UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: December 18, 2002

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SUBJECT : Strangulations Involving Children Under 5 Years Old

This memorandum is an update to a 1981 report concerning strangulations involving children less than 5 years of age. The 1981 report reviewed cases reported from 1973 through 1980. This update includes cases reported from 1997 through September 2002.

Executive Summary

This analysis was performed to provide an update to a 1981 CPSC report concerning accidental strangulations to children. Nearly 570 incidents were reviewed, including 150 fatalities, involving children less than 5 years of age. These cases were reported to the U.S. Consumer Product Safety Commission from January 1997 – September 2002.

Comparing the current review's data with the 1981 review's data, there were 6.5 fewer deaths per year. There were 381 more non-fatal incidents reported within the time period studied for the current review. Just under half of the non-fatal incidents in the current review are associated with toys. Half of those incidents did not involve an injury.

There have been many voluntary and mandatory standards established, educational campaigns conducted, and compliance has been active in addressing products discussed in the 1981 review as child strangulation hazards. The decline in the number of child strangulation deaths in various product categories may be attributable to these CPSC activities. The following product categories have fewer child strangulation deaths in the current review when compared with the previous review:

- children's clothing
- pacifier cords
- toys
- cribs

The following product categories had more child strangulation deaths in the current review:

- drapery/blind cords
- restraint harnesses/safety belts

There are recent or current CPSC activities regarding child strangulation in the categories of drapery/blind cords, restraint harnesses/safety belts, playground equipment and bunk beds.

The age group with the most child strangulation deaths in the current review is 3-year-olds, but there was no single age group which stood out. The next largest age group was children between the ages of 9 months and 12 months which was the largest age group in the 1981 review.

Background

In 1981, Epidemiology staff prepared a report[1] which reviewed data on accidental strangulation to children less than five years-of-age. This report is an update of that review. These analyses deal with deaths and incidents of ligature strangulation in which something around the child's neck resulted in strangulation. Entrapments, such as head entrapment between a crib mattress and the crib itself, are excluded from this analysis. Within this report, there is discussion about primary and secondary products. Products coded as the primary product were around the child's neck and caused the strangulation. The secondary product was that which caused the primary product to tighten around the child's neck. For example, if a child was wearing a toy guitar with the shoulder strap around the neck and the strap got caught on a bunk bed post causing strangulation, the primary product was the toy shoulder strap and the secondary product was the bunk bed. Some cases, such as strangulation by a window blind cord, do not involve a secondary product.

This report concerns a shorter time period, slightly less than 6 years, than the previous report, 8 years. The present review (1997 – 9/2002) contains more reports, 568, of child strangulation hazards than the previous report, 298 cases from 1973 through 1980. The increase is in the number of non-fatal injury and non-injury incidents reported, from 37 to 418. The increase in cases is possibly due to improved reporting systems, rather than an actual increase in child strangulation.

To evaluate differences in reporting, we compared the total number of cases for all products and hazards in the Injury and Potential Injury Incident database (IPII) over 2 year time periods. We are only able to retrieve data as far back as 1980, so that is the beginning of the first time period searched. From January 1980 through December 1981, 34,162 consumer product related incidents and complaints of product hazards were reported and were included in IPII. From January 2000 through December 2001, 42,478 reports are included in the IPII database. This increase of 24.3% may be due to heightened public awareness of CPSC, improved hotline service, and internet reporting.

There were more deaths, 261, in the 1981 report than in this review which found 150 deaths. The death certificate file is only complete through 1999 and 83% complete for 2000 so there may be more cases which we have yet to receive.

Table 1	1981 review: 1973 - 1980	2002 review: 1997 – 9/2002
Total	**298**	**568**
Non-Fatal Incidents/ Injuries	37	418
Deaths	261	150
Average Number of Deaths per Year	32.6	26.1

Source: Injury and Potential Injury Incident database,
In-Depth Investigation database,
Death Certificate database, 1997 – Sept. 2002

[1] Rutherford, George, Shelia Kelly. "Accidental Strangulations (Ligature) of Children Less than 5 Years of Age" U.S. Consumer Product Safety Commission, May 1981.

Activities Addressing Strangulation of Children

CPSC has been actively trying to reduce child strangulation since the agency's inception. A general timeline of the activities to address the hazard follow.

- 1976: ASTM voluntary standard addressing toys with cords and elastics as a potential strangulation hazard to children. This standard was later updated to further reduce the hazard.
- 1978: Mandatory standard was established that specified pacifiers cannot be sold with a ribbon, cord or string attached. Warning labels are required telling parents of the dangers associated with tying the pacifier around the child's neck.
- 1985: CPSC public safety notice alerting parents to the strangulation hazard associated with drapery or window blind cords.
- 1986: Voluntary standards concerning crib posts were established to reduce the likelihood of something catching on the crib thus strangling the child.
- 1990: Stricter voluntary standard was established for crib posts and projections.
- 1990: Petition proposing rulemaking concerning crib toys as a strangulation hazard was granted. Rulemaking was terminated in 1993 deferring to stronger voluntary standards which were being developed.
- 1994: Voluntary standards were established addressing the crib toy strangulation hazard discussed in the 1990 petition.
- 1994: Voluntary standard was established that prohibited drawstrings on the neck or hood of children's outerwear.
- 1995: Window blind and drapery cords redesigned so they do not have loops, repair kits are made available to the public for existing blind cords, and a public safety notice was sent out alerting parents and caregivers to this strangulation hazard.
- 1997: A study published in JAMA stated that CPSC incident data under-reports child strangulation involving drapery or window blind cords.
- 1999: Public safety notice was published alerting parents and caregivers to the dangers associated with children wearing helmets on playgrounds. The helmets can get caught in the playground equipment thus causing the chinstrap to strangle the child.
- 1999: CPSC conducted a new investigation concerning child strangulation on the inner loop of blind or drapery cords, and a public safety notice is published.
- 2000: Follow-up safety notice is published alerting parents and caregivers to the strangulation hazard associated with drapery or blind cords.

Deaths: Primary Products

There were noticeable changes in child strangulation deaths reported from the previous report to the current report (Table 2). Reported deaths involving clothing, pacifier cords, toys, and ropes etc. decreased. Drapery/blind cord and restraint harness/safety belt strangulation deaths reported increased.

Table 2: Deaths by Primary Product

	1981 review	2002 review
Drapery or blind cords	41	52
Clothing	57	6
Toys	22	6
Pacifier cords	28	3
Bedding	5	7
Restraint harnesses/ safety belts	22	25
Playground equipment	5	4
Ropes/ strings/ cords/ elec. cords	55	31
Necklaces/ bibs	7	5
Other/ unknown	19	11
Total	261	150

Source: Injury and Potential Injury Incident database,
In-Depth Investigation database,
Death Certificate database, 1997 – Sept. 2002

I. Drapery/window blind cords

The largest number of fatalities in any category, 52, occurred from strangulation by a drapery/window blind cord. In the 1981 report, there were 41 window blind cord or curtain cord deaths. Since there has been so much CPSC action on this hazard, the increase in reported incidents, injuries and deaths may be related to increased public awareness and an effort by CPSC to find more of these cases to study. However, 52 deaths in less than 6 years is still a serious concern.

II. Clothing

This product grouping had the largest number of child strangulation deaths in the 1981 review and had the largest reduction, 51 fewer deaths in the 2002 review. In this review, two of the six clothing deaths were associated with a drawstring on a child's jacket catching on a playground slide. The other clothing related strangulation deaths involved a shirt collar, a sash, an unspecified part of the child's clothing catching on playground equipment, and a cloth belt catching on a playground slide. Of the 57 clothing-related strangulation deaths reported in the 1981 review, 19 were associated with strings or hoods on the clothing. Buttons accounted for six of the deaths from the 1981 review while there were no button related incidents in this review.

III. Toys

Of the six toy-related child strangulation deaths found in this review, four involved a shoulder strap of some type. Two of those caught on a post on a bunk bed. Crib toys are generally affixed to the side of the crib and may have strings, ribbons or something else which could pose a strangulation hazard if the child is able to reach it. In the present review, there were no deaths concerning crib toys. In the 1981 review, 10 of the toy deaths resulted from strangulation from a crib mobile or gym (crib toys). ASTM standards require product labeling warning parents or caregivers of the potential strangulation hazard and to remove the crib toy when the child is 5 months or is able to push up onto hands and knees enabling them to reach the crib toy.

IV. Pacifier cords

In this review, there were three strangulation deaths involving pacifier cords. All three of these deaths involved a string, shoelace, or other cord attached to the pacifier. In two of these fatalities, the pacifier cord became caught on a part of a crib. In the other fatality, there was no secondary product involvement. In the 1981 review, there were 28 strangulation deaths involving pacifier cords. Since 1978, a warning has been put on all pacifier packaging telling parents and caregivers of the potential strangulation hazard if the pacifier is attached to a string, ribbon, etc. around the child's neck. Pacifiers are also prohibited from being sold with a ribbon, string, etc. attached.

V. Bedding

In the 2002 review, there were seven bedding related child strangulation deaths. These seven children were between 6- and 12-months-old. All involved bedding (blanket, sheet, etc.) wrapping around the child's neck. In the 1981 review, there were five bedding related child strangulation fatalities. Three involved the binding of blankets, one involved a loosened nylon liner of a playpen, and the remaining fatality involved a "jury rigged" attachment for a bumper pad tie.

VI. Restraint harness/safety belts

Restraint harnesses/safety belts were involved in 25 child strangulations in the 2002 review. In five of those the child was in a youth chair or high chair, nine involved a car seat/carrier, eight involved a portable baby swing, two involved a stroller, and one incident involved a wheelchair. In the 1981 review, restraint harnesses/safety belts were involved in 22 child strangulations. Nine fatalities involved a high chair, nine involved a restraint harness used to keep the child from getting out of cribs, playpens, or similar areas and the remaining four fatalities are suspected to have involved infant carriers.

VII. Playground equipment

The four playground equipment, as primary product, related child strangulation deaths in the 2002 review all involve a swing or climbing rope attached to playground equipment. All of the children were 3-years-old. There were five playground equipment related child strangulations found in the 1981 review. Four of the children were 4-years-old and one was 2-years-old.

VIII. Ropes/ strings/ cords/ elec. cords

Nineteen of the 31 child strangulation deaths involving a rope, string, cord or electric cord involved children between the ages of 2 and 4. Ten of the deaths did not involve a secondary product and 8 of the deaths involved playground equipment as the secondary product. The 1981 review had a higher number of deaths, 55, associated with this category. The decrease may be related to changes in reporting and/ or heightened public awareness of child strangulation hazards.

Deaths: Secondary Products

In the 2002 review, 28% of the child strangulation deaths involve a secondary product while in the 1981 review, just under half of the deaths involved a secondary product. (Table 3)

I. Cribs

The largest group of secondary products in the 1981 report was cribs with 59 deaths (Table 3). Nineteen of those deaths involved a crib corner post or projection. In the current review, only two deaths were found which involved a crib as the secondary product. The child's pacifier was tied around his neck by a shoelace or ribbon which became looped over the edge of the crib or on a crib rail. This is a dramatic decrease which may be attributable to the voluntary standards concerning crib corner posts and projections introduced in 1986 and updated in 1990.

Table 3: Deaths by Secondary Product

	1981 report	2002 report
Playground equipment	22	15
Crib	59	2
Bed	5	7
Doors	6	1
Other/ unknown	41	17
No secondary	128	108
Total	261	150

Source: Injury and Potential Injury Incident database, In-Depth Investigation database, Death Certificate database, 1997 - Sept 2002

II. Beds

Deaths involving beds were comparable for the two periods with five deaths in the 1981 review and seven deaths in the 2002 review. All of the deaths from the 2002 review involved a bunk bed. Two deaths involved something getting caught on a post on the bunk bed, three involved something with a loop tied to the bunk bed, and the remaining two incidents do not specify the part of the bunk bed involved. There was one non-fatal incident involving a guardrail of a bunk bed.

III. Playground equipment

Deaths involving playground equipment as a secondary product were comparable for the two periods with twenty-two deaths in the 8 years in the 1981 review and fifteen deaths in the 6 years in the 2002 review. In one of the deaths from the 2002 review, the child was wearing a bicycle helmet which became lodged in the playground equipment, causing strangulation. In eight of the deaths, a string or rope was the primary product.

Non-Fatal Incidents

I. Toys

Toys were the largest primary category grouping, with 194 non-fatal reports. Most of the reports, 107, resulted in no injury. Many of those reports were parents alerting CPSC to a perceived potential strangulation hazard. Seventy-nine incidents involved injury in which the child was treated and released from the hospital.

II. Bedding

Bedding is the second leading primary product involved in 71 non-fatal reports. This included bed coverings, loose threads from bedding, and ties from bedding such as crib bumper pads. There were 28 injuries and 43 incidents which did not report an injury. The majority of reports, 44, involved bed coverings.

III. Other primary products

Within the category "other primary products", 11 incidents were from potential strangulation by the chinstrap on a helmet or hat. There were three incidents involving the tape from a cassette that wrapped around a child's neck. Two of those incidents occurred when cassette players with childproof closures were left in the crib. The children were able to open the player and take out the cassette tapes. Three incidents involved some type of bag, four involved a plastic tie, and three involved the fabric from the canopy over the child's bed.

Deaths: Age of Children Involved

In the 1981 report, 44.6% of all deaths occurred to children between 9 and 12 months old. The distribution of incidents over the age groups changed so that in the 1997 through 2002 data there is no one group which stands out. The age groups with the most fatalities in the current review are 3-year-olds with 19% and 9 to 12 months with 17%.

Table 4: Number of Reported Deaths by Primary Product and Age Group

	1 to 4 mo.	5 to 8 mo.	9 to 12 mo.	13 to 16 mo.	17 to 23 mo.	2 years	3 years	4 years	Total
Drapery or blind cords	1	1	5	12	7	10	12	4	52
Clothing	0	0	0	0	0	3	1	2	6
Toys	0	0	0	0	1	1	2	2	6
Pacifier cords	1	0	2	0	2	0	0	0	3
Bedding	0	4	3	0	0	0	0	0	7
Restraint harnesses/ safety belts	4	5	9	0	2	2	0	3	25
Playground equipment	0	0	0	0	0	0	4	0	4
Ropes/ strings/ cords/ elec. cords	0	2	6	1	3	5	4	10	31
Necklaces/ bibs	0	0	0	0	1	2	2	0	5
Other/ unknown	0	4	1	1	1	0	3	1	11
Total	6	16	26	14	15	23	28	22	150

Source: Injury and Potential Injury Incident database,
In-Depth Investigation database,
Death Certificate database, 1997 – Sept. 2002

Certain product group/age group combinations have more deaths than other product group/age group combinations. For the 9 to 12 month olds, one third of the deaths involved restraint harnesses/safety belts. All but two of the deaths of the 13 to 16 month olds involved drapery or blind cords and a large number of deaths of 2 and 3 year-olds involved this product group.

Discussion

The number of reported incidents increased from the 1981 review to the 2002 review despite the 2002 review covering two fewer years than the 1981 review. The increase was among the non-fatal incidents and may have been due to improved reporting. The number of reported deaths is smaller in the 2002 review.

I. Successful CPSC activities

In the 1981 review, strangulation hazards related to children's clothing, pacifier cords and crib corner posts/projections were all cause for major concern. Since then, voluntary standards, educational campaigns, and recalls appear to have been successful in reducing these hazards. The voluntary standard effective in 1994 banning drawstrings on children's outerwear appears to have helped reduce the clothing strangulation hazard. The 1978 pacifier cord mandatory standard requiring warning labels concerning the strangulation hazard and banning the sale of pacifiers with attached ribbons, cords or strings appears to have contributed to the reduction in incidents associated with the pacifier cord strangulation hazard. In the 1981 review, cribs as a secondary product accounted for the largest grouping of child strangulation deaths. The hazards associated with children's clothing and pacifier cords were reduced additionally by voluntary standards concerning crib corner posts and projections set in 1986 and updated in 1990. The most dramatic decline, 57 fewer fatalities, occurred in the crib as a secondary product category and may be related to these crib standards. Clothing related strangulation deaths showed the second most dramatic decline, with 51 fewer fatalities.

II. Current CPSC activities

There are several product areas which have ongoing projects or had a recent project to address the child strangulation hazard associated with them. Window blind cords is a hazard area we have been trying to address for many years. In 1985, a public safety notice was published and in 1995 voluntary standards were established, repair kits were made available, and there was an educational campaign. By 1996, free-hanging loops were eliminated from all new window coverings. Since window coverings may have a long product life, the effect of these standards may take a number of years to become apparent.

Certain restraint harnesses and safety belts on children's products such as strollers, high chairs and baby carriers may still pose a strangulation hazard, according to the data in this current review. Strangulations involving playground equipment as a primary or secondary product are also still a hazard to children. Currently, there are projects investigating these hazards in an effort to identify what can be done to reduce them.

On November 8, 2002, a notice was published in the federal register of a petition submitted to CPSC requesting a standard for bunk bed corner posts. The petitioner asserts that, due to the height of bunk beds, the corner posts pose a strangulation hazard when something such as the child's clothing becomes caught on it.

III. Summary

The 1981 review found several product groupings posing a risk of child strangulation including drapery/blind cords, clothing, toys, pacifier cords, restraint harnesses/safety belts, ropes/strings etc., playground equipment, and cribs. Since then, CPSC has had projects successfully addressing many of those identified hazards. In certain product groupings, including window blind cords and restraint harnesses/safety belts, it is too early to see in the data the full effect of CPSC actions. The product groupings associated with the largest number of strangulation deaths in 1997 through September 2002 currently have ongoing CPSC activities addressing these hazards.