Restraint-related deaths in health and social care in the UK: learning the lessons

Much debate has recently taken place around what represents good practice in terms of physical intervention. Unfortunately a shortage of good quality research has meant that aspects of this discussion have been over reliant on 'expert' opinion and unduly influenced by sensationalist media reporting, rather than systematically-collated evidence. Brodie Paterson and colleagues outline the results and discuss the implications of a project which aimed to explore the frequency of deaths associated with restraint in health and social care settings in the UK

Violence poses a major threat to the welfare of many of the staff who work in health and social care settings and our attempts to reduce that risk may, in certain circumstances, involve the use of restraint. It remains, of course, ultimately desirable to avoid any form of physical intervention, as any such intervention risks the possibility not just of physical but also psychological trauma (Smith 1995).

Restraint is an intrinsically unsafe procedure, which may, however, in some circumstances, be less dangerous than the alternatives available. The most obvious way of reducing the risk of restraint-related injuries and deaths is to avoid restraint by actively promoting alternative intervention and management strategies which focus on primary prevention and positive engagement (Allen 2000). Where restraint is unavoidable however, its practice should be based on a consensus informed by the robust scrutiny and testing of alternative interventions based on the principle of the least restrictive environment (Aitken and Tarbuck 1995). The risks involved should be identified and discussed with the client, carers, relatives and advocates and considered against the risks of alternatives (Harris *et al* 1996).

Direct care staff in the UK are increasingly being trained in systematic methods of preventing violence and such training will often incorporate some kind of physical interventions component, usually involving some training in how to 'hold against active resistance' i.e. restrain. The assumption is that such training will improve both staff and patient safety (British Institute for Learning Disabilities 1998, Clinical Resource Audit Group Scottish Health Service Management Executive 1996, Paterson *et al* 1992). However, a number of case reports (Morrison and Sadler 2001, Paterson and Leadbetter 1998, Siebert and Thogmartin 2000) have suggested that restraint may, in certain circumstances, be associated with both serious injuries and deaths (General Accounting Office of the United States 1999, Miles and Irvine 1992). There have been reviews of restraint-related deaths in police custody in the US (Ross 1998) and England (Leigh *et al* 1999) but to date no similar exercise appears to have been conducted in health or social care in either the UK or US. This is despite suggestions that restraint may be more common in such settings and that young people and people with disabilities may be at increased risk (Allen 2000, Boyle 1999).

There is currently no central database of either restraint-related injuries or deaths in the UK. Therefore, while a series of individual injuries or deaths may have been reported and investigated locally, there has been no systematic review of the phenomena. This review chose to focus only on deaths and to exclude injuries, on the assumption that deaths are more likely to be reported and are likely to be the focus of subsequent inquires which themselves may attract comment.

The aims of the exercise undertaken were primarily to:

- establish preliminary figures for restraint-related deaths and establish a database of such deaths
- carry out a preliminary analysis of the factors associated such deaths.

Survey

Inclusion criteria

Restraint was operationally defined as 'being held against active resistance' by physical or mechanical means. Deaths that had occurred in health or social care settings, i.e. hospitals or care homes (as opposed to police cells or prisons), were included. Inclusion in this series does not, however, necessarily imply a causal association between the patient's/client's restraint and his or her death.

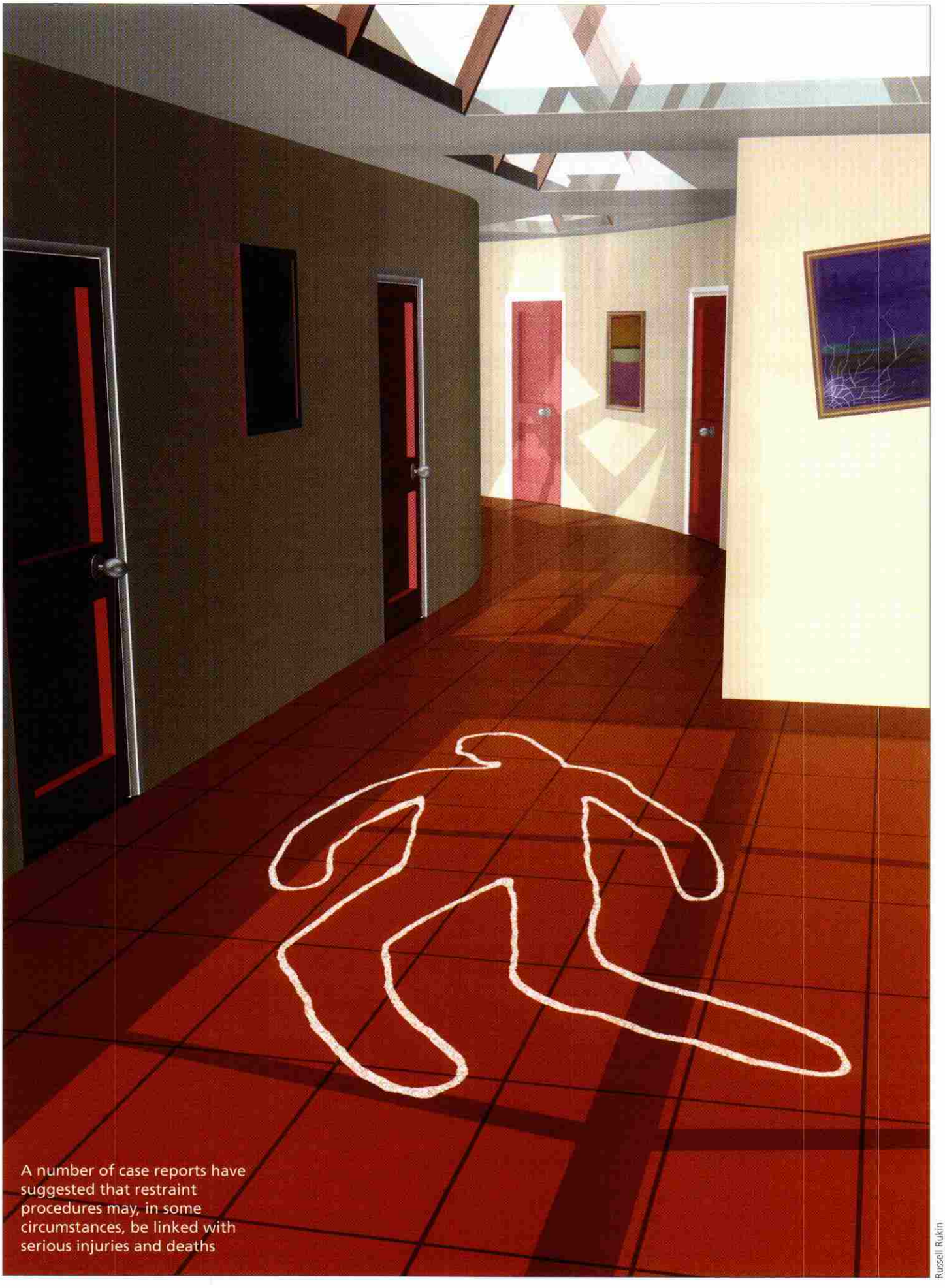
O'Halloran and Frank (2000) have stressed the necessity of establishing a temporal relationship between restraint, sudden loss of consciousness and death. In all of the cases reviewed evidence exists to confirm the patient's loss of consciousness during restraint and his or her subsequent death without recovering consciousness. In some of the cases, however, the actual restraint was seen as a contributory factor rather than the cause of death. The relationship between restraint use and the risk of adverse consequences is complex and will be explored in the discussion section

Method

The case finding process had a number of elements. First, letters were written to the Mental Welfare Commission for Scotland and the Mental Health Act Commission in England, asking for details of any cases they were aware of. Second, a review of a series of nursing and healthcare databases (MED-

keywords

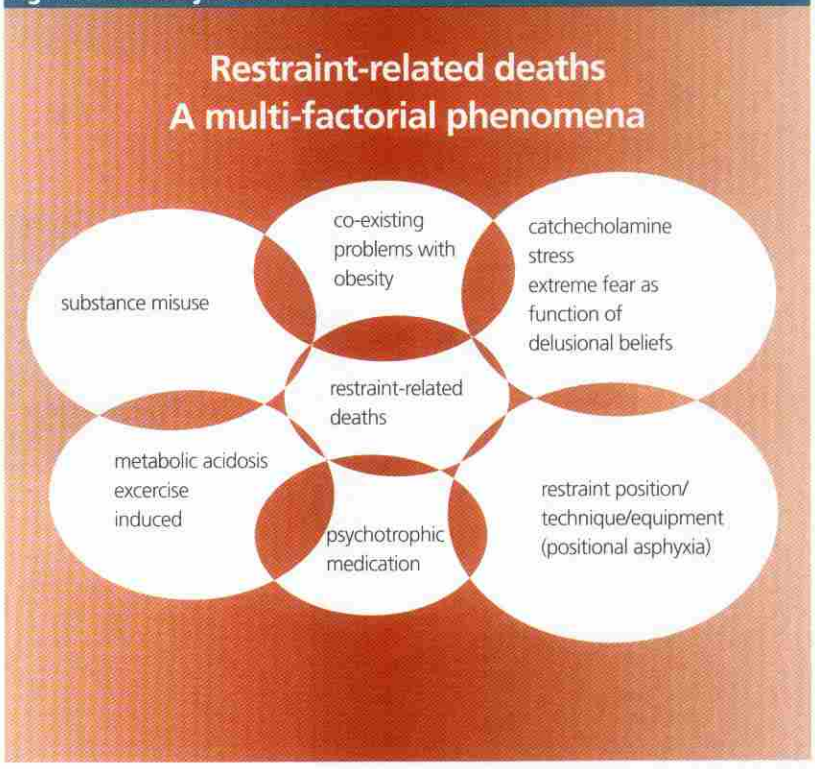
> death
> violence
> patients: rights



A number of case reports have suggested that restraint procedures may, in some circumstances, be linked with serious injuries and deaths

Russell Rukin

Fig.1. Contributory factors



LINE, CINAHL and PSYCHLIT) was conducted; search terms were 'restraint and death', 'restraint and death and mental' 'restraint and asphyxia'.

Although a number articles relevant to the broad topic of restraint-related deaths were identified, particularly with regard to restraint and asphyxia, only two UK case accounts were found (Paterson and Leadbetter 1998, Morrison and Saddler 2001). The apparent failure of this search process led to considerable thought about the process of case identification and, ultimately, to the development of a third element to the case finding process involving a newspaper database search. The rationale for accessing a newspaper database was that while cases might not have been discussed in the professional literature they were potentially likely to have been the subject of newspaper reporting. The Lexis-Nexis Executive News plus is a collection of databases containing in total around 2,300 UK and overseas newspapers, newswires and magazines. Three separate searches were carried out on March 2001. The total number of articles reviewed, including multiple copies identified by the search method, was 765.

Each article was screened for relevance by the lead author. The inclusion criteria employed required that there was a report of or comment on a reported death which had occurred in a health and social care setting and which had been associated with restraint. From these various exercises, and from cases otherwise known to the authors, including involvement as an expert witness and via published inquiry reports obtained, a total of 12 cases were identified.

Four distinct 'clusters of deaths' were identified. These were:

- neck holds
- mechanical restraint-related deaths
- prone restraint related deaths
- atypical restraint-related deaths.

A discussion of the potential contributory factors is accompanied by brief case details.

Neck holds

In at least two of the cases described, namely those of Bryan Marsh and Michael Martin, there is some evidence that the restraint involved physical pressure to the neck. Pressure exerted on the carotid arteries can rapidly induce unconsciousness but carries a significant risk that death rather than unconsciousness will result (Reay and Eisle 1982).

Michael Martin died in Broadmoor in 1979. Although he was initially restrained by a neck hold he was ultimately held face downwards and sedated. He was then left for 50 minutes being periodically observed before it was noted that he had not moved during this period. This case is of particular note because the subsequent inquiry called for the 'Special' (i.e. high security) hospitals to adopt 'non violent' restraint methods and ultimately to the adoption of Control and Restraint Training from the prison service (Ritchie 1985).

Bryan Marsh died in Rampton in 1992. A second post mortem suggested that he had been restrained about the neck at the time of his death, although this was ascribed to a heart attack.

Mechanical restraint

A series of deaths in the US involving the use 'mechanical restraint' have been reported by (Miles and Irvine 1992). In the cases described generally involving elderly people experiencing confusion, garments specifically designed for restraint purposes are often involved and in the person's attempts to escape he or she becomes entangled with lethal consequences (Corey *et al* 1992). Such cases may not be uncommon with Morrison (1997) recording that in the US from 1987 to 1996 the manufacturers of protective restraints reported 131 deaths to the Federal Drug Administration Agency. However, in some cases with similarities to that of the case below, an element of the individual's own clothing rather than a form of specialised restraint 'vest' or other garment can effectively become a ligature as he or she slips out of a bed or wheelchair.

Freda Latham, a woman with learning disabilities, died in 1995 in Staffordshire after being 'mechanically' restrained by being tied to a toilet seat with her 'bib'. She was initially therefore in a seated position but appears to have slipped off the toilet seat and has then been strangled by her bib which acted as a ligature.

Prone restraint

Prone restraints appear to predominate in this series. It is extremely important to stress that the term 'prone restraint' does not describe in any way a homogenous procedure but a wide range of situations in which the person is held on the floor, generally (unless otherwise described) 'face down'. A wide range of variations appears to have been used in the cases described. This is perhaps implied in the varying numbers of staff reportedly involved in the incidents, which ranged from two to eight. In the case of David Falconer, both his arms and legs appear to have been pinned behind his back in a procedure which, it has been suggested, may mirror aspects of a technique associated in the literature with a number of restraint-related deaths in American police custody which is known as 'hobble tying' (Paterson and Leadbetter 1998). In this procedure the individual is placed in a prone position face down on the floor. The client's hands are then secured behind him or her with handcuffs and his or her legs are cuffed or otherwise secured by way of ties at the ankles. The ankles are then secured to the wrists with the client's legs bent and shoulders pulled back in order to accomplish this (Stratton *et al*

1995). Respiration requires:

- an unobstructed open airway
- adequate gas exchange between alveoli and the pulmonary vascular system
- a functional ventilatory pump or 'bellows' system to produce an airflow in and out of the lungs.

Even with an unobstructed airway and perfectly healthy lungs, if a failure occurs with the mechanical component of respiration (the muscular pump or bellows system), effective respiration cannot be achieved. Failure of the ventilatory pump will result in alveolar hypoventilation and a reduced uptake of oxygen manifested primarily by hypercapnia (Chan *et al* 1998)

The mechanical element of respiration requires:

- appropriate central nervous system control of respiratory muscle activity
- the ability of the ribcage to be expanded and relaxed by action of the intercostal muscles and the diaphragm
- and the ability of the diaphragm (the largest respiratory muscle) to contract in order to displace the abdominal viscera downwards and outwards.

Reay *et al* (1992) proposed that when placed in hobble restraints or similar positions the bellows aspect of the respiratory triad may be significantly compromised because pulling the shoulders up and back, done in order to secure the person's wrists to his or her legs, may force the chest wall into a hyper-expanded position thereby seriously limiting chest wall relaxation and expansion.

The face down position may prevent contraction of the diaphragm, particularly where the subject is obese and excess adipose tissue is displaced upwards into the abdominal cavity. This may prevent the creation of the negative pressure gradient required for inspiration.

The effects described may be exacerbated if pressure is applied downwards on the patient's back by staff to ensure the subject remains face down or to hold the person more securely e.g. while medication is administered (O'Halloran and Frank 2000). Even where the patient's legs are not involved, if the wrists are pushed behind the back against resistance, and pressure is then exerted downwards on the chest from behind, this may have the effect of severely impairing respiration (see the case of John Patterson).

It has been suggested, however, that a fundamental weakness in the restraint asphyxia hypotheses is an apparent inability to demonstrate clinically significant changes in respiration as a result of hobble tying in controlled i.e. experimental simulations (Chan *et al* 1997). Reay and colleagues' initial research (Reay 1988) found significant decreases in heart rate and oxygen saturation level recovery rates in ten adult volunteers restrained via hobble tying after moderate exercise to raise their pulse rate to 120 beats per minute (bpm).

Similarly, Roeggla *et al* (1997) reported that the experimental application of hobble restraint with non-struggling, healthy volunteers dramatically altered cardio-pulmonary function within three minutes. Mean Forced Vital Capacity (FVC) decreased by nearly 40 per cent and Forced Expiratory Volume by (FEV) by 40 per cent, with significant changes to both blood pressure and heart rate (Roeggla *et al* 1997).

However, the link between hobble tying and positional asphyxia was then disputed by Chan *et al* (1997) who examined the impact of prone restraint on pulmonary function using 15 subjects. By employing more vigorous exercises they obtained more accurate measurement of blood gases using arterial sampling. They found statistically significant differences in FVC and FEV between restraint and rest in a seated position. They concluded, however, that these differences did not result in clinically significant differences in blood gases. Research by Schmidt and Snowden (1999) involving 18 subjects also failed to support Reay's assertions, suggesting that although hobble tying could impair respiration, the degree of impairment was marginal and unlikely therefore to be clinically significant.

However, a number of serious criticisms can be made of the ecological validity of both the original studies that initially supported the concept of restraint asphyxia and the later studies that have questioned it. Two main criticisms may be put forward in this respect. First, there is a lack of similarity between the subjects who participated in the experiments and those likely to be victims of restraint asphyxia. Obesity, a factor present in nearly all of the original series of deaths described by Bell *et al* (1992) was used as an exclusion criteria by Reay *et al* (1988). Positive testing for recreational drug use – a factor reported in the majority of cases of restraint-related deaths cited by Ross (1998) – was used as an explicit exclusion criteria in the study by Chan *et al* (1997) and not discussed by Roegglea (1997).

Second, it is possible to suggest that aspects of the procedures used in the simulation did not accurately reflect those liable to be found in association with cases of restraint asphyxia. In the study by Chan *et al* (1997), as previously discussed, the subjects were not 'hobble tied' in the conventional sense but via a 'modified' procedure which ensured that their arms were maintained in a straight rather than bent position by means of splints. It has been argued, however, that this difference negated one aspect of hobble tying, the pulling of the shoulders up off the ground when the wrists are secured to the ankles and back, which may have a significant physiological impact (Miller 1998a).

Schmidt and Snowden's (1998) research actually had two different elements; in the first stage in which the effects of hobble tying on recovery rates were examined when students exercised on a cycle ergonometer until their heart rates exceeded 120bpm and were then allocated to a hobble tied or seated position. In the second phase, subjects participated in a simulated chase over 250 meters followed by a 'struggle' resulting in a heart rate in the subjects ranging from 175-212bpm.

The effect of hobble tying on recovery from this scenario, which is perhaps much closer to a real-life restraint scenario than in stage 1, was not examined. The authors chose instead to examine the effects of a 'maximal restraint' position where the individual was handcuffed and his or her ankles secured. Rather than linking the legs to the wrists as in hobble tying, a cord was then placed round the subject's waist which is then connected to the foot restraint.The subject is then immobilised in a side lying position. The subject was then encouraged to actively struggle against the restraints but in a position expressly designed to minimise these factors suggested to contribute to reduced pulmonary function and for a maximum period of 30 seconds. Arguably therefore, although exercise as a variable was partially controlled for in the studies described, the effects of severe exercise stress inducing bpm in excess of 175 have not been studied in relation to hobble tying.

The contribution of these studies to our understanding of UK restraint-related deaths is, however, hampered further

by the infrequent association with death of hobble tying or procedures similar to it observed in this series. There has, however, been some research in the UK. Parkes (2000) investigated the effects of three restraint positions: a prone, i.e. face down 'C&R' restraint position, a supine i.e. face up position and a seated position, which was used as the control. He found no significant difference in recovery time between the seated position and the prone restraint position although there was a difference between prone and supine.

In the case of John Patterson it seems that pressure was exerted downwards on his back in order to restrain him. In a Home Office-funded study (Cary *et al* 2000) the effects on recovery rates after exercise of placing 75kg (in sandbags) on the backs of 12 subjects placed in a prone face down position were studied. While the results indicated significant effects on ventilatory function, Cary *et al* (2000) comment that there was no evidence of impaired cardio-respiratory function. Again, the ecological validity of the study is questionable; the subjects' exercise regime was controlled to ensure their heart rate was only 85 per cent of the maximum measured in an exercise load test the previous day.

Further, no rationale is given for fixing the load placed on the subject's back at 75kg. Where several staff are involved in a restraint it is easy to conceive of scenarios in which the weight placed on the subject's back could easily exceed this figure. In the case of Zoe Fairley, it is estimated that the combined weights of the staff, who used their body weight to restrain her, may have exceeded 300kg (York City Council 1997).

'It might be argued that we do not need to do research to investigate the potential risks involved in placing 300kg on a subject's back to ascertain the likely consequences'

In addition, as in the previous studies cited (with the limited exception of Schmidt and Snowden 1999 discussed previously) the subjects did not continue to struggle while restrained in the prone position but were instead acquiescent. This distinction can be crucial in some circumstances because it is the combination of prolonged struggle over several minutes or hours with the pulmonary restriction affected by restraint position, which may prove particularly lethal (Hick *et al* 1999). In all of the cases cited there is some evidence that the patients concerned continued to struggle vigorously against restraint over periods of time ranging from a few minutes (Michael Craig) to over 45 minutes (David Falconer).

Acute or excited delirium, sometimes referred to as agitated delirium, has been suggested to offer a credible explanation for a number of recent deaths ascribed to 'restraint asphyxia' (Farnham and Kennedy 1997). Before effective treatment for the acute phases of mania or psychosis was available, death as a consequence of exhaustion in patients who exhibited prolonged agitation was not uncommon (Bell 1859). Of some 2,444 deaths in one Scottish asylum over 28 years 9.6 per cent (or over 234) were ascribed to 'exhaustion from mental disease' (Easterbrook 1940:592). Similar figures are available from a number of US studies. Milling (1941:297) discussed deaths at the South Carolina State Hospital from 1915 to 1937 and records '360 cases in which the cause of death is given as Exhaustion due to mental excitement'. Larson (1939), discussing 14 fatal cases of acute mania, notes that the mental symptoms included confusion, complete disorientation, rapidly changing hallucinations, irrationality and ideas totally devoid of sequence.

Cardinal among the physical symptoms and present in every case were increased psychomotor activity, insomnia, dehydration, fatigue and elevation of temperature. In 1946, Shulack described a phenomena he called sudden exhaustive death in 'excited manics' (Bellak 1952). Describing the onset and symptoms of this syndrome, he observed:

- sustained motor and mental excitement with continued activity for a period
- rapid thready pulse
- rapid loss in body weight
- profuse clammy perspiration
- fall in blood pressure
- hyperthermia, delirium and death.

Bellak (1952), discussing the cause of death, somewhat presciently goes on to speculate whether some form of a general toxaemia had resulted from the 'excessive and continuous muscle metabolism'. Nearly 50 years later this hypothesis has recently received support in Hick *et al*'s (1999) report of two series of collapse associated with restraint. In the first series, with one exception, all of the patients died despite intensive treatment. On re-examination all of these patients were noted to have a severe acidosis and Hick *et al* (1999) report the results of a second series of patients presenting in similar circumstances treated with sodium bicarbonate given intravenously and hyperventilation who survived.

Hick *et al* (1999) comment that acute mental disturbance 'may alter pain sensation allowing exertion far beyond normal physiologic limits' without the patient experiencing subjective fatigue resulting in a severe metabolic acidosis. This condition might prove fatal whether restraint was involved or not. However, in a case of agitated delirium one physiological consequences of which may be acidosis, the effect of restraint position on pulmonary function that would not normally be significant in a healthy adult, could prove critical (Hick *et al* 1999).

An acute stress reaction: an hypothesis

The hypothesis developed by Hick *et al* (1999) allows us to imagine a scenario in which an individual experiencing mental illness perceives themselves to be in mortal danger. The resultant extreme fear may manifest itself physiologically in an acute stress reaction constituting a risk factor for death in its own right via the catecholamine stress on the heart (Case 1986). Characteristic of agitated delirium they exhibit confusion, agitation, hyperthermia and hyperactivity potentially involving extreme exertion (Miller 1998b). This may occur over minutes, hours or even days. If he or she is restrained because of concerns over his or her safety or that of others he or she is potentially likely to struggle vigorously against the restraint. However, if his or her pain perception is altered as a consequence of illness there is the potential that he or she will continue to struggle until he or she collapses or dies (Mohr and Mohr 2000).

Hicks *et al*'s (1999) model of restraint-related deaths is extremely persuasive, if still hypothetical, given the problems with the experimental literature discussed. We can safely conclude only that the experimental research to date has failed to prove or disprove it, although the implications for the treatment of restraint-related collapse of their research are highly significant. As Hicks *et al* (1999) acknowledge, however, 'Continued Combativeness despite restraints.... Seems to be a marker for a patient at high risk of death, regardless of pathophysiology'. Seven prone deaths were observed.

Orville Blackwood, a young black man, died in Broadmoor in 1991. He was restrained in a prone face down position by between five and seven staff while forcibly medicated. The cause of death was not given as restraint but as cardiac fail-

ure associated with the administration of phenothiazine drugs (Prins 1994).

David Falconer, an inpatient at the Edith Morgan clinic in Devon, died in 1994 with cause of death given as heart attack and traumatic asphyxia. He was reported as losing consciousness after he had been restrained in a face down prone position for 45 minutes with his arms and legs pinned behind his back. He failed to recover consciousness and was pronounced dead the next day

Zoe Fairley, a 21-year-old woman with learning disabilities, died in 1995 in a care hostel run by North Yorkshire Council after being restrained in a prone face down position by first two and then four staff. The post mortem concluded her death was caused by asphyxia due to 'fixation' of the chest during prone restraint.

Roger Sylvester, a 30-year-old black man, died in St Anne's hospital where he had been admitted as a place of safety after being restrained by eight police officers.

John Patterson, aged 39, died in 1997 in Poole after being restrained face down on a lawn by three care staff. His wrists were held behind his back by one member of staff while another secured his left arm and a third secured his legs

David Bennett, a 38-year-old black man, died in the Norvic clinic in Norwich in October 1998. He was restrained by at least three staff after attacking a female member of staff and his heart stopped during the restraint.

Michael Goldwater, a 35-year-old man with schizophrenia, died after having a heart attack while being restrained face down on the floor by staff in Runwell Hospital in April 2000.

Restraint technique thus represents one variable albeit potentially a highly significant, whose influence is mediated by a range of other factors (Chan *et al* 1998, Milliken 1998). This does not imply that restraint position in itself cannot prove fatal. Certain procedures, e.g. neck holds unquestionably carry a high risk of fatality and should be proscribed in all care settings, as should any form of physical obstruction of the nose and mouth. This carries the obvious possibility of suffocation and has led in some settings for procedures such as covering the patient's mouth to prevent spitting to be banned (General Accounting Office of the United States 1999).

However, the role of a number of other positions, notably prone restraints,remains ambiguous. The available evidence from this series shows that pressure exerted downwards on the chest in order to hold the person face down must be avoided, as should positions mirroring aspects of 'hobble tying'.

Deaths involving children

Of some interest is that in this series no restraint-related deaths involving children were identified. This is in marked contrast to the situation in the US where children appear over represented in reports of deaths involving restraint (Hartford Courant 1999). This disparity is not immediately explicable, but in the light of such statistics it is of potential concern that some child care services in the UK appear to have opted to purchase aggression and violence management systems originally developed in the US. Given the reported frequency of deaths involving children in the US the use of systems which may have not been the subject of research with regard to their physiological implications is questionable and research in this area seems urgently necessary.

The full combination of risk factors associated with restraint-related deaths may prove both difficult and undesirable to simulate under controlled experimental conditions because of the ethical issues involved in exposing participants to a very high level of risk, particularly with certain procedures such as hobble tying (Parkes 2002).

Stratton *et al*'s (2001) case series reports a total of 214 episodes of hobble tying in agitated delirium in which death occurred in approximately 12 per cent of cases. Exposing experimental subjects to this level of risk is inconceivable. It might be argued that we do not need to do research to investigate the potential risks involved in placing 300kg on a subject's back to ascertain the likely consequences. This does not mean that research cannot or should not be carried out into the physiological impact of restraint procedures in common usage to determine their relative impact on respiration in healthy adult subjects.

With the exception of the study reported by Parkes (2000) and Cary *et al* (2000) there appears to have been no research on the potential negative effects on pulmonary function of a wide range of procedures used commonly in the UK. Although hobble tying or similar procedures do not appear to be routinely employed, the absence of data on routine restraint as well as the frequency of untoward events makes it extremely difficult to comment on:

- the relative risks involved in restraint per se. Because we do not know how often restraint is used we thus have no data on the frequency of adverse consequences relative to the overall frequency with which restraint is used.
- the comparative risks involved across a wide range of individual procedures and between systems
- the relative risks involved in restraint comparison to alternative interventions including seclusion, mechanical restraint or medication (Busch and Shore 2000).

Cocaine-induced delirium

The potential role of cocaine intoxication merits separate discussion. Cocaine, and other recreational drugs, have been reported in association with agitated/excited delirium since the 1970s (post-1975). The presenting features of the syndrome, i.e. agitated delirium, are similar but the aetiology is different with cocaine or methamphetamine consumption the most common antecedents (Mirchandani *et al* 1994). Ross (1998), discussing a series of 61 cases reports of excited delirium custody deaths, indicates that cocaine use was an issue in 69 per cent, but that in many instances this was combined with alcohol and sometimes other drugs. There is, however, no evidence from this preliminary examination of this series of deaths of cocaine intoxication.

Neuroleptic Therapy/Neuroleptic Malignant Syndrome

In addition to recreational drugs, the role of prescribed medication, particularly the neuroleptics, has been discussed in relation to sudden deaths in psychiatry (Whyman 1976). Kumar (1997) has reviewed the potential adverse effects identified including cardiac arrhythmia and respiratory failure and case reports have linked neuroleptic therapy, particularly the phenothiazines, with deaths involving violent struggle (Laposata *et al* 1988). Administration of neuroleptics may also increase the risk of death during restraint by impairing the client's ability to swallow or expectorate effectively leading to an increased risk of the inhalation of vomit (Jitsufuchi *et al* 1995, Wendkos 1979). This was a factor in a number of the deaths described in this series.

Issues related to learning disabilities

Neuroleptics drugs are frequently used in the care of people with a learning disability, although their role remains controversial in the absence of an identifiable mental illness (Manchester 1993). Four out of the 12 cases described in this series have involved people with a learning disability. Particular health problems identified which occur with increased frequency in association with learning disability include: obesity, which is

the most commonly reported health problem (Bond *et al* 1997) and heart disease (Department of Health 1994). Both of these factors may increase the risk of adverse consequences during restraint. The increased prevalence of hearing and/or visual impairment (Vitiello and Behar 1992) may also effect the person's ability to communicate their distress or understand and respond to requests during restraint. This may increase the likelihood of a prolonged struggle with its concomitant risks.

'...there is an urgent need for standards for violence management training in a number of areas including that of physical intervention'

Other dangers: seated and basket holds

While recognition of the potential problems that may arise from prone restraint appears to be growing, other restraint positions are not without dangers (O'Halloran and Lewman 1993). Case reports from the US indicate that where the individual being restrained is in a position in which the upper torso is hyperflexed (that is, leaning forward, bent over at the waist while seated or kneeling), respiration may be severely compromised, particularly if the individual being restrained is obese (O'Halloran and Lewman 1993).

Case reports in the American literature have also linked 'basket holds', a procedure in which the individual is restrained by a member of staff standing or sitting behind him or her who then crosses the subject's own arms in front of them and secures them at the wrist or forearm, to instances of restraint-related deaths (Hartford Courant 1999).

Atypical deaths

Two of the deaths observed in this series; Michael Craig who died in Glasgow in 1997 and Shaun Martin who died in Stratheden hospital in Fife in 1994, occurred in situations not previously described in relation to restraint-related deaths. Michael Craig died while being restrained in a kneeling position by two members of staff securing his arms and lying with his torso face down across a bed. Shaun Martin died while being restrained in a 'side lying' position on a bed (see Morrison and Sadler 2001 for a detailed description of this case) one member of staff is reported to have lain across his torso in order to secure him on the bed while others held his arms and legs. There is no experimental literature on such deaths but they serve to draw attention to the need to recognise the potential dangers involved in all restraint positions where respiration may be compromised.

The research presented is based on the most comprehensive survey undertaken to date in the UK of this phenomenon. It must be acknowledged that a number of deaths may not have been identified, and that this review is only a preliminary summary. A more indepth multidisciplinary review of these cases is needed and might yield more information about the factors involved in such deaths.

Interestingly, no deaths prior to 1980 were identified. This may reflect weaknesses in the methodology, particularly the electronic search of newspaper databases which could not be extended further back than 1985. It may also, however, indicate an increased willingness to attribute the cause of death to restraint. It is tempting to speculate, with the wisdom of hindsight, that alternative interventions such as seclusion or mechanical restraint might have prevented some of the deaths reported in this series. However, getting a violent individual into seclusion without his or her cooperation will

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almost inevitably involve some form of physical intervention and mechanical restraint, as observed, is clearly not without its own risks.

Conclusion

It has been argued that there is an urgent need for standards for violence management training in a number of areas including that of physical intervention (Paterson 2000, National Control and Restraint General Services Association 2000, Smith 1999). However, these standards must be based on evidence rather than opinion (Allen 2000, Wright 1999). The problem is, as a recent review on behalf of the American Medical Association concluded, that the current research literature on restraint is 'far too limited' to act as a basis for 'scientific guidelines on its use, on the training necessary for administering these methods and on the methods most appropriate for individual patients and particular situations' (Brown *et al* 2000).

In the absence of such research, recent good practice guidance on physical interventions (Department of Health 2000, Harris *et al* 1996), including suggestions that certain restraint positions should be avoided, are, to some extent, based on speculation about the potential risks involved rather than evidence of any real quality (Sailas and Fenton 1999). This situation is clearly unacceptable and a programme of funded research addressing the dearth of knowledge in this area is vital if practice in this most sensitive of areas is to become evidence based (Allen 2000).

If we accept the principle that restraint may be used where appropriate safeguards are in place to prevent its misuse, it is incumbent upon us to evaluate the potential risks involved so that potentially dangerous procedures can be eliminated from practice before, rather than after, tragedy.

The bio-mechanical evaluation of risks in carefully controlled experimental conditions can, however, never adequately simulate the dynamics of an actual violent incident where recall and thus the practice of physical restraint may only approximate to that originally taught (Bell and Stark 1998). This is of concern, given that relatively minor variations in some procedures, such as basket holds, may greatly affect the risk involved (Paterson and Leadbetter 1998). We must therefore seek to learn about the risks involved in the application of procedures, not just in the laboratory but in practice ■

Brodie Paterson MEd, BA(Hons), RMN, RNLD, RNT, Lecturer, Department of Nursing and Midwifery, University of Stirling, Stirling;
Patrick Bradley MSc, BEd, RNLD, Dip Nursing, Teaching Fellow, Department of Nursing and Midwifery, University of Stirling;
Cameron Stark MB, ChB, MPH, MRCPsych, MFPHM, Consultant in Public Health Medicine, Highland Health Board, Beechwood Park, Inverness;
David Sadler MB, MRC Path, Senior Lecturer, Department of Forensic Medicine,University of Dundee, Dundee;
David Leadbetter MSc, BSc(Hons), CQSQ, Consultant Trainer, CALM Training Services Limited, Menstrie Business Centre, Menstrie Clackmannanshire;
David Allen PhD (Professor), University of Wales College of Medicine, Welsh Centre for Learning Disabilities,Cardiff

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