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Clin Pediatr (Phila) 2008; 47; 261 originally published online Dec 5, 2007;
DOI: 10.1177/0009922807309300

The online version of this article can be found at:
http://cpj.sagepub.com/cgi/content/abstract/47/3/261
An Analysis of Deaths in Portable Cribs and Playpens: What Can Be Learned?

Allison Jackson, MD, MPH, and Rachel Y. Moon, MD

To assess the risk of using portable cribs and playpens as sleep surfaces for infants, data from playpen/portable crib deaths occurring between January 1, 1999, and February 4, 2004, that were reported to the Consumer Product Safety Commission were retrospectively reviewed. Twenty-one playpen/portable crib deaths were identified. Two-thirds of the deaths were in infants. Asphyxia, positional asphyxia, and suffocation were the leading causes of death. Several deaths were the consequence of risks unique to playpens and portable cribs: playpen collapse, modifications to the playpen, and improper assembly. The data demonstrate some unique risks posed by playpens/portable cribs, including risks from improper assembly and setup. Programs recommending and using playpens/portable cribs as routine infant sleep surfaces must be aware of the need for additional guidance regarding use of playpens/portable cribs.

Keywords: infant death; SIDS; sudden infant death syndrome; playpen; crib; suffocation; asphyxia; entrapment; strangulation

Introduction

The Back to Sleep campaign and other safe sleep practice recommendations have had a significant impact on reducing the incidence of sudden infant death syndrome (SIDS). One of the American Academy of Pediatrics (AAP) recommendations is that infants sleep on a separate sleep surface, such as a crib. Portable cribs and play yards/playpens are considered by many to be comparable with cribs with regards to safety. In fact, some states, as part of free crib programs, provide families with portable cribs and playpens because they are easily transportable, do not take a lot of space, and are quite convenient, particularly for families with transient living arrangements or cramped quarters.

All infant deaths that occur in sleep settings are not the result of SIDS. Accidental deaths can occur in sleep settings as well. Accidents and SIDS rank in the top 10 causes of infant deaths; thus, any efforts to decrease risks will improve outcomes for children. To this end, data from portable crib and playpen deaths that occurred from 1999-2004 were reviewed to understand more about the circumstances of these deaths and to assess risks unique to portable cribs and playpens.

Patients and Methods

We performed a retrospective review and analysis of playpen and portable crib deaths occurring between January 1, 1999, and February 4, 2004, that were reported to the Consumer Product Safety Commission (CPSC). Cases were obtained through a search of
3 CPSC databases: Death Certificate, Injury and Potential Injury Incidents, and In-Depth Investigations. These databases have information about deaths and duplicate reports of cases that may provide more details concerning the deaths. Information is obtained from death certificates from the 50 states, the District of Columbia, and New York City, medical examiner and coroner reports, police and fire department reports, and media articles. In addition, the CPSC conducts its own investigations into specific cases.

After duplicate cases were removed, searches of the 3 databases provided 21 cases of deaths involving playpens and portable cribs. From those records were abstracted descriptions of the incident, including the position of the infant when placed to sleep and when discovered, the presence of soft bedding, and the cause of death.

This study received exemption from review by the Children’s National Medical Center Institutional Review Board.

### Results

Of the 21 children who died, 66.7% were boys, 28.6% were girls, and in 4.8% the sex was not documented; the mean age at time of death was 36.7 weeks (range, 8-112 weeks), and 14 (66.7%) were younger than 1 year old. The cause of death was determined in 17 of the reported cases. The leading causes of death, when a cause of death was determined, were asphyxia in 7 (33.3%) and positional asphyxia in 4 (19%), followed by suffocation in 2 (9.5%) and 1 case each of SIDS, sudden unexpected death in infancy (SUDI), and subdural hematoma (Table 1).

Soft bedding was present in 38.1% of all cases and in 8 (57.1%) of the infant cases. The sleep position in which the child was placed was unknown in 76.2%, 19% (n = 4) were placed in the prone position, and 4.8% (n = 1) were placed supine. The position in which the child was discovered, when known, was most frequently prone (52.4%). One child was found supine, 1 was discovered hanging, and the position of the remaining 8 (38.1%) was unknown.

More than one-third of the children (38.1%) died while in the care of child care providers, and 14% occurred while in the care of parents; the caregiver at the time of death was unidentified for approximately half (47.6%) of cases.

Because SIDS and SUDI are defined as occurring during the first year of life, we analyzed the data separately for deaths occurring during infancy (ie, before age 1 year) and after age 1 year.

### Infants

**Positional Asphyxia**

Positional asphyxia was the cause of death in 4 of the 14 infants (Table 2), who were aged 2 to 9 months. The 2-month-old infant was found facedown on a quilt, on the changing table portion of an incorrectly assembled portable crib that folded in a V configuration. The 3-month-old was found facedown in a portable crib on the comforter that was placed over a 2-inch foam pad. The 4-month-old was discovered in the portable crib between the side and a chair cushion that was used as a mattress. The 9-month-old infant was discovered with her head wedged between the slats of an older-model portable crib that had slats 3¼ inches apart. One of these 4 infants was placed supine, one was placed side or prone, and the initial position placed for the remaining 2 infants was not documented; however, both

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>Total Deaths, No. (%)</th>
<th>Deaths &lt;1 Year of Age, No.</th>
<th>Deaths &gt;1 Year of Age, No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphyxia</td>
<td>7 (33.3)</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Positional asphyxia</td>
<td>4 (19)</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Suffocation</td>
<td>2 (9.5)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Entanglement</td>
<td>1 (4.7)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>SIDS</td>
<td>1 (4.7)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>SUDI</td>
<td>1 (4.7)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Subdural hematoma</td>
<td>1 (4.7)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Undetermined</td>
<td>4 (19)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>21 (100)</td>
<td>14</td>
<td>7</td>
</tr>
</tbody>
</table>

Note: SIDS = sudden infant death syndrome; SUDI = sudden unexpected death in infancy.
were found prone. Soft bedding was present in the cribs of the 3 youngest infants.

Asphyxia

Asphyxia was determined to be the cause of death in 4 infants, who were aged 3 to 9 months. One 3-month-old infant was found with her face wedged between the mattress and mesh siding of a portable playpen. Another 3-month-old was found wedged between the bedding and the sidewall of the portable playpen. The 8-month-old was found with one end of the V of the collapsed playpen around the back of his head. The 9-month-old infant was discovered on his stomach with 2 small pillows on either side of him. One of these infants was placed prone, and 3 were found prone. Soft bedding was present in the deaths of 2 of the infants, and in 1 case, an ill-fitting mattress was used.

Suffocation

One 4-month-old infant was determined to have died of suffocation. He was found prone and facedown in the playpen with his blanket twisted around him.

Sudden Infant Death Syndrome

Sudden infant death syndrome was determined to be the cause of death in a 5-month-old infant who was found facedown in a playpen on top of a plastic-covered mattress pad. This infant was obese and was usually placed supine but had been placed prone at last sleep.

Sudden Unexpected Death in Infancy

Sudden unexpected death in infancy was determined to be the cause of death in an 8-month-old infant who was found in a portable crib with a full-sized crib fitted sheet twisted and wrapped around his neck. He was placed prone for sleep, and found prone. Soft bedding (a pillow and stuffed toys) was in the portable crib.

Subdural Hematoma

A subdural hematoma was determined to be the cause of death for a 2-month-old infant. The infant was found unresponsive in a portable crib after feeding. Other details of the sleep environment were not provided.

Undetermined

The cause of death was not determined for 2 infants. A 4-month-old was found in his playpen unresponsive in a supine position on pillows. The second infant’s age was not documented, but he died in a portable crib that had been recalled. The infant’s parents were unaware of the recall. Further details on the circumstances of this child’s death were not documented.

Children Aged Older Than 1 Year

Asphyxia

The deaths of 3 of the children aged older than 1 year were determined to be the result of asphyxia (Table 3). The youngest, who was 12 months old, was placed unattended in the play yard and was found entangled by the neck in the cords from window blinds that were above the play yard. The second child, who was 23 months old, was found hanging by her neck on a soft crib railing from a collapsible crib. It is suspected that she was reaching for a shoe outside of the crib. The oldest child, who was 2 years old, was found on his stomach with 3 sides of the play yard collapsed and his neck caught in the V on one side.

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**Table 2.** Hazard Pattern in 14 Infants

<table>
<thead>
<tr>
<th>Description</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wedging in between crib slats</td>
<td>1</td>
</tr>
<tr>
<td>Wedging between bedding or mattress and side of playpen</td>
<td>3</td>
</tr>
<tr>
<td>Collapse of playpen wall</td>
<td>2</td>
</tr>
<tr>
<td>Comforter/blanket twisted around infant</td>
<td>2</td>
</tr>
<tr>
<td>Entrapment between playpen and other object</td>
<td>0</td>
</tr>
<tr>
<td>Entanglement in cords/strings near playpen</td>
<td>0</td>
</tr>
<tr>
<td>Facedown on inappropriate surface (soft bedding or plastic mattress cover)</td>
<td>3</td>
</tr>
<tr>
<td>Hanging on crib railing</td>
<td>0</td>
</tr>
<tr>
<td>Unknown</td>
<td>2</td>
</tr>
</tbody>
</table>

*a.* Infants defined as children aged 1 year or younger.
Suffocation

Suffocation was determined to be the cause of death for a 16-month-old child who was found with his head stuck between the side rail of the playpen and a baby gate that had been placed over the playpen to keep him from getting out.

Entanglement

Entanglement was the determined cause of death for a 13-month-old child who was found with her head and neck entangled in a strap of a child play device placed on a table next to the playpen.

Unknown

The cause of death was not recorded for two 13-month-old children. One child was discovered stuck between the changing table and the edge of the portable crib’s rail. The other child was found with his head outside the slats of the portable crib. In this case, a screw had come out of the top corner rail, allowing the end and side rails to separate.

Discussion

Sudden infant deaths are not limited to SIDS. Sudden infant death syndrome is a diagnosis made when no explanation can be found for the sudden death of an infant aged younger than 1 year after a comprehensive investigation that includes evaluation of the death scene, clinical history, and an autopsy. Many of the deaths in portable cribs and playpens, although classified as sudden infant deaths, may not fulfill criteria for SIDS. Sudden infant death syndrome was the cause of death for only 1 of these infants, a 5-month-old obese infant who was usually placed supine but was placed prone for the last sleep. Infants who typically sleep supine are at an exceptionally increased risk for SIDS if they are placed prone or roll into the prone position.

One child, whose cause of death was a subdural hematoma, may have been a victim of maltreatment, but very few details about this infant were available. A sensitive, but thorough death scene investigation, review of the clinical history, and autopsy, inclusive of assessment of toxic exposures or other causes of death, are required to differentiate SIDS from child abuse. Other deaths were determined to be caused by asphyxia, positional asphyxia, suffocation, SUDI, and undetermined.

Several of the deaths were a consequence of risks that are unique to playpens and portable cribs: playpen collapse, ad hoc modifications to the playpen, and incorrect assembly. Three children were wedged in between the mattress or bedding and the side of the playpen. In addition, 2 children were entangled in cords or straps near the playpen.

Soft or loose bedding, such as pillows, loose blankets, and ill-fitting sheets, was a contributing factor in 8 of the 14 infant deaths. At least 2 infants were placed on sleep surfaces different from the original playpen mattress. Many articles in the sudden infant death literature define bedding issues related to crib sleeping, so soft or loose bedding as a risk factor is not unique to the setting of the playpen or portable crib. However, it is important that mattresses be well fitting and not replaced by pillows or cushions.

Although some recommendations can be offered based on analysis of this group of playpen-related deaths, the study has some limitations. The data for this analysis were obtained from the CPSC. Because reporting to the CPSC is voluntary, the CPSC does not necessarily receive all of the death certificates in the United States. These data therefore represent an undetermined fraction of actual incidents occurring in the United States and should be considered an underestimate. Although no data have been published on the number of infants in the United States that use portable cribs and playpens as sleep surfaces.
to serve as denominator data for this analysis, data from the National Infant Sleep Position study indicate that playpen use as a sleep surface has increased. In 1998, only 0.6% of infants slept in a playpen during the night; in 2006, 3.7% did. The CPSC data also suggest that 3% to 5% of infant suffocation deaths occur in portable cribs and playpens.

An additional limitation is the inconsistency in documentation for many pertinent details about each incident, such as the presence of soft bedding and the child’s usual sleep position. This is largely due to the lack of standardization of death scene investigation and autopsy protocols in the United States. In addition, inconsistency exists in how coroners and medical examiners may define cause of death, such that similar cases may be coded differently by different authorities; in this series, asphyxia, positional asphyxia, suffocation, undetermined, SIDS, and SUDI were all diagnoses. Future more uniform and comprehensive data collection is important to confirm these findings. It is hoped that the new Centers for Disease Control and Prevention guidelines for standardized data collection and reporting protocols for the investigation of sudden unexplained infant deaths will provide more uniformity in the data collected and allow for better study design and analysis.

Conclusion

The AAP has published guidelines for a safe sleep environment for infants, which include the supine sleep position, use of cribs that meet the safety standards of the CPSC and the American Society for Testing and Materials, use of a firm and snug-fitting crib mattress, and avoidance of soft objects and loose bedding in the crib. These guidelines should be followed when portable cribs and playpens are used in the home and in child care settings. In addition to the AAP guidelines, if playpens and portable cribs are to be used, it is important to ensure that the crib is properly assembled and locked in position to avoid accidental collapse, that use of outdated or recalled cribs is avoided, and that the playpen or portable crib is not near items that might lead to strangulation. Once the child is able to stand, care should be taken so that he or she will not attempt to climb out of the playpen or portable crib. The rigorous safety design requirements for cribs should also be required for playpens and portable cribs. Finally, programs recommending and providing cribs to families must be aware of the need for guidance regarding the unique risks of playpens and portable cribs.

References

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