

Sudden Unexpected Infant Deaths in Minnesota

Informing Prevention Strategies

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Sudden unexpected infant deaths (SUIDs) are a leading cause of infant mortality in Minnesota, and many of these deaths could be prevented. This article describes the 2014 SUID rate in Minnesota across subpopulations as well as the prevalence of risk and protective factors for SUID. It also discusses opportunities for SUID prevention.

Sudden unexpected infant death (SUID) is the third leading cause of infant mortality in Minnesota and the leading cause of infant mortality among American Indians in the state.¹ SUIDs include deaths from unknown causes, sudden infant death syndrome (SIDS), sleep-related suffocation and other sleep-related causes.

The SUID rate in the United States decreased substantially after the American Academy of Pediatrics (AAP) changed its safe sleeping recommendations in 1992 and the NIH launched its Back to Sleep campaign in 1994. The rate plateaued, then began decreasing slightly starting in 2009. Improved death scene investigations have revealed that many deaths that once may have been attributed to SIDS are the result of unknown causes or suffocation.² Extensive research has identified risk and protective factors for SUIDs; these inform the AAP's most current recommendations.³

A priority in the Minnesota Department of Health's Infant Mortality Reduction Plan for Minnesota is to further reduce the rate of SUID in the state.¹ With that in mind, health department epidemiologists set out to better characterize SUIDs in Minnesota. We assessed maternal demographics, categorization of SUID cases and safe sleep factors. In this article, we report

our findings and provide recommendations for preventing SUIDs in the state.

Methods

We identified cases of SUID involving Minnesota residents younger than 1 year of age who died in 2014 using a definition developed by the CDC for its SUID Case Registry* (infant deaths that occur suddenly and unexpectedly, and whose cause is not immediately known prior to investigation). Data for each SUID case were obtained from birth certificates, death certificates, law enforcement reports, autopsy reports, death scene investigations and medical records entered into the national Child Death Review Case Report System.

The SUID cases were categorized according to a classification system developed for the CDC registry. That classification system "recognizes the uncertainty about how suffocation or asphyxiation may contribute to death and that accounts for unknown and incomplete information about the death scene and autopsy."⁴ We used the AAP's definition of a safe sleep

environment (one in which the infant is in a supine position on a firm sleep surface that is free of loose bedding, soft objects and other people) when calculating the incidence of SUID cases related to the sleep environment. Adequate prenatal care was defined as nine or more visits during pregnancy, to be consistent with previous analyses done using the CDC's SUID Case Registry.

We calculated SUID rates per 10,000 births in 2014 for certain demographic groups and for the presence of certain risk or protective factors. Race was determined by the mother's race on the infant's birth certificate.⁵ Data from the 2012 Minnesota Pregnancy Risk Assessment Monitoring System were used to determine smoking rates during pregnancy.

Findings

Demographics

We identified 53 cases of SUID in Minnesota in 2014 for an overall rate of 7.6 deaths per 10,000 infants (children younger than 1 year of age). The youngest infants were especially at risk, with 45 of the cases (85%) occurring in the first 6 months of life. Infants with younger mothers were also at higher risk for SUID. Those with mothers 15 to 19 years of age had a SUID rate of 29.5 per 10,000 births; those with mothers 20 to 24 years of age

*The SUID Case Registry was created by the Centers for Disease Control and Prevention (CDC) in 2010. Minnesota is one of 16 states and two jurisdictions in the United States that are funded to participate in the registry.

had a rate of 14.8 per 10,000 births; and those with mothers 25 years of age and older had a rate at or below the overall rate of 7.6 per 10,000 births. SUID rates were found to be higher among black and American Indian mothers than among white and Asian mothers (Table 1).

Sleep Environment

Fifty-two of the 53 SUID cases occurred in a sleep environment. Of the deaths that took place in a sleep environment, 63% of infants (n=33) had been sharing a sleeping surface with another person (Table 2). Eighty-five percent of infants (n=44) were using soft bedding such as pillows or blankets. More than half (54%, n=28) of the cases occurred when the infant was sleeping in an adult bed. The position in which the child was put to sleep was documented in 41 cases. Of those cases, 58% of the infants were placed on their back

(n=23), 33% were placed on their stomach (n=13) and 13% were placed on their side (n=5). Of the cases in which sleep position was reported, 38% (n=15) changed position from that in which they were initially placed to that in which they were found. Every sleep-related SUID case for which there was information about the scene (n=51) involved either soft bedding in the sleep environment or sharing a sleep surface; half the cases involved both.

Fourteen of the SUID cases (26%) were categorized as having “incomplete case information” or “no autopsy or death scene investigation” according to the CDC’s classification system. Eighteen (34%) were classified as “unexplained: unsafe sleep factors,” nine (17%) were “unexplained: possible suffocation with unsafe sleep factors” and 12 (23%) were “explained: suffocation with unsafe sleep factors.” No cases

were categorized as involving “no unsafe sleep factors.”

Other Risk and Protective Factors

Sixty-six percent of the mothers (n=35) in the 53 SUID cases had received adequate prenatal care, and 68% (n=36) had initiated prenatal care in the first trimester (Table 2). The SUID rate varied according to the trimester in which prenatal care began. The rate per 10,000 births for mothers who began receiving prenatal care in the first trimester was 6.6, it was 11.5 for those who began care in the second trimester and 16.2 for those who first received care starting in the third trimester.

Thirty-six percent (n=19) of the mothers whose infants died as a result of SUID smoked during the last trimester of pregnancy, as compared with 12% of all new mothers of infants in Minnesota in 2012. Sixty-eight percent (n=36) of mothers among the SUID cases had ever breast fed their infant.

TABLE 1

Rate of SUID by mother’s race (2014)

Mother’s race	Number of SUIDs	Number of birth mothers in Minnesota in 2014	Rate per 10,000 births
White	29	52,526	5.5
Black	17	7,885	21.6
American Indian	4	1,293	30.9
Asian	2	5,543	3.6
Other	0	2,282	0
Unknown	1	387	25.8
Total	53	69,916	7.6

TABLE 2

Risk and protective factors in 2014 Minnesota SUID cases

Sleep-related factors (N=52)	Yes	No	Missing
Shared a sleep surface	33 (63%)	19 (37%)	0 (0%)
Used soft bedding	44 (85%)	0 (0%)	8 (15%)
Placed infant on side or stomach	18 (35%)	23 (44%)	11 (21%)
Unsafe sleep environment	52 (100%)	0 (0%)	0 (0%)
Other factors (N=53)			
Infant ever breastfed	36 (68%)	15 (28%)	2 (4%)
Mother received adequate prenatal care	35 (66%)	15 (28%)	3 (6%)
Smoked during pregnancy	23 (43%)	28 (53%)	2 (4%)

Discussion

The AAP expanded its recommendations for preventing sleep-related deaths in 2011. The new recommendations include supine sleeping, room sharing without bed sharing, using a firm sleep surface, avoiding soft bedding, reducing exposure to tobacco smoke, and breast feeding.³ In 2014, there was not a single sleep-related death in Minnesota in which the infant was found in a safe sleeping environment as defined by the AAP. More specifically, every case involved either soft bedding or a shared sleep surface.

We determined that an adequate autopsy and death scene investigation were performed in three out of every four Minnesota SUID cases. Of those cases with adequate information, about a third were categorized as “explained: suffocation with unsafe sleep factors,” which means there was strong evidence for suffocation without competing causes of death. In the remaining cases, there were competing causes of death, conflicting witness accounts, inadequate detail about the scene investigation or uncertainty about whether

the unsafe sleep environment contributed to the death.

Physicians and other health care providers who come in contact with parents of infants and expectant parents have an opportunity to discuss safe sleep practices and the reasons for them. Our review of medical records from SUID cases suggests that parents often receive a clear message about placing infants to sleep on their backs but less clear messages about the dangers of bed sharing and soft bedding. Several parents mentioned that they knew a bed was not safe for infants, so they placed pillows around the infant to prevent them from falling off. Parents of one infant who died suddenly and unexpectedly after being placed on his stomach told death scene investigators that they thought they were following their provider's recommendation for "tummy time."

In addition to increasing and targeting education about safe sleeping practices, policy changes could help prevent SUIDs. The large disparities in SUID rates by race is a notable finding. The number of American Indians and Asians in our study was small. However, the magnitude of the disparities between the rates of SUID for these groups and others are consistent with what we have measured in the past. A limitation of this study is that data were only available for the mother's race. Including the father's race may have affected the SUID rates by race. The Advancing Health Equity in Minnesota Report to the Legislature identifies health disparities, such as those that affect infants of color, and recommends changes that address institutional discrimination and social determinants of health.⁶ Smoking during pregnancy has been consistently identified as a risk factor for sudden infant death,⁵ and policies that support preventing tobacco use and smoking cessation are important to preventing SUIDs.

Conclusion

All infant deaths are tragic, especially those that could have been prevented. Many factors affect a baby's risk of SUID including social determinants of health, a caregiver's understanding of safe sleep

practices and ability to consistently provide a safe sleep environment, and exposure to tobacco. Public health, law enforcement, health care practitioners and other community members all have roles to play in addressing these issues and helping parents make Minnesota a safer place for babies. **MM**

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