

# Asphyxial Deaths due to Physical Restraint

## A Case Series

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**Objective:** To assess the common factors and the pattern of deaths related to the use of physical restraints.

**Design:** Case series.

**Participants:** The chief death investigators of 37 large jurisdictions were sent questionnaires for all cases of restraint-related deaths. Sixty-three questionnaires from 23 jurisdictions were returned.

**Measures:** The questionnaires allowed us to determine the restraint type used, the age and sex of the deceased, the furniture type with which restraints were used, the type of facility where the deceased was restrained, and whether the application of restraints was incorrect.

**Results:** We report 63 cases of asphyxial deaths from the use of physical restraints. Ages of decedents ranged from 26 weeks to 98 years. The greatest number of deaths occurred in the 80- to 89-year-old patients. There is a higher

frequency for females of all ages, but the distribution for males and females is roughly the same for all age groups. Deaths occurred while the patient was restrained in a chair (wheelchair or geriatric recliner) or a bed. Most chair-related deaths (six of 19) and bed-related deaths (16 of 42) involved the use of vest restraints. Thirteen of the 42 bed-related deaths involved bedrails. The majority of deaths (61%) occurred in nursing homes and 57 of these 63 cases occurred while restraints were properly applied.

**Conclusions:** Our report of 63 cases is an underrepresentation of the true number of restraint deaths. Our finding that the vast majority of restraint deaths occurred while restraints were correctly applied implies an inherent danger in the use of physical restraints. The safety of restraining patients and the efficacy of physical restraint needs to be examined and alternate means of assuring the safety of patients need to be developed.

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**P**HYSICAL RESTRAINT for the control of violent and unwanted behavior,<sup>1</sup> especially of the mentally ill, has a long history. Among the many reasons for the application of restraints are the prevention of injury, the fear of lawsuit should an unrestrained patient be injured, and control of the patient who wanders.<sup>2-5</sup> There are also reports of the use of restraints for punishment of patients and for the convenience of insufficiently staffed health care facilities.<sup>6,7</sup>

The prevalence of physical restraint has been reported to be anywhere from 6% to 86% of a given patient population.<sup>8</sup> The percentages differ according to the type of health care facility. Nursing homes have reported use of restraints for anywhere from 25% to 84.6% of their population.<sup>9,10</sup> The incidence of restraint application in hospitals appears

lower than that in nursing homes, with reported ranges from 7.4% to 22%.<sup>3,11</sup> In one prospective study of hospital use of restraints, 17% of patients were restrained.<sup>12</sup> The estimates are that over 500 000 elderly patients in the United States are restrained to wheelchairs and beds on any given day.<sup>8</sup>

Despite the widespread use of a variety of physical restraints, there has been, until recently, relatively little objective documentation of the overall benefit to the patient. Examination by several authors of the use of restraints in the United States has

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See Materials and Methods  
on next page

## MATERIALS AND METHODS

The number of persons in restraints of any type in hospitals, in nursing homes, and at home is not known, and the acquisition of firm epidemiologic statistics is beyond the scope of this study. In order to identify medical examiner and coroner jurisdictions where deaths due to restraints might have occurred, a number of large jurisdictions were arbitrarily contacted, as were jurisdictions identified by review of the medical literature and newspaper reports. The chief death investigative officer of each jurisdiction was provided with questionnaires for collection of information about all pertinent deaths from 1979 through 1989. Of 37 jurisdictions contacted, 63 questionnaires (**Figure 1**) with pertinent details were returned from 23 jurisdictions. Two mailings were used for those jurisdictions that did not answer the initial request.

Criteria for considering a death related to use of a physical restraint included an autopsy and review of the medical circumstances of the death.

While the numbers of questionnaires returned and completed varied considerably by jurisdiction and could not be related to size of an office, there was widespread geographic distribution with cases from 14 states, from east to west coast.

Data were tabulated from the questionnaires. Where only partial information was received, those portions of the questionnaire completed were used and direct contact with the affected jurisdiction was attempted to gain the residual information. The most frequently unanswered questions were explanations for the restraint of the patient and the patient's original diagnosis. After this sequence of investigation, restraint type and bed vs chair positioning remained unavailable for two patients.

The types of restraints were characterized as vest, wrist, waist, and bedrail, with the furniture type being either chair or bed.

indicated multiple problems for patients. Psychological difficulties of anger and combativeness, as well as depression, are indicated.<sup>13-17</sup> More objective physical findings are muscle atrophy from lack of exercise, especially in elderly restrained patients, along with problems of skin breakdown and aspiration pneumonia.<sup>14,18-20</sup> Numerous reports of deaths due to asphyxia emphasize the direct physical danger of physical restraint.<sup>11,13,21-25</sup>

A recent literature review suggested that cognitively impaired older patients have an increased risk of accidental death.<sup>8</sup> These patients "are less able to understand and cooperate with medical care regimens and may behave in ways that can endanger or disturb patients and staff."<sup>8</sup> In this country, fear of self-inflicted patient dam-

age has led to heavy reliance on use of restraints over the years in comparison with other countries, such as Britain, where use of restraints is relatively limited.<sup>8,21</sup> The benefit to the patient is open to debate, with indications that patient safety is not necessarily enhanced by the use of restraints, since deaths may result perhaps as often from the use of restraints as from the lack thereof.<sup>21,26</sup> For instance, the confused patient may regard a bedrail more as a challenge and scalable height than an impairment to mobility. The resulting fall from the top of a bedrail is much more likely than a simple roll off the bed to cause serious damage to a frail patient.

Multiple types of restraints exist, such as geriatric recliner chairs (GeriChairs), lap belts, waist restraints, wheelchair belts, wrist restraints, and bedrails. The exact incidence of use of each type of restraint has limited published documentation.<sup>21,26</sup>

In the authors' jurisdiction, a series of restraint deaths over 7 years raised questions about the mechanism of injury and the safety of particular restraints.

## RESULTS

Sixty-three deaths, all due to asphyxia, were reported. Constraints of data access and economy do not allow this study to be a direct epidemiologic evaluation of the incidence of asphyxial deaths due to restraint. We do have the ability, through case analysis, to look for common factors and pat-

*See also page 371*

terns to these deaths. The uneven numbers of cases reported from jurisdictions of variable sizes cannot be accurately interpreted, for case acceptance criteria vary as may the incidence of and criteria for application of restraints.

A much larger number of reported deaths were ascribed to restraint use in elderly than in younger patients (**Figure 2**). Exact incidence according to age group could not be established. In Figure 2, a graph of numbers

Jurisdiction: Contact person _____	Paper # _____
Address _____	
Telephone No. _____	
Case file # _____ DOD _____ Age _____ Race _____ Sex _____ Height _____ Weight _____	
Principal diagnoses _____	
Reason for restraint _____	
Was restraint applied per directions? _____	
Type of restraint and manufacturer _____	
Narrative of events: _____	
Reconstruction of events _____	
Police agency involved _____ Case file # _____	
Telephone No. and/or contact person _____	
Type of facility of occurrence: Nursing home _____ Hospital _____ Home _____	
Other _____	
Medical examiner/coroner/pathologist name _____	
Autopsy findings (protocol, if possible) _____	
Toxicologic findings _____	

**Figure 1.** Questionnaire for collection of information about pertinent deaths. DOD indicates date of death.

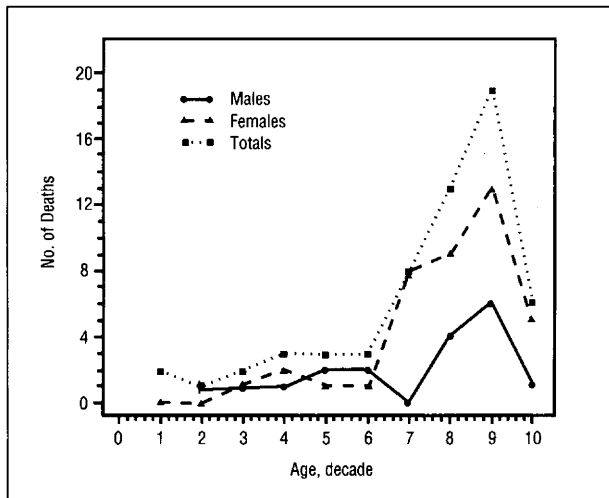


Figure 2. Age distribution of restraint deaths with breakdown by sex.

of patients vs years of age at death (for each sex), the most frequent occurrence of asphyxiation is in the older age group of 80- to 89-year-old patients. Our range of age is 26 weeks to 98 years. There is a higher frequency for females in almost all groups. The percent distribution for males and for females is roughly the same for each age range.

One interesting finding is the underrepresentation, on a national population basis, of nonwhites in our documented cases of restraint deaths. Mion et al<sup>26</sup> found that a low number of nonwhites (20% of all restrained patients) were restrained, and nonwhites accounted for fewer than four (6.2%) of 63 of our asphyxial deaths. We cannot explain this racial difference.

The majority of the deaths (61.3%) occurred in nursing homes (Figure 3). Only 8.1% of the deaths occurred in the home of the victim or the victim's family home, and the rest occurred in the hospital (24.2%) and "other" places (6.4%) such as special schools for the handicapped or church infirmaries. Since the prevalence of the use of restraints in different types of residences is not known,

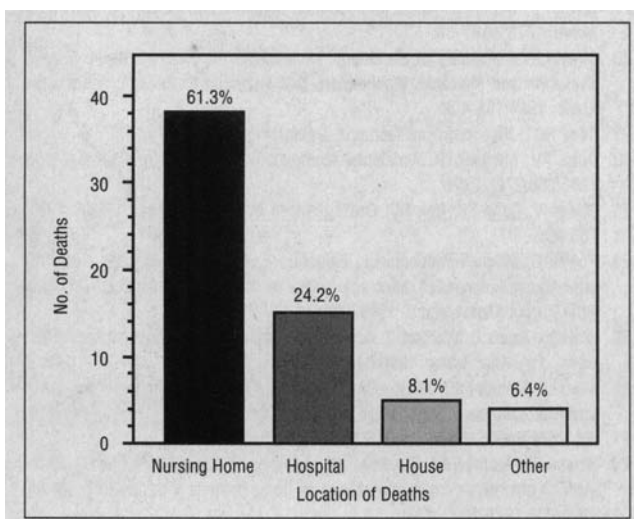


Figure 3. Restraint deaths by place of occurrence in 62 of 63 cases.

we cannot say whether these percentages are consistent with any expected ratios.

Surprisingly, only six of the 63 deaths were associated with restraints that were incorrectly applied; five of these six involved vest restraints. In more than 90% of the cases, the restraints were found to be properly applied. This implies an inherent danger in use of physical restraint, so design of restraints should be further scrutinized.

The Table shows the distribution of furniture and restraint types, where known, involved in the deaths. The majority (16 of 19) of wheelchair asphyxiations involved vest restraints. The other three wheelchair deaths were due to waist restraints. The vest restraint, loosely fastened around the upper torso of the patient and harnessed to the back of the wheelchair, allows neck compression when the patient slides down in the chair.<sup>22</sup> In patients restricted to bed, vest restraints are the most common of the restraints to cause death, followed closely by chest and/or abdominal compression by bedrails. The bedrail deaths have a component of either a vest or wrist restraint that allows partial mobility on the part of the patient but does not restrict movement sufficiently to prevent the patient from sliding in between the mattress and bedrail. The data do not include any deaths due to secondary effects of bedrails such as hip fractures following a fall from an attempt at climbing over bedrails.

In descending order of prevalence, the restraint types include vest, bedrail, and waist restraint. It is interesting to note that more than twice as many deaths occur in bed than in wheelchairs. One might speculate that patients are observed less frequently when they are in bed as opposed to when they are wheelchair bound. However, observed percentages may be related to prevalence of restraint use in bed as opposed to restraint use in wheelchairs.

Locally investigated cases show that bedrail-related deaths occur where the uprights to the bedrail are not close to the end of the bedrail, so that a patient, by sliding sideways, can slide between the end of the bedrail and the mattress.

#### COMMENT

Our report of 63 cases is an underrepresentation of the true number of restraint deaths, since we are aware of other cases

Restraint Type	Furniture Type		Total
	Chair	Bed	
Vest	16	19	35
Waist	3	8	11
Wrist	...	2	2
Rail	...	13	13
<b>Total</b>	<b>19</b>	<b>42</b>	<b>61</b>

through the popular press and through communication with medical examiner offices. However, obtaining documentation for many cases is beyond our ability. Through investigation of the documented cases we received, it becomes apparent that some deaths were originally considered natural. In one case, the restraints were removed from the deceased and the victim was placed back in bed and reported to be found dead there. Since many patients are old and chronically ill, certification may attribute death to natural causes. Thus, we speculate that some of these accidental asphyxial restraint deaths go unreported to both the medical examiner and the family of the deceased.

Awareness of deaths involving the correct use of physical restraints should cause us to rethink whether restraints are beneficial. Are morbidity and mortality lowered with restraint use? According to a published prospective study of the use of physical restraints, both morbidity and mortality decrease when restraints are eliminated.<sup>26</sup> More research is needed. It is impossible to deduce incidence of asphyxia without first knowing the prevalence of restraint use, restraint users, and/or restraint types.

Aside from the questionable benefit or safety of physical restraints, there has recently been a growing interest in the ethical issues of restraining the elderly. This issue has been written about in the popular press (*US News and World Report*. January 22, 1990:74; *Minnesota Star Tribune*. December 2, 1990:1, 18-21; December 3, 1990:1, 10-11; December 4, 1990:1, 18-20; December 5, 1990:1, 18-20). Opponents of physical restraint of the elderly speak of its ill effects, such as muscle atrophy and skin breakdown associated with immobility, and the psychological trauma of being held against one's will.

With a greater public interest in the safety and propriety of physical restraints, opposition to their use is growing. The new federal regulations under the Omnibus Budget Reconciliation Act<sup>27</sup> state that the "resident has the right to be free from any physical restraints imposed or psychoactive drugs administered for purposes of discipline or convenience and not required to treat the resident's medical symptoms." Interest in alternatives to physical restraint, especially for the elderly, has been increasing.<sup>28</sup> The Kendal Corporation (Kennett Square, Pa) sponsors a program to help eliminate the use of physical restraints in nursing facilities and presents successful programs in the newsletter *Untie the Elderly*.

Many methods have been used to try to decrease the prevalence of restraint use, including architectural design to increase supervision of facility residents. For instance, the outside of a facility can be large and open with secure borders so residents can walk and wander around freely without getting lost or injured. Currently the Kendal Corporation has a database that provides information to keep track of the many methods that have been used to decrease the need for restraint use.

Today, the medical community must realize that use

of restraints is not a totally benign therapy. Physical restraint is potentially lethal, and this needs to be understood by those who prescribe it.

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