiatric conditions) that is beyond their competence or which they are not equipped or trained to fulfill.

Police involvement with an individual can also include those who are being pursued by the police either on foot or by vehicle, those who have been stopped and are being questioned outside the environment of a police station, and those who have become unwell through natural causes while in contact with or in the custody of the police.

The definitions of “death in custody” are therefore wide, and attempts at simple definitions are fraught with difficulty. Any definition will have to cover a multitude of variable factors, in various circumstances and with a variety of individuals. The crucial point is that the police owe a duty of care to each and every member of the public with whom they have contact, and it is essential that every police officer, whether acting or reacting to events, understands and is aware of the welfare of the individual or individuals with whom he or she is dealing.

3. Statistics

Because of the lack of a standard international definition of “death in custody,” the simple comparison of the published raw data from different countries is of no value. The number of deaths recorded in police custody in England and Wales from 1990 to 2002 (2) shows considerable variation year to year but with an encouraging decline from the peak in 1998 (Fig. 1). In contrast, the data from Australia for much of the same period show little change (3) (Fig. 2). These raw data must be treated with considerable care because any changes in the death rates may not be the result of changes in the policy and practice of care for prisoners but of other undetermined factors, such as a decline in arrest rates during the period.

4. Investigation of Deaths in Custody

4.1. Legal Framework

In the United Kingdom, all deaths occurring in prison (or youth custody) (4) must be referred to the coroner who holds jurisdiction for that area. However, no such obligation exists concerning deaths in police custody, although the Home Office recommends (5) that all deaths falling into the widest defini-
Fig. 1. Deaths in police custody in England and Wales.

Fig. 2. Deaths in police custody in Australia.

tion of “in custody” should be subject to a coroner’s inquest, and, hence, a full inquiry into the facts and a full postmortem examination should be performed. This acceptance that all deaths occurring in custody should be fully investigated and considered by the legal system must represent the ideal situation; however, not every country will follow this, and some local variations can and do occur, particularly in the United States.
4.2. Protocol

No standard or agreed protocol has been devised for the postmortem examination of these deaths, and, as a result, variation in the reported details of these examinations is expected. These differences in the procedures and the number and type of the specialist tests performed result in considerable variation in the pathological detail available as a basis for establishing the cause of death and, hence, available for presentation at any subsequent inquest. The absence of a defined protocol hinders the analysis of the results of these examinations and makes even the simplest comparisons unreliable. There is an urgent need for a properly established academic study of all of these deaths, such as that performed in Australia under the auspices of the Australian Institute of Criminology (6), to be instituted in the United Kingdom and the United States.

4.3. Terminology

In addition to the lack of reproducibility of the postmortem examinations, the terminology used by the pathologists to define the cause of death, particularly in the form required for the registration of the death, may often be idiosyncratic, and similar disease processes may be denoted by different pathologists using many different phrases. For example, damage to the heart muscle caused by narrowing of the coronary arteries by atheroma may be termed simply ischemic heart disease or it may be called myocardial ischemia resulting from coronary atheroma or even by the “lay” term, heart attack (7). This variation in terminology may lead to confusion, particularly among lay people attempting to understand the cause and the manner of death. A considerable amount of research (1,7) has been produced based on such lay assessments of the pathological features of a death, and this has, at times, resulted in increased confusion rather than clarification of the issues involved.

If the issues regarding the definition of “in custody,” the variation in the postmortem examinations and the production of postmortem reports, and the use and analysis of subsequent specialist tests all raise problems within a single country, then the consideration of these deaths internationally produces almost insuperable conflicts of medical terminology and judicial systems.

5. Deaths Related to the Phases of the Custodial Process

In an attempt to add some clarity to the situation, it is possible to state that whatever national definition of “in custody” is used, numerous phases of the custodial process can be identified, and the types of deaths that occur during these phases can be analyzed. Clearly, a death, whether sudden or delayed, may
Deaths in Custody

Table 1
Expected Types of Deaths in Different Phases of Custody

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<th>Natural</th>
<th>Accidental trauma</th>
<th>Alcohol</th>
<th>Drug</th>
<th>Self-inflicted</th>
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<td>Detention</td>
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occur for many reasons even in the absence of police, but because it is the involvement of police that is the *sine qua non* of “in custody,” deaths in the first phase must be considered to be the presence of police officers at the scene. Subsequently, an arrest may be made with or without the use of restraint techniques and the prisoner will then be transported to a police station. This transport will most commonly involve a period within a police vehicle, which may be a car, a van with seating, or some other vehicle. Many factors may determine the type of transport used and the position of the individual in that vehicle. Detention in the police station will be followed by an interview period interspersed with periods of time incarcerated, usually alone, within a cell. After the interview, the individual may be released directly, charged and then released, or he or she may be detained to appear before a court. It is at this point that custody moves from the police to other authorities, usually to the prison service.

When considering the types of death that can occur during each of these phases, six main groups can be identified based on the reported causes of death. The groups are composed of the following:

- Natural deaths.
- Deaths associated with accidental trauma.
- Deaths related directly to the use of alcohol.
- Deaths related to the use of other drugs.
- Deaths associated with self-inflicted injury.
- Deaths associated with injuries deliberately inflicted by a third party.

It is clear that different factors may lead directly to or play a major part in the death of an individual while in custody and that different factors will play their part at different phases in the period of custody (see Table 1).

Acute alcohol intoxication or the deleterious effects of drugs are, in most cases, likely to have a decreasing effect because they are metabolized or excreted from the individual’s body. Therefore, they are most likely to cause death in the postarrest and early detention phases, and it is important to
note that their effects will be least visible to those with the “duty of care” while the individual is out of sight, detained within a cell, particularly if he or she is alone within that cell. Similarly, the effects of trauma, whether accidentally or deliberately inflicted, are most likely to become apparent in the early phases of detention, and it would only be on rare occasions that the effects of such trauma would result in fatalities at a later stage, although this has occurred on several occasions, particularly with head injuries (7). Conversely, death resulting from self-inflicted injuries is unlikely to occur in the prearrest and arrest phases of detention but it can and does occur when the individual is placed in a cell and is not under immediate and constant supervision.

On the other hand, deaths from natural causes can occur at almost any time during the arrest and detention period. It is possible that the stress (whether emotional, physical, or both) associated with the initial phases of arrest and with the subsequent, more emotionally stressful phases during detention are likely to precipitate the death of the susceptible individuals through the effects of sympathetic stimulation and adrenalin release. Deaths from natural causes should be reduced by the medical examination and supervision of detainees from the time of initial detention and throughout the period of detention (see Chapter 8).

However, it is quite clear that the deaths described in many reports are not “pure” (i.e., they are not attributable to any one single category). Individuals with heart disease may also be under the influence of alcohol; individuals under the influence of alcohol or drugs may also have suffered trauma, either accidental or deliberate, before or during their detention. In determining the cause of death, it can therefore be extremely difficult to weigh each of the factors that could be identified during the period of detention. There is great need for early assessment and accurate diagnosis of natural disease (physical or psychiatric), alcohol or drug intoxication, and for the identification, documentation, and treatment of all types of trauma.

The removal of an individual’s freedom places on the police a duty of care to that individual, and it is only by the active assessment of each and every person entering police custody and the continuing care of that individual that the number of deaths in custody can be reduced.

6. **Causes of Death**

6.1. Natural Causes

Apart from a few unusual cases, deaths resulting from natural causes while in police custody fall into the groups of disease processes that are commonly associated with sudden natural death in the community.
6.1.1. Cardiovascular Disease

The most common cause of death in the community, and of sudden death particularly, is cardiac disease, and within this group, those deaths recorded as resulting from ischemic heart disease or coronary atheroma are the most common. The exact definitions and criteria for the pathological diagnosis of significant ischemic heart disease (8) are not within the scope of this chapter. Although there is a clear increase in the incidence of this cause of death with age (9), it is important to remember that a small percentage of people in the younger age groups, most commonly those with hypercholesterolemia and hyperlipidemia, may also have significant coronary artery disease, and because the younger age groups are more likely to be arrested by the police, these few individuals may assume great significance.

The significance of coronary atheroma is that individuals with this disease are particularly prone to the development of dysrhythmias during periods of stress when their decreased ability to perfuse areas of the myocardium may result in the development of ectopic electrical foci. Deaths may be preceded by the development of classical cardiac chest pain, or it may present with sudden collapse and death without warning.

Individuals suffering from significant myocardial hypertrophy resulting from chronic hypertension are also at greater risk during periods of stress. Once again, it is the older age groups that are most commonly affected by essential hypertension, which may also render these individuals susceptible to focal lack of myocardial perfusion during periods of tachycardia. In addition to these two disease processes, there are also rarer diseases or syndromes that may cause sudden death, which are possibly more significant in the context of “deaths in custody” because some of them tend to affect younger age groups in particular. Congenital valvular disease (e.g., floppy mitral valve disease) and congenital myocardial disease (e.g., cardiomyopathies) may both render an individual more susceptible to sudden cardiac death and, as with ischemic or hypertensive heart disease, sudden death is more likely when the sympathetic stimulation that is associated with stress (emotional and/or physical) has resulted in tachycardia.

Current research is now focusing on a genetic basis for many other sudden cardiac deaths in the younger age groups. These genetically mediated disease processes (e.g., the prolonged QT intervals) can sometimes be diagnosed in life by electrocardiogram; however, after death, their presence—and hence their possible relationship to the sudden death—can only be inferred from the detection of specific gene defects (10). The examination for these specific gene markers in any sudden death in police custody must now be considered in the absence of other causes of death.
Myocarditis and rheumatic heart disease are rare causes of death in young individuals, although such deaths may occur without any prior indication of a disease process in individuals in police custody and elsewhere.

Other cardiovascular causes of sudden death, for the most part, are also age related. The rupture of atheromatous aortic aneurysms is a disease almost entirely confined to late-middle and old age, whereas the rarer forms of aortitis and collagen diseases of the aorta (11), which may also result in rupture, are more commonly seen in the younger age groups.

Pulmonary emboli can cause sudden death or may present as dyspnea and chest pain. It is most unusual for deep venous thrombosis of the leg veins to be present in a young active male; however, the association between some types of the combined oral contraceptive pill and the development of thromboses has been known for some time (12) and may render a small subgroup of the female population at greater risk of pulmonary emboli than the general population.

6.1.2. Central Nervous System

The stress associated with arrest and detention in custody may also have significant effects on the cerebrovascular system and may, in susceptible individuals, precipitate intracerebral hemorrhage by the rupture of congenital or acquired aneurysms or vascular malformations. Ruptured berry aneurysms will result in the development of acute subarachnoid hemorrhages. It is less likely that these intracranial hemorrhages will result in sudden death, but they may result in sudden unconsciousness, which ultimately leads to death. Clearly, the distinction between hemorrhage resulting from a natural disease process and death resulting from trauma will need to be established and a specialist neuropathological examination will be required should death occur.

As with the heart, the possibility that an infectious process within the central nervous system (CNS) is the cause of sudden collapse and death must be considered. However, it is unlikely that meningitis or encephalitis will present without any prodromal symptoms. Epilepsy is unlikely to develop de novo after arrest and detention, but epilepsy can and does lead to sudden collapse and death, and a pre-existing history of epilepsy is clearly important. Any individual known to suffer from epilepsy should be monitored with the utmost care and his or her prescribed medication continued.

Other forms of intracranial pathology that may lead to sudden death include tumors, both benign and malignant, and such rarities as the development of colloid cysts of the ventricular system.
6.1.3. Endocrine

Diabetes mellitus should raise similar concerns to those associated with epilepsy because poorly controlled diabetes occasionally may be the direct cause of sudden death and, through its association with an increased incidence of arterial disease, it is a major factor in the development of coronary artery disease in the younger age groups. At postmortem, consideration must be given in all cases of sudden death in a young individual, particularly when there is a history of diabetes mellitus, to the sampling of the vitreous humor to determine the blood glucose level at the time of death. The samples must be taken as soon after death as possible to avoid postmortem use of the intraocular glucose yielding erroneous results (14).

6.1.4. Other Causes

There are many other natural disease processes that could theoretically lead to sudden collapse and death. Among them is asthma, a disease that is usually unlikely to lead to sudden death if adequately treated and supervised but that may, if untreated and unsupervised and in stressful circumstances, result in the individual being found dead in their cell. Other disease processes include the development of hemoptysis, from tuberculosis or pulmonary malignancy, or hematemesis, from peptic ulceration or esophageal varices, which can be life threatening and may, because of the bleeding, be considered to be the result of trauma rather than a natural disease process. These cases should present no problem to an experienced pathologist following a full postmortem examination.

6.1.5. Conclusion

The significant feature when considering possible natural causes of death of an individual in police custody is that some diseases can lead to rapid collapse and death with no warning in a young individual who is apparently fit and well immediately before the collapse. There is no method that the police can use to determine which of the individuals they encounter will be suffering from any of these diseases or from a genetic abnormality that may lead to electrical disturbances within the myocardium. Indeed, many of these disease processes can only be diagnosed after complex medical testing and after taking a full medical history.

That many of these diseases are rare in the age group that is most likely to be detained in custody places additional burdens on the police officers who are required to care for them and also on the doctors required to examine and treat them in the police station. The difficulties that these cases present to the
Pathologist lie in the need to have an awareness of all of the possible natural causes of sudden death and a careful determination and, if necessary, exclusion of all of these causes (cardiac, neurological, and endocrine) before forming the conclusion that some other factor has resulted in death.

6.2. Accidental Trauma

It is clear that determining whether trauma is the result of an accident may depend on the “eye of the beholder.” For example, it is impossible at postmortem to determine if the injuries were caused by a fall from a window during arrest, were the result of an accidental fall, an intended jump, or a deliberate push from that window because the points of contact during the descent and the contact with the ground will result in the same injuries whatever the initial “cause.” Pathologically, the only features of relevance in determining the exact cause of the initiation of the descent are the identification of specific gripping, holding, or other restraining injuries that could have occurred before the descent or the identification of marks or injuries that may or may not be present (for instance to the fingers) that could be ascribed to attempts to hold on to a window ledge. All of the injuries or marks found on the body will have to be correlated with witness statements from both the police and any other parties present at the time of the fall. Often the true interpretation of many of the injuries and marks found during the postmortem will only become clear when these statements are considered.

However, in general terms, accidental trauma can be caused by many events during the course of an arrest. Falls onto the ground may occur from a height or from standing. Gripping and restraining injuries are commonly present on many areas of the body. The site and significance of the injuries that are present will depend on the descriptions of the events before, during, and after the arrest.

It is essential that all injuries, no matter how apparently trivial, present on a detained individual are carefully documented by the forensic physician who examines the detainee whether at a police station or elsewhere. Contemporaneous photographs are always extremely helpful in these circumstances.

In terms of cause of death, few of the minor injuries will be relevant, but they may provide an indication of the extent and degree of the force that was applied to effect an arrest and, as such, they can be of immense value. Injuries present in high-risk sites (e.g., around the neck) must be examined, documented, and interpreted with particular care. All of the injuries must be interpreted in the light of witness statements and can provide useful corroborative evidence.
7. **Alcohol- and Drug-Related Deaths**

7.1. **Alcohol**

Alcohol is one of the most commonly used drugs in the world. The small ethyl alcohol molecule can pass easily through the blood–brain barrier to the CNS where it has direct suppressant affects on the whole of the CNS. At low concentrations, the specialized cells of the cerebral cortex are affected, but as the concentration increases, the depressive effects involve the higher areas of the brain, resulting in increasingly disinhibited behavior. Still higher levels of alcohol result in the depressant effects involving the lower levels of brain function, including the vital cardiorespiratory centers in the midbrain and the medulla, predisposing the intoxicated individual to cardiorespiratory depression or arrest. Alcohol levels in excess of 300 mg/dL are considered to be potentially lethal, and although some individuals have survived, usually with medical attention, with higher levels, it should be remembered that some individuals have died with far lower levels of alcohol in their blood stream.

However, the effects of alcohol are not confined to the brain; there is also marked peripheral vasodilation, resulting in increased heat loss that may occasionally lead to hypothermia. The adverse effects of alcohol on the coronary circulation, particularly when associated with coronary atheroma, may lead to myocardial ischemia and the development of dysrhythmias and sudden death.

Alcohol also has marked diuretic effects and, when combined with the ingestion of large quantities of fluid (particularly in beer and lager drinking), it may result in electrolyte disturbances, particularly hyponatremia.

The chronic effects of alcohol involve many of the internal organs; alcoholic cardiomyopathy, hepatic steatosis, and cirrhosis are the most common, and all can lead to sudden death.

Alcohol may also be a major factor in causing death by predisposing the individual to accidental trauma and by obscuring the effects of that trauma. This is particularly the case in head injuries when the changes in the level of consciousness are attributed to the effects of alcohol rather than an identified or unidentified head injury.

Alcohol is also a gastric irritant and may precipitate vomiting when taken in excess. This, combined with the effects of decreased consciousness and the reduced laryngeal reflexes associated with intoxication may result in a significantly increased risk of aspiration of vomit into the airways and death. Such an event is unpredictable and, without constant supervision, unpreventable.

The anesthetic effects of alcohol may also result in deaths from asphyxiation. These deaths are the result of the intoxicated individual moving into or being placed or left in a position that impedes respiration either by occlusion
of the external respiratory orifices or the internal airways (particularly the larynx) or restricts the free movement of the chest wall. These positions may result from lying face down on a bed, marked extension or flexion of the neck, or lying across an edge with the head down. Deaths resulting from impairment of respiration in this manner classically result in profound asphyxial changes involving the upper body, and these deaths are ascribed to postural asphyxia.

Given the speed with which an individual under the influence of alcohol can die from either the aspiration of vomit or postural asphyxia, it is doubtful if a police station cell is the correct environment for his or her recovery from intoxication.

7.2. Drugs

Drug use is now so ubiquitous in Western society that any examination of a potential detainee by a forensic physician must include a careful evaluation of drug use whether in the past or recently. The skill of the forensic physician will undoubtedly be stretched to the full in the evaluation of the history given, and this is discussed fully in Chapter 10. The failure to identify a drug abuser who then suffers from withdrawal while in custody is just as potentially life-threatening as the failure to continue a detainee’s prescribed medication.

In terms of deaths in custody, all drug use, whether social, abusive, or therapeutic, is relevant (13), and the possibility that a detainee may have abused just one drug or a combination of drugs with or without alcohol before death must be positively excluded. A full drug screen on blood and, if available, urine is imperative. Some laboratories will also examine samples of bile and/or liver to detect evidence of previous drug abuse.

The management of acute drug intoxication is a matter of clinical judgment, but with adequate medical care, it is unlikely that, except in exceptional circumstances, drug intoxication alone will lead to sudden death in custody.

8. Deliberate Injuries

8.1. Baton Blows

Blows from a baton are usually easily identified because forceful blows produce the classic “tram line”-type injuries on the skin. “Tram line” injuries are typical of a blow from a linear blunt object; the areas of the skin that are most traumatized are not those at the middle of the site of contact where the skin is most evenly compressed but rather at the margins on the contact site where the stretching and distortion of the skin and, hence the damage to the underlying tissues, including the blood vessels, is most pronounced. A linear object will, almost by definition, have two such margins, which run
parallel, and a blow from such an object results in two linear parallel bruises; hence, the terminology “tram line.”

Blows from a baton may also result in deeper bruising, nerve damage, and fractured bones. The deeper injuries tend to reflect the use of greater force, but it is not possible to correlate with any degree of certainty the amount of force needed to cause a particular injury in any individual.

It is essential for both the forensic physician who examines a living victim of a baton blow to the head (or from any other cause) and the pathologist who performs a postmortem examination to remember that significant cerebral trauma can be caused in the absence of obvious external trauma or skull fractures, and it would be prudent to assess anyone who has received or complains of receiving a head injury from a baton or from any other cause and to consider carefully if referral to hospital for a full neurological assessment is advisable.

8.2. Neck Holds

Pressure on and around the neck is well-known to be a potentially lethal action (14). Death can be caused after compression of the neck by any one of four mechanisms or by any combination of two or more of the following:

- Airway obstruction by direct compression of the larynx or trachea or by the pressure on the neck raising the larynx upward and causing the superior aspect of the pharynx to be occluded by the tongue base. This can be achieved by pressure of a forearm across the front of the neck, sometimes called the “choke hold.”
- Occlusion of the veins in the neck. The low pressure in the venous system and the thin yielding nature of the vein walls make venous occlusion more easily achieved than arterial occlusion; however, the large reserve capacity of the venous system makes it unlikely that rapid death would result even if complete occlusion was achieved, unless some other factor supervened.
- Compression or occlusion of the carotid arteries. This is harder to achieve than venous occlusion because of the higher pressure in the arterial system and the thickness of the arterial walls; however, the effects of occlusion will become apparent much quicker. Saukko and Knight (14) record that occlusion of the carotid circulation for 4 min or more may result in brain damage, and Reay et al. (15) demonstrated significant changes in blood flow in the face of five individuals who were subjected to compression of the carotid arteries by the application of a “sleeper hold” in experimental conditions. A sleeper hold is applied when the upper arm compresses one side of the neck and the forearm the other and the larynx rests in the “V” formed by the elbow.
- The fourth mechanism by which death can occur during pressure to the neck results from stimulation of the vagus nerve by direct pressure in its course down the neck or as a result of stimulation of the carotid sinus. Vagal stimulation
results in bradycardia, which may progress to asystole or, in some cases, immediate asystole.

Mercy et al. (16) reviewed 20 deaths where neck holds had been applied and concluded that in 19 of these cases, the application of the neck hold was associated with the death. Conversely, Kowai (17) concluded that the use of the choke hold could take between 10 and 20 s to cause unconsciousness, and, therefore, it was safe. Clearly, they did not experience the vagal effects of this hold in their experiments.

Neck holds are commonly used in many forms of wrestling or martial arts, and in these situations, they are seldom associated with fatalities, possibly because of the ability of the person held to indicate his or her willingness to submit to a referee and so cause the hold to be released. No such authority is present during a restraint by police; perhaps this is why fatalities are recorded in this situation. In the United Kingdom, the use of neck holds by police during restraint is specifically prohibited and officers are warned during their training of the potentially fatal effects of applying any pressure to the neck. However, in the United States, neck holds are an approved method of restraint.

The pathological examination of deaths associated with compression of the neck requires a detailed and careful dissection of the neck structures (18). The finding of injuries to the muscular, cartilaginous, vascular, or neural components of the neck must be interpreted in the light of the restraint events, the actions of the restrainers, and the subsequent resuscitation, if any. Pressure on the neck to maintain an airway after cardiac or respiratory arrest may result in bruising, which could be confused with pressure before or, indeed, causing that arrest. Therapeutic insertion of cannulae during active resuscitation by paramedics or in the hospital commonly leads to marked hemorrhage in the neck that, although it is unlikely to be confused with bruising caused by a neck hold, may mask any bruising that was present.

Pressure on the neck is not, of course, the only mechanism whereby an individual may suffer anoxia or asphyxiation. Any action that partially or completely occludes the mouth and/or the nose will result in difficulty in breathing and may result in asphyxiation. The features of these other causes of asphyxiation, traumatic or restraint asphyxia, are discussed in Subheading 11.

8.3. Homicide

There have been numerous cases where individuals have been murdered in the cell by another inmate. Such deaths are most commonly associated with blunt trauma, but strangulation, stabbing, and other methods may be employed
if suitable weapons are available. It is also evident that individuals have been deliberately assaulted and killed by police officers during arrest and detention.

The forensic physician should always be aware of the possibility that police may have used excessive force or that deliberately homicidal injuries may have been inflicted. If injuries are present on any individual in their care, these injuries must be carefully documented and, if they are beyond that which the physician considers reasonable in the circumstances, their concerns should be expressed immediately to a senior officer, to a legal representative of the detainee, and an official complaints procedure. The physician also has the duty to ensure that no further harm comes to that person.

9. SELF-INFLECTED INJURIES

Suicidal deaths in custody are a cause for continuing public concern. The methods used are variable but reflect the materials available to the individual at that time.

9.1. Hanging

To effect a hanging suicide, the individual must have two things: an object that can be made into a noose and a point on which to tie it. In addition, the individual must be able to place his or her body so that his or her body weight can be used to apply pressure to the neck via the noose.

The materials and objects that can be made into a noose are many and vary from the obvious (ties, belts, shoelaces, etc) to the unusual (underwear, shirts, etc). To attempt to reduce the possibility of hanging suicides many police station cells have been redesigned and attachment points for the noose (pipes, bars, etc) have been removed or covered. However, the lack of these obvious points did not deter some individuals who placed the bed on end and used the upper end as the fixing point. Installation of fixed beds or benching should preclude the use of that method in future. It must be remembered that hanging can still be achieved, although is clearly more difficult, from a low suspension point, and any protrusion from a wall or fitment in a cell can potentially be used as the upper attachment for the noose.

In addition to removing the fixing points, attempts have been made to remove the items that have been used as nooses in the past and belts, shoelaces, etc. are sometimes taken from prisoners. Paper clothing has been used, although this has not been entirely successful because it entails removing all of the individual’s clothing, which is clearly impractical in many cases and may raise problems with human rights. If made strong enough to withstand any degree of wear, the paper clothing would also be strong enough to act as a noose.
The key to preventing hanging suicides lies in the careful evaluation of all individuals who are to be detained and in the design of the cells in which they are held to preclude any possible point for the attachment of a noose.

Given the speed with which hanging can be effected, it is most unlikely that anything other than a permanent watch over the suicidal detainee would provide a foolproof method to prevent hanging in a cell. A cycle of 15-minute checks will allow more than ample time for an individual to hang himself or herself and cannot be considered to be adequate protection against this type of suicide.

9.2. Ligature Strangulation

Because the possibility of suspension is reduced by the changes in the design of the cells, the possibility of other forms of self-asphyxiation are likely to increase. Self-strangulation by ligature is considered to be possible but difficult (14); because the pressure has to be applied to the neck in these cases by the conscious muscular effort of the hands and arms, it follows that when consciousness is lost and the muscular tone lessens, the pressure on the ligature will decrease, the airway obstruction and/or the vascular occlusion will cease, and death will generally be averted. However, if the ligature is knotted or if the material is “non-slip” and looped around itself, then it is possible for the individual to apply the pressure to the neck and for that pressure to be maintained even after consciousness is lost and, as a result, death may follow.

As with hanging, the key to preventing these deaths lies in careful evaluation and, if necessary, the removal of clothing and observation.

9.3. Incised Injuries

All prisoners should be carefully searched before incarceration, and any sharp objects or objects that could be sharpened must be removed. The extent of the search will probably depend on the mental state of the individual, and the possibility of an intimate search to exclude weapons concealed in the vagina or rectum should be considered in those individuals who are considered most at risk. Death from deep incised wounds to the neck or arms can occur quickly. Even if the individual is found before death has occurred, the effects of profound blood loss may make death inevitable, despite resuscitation attempts.

9.4. Drugs

When considering the possibility of suicide using drugs while in police custody, the two key factors are, once again, evaluation and searching. Careful searching (possibly including intimate searches in some cases) will prevent the ingestion of drugs by an individual after he or she has been placed in
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the cell. The forensic physician must always be aware of the possibility that excessive quantities of a drug or drugs were taken before arrest and detention and may exert their effect when the individual is in the cell.

10. Excited Delirium

10.1. Definition

The exact definition of this syndrome remains elusive, despite many publications apparently describing similar events (19,20). Indeed, the many different names given to these apparently similar conditions (Bell’s mania, agitated delirium, excited delirium, and acute exhaustive mania) throughout the years indicate that it is a syndrome that may have many different facets, not all of which may be present in any single case. However, all of these descriptions do comment on the high potential for sudden collapse and death while the individual is in the highly excited states that they all describe. It is now accepted that such syndromes do exist, and although it is now commonly associated with use and abuse of cocaine (21), it is important to note that it was described in 1849 well before cocaine use and abuse became common (19).

10.2. Features

The clinical features of excited delirium are generally accepted to be the following:

- A state of high mental and physiological arousal.
- Agitation.
- Hyperpyrexia associated with sweating.
- Violence, aggression, and hostility.
- Insensitivity to physical pain or to restraint sprays.

In addition to these clinical observable features, there will certainly also be significant physiological and biochemical sequelae, including dehydration, lactic acidosis, and increased catecholamine levels (22). These biochemical and physiological features may be such that they will render the individual at considerable risk from sudden cardiac arrest, and the descriptions of cases of individuals suffering from excited delirium (23) indicates that the sudden death is not uncommon. Shulack (23) also records that: “the end may come so suddenly that the attending psychiatrist is left with a chagrined surprise,” and continues: “the puzzlement is intensified after the autopsy generally fails to disclose any findings which could explain the death.” More than 50 years after the publication of that paper, it is still true, but the site of the death may have moved from the psychiatric ward to a police station.
The findings noted in by Shulack in 1944 are also repeated today in many cases that have the features of excited delirium, the difference now being that toxicological examination not uncommonly reveals the presence of cocaine or, in a therapeutic environment, neuroleptic drugs and, as a result, it is tempting to relate the cause of death to the presence of the drug or drugs. In the context of restraint associated with death in cases of excited delirium, the presence of injuries to the neck may lead to the conclusion that death resulted from asphyxia, but this interpretation needs careful evaluation.

What is perhaps of greater importance is that in all of the cases described in the clinical literature (19,20,23–25), there has been a prolonged period of increasingly bizarre and aggressive behavior, often lasting days or weeks before admission to hospital and subsequent death. The clinical evidence available for the deaths associated with police restraint indicates that although there may have been a period of disturbed behavior before restraint and death, the duration of the period will have been measured in hours and not days. This change in time scale may result from the different etiology of the cases of excited delirium now seen, and it is possible that the “natural” and the “cocaine-induced” types of excited delirium will have different time spans but a common final pathway. This feature also must be elucidated in the future.

The conclusion that can be reached concerning individuals displaying the symptoms of excited delirium is that they clearly constitute a medical emergency. The police need to be aware of the symptoms of excited delirium and to understand that attempts at restraint are potentially dangerous and that forceful restraint should only be undertaken in circumstances where the individual is a serious risk to himself or herself or to other members of the public.

Ideally, a person displaying these symptoms should be contained and a forensic physician should be called to examine him or her and to offer advice to the police at the scene. The possibility that the individual should be treated in situ by an emergency psychiatric team with resuscitation equipment and staff available needs to be discussed with the police, and, if such an emergency psychiatric team exists, this is probably the best and safest option. If such a team does not exist, then the individual will need to be restrained with as much care as possible and taken to the hospital emergency room for a full medical and psychiatric evaluation. These individuals should not be taken directly to a psychiatric unit where resuscitation skills and equipment may not be adequate.

11. RAPID UNEXPLAINED DEATHS DURING RESTRAINT

Deaths occurring while an individual is being restrained are extremely rare. In the UK Police Research Group Paper (26), which covers the period
1990–1996, 16 cases are identified where police action “may have been associated with the death” amounting to 6% of the deaths that this group studied. From consideration of the medical aspects of these deaths recorded in their report, it would appear that six of the deaths resulted from natural disease and four were related to drug use or abuse. Of the remaining six cases, one was associated with a baton blow to the head, two to asphyxiation resulting from pressure to the neck, two to “restraint asphyxia,” and one to a head injury. Therefore, in the deaths during the 7 years that this group considered, a total of four deaths (<1.5% of the 267 deaths in police custody reviewed by this group) were apparently directly associated with asphyxiation during restraint.

However, the close association of these deaths with the actions of the police in restraining the individual raises questions about the pathologists’ conclusions and their acceptance by the courts. It is common for several pathological opinions to be obtained in these cases; in a review of 12 in-custody deaths, an average of three opinions had been obtained (range 1–7) (27). Indeed, in one of the cases cited as being associated with police actions, seven pathological opinions were sought, yet only one opinion is quoted. This points to the considerable difficulty in determining the relative significance of several different and, at times, conflicting areas of medical evidence that are commonly present in these cases.

The area of restraint that causes the most concern relates to asphyxiation during restraint. It has been known in forensic circles for many years that individuals may asphyxiate if their ability to breathe is reduced by the position in which they are placed or into which they fall (Subheading 7.1.; ref. 28). This type of asphyxiation is commonly associated with alcohol or drug intoxication or, rarely, with neurological diseases that prevent the individual from extracting themselves from a position that either partially or completely occludes their mouth and nose or limits the freedom of movement of the chest wall. Death resulting from these events has been described as postural asphyxia to indicate that it was the posture of the individual that resulted in the airway obstruction rather than the action of a third party.

In 1988, research by Reay et al. (29) was published that was initially believed to show that in laboratory conditions, placing an individual in the hog-tie position significantly increased the time taken to return to resting blood oxygenation levels after moderate exercise. “Hog-tieing” is a form of restraint where the detainee is placed face down and the hands are tied together and then tied to the feet. Reay concluded that positional restraint (hog-tieing) had “measurable physiological effects.” In 1992, Reay published an article (30) that recorded six cases where, in his opinion, individuals had died as a result of “hog-tieing” and being placed prone in police vehicles. This article raised
the possibility that asphyxiation was occurring to individuals when they could not move themselves to safer positions because of the type of restraint used by the police. The concept of “restraint asphyxia,” albeit in a specific set of circumstances, was born.

Since the description of deaths in the prone hog-tied position, Reay’s original concepts have been extended to account for many deaths of individuals simply under restraint but not in the hog-tied position. The term restraint asphyxia has been widened to account for these sudden and unexpected deaths during restraint. Considerable pathological and physiological controversy exists regarding the exact effects of the prone position and hog-tieing in the normal effects upon respiration. Further experiments by Chan et al. (31) have cast considerable doubt on Reay’s thesis, although other experiments by Roeggla et al. (32) support the original theory. Although the physiological controversy continues, it is clear to all those involved in the examination and investigation of these deaths that there is a small group of individuals who die suddenly and apparently without warning while being restrained.

Recent physiological research on simulated restraint (33,34) revealed that restraint did produce reductions in the ventilatory capacity of the experimental subjects but that this did not impair cardiorespiratory function. In two of the eight healthy subjects, breath holding after even moderate exercise induced hypoxia-related dysrhythmias, and it was noted that arterial oxygen saturation fell rapidly even with short breath hold times, especially if lung volume was reduced during exhalation.

The problem that currently faces the forensic pathologist is the determination of the cause or causes of these deaths. This is made harder because there are seldom any of the usual asphyxial signs to assist and, even if those signs are present, it is difficult to assign weight or significance to them because similar changes can be caused simply by resuscitation (35,36).

The major features of asphyxiation are cyanosis, congestion, and petechial hemorrhages (14). These features are seen to a greater or lesser extent in many, but not all, cases of asphyxiation. They often are completely absent in many plastic bag asphyxiations and in hanging, they have variable presence in manual strangulation, and they are most commonly seen in ligature strangulation. However, their most florid appearances are in deaths associated with postural asphyxia or crush asphyxia cases where death has occurred slowly and where it is associated with some form of pressure or force reducing the ability of the individual to maintain adequate respiratory movement, either from outside the body or from the abdominal contents splinting the diaphragm.
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It is of interest then that these features, if present at all in these cases are, at most, scant and do not reflect their appearance in other cases of crush asphyxia, suggesting that different mechanisms are the cause of death in these two sets of circumstance.

The individuals who die during restraint are not infrequently under the influence of drugs (particularly cocaine) or alcohol; they may be suffering from some underlying natural disease (particularly of the cardiovascular system), or they may have suffered some trauma. These “additional” factors are sometimes seized by pathologists and courts to “explain” the death, sometimes even in the face of expert opinion that excludes the additional factor from playing a major part in the death. It would seem that there is a subgroup of the population that is either permanently or temporarily susceptible to the effects of restraint, whether those effects be mediated entirely or partially through decreased respiratory effort or some other factor.

There is a separate entity, the exact cause of which is not yet clear, where otherwise fit and healthy individuals die suddenly while being restrained and yet do not show significant features of asphyxiation. It is hoped that further research on the physiology of restraint will elucidate the mechanisms that cause death in these cases. Until these mechanisms are established, it is reasonable to propose that these deaths should be classified for what they are—rapid unexplained death during restraint—rather than to conclude that the cause of death cannot be determined or to ascribe a doubtful medical or toxicological cause of death that does not bear close scrutiny.

Deaths classified as rapid unexplained death during restraint must fulfill several of the following criteria:

1. The death must have occurred during restraint, and the individual must have collapsed suddenly and without warning.
2. A full external and internal postmortem examination must have been performed by a forensic pathologist, which did not reveal macroscopic evidence of significant natural disease, and subsequently a full histological examination of the tissues must have been performed, which did not reveal microscopic evidence of significant natural disease.
3. Studies must not reveal genetic markers of significant disease.
4. There must be no evidence of significant trauma or of the triad of asphyxial signs.
5. A full toxicological screen must have been performed that did not reveal evidence of drugs or alcohol that, alone or in combination, could have caused death.

The small numbers of these deaths in any single country or worldwide makes their analysis difficult; indeed, to search for a single answer that will explain all of these deaths may be futile. The bringing together of these deaths
under a single classification would make the identification of cases and their analysis easier.

The problem for the police is that when approaching and restraining an individual, they cannot know the background or the medical history nor can they have any idea of the particular (or peculiar) physiological responses of that individual. The techniques that are designed for restraint and the care of the individual after restraint must allow for safe restraint of the most vulnerable sections of the community.

New research into the effects of restraint may possibly lead to a greater understanding of the deleterious effects of restraint and the development of safer restraint techniques. Although this experimental work is being performed, the only particular advice that can be offered to police officers is that the prone position should be maintained for the minimum amount of time only, no pressure should be applied to the back or the chest of a person restrained on the floor, and the individual should be placed in a kneeling, sitting, or standing position to allow for normal respiration as soon as practical.

It should be noted that an individual who is suffering from early or late asphyxiation may well struggle more in an attempt to breathe, and, during a restraint, this increased level of struggling may be perceived by police officers as a renewed attempt to escape, resulting in further restriction of movement and subsequent exacerbation of the asphyxial process. Officers must be taught that once restrained, these further episodes of struggling may signify imminent asphyxiation and not continued attempts to escape, that they may represent a struggle to survive, and that the police must be aware of this and respond with that in mind.

Since these matters were first brought to forensic and then public attention and training and advice to police officers concerning the potential dangers of face down or prone restraints, especially if associated with any pressure to the chest or back improved, there has been a decrease in the number of deaths during restraint. However, even one death in these circumstances is too many, and it is hoped that by medical research, improved police training, and increased awareness of the dangers of restraint that these tragic deaths can be prevented.

REFERENCES