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Accidental Asphyxial Deaths Involving Infants and Young Children

Fatal accidents occurring in infants and children are theoretically, if not actually, preventable in all instances. However, prevention may be dependent on public understanding of the nature and frequency of such accidents and the facts which lead to their occurrences. Valuable data for community education may be obtained from properly functioning medical examiner systems which require that all sudden and unexpected deaths be reported, investigated at the scene of occurrence, and examined by a competent forensic pathologist. However, such reports continue to be more frequently used for law enforcement activities than for the benefit of public health.

In 1972 we reported an initial survey of accidental infant asphyxiation in the bedroom [*1*]. In the present study, which covers a four-year period, we have identified a group of children aged 0 to 2 years whose deaths were asphyxial, and we have categorized the specific causes of these fatalities. This report further considers these data in terms of prevention of accidental asphyxiation.

Case Study

From 1970 to 1973, inclusive, the Medical Examiner's Office of Dallas County, Tex., recorded 609 deaths of children from 0 to 2 years of age, 122 of these being classified accidental and approximately one third, or 45 cases, ascribed to asphyxia of various mechanisms (see Tables 1 and 2). The remaining 77 cases were deaths resulting from vehicular injuries, predominantly by automobile. During this same time period, there were 30 cases of homicide, including instances of child abuse or "battered baby syndrome." There were 73 cases of undetermined or unclassified deaths in this age range, a few of which were possibly accidents of an asphyxial nature, that were not included in the original statistic. In the 384 cases of natural deaths over this four-year span, 89 cases of sudden infant death syndrome, or "crib death," were documented. Significant data for each of the 45 cases of accidental asphyxia are listed in Table 3.

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TABLE 1—*Medical examiner's statistics of deaths in children.*

Year	All Deaths 0—2 Years	All Accidental Deaths 0—2 Years	Accidental Asphyxial Deaths 0—2 Years
1970	174	25	8
1971	159	39	17
1972	116	24	6
1973	160	34	14
Total	609	122	45

TABLE 2—*Mechanism of death producing asphyxiation.*

Mechanism	0–6 Months	7–12 Months	13–18 Months	19–24 Months
Smothering	3	0	0	0
Suffocation	1	1	0	0
Wedging	10	1	0	0
Hanging	0	3	0	0
Drowning	0	9	3	0
Choking	0	1	0	0
Burning	2	2	4	5
Total	16	17	7	5

TABLE 3—*Individual case data.*

Mechanism	Age	Race	Sex	Comments
Smothering	1 month	W	M	sleeping in carbed on floor; 1-year-old sibling crawled in with baby for "warmth"
Smothering	1 month	W	F	sleeping with mother in adult bed
Smothering	2 weeks	B	F	sleeping with mother in adult bed (1-year-old sibling also in bed)
Suffocation	5 months	W	F	cleaning bag on adult bed with child
Suffocation	8 months	W	F	bread wrapper in bed with child
Wedging	1 month	B	F	wedged between mattress and headboard of adult bed.
Wedging	4 months	W	F	broken crib (3 sided); wedged between wall and mattress on open side
Wedging	6 months	B	F	child on adult day-bed; wedged between mattress and wall
Wedging	2 months	W	M	wedged between crib slats and mattress (improper fit)
Wedging	1 year	W	F	built-in chest of drawers; twin sibling closed drawer
Wedging	10 months	W	M	broken crib (top rail broken); wedged between mattress and crib side
Wedging	2 months	B	F	child on adult double bed; wedged between wall and mattress
Wedging	1 month	W	F	wedged between defective baby bed and wall
Wedging	2 months	W	F	wedged between folded quilt and crib bumper of baby bed
Wedging	3 months	W	M	child on "beanbag" bed; caught in self-made crevice
Wedging	5 months	W	M	found in 4 to 5-in. crack between adult waterbed and wall; babysitter sleeping on same bed with child.
Hanging	8 months	W	M	broken crib (held together by rope); suspended in rope

TABLE 3—*Individual case data*—Continued.

Mechanism	Age	Race	Sex	Comments
Hanging	9 months	W	M	hanged when the ribbon around his neck attached to pacifier became entangled with a bar on crib
Hanging	9 months	W	F	hanged when pacifier attached to shoestring around neck became caught on the corner crib post
Drowning	11 months	B	F	in bathtub with sibling
Drowning	9 months	W	M	fell into plastic bucket of soapy water
Drowning	10 months	W	M	in bathtub with sibling
Drowning	8 months	B	F	in bathtub with sibling
Drowning	20 months	W	M	left by mother in bathtub; child turned on water
Drowning	2 years	B	F	left alone in bathtub by babysitter
Drowning	1 year	W	M	in bathtub with sibling
Drowning	13 months	B	F	fell into diaper (cleaning) pail (plastic) half-full of water, capacity about 3 gal
Drowning	7 months	W	F	left by mother in bathtub (full-size)
Drowning	10 months	W	M	fell into diaper pail (plastic) half-full of Boraxo® and water; capacity about 5 gal
Drowning	9 months	W	M	fell into plastic cleaning pail half-full of water; capacity about 5 gal
Drowning	10 months	B	M	fell off adult bed into a bucket of soapy water, half-full; capacity about 5 gal
Choking	1 year	B	F	small rubber ball lodged in throat
Burning	23 months	B	F	house fire started by children playing with matches
Burning	17 months	B	M	pallet on which children were sleeping caught fire
Burning	3 months	W	M	in baby-bed in trailerhouse which caught fire
Burning	15 months	B	F	in baby-bed in bedroom of house; house fire
Burning	21 months	B	M	house fire; frame house
Burning	9 months	W	F	house fire; possibly caused by lightning
Burning	13 months	B	F	house fire
Burning	24 months	B	F	house fire; confined mostly to hallway
Burning	22 months	W	M	house fire and natural gas explosion
Burning	18 months	W	F	left with babysitter and siblings; open space heater
Burning	12 months	B	M	fire started in bedroom
Burning	24 months	W	F	burned in automobile fire
Burning	2 weeks	B	F	house fire

Findings and Discussion

Smothering

The three infants accidentally smothered by someone else lying on them were in the younger age range, none of them being older than 1 month. In two of the three instances, a 1-year-old sibling was also involved, on one occasion being a third party in bed with one of the parents. In both circumstances, the mother suspected that traumatic asphyxia was responsible for her younger child's demise. Such a circumstance, although not unknown, apparently occurs rarely. A recent review has pointed out the potential of accidental death in situations involving bed-sharing by parent(s) and child(ren) [*2*]. There is no indication that mechanical suffocation is responsible for vast numbers of crib deaths, but Francisco [*3*] has pointed out the dangers of this subtle and sometimes masquerading phenomenon.

Suffocation

It has been shown that even the smallest infants breathe without difficulty through

heavy woven fabrics, such as woolen blankets. However, plastic bags do not have a porous surface, and they are extremely dangerous to infants and children. In the two cases presently reported, one of the offending containers was a dry-cleaning bag, well known to cause suffocation, and the other a bread wrapper, not generally considered a bedroom article. Tooth impressions found on the wrapper confirmed that the infant was holding it about her mouth and face when she died [*4*].

Wedging

Blackbourne [*5*] was among the first to point out the serious dangers of defective, poorly fitting, and ill-designed infant cribs. Three of the six baby beds examined in this series indicated defects varying from an improper fit of the mattress to a broken crib with portions of the frame missing. In one instance, an incompletely filled "bean-bag" bed was responsible when the child was wedged between the side of the bed and the wall. In another example, a child was forced between the opening of two drawers by her identical twin. In most of these deaths, abnormal lividity patterns on the head and trunk, as well as occasional linear-patterned contusions and abrasions, were observed.

The importance of the scene investigation, including examining the offending bed and documenting the exact location of the child, is of paramount importance in eventually clarifying this subtle mechanism of asphyxia. Even at the autopsy, the abnormal lividity patterns will persist in the organs, with the point of wedging often separating extreme pallor from marked suffusion and engorgement. As a preventive measure, the Dallas County medical examiner's office confiscates broken and defective cribs and has cooperated with the news media in pointing out this danger to the public. The Consumer Product Safety Commission [*6*] has also developed new regulations pertaining to crib safety in terms of design and manufacture.

Hanging

In the three instances of hanging, one occurred when a broken crib, held loosely together by rope, became partially separated and the resulting space was responsible for the infant becoming entangled in the strands. Two cases, previously cited by DiMaio [*7*], involved a pacifier attached around the infant's neck by a string which became entangled with a cross-bar on the crib and a corner crib post, respectively.

Drowning

Of the twelve instances of drowning, it is significant that five occurred in water pails or diaper buckets whose capacity varied from 3 to 5 gal (0.01 to 0.02 m^3). In most of the cases, the mother was cleaning the floor and the bucket was approximately half-filled with soapy water. The infants were of the older age group, ranging from 7 to 15 months. An obvious precaution should be given to families with small infants, so that any type of pail is either covered or out of the reach of small infants; when the pail is used for cleaning the infant should be continuously watched. Four of the seven bathtub drownings occurred when older siblings were "tub-sharing," a potential danger to be avoided in younger children. Blackbourne [*8*] has emphasized the dangers of bathtub deaths in small infants, with 3 of his 13 cases having accompanying scalding burns.

Choking

The one instance of choking involved a rubber ball being lodged in the throat of a 1-year-old child. The danger of uninflated, deflated, or broken balloons is well known [*9*]. This office has recorded a recent case (1974) involving a 22-month-old child in a

nursery home, where a portion of a broken balloon from a party the previous evening was found lodged in the larynx. Close and careful supervision with balloons, even when inflated and tied, and particularly following festivities if there is improper clean-up, is obviously mandatory.

Conflagration

In most instances of house fires, the possibility of children playing with matches has to be considered as the likely origin, although several other mechanisms can be documented, with one instance of lightning and one of a natural gas explosion occurring in the present series. An auto accident resulting in fire was also noted; there was one case of a residential fire involving a mobile home. Only 3 of the 13 fatalities were below 1 year of age, but older siblings are usually involved, especially when playing with matches is incriminated. It should be further noted that in this category, in contradistinction to the other groups, the white to black ratio is reversed and not in keeping with the general population, suggesting that substandard housing, improper heating, and other similar socioeconomic factors may be partially responsible for the development of factors resulting in conflagration.

Summary

Forty-five cases of accidental asphyxial deaths in infants and young children below 2 years of age are described. The mechanism involved, the available historical information, and the possible preventive measures are discussed. Dangers such as bed- and tub-sharing, diaper and cleaning pails, plastic wrappers, balloons, small beds, toys on strings, broken or poorly designed cribs, and poorly positioned adult beds must be brought to the attention of the parent as consumer. The public health considerations and the educational aspects relating to the community at large are cornerstones in the effort to reduce these tragic and untimely deaths.

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