

# Safe Sleep Guideline Adherence in Nationwide Marketing of Infant Cribs and Products

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abstract

**BACKGROUND:** Sudden infant death syndrome and sleep-related sudden unexpected infant death remain leading causes of infant mortality in the United States despite 4 safe sleep guideline restatements over the previous 24 years. Advertising and retail crib displays often promote infant sleep environments that are counter to the most recent American Academy of Pediatrics (AAP) guidelines.

**METHODS:** Magazine advertisements featuring sleep in parenting magazines from 1992, 2010, and 2015 were reviewed for adherence. Crib displays from nationwide retailers were surveyed for adherence to the latest AAP safe sleep guidelines. The primary outcome was adherence to the guidelines.

**RESULTS:** Of 1758 retail crib displays reviewed, only half adhered to the latest AAP guidelines. The most common reasons for nonadherence were the use of bumper pads and loose bedding. The depiction of infant cribs and sleep products in magazine advertising has become significantly more adherent over time; however, 35% of current advertisements depict nonadherent, unsafe sleep environments. Magazine advertising portraying safe sleep environments revealed racial and ethnic disparities.

**CONCLUSIONS:** Although improvements have been made over time with increased adherence to AAP safe sleep guidelines, significant deficiencies remain. Advertising continues to depict unsafe sleep environments. Crib manufacturers and retail establishments continue to market and sell bedding and sleep products considered unsafe by the AAP in approximately half of retail crib displays. Pediatric and public health care providers should continue educational and advocacy efforts aimed at the public, but should also include retailers, manufacturers, and advertising professionals to foster improved sleep environments for all children.

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Dr Kreth codesigned the study, carried out the majority of data gathering, assisted in the data analysis, and authored the initial manuscript; Ms Shikany helped with study design, carried out a significant portion of the data gathering, and reviewed and revised the manuscript; Ms Lenker conceptualized the study and reviewed and revised the manuscript; Dr Troxler codesigned the study, carried out a significant portion of the data gathering, provided the main statistical analysis, and coauthored, reviewed, and revised the manuscript; and all authors approved the final manuscript as submitted.

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**WHAT'S KNOWN ON THIS SUBJECT:** There have been few published studies examining the marketing of infant cribs and products for adherence to the most recent American Academy of Pediatrics safe sleep guidelines. Retail marketing often includes items that are not adherent to the guidelines.

**WHAT THIS STUDY ADDS:** This is the first survey of infant cribs and product marketing with respect to safe sleep guideline adherence since the 2011 American Academy of Pediatrics guidelines. These data may inform health care providers and help tailor future policy and advocacy efforts.

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In 1992, the American Academy of Pediatrics (AAP) first released recommendations that all infants should be placed in a supine position for sleep to lower the incidence of sudden infant death syndrome (SIDS).<sup>1</sup> After revisions in 1996 and 2005, the guidelines were expanded in 2011 to address sudden unexpected infant deaths (SUID) during sleep.<sup>2-4</sup> Despite these official statements, SIDS/SUID remains the leading cause of infant mortality in the United States for children 1 month to 1 year of age according to the US Centers for Disease Control and Prevention.<sup>5</sup> After the initial publication of the AAP safe sleep recommendations in 1992, the rate of SIDS/SUID in the United States decreased from 1.2 per 1000 live births to 0.56 per 1000 live births, where it has remained.<sup>4,6-8</sup> More than 95% of infant deaths attributed to SIDS/SUID are associated with  $\geq 1$  modifiable risk factors.<sup>9</sup> Over the ensuing 2 decades, there has been increasing awareness of, and national attention directed at, strategies to decrease these preventable deaths. Such efforts have included changing hospital practices, instituting parent/caregiver education programs, information campaigns, and substantive public health efforts.<sup>10-12</sup> Despite these recommendations and public health efforts, unsafe sleep practices have continued.<sup>13,14</sup>

Although most pediatricians counsel parents on safe sleep practices, the total amount of time spent with a primary care provider during a well-child visit is brief compared with the amount of time parents are exposed to advertising for infant products. A recent survey on the duration of well-child checks showed that 33.6% of visits were <10 minutes long, whereas 47.1% were between 11 and 20 minutes long.<sup>15</sup> Although there are no published data showing the length of time parents spend shopping for infant sleep-related products, it is likely >20 minutes. According to the third edition of the Bright Futures

guidelines, anticipatory guidance on safe sleep is just one of >20 suggested topics to cover during the prenatal visit, the newborn visit, and the 1-week visit.<sup>16</sup> The advertising onslaught parents experience while shopping for infant cribs or reading parent-oriented magazines easily eclipses the brief safe sleep advice received from primary care providers during these visits.

The socioecological model endorsed by the National Action Partnership to Promote Safe Sleep recognizes that the normative beliefs of others and societal pressures influence parents and caregivers.<sup>17</sup> Advertisements by crib manufacturers, national retailers, and magazines directed at parents are sources of societal pressure. Despite at least 1 national effort by a major advertising trade association to portray safe sleep environments adherent to the most recent AAP guidelines in the marketing of infant sleep-related products,<sup>18</sup> such advertising continues to show nonadherent sleep environments.

The purpose of this study is to examine the online, print, and physical marketing of infant cribs and sleep environments by major retailers for adherence to the AAP safe sleep guidelines. We postulated that there would be a trend toward more guideline-adherent sleep depicted in parent-oriented magazine advertisements after the original guideline introduction and improving guideline adherence seen over time. We hypothesized that there would be significant differences in guideline adherence among retail settings and that more expensive cribs would be less adherent to the AAP safe sleep recommendations due to the addition of bedding or bumper pads in their displays.

## METHODS

A member of the University of Alabama at Birmingham Institutional

Review Board reviewed the research protocol and approved the project as not human research. The investigators reviewed print advertisements from a nationally distributed parenting magazine, with a monthly circulation of >10 million readers, for depictions of safe sleep in the advertisements. Six consecutive issues from 3 temporal cohorts were chosen a priori for assessment: preceding the initial 1992 sleep guidelines, before the most recent guideline restatement in 2011, and the current year. All advertisements in these cohorts were reviewed, totaling 1893 ads across the 3 cohorts. Information collected from each advertisement included company, product, whether sleep was featured, and whether the sleep environment portrayed was adherent to the 2011 guidelines. Data on the race of portrayed adults and children were gathered. The race of subjects portrayed was analyzed by a 2-reviewer visual assessment of the advertisement. If agreement was not reached, the race was considered indeterminate. Analysis focused on advertisements depicting sleep and featuring children <1 year of age. Two investigators independently reviewed and scored all advertisements depicting sleep. Scoring discrepancies were resolved by an open review of the advertisement by the research team.

The research team performed a comprehensive review of infant crib retail displays across multiple settings. The physical in-store displays as well as the online crib displays for 11 national retail establishments were chosen for assessment a priori and were classified as “big box” retail establishments, “warehouse club” establishments, baby-specific retailers, department stores, and furniture stores. The 2011 AAP policy statement was used to develop a standardized review form consisting of a 6-question checklist that

determined each crib's adherence to the guidelines. Specific questions are detailed in Table 1. Information was gathered on the crib manufacturer, model, price, the retail store classification as listed above, and whether the display was online or in a physical store. One local store from each national brand was chosen and every physical in-store crib display as well as every crib displayed on that store's national Web site were reviewed by 1 of 2 reviewers. These reviewers independently assessed the same store (108 cribs total) to assess for validity and reproducibility of their results.

All data were entered into a FileMaker 13 Advanced database (FileMaker, Inc, Santa Clara, CA). Descriptive statistical analysis (histograms and quartile determination) was performed. Nonparametric continuous data were analyzed by using the Kruskal–Wallis test. Nominal data were analyzed by using the  $\chi^2$  test. In instances where the sample size was deemed too small to use  $\chi^2$ , Fisher's exact test was used. Interrater reliability was assessed by using Cronbach's  $\alpha$ . Statistical analysis and visualization were performed by using commercially available software, GraphPad Prism version 6.0e for Mac (GraphPad Software, LaJolla, CA) and Aabel version 3.0 (GigaWiz, Tulsa, OK). Two-sided  $P$  values  $< .05$  were deemed significant.

**TABLE 1** Crib-Specific Questions Used for Assessment of the Crib's Safe Sleep Environment Derived From the 2011 AAP Safe Sleep Guidelines<sup>a</sup>

Is the sleeping surface a firm crib mattress?
Are there significant gaps <sup>a</sup> between the mattress and the side of the crib?
Are there soft objects in the crib?
Is there loose bedding in the crib?
Are bumper pads present?
Are there any wedges, positioners, or special SIDS-reducing mattresses or sleep surfaces present?

<sup>a</sup> We defined any gap  $>2$  inches as significant in our assessment because this was undefined in the AAP safe sleep guidelines.

## RESULTS

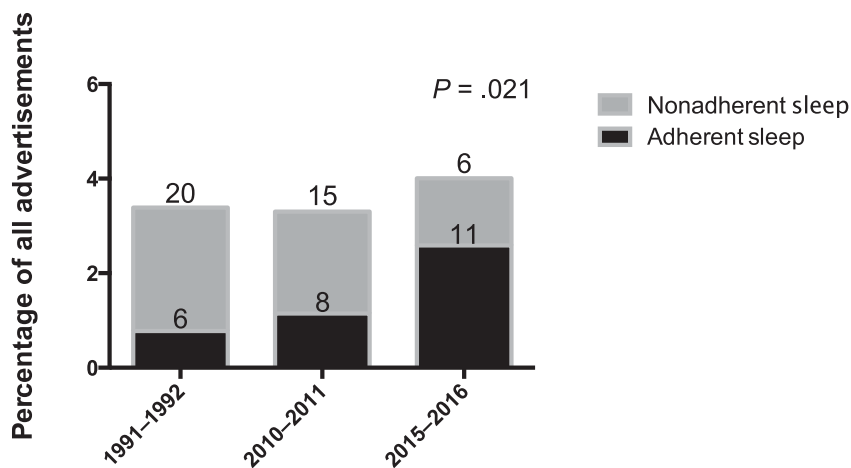
Investigators analyzed a total of 1893 print advertisements: 767 from the 1991–1992 cohort, 698 from the 2010–2011 cohort, and 428 from the 2015–2016 cohort. The total number of advertisements declined in the most recent magazine cohort with 44.2% fewer advertisements compared with the 1991–1992 cohort ( $P < .001$ ). Only 95 advertisements featured sleep, cribs, or bedding in any form, and only 66 depicted sleep or sleep-related products for children estimated to be  $<1$  year of age (3.5% of total advertisements reviewed). Overall, the percentage of advertisements depicting safe sleep has improved significantly over time (Fig 1).

White children were featured most often in advertisements overall, occurring in 93.6% of all advertisements with children present, whereas nonwhite children were depicted in 34.0% of all advertisements with children present. Indeterminate race comprised 7.6% of all advertisements featuring sleep in children  $<1$  year of age. In the 1991–1992 cohort, there were 2 advertisements featuring children with adherent sleep environments for which race

could not be determined. When race was able to be determined, safe sleep was far more likely to be shown using white children versus nonwhite children ( $P = .028$ ). Excluding the advertisements depicting children of indeterminable race, guideline-adherent sleep was only depicted with white children. Out of the 1893 advertisements reviewed, no children identified from underrepresented minorities were featured in any guideline-adherent sleep advertisements (Fig 2).

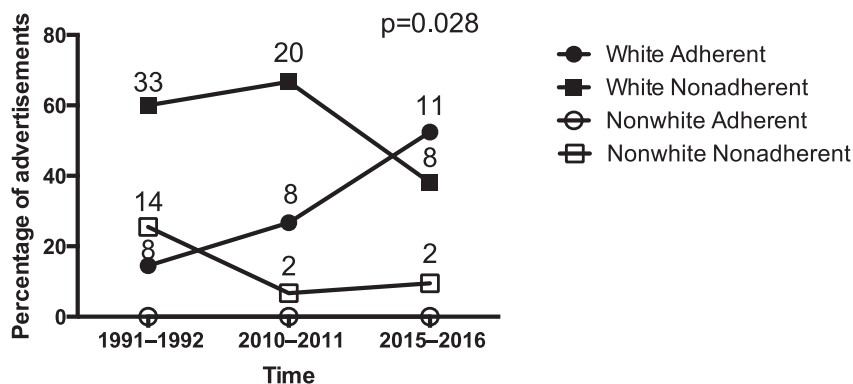
Advertisements were reviewed to determine the sleep position of children featured in the images. Only 54% of advertisements featuring a sleeping child not being held by an adult depicted the child asleep in the supine position. There was no significant difference in the rates of supine sleep position in advertisements before or after the publication of the AAP Safe Sleep Guidelines, with 57% of children depicted sleeping supine in the 1991–1992 cohort compared with 61.5% in the 2011–2012 cohort and 40% in the 2015–2016 cohort.

Researchers reviewed a total of 1758 individual crib displays from 11 nationwide chain stores from both in-store physical displays



**FIGURE 1**

Advertisements in 3 temporal cohorts featuring adherent sleep environments according to the 2011 AAP safe sleep guidelines. The numbers on the graph denote the absolute number of advertisements in each category.



**FIGURE 2**

Adherence to the AAP safe sleep recommendations by race/ethnicity of children depicted in advertisements featuring sleep in 3 temporal cohorts. The numbers on the graph denote the absolute number of advertisements in each category.

and online displays as outlined in Table 2. Cronbach's  $\alpha$  for interrater reliability was 0.927. Although online crib displays far outnumbered the physical store displays, overall guideline adherence was not significantly different between the in-store and online displays, with 51.1% of cribs overall adherent to the guidelines. Big box retail stores were more likely to be guideline-adherent than any other category at 55.1% adherence ( $P = .035$ ). Warehouse clubs were the most likely to be nonadherent (61.1% nonadherent). Almost half of all crib displays reviewed (48.9%) were deemed unsafe as infant sleep environments based on the AAP guidelines.

Crib price correlated with adherence to the safe sleep recommendations. Crib prices ranged from \$99.98 to \$2200 for the most expensive

complete nursery furniture set that included a crib. The median price for a crib purchased online was \$250 compared with \$399 for physical stores ( $P < .001$ ). When cribs were analyzed by price quartile, there was a statistically significant difference ( $P < .001$ ) with more adherent cribs in the mid-range pricing and more nonadherent cribs being in the most and least expensive quartiles (Fig 3).

The presence of bumper pads in the advertised cribs (70.2% of nonadherent cribs) was the most common reason for guideline nonadherence, followed by inclusion of loose bedding (55.7% of nonadherent cribs), and soft objects in the crib (12.9% of nonadherent cribs). Physical stores were more likely to have crib displays that were nonadherent because of loose bedding and soft objects in the crib

than online displays. Online images were more likely to display bumper pads in use compared with physical stores ( $P < .001$ ). When analyzed by price quartile, the least and most expensive cribs were more likely to have bumper pads ( $P = .008$ ) and loose bedding ( $P = .002$ ) than the mid-range priced cribs. The most expensive cribs were more likely to have soft objects present in them compared with the other quartiles ( $P < .001$ ).

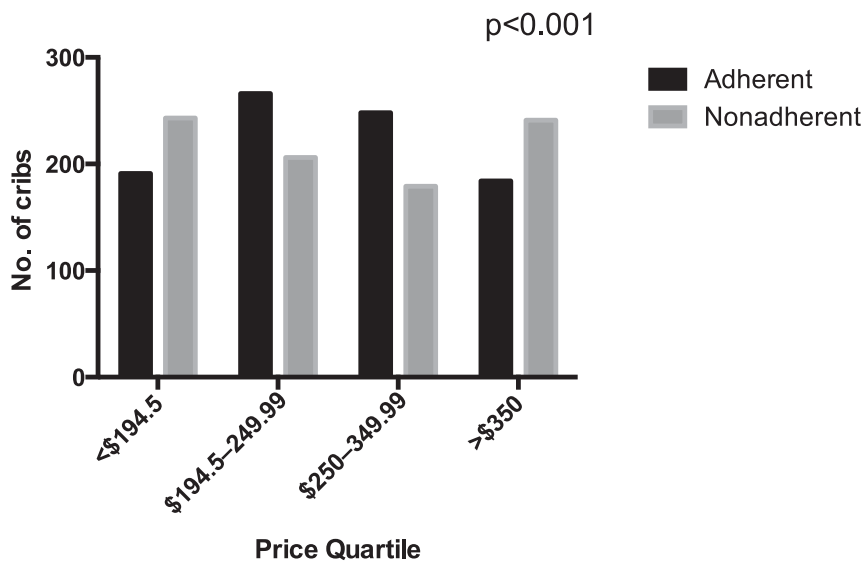
## DISCUSSION

By examining magazine advertisements, we were able to assess changes in marketing over time. Although the total number of advertisements decreased over this time frame by ~44%, the percentage of advertisements featuring sleep in children <1 year of age remained stable at 3% to 4% of advertisements. In the 24 years since the publication of the original guideline, advertisement content featuring sleep environments has changed significantly. Before the publication of the initial safe sleep guidelines in 1992, only 23.1% of advertisements depicting a sleep environment were adherent. By 2010 to 2011, 34.7% of advertisements including a sleep environment were adherent. In the most recent cohort, 64.7% of advertisements depicting sleep were adherent to the AAP safe sleep recommendations. This is a

**TABLE 2** Comparison of Crib Adherence to the 2011 AAP Safe Sleep Guidelines by Retailer Location and Setting

Retail Location (n)	Total			Online			In-Store			P Online versus In-Store Adherence
	Total	Total No. Adherent	Total % Adherent	Total Online	No. Online Adherent	% Online Adherent	Total In-Store	No. In-Store Adherent	% In-Store Adherent	
Big box retailers (2)	668	368	55.1	659	359	54.5	9	9	100.0	.005
Infant-specific retailers (2)	650	327	50.3	622	318	51.1	28	9	32.1	.055
Department stores (2)	353	165	46.7	349	161	46.1	4	4	100.0	.047
Warehouse club retailers (2)	54	21	38.9	54	21	38.9	0	N/A	N/A	N/A
Furniture stores (3)	33	17	51.5	28	17	60.7	5	0	0.0	N/A
Total	1,758	898	51.1	1,712	876	51.2	46	22	47.8	.765

The  $P$  value was determined utilizing Fisher's exact test because the values for many of the in-store cribs were smaller than could be analyzed by using  $\chi^2$ .  $n$  = Number of store brands surveyed. N/A, The number of cribs sold in the physical store was not sufficient to allow statistical analyses.



**FIGURE 3** Adherence to the 2011 AAP safe sleep guidelines by crib price quartile. The median price of a crib was found to be \$250.00. The 25th percentile was \$194.50 and the 75th percentile was \$350.00.

significant shift ( $P = .021$ ) and likely reflects the continued advocacy by the AAP, pediatricians, and other health care professionals. Our study expands on the work described by Joyner et al<sup>19</sup> in their 2008 review of images of sleep environments in 28 magazines with large readership of women of child-bearing age. Their study demonstrated that 36.4% of sleep environments shown were adherent to the latest AAP guidelines available at the time. Their findings included images from articles, not just advertisements, possibly leading to greater adherence in their study compared with the 2010–2011 cohort described in this study. Joyner did not assess the changes over time, which we have shown to be significant.

The racial/ethnic disparities observed in the advertisement of safe sleep are of particular concern. Among advertisements in which the race of the child could be determined, the adherent sleep environments only featured white children. In contrast, nonwhite children were depicted in 18.5% of advertisements, all showing unsafe sleep environments. The lack of guideline-adherent sleep environments in

advertising depicting minority children is alarming considering that infants of non-Hispanic, African-American mothers had more than double the rate of death by SIDS/SUID when compared with all race mortality.<sup>20</sup> The reason for this disparity is unclear, but the overall number of children shown in unsafe sleep environments in present day advertising demonstrates the need for ongoing education and advocacy on behalf of all children, especially for children from underrepresented minorities.

A 2014 study by Gaydos et al<sup>21</sup> of 92 African-American mothers and 20 health care providers outlines the understanding of and reasons for nonadherence to the AAP safe sleep guidelines among this community. They note “almost universally, both mothers and providers stated that mothers understand the content of the AAP safe sleeping recommendations.”<sup>21</sup> All mothers in this study had either a crib or a bassinet available to them to use; however, 96.7% of mothers in the study reported unsafe sleep environments for their infants. Gaydos et al<sup>21</sup> demonstrate that more than counseling by providers

is needed to reach this at-risk population; the cultural norm of safe infant bedding needs to change.

Overall, a slight majority of marketed cribs were adherent to the AAP safe sleep recommendations. Big-box retail establishments and department store physical crib displays were 100% guideline-adherent (Table 2). This finding was in contrast to the in-store displays for furniture stores and baby-specific retailers, who had far less adherence. We hypothesized that baby-specific stores would be less likely to be guideline-adherent compared with other store types due to these stores attempting to increase sales of bedding, bumper pads, and soft toys. Both baby-specific and furniture stores marketed a significant number of bedding accessories under their store’s own brand that increased the inclusion of nonadherent items in their displays. Department and big box stores may not focus on marketing these nonadherent items or may be adopting and promoting the AAP’s safe sleep message. Regardless of the reason, they deserve a special mention for 100% in-store guideline adherence.

The majority of online crib displays used stock images provided by the manufacturers and, therefore, reflected the manufacturer’s display preferences. Stores that sold their own brand of cribs did not follow this pattern. There was 1 store that allowed parents and other reviewers to submit user-generated photos. These reviews and photos were then approved by the individual store before they were posted online and so were included in our analysis.

The inclusion of bumper pads, loose bedding, and soft objects in the crib were the most common reasons for displays to be nonadherent. In physical stores, 95.8% of nonadherent cribs had loose bedding included in the display. The removal of these items from retail crib displays would convert the



majority of nonadherent displays to safe sleep environments. Shapiro-Mendoza et al<sup>13</sup> demonstrated that more than half of mothers reported using some form of loose bedding with their sleeping infants. Although Shapiro-Mendoza et al<sup>13</sup> showed an improving trend away from bedding use with time, the declines seen with other racial groups stagnated among black infants. The presence of loose bedding in retail displays only serves to normalize their use. Due to their continued high prevalence, pediatric and public health care providers should target loose bedding and bumper pads for discussion with parents, manufacturers, and retailers.

Limitations of this study include the review of only 1 parent-oriented magazine. We were able to find only 1 parent-oriented magazine that was continuously published throughout the time span assessed. We postulate that this magazine has a majority white readership that may skew the advertisements included. Bias of magazine advertisers may help to explain the limited number of minority children featured in advertising, because companies likely focus advertisements to match the subscriber demographics. Due to the limitations of some print advertisements, we were unable to determine the race of every child <1 year of age featured, which may have affected the analysis.

The review of in-store crib displays was limited by the inclusion of only a single store of each national chain in 1 geographic region. Because

these were national chain stores, the displays in each store should adhere to the standards of the national store brand; however, this may vary from store to store and by geographic region. The review of online crib displays was limited by the stock images manufacturers provided to each retailer. Stores that sold cribs that were not manufactured under their own store brand used images of the cribs supplied by the manufacturers, which may not represent the sleeping environment that the stores wish to promote. However, each store is advertising using these images and is reflective of the sleep environment that is being portrayed to consumers and parents.

Finally, the study did not assess the type of soft object in the crib and so was unable to address the percentage of cribs that contained pillows or blankets. These objects have been associated with an increased risk of SIDS/SUID and should be evaluated in subsequent studies.

## CONCLUSIONS

Although much has improved in terms of safe sleep guideline adherence in advertising over the years, much more is still left to be done. Almost 40% of current advertisements featuring sleep in children <1 year of age continue to show unsafe sleep environments as defined by the AAP and 60% of these advertisements depict infants sleeping in nonsupine positions. Almost half of all online

and in-store crib displays featured items specifically mentioned by the AAP as not recommended in a safe sleep environment. Although the recommendations have clearly made an impact over time, the message has not been adopted by all. Parents are likely to hear about safe sleep from their providers during office visits, but as one of >20 recommended topics to be discussed in early visits,<sup>16</sup> this discussion can be easily overshadowed by what parents see when shopping for cribs or reading parent-oriented magazines. The lack of safe sleep in advertising depicting underrepresented minority children along with the high incidence of SIDS/SUID in this population makes messaging for this population a priority. The AAP and public health care providers need to broaden current educational and advocacy efforts beyond parents and caregivers to include advertisers, stores, and crib manufacturers. By doing this, we may change the advertisements that shape societal norms of what an infant sleep environment should look like to ensure a safe place to sleep for all children.

## ABBREVIATIONS

AAP: American Academy of Pediatrics

SIDS: sudden infant death syndrome

SUID: sudden unexpected infant death

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