

# Circumstances Leading to a Change to Prone Sleeping in Sudden Infant Death Syndrome Victims

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**ABSTRACT.** *Context.* In addition to usual prone sleeping, unaccustomed prone sleeping represents a significant risk factor for sudden infant death syndrome (SIDS). However, little information is available regarding the circumstances leading caretakers to change the infant's sleep position to prone position in SIDS victims.

*Objective.* To determine, in a population of SIDS victims, the timing of a change to prone sleeping and the reason for that change in infants who were originally nonprone sleepers.

*Design and Setting.* Case series analysis from a questionnaire administered between 1991 and 1997 to parents and other caretakers of SIDS victims in the province of Quebec (Canada).

*Subjects.* One hundred fifty-seven SIDS cases occurring in the province during the study.

*Results.* Of the 157 SIDS cases studied, 139 were found in the prone position, although only 93 infants usually slept prone. Of the 64 nonprone sleepers, 34 had been changed to prone by the parents or another caretaker before death, and 18 had apparently turned to prone for the first time. In the 34 cases changed to prone, the change occurred <1 week before death for 21 infants; for 16 of those infants, death occurred the first or second time that they slept prone. In 56% of the cases changed from a nonprone to prone sleeping position, a caretaker other than the parents had precipitated the change.

*Conclusions.* Ongoing campaigns to decrease the risk of SIDS should emphasize the risk of unaccustomed prone sleeping to both parents and secondary caretakers. *Pediatrics* 2000;106(6). URL: <http://www.pediatrics.org/cgi/content/full/106/6/e86>; *sleep position, first time prone, day care, secondary caretaker.*

ABBREVIATION. SIDS, sudden infant death syndrome.

It is well recognized that prone sleeping is a significant risk factor for sudden infant death syndrome (SIDS). In the past several years, the incidence of SIDS has decreased significantly in countries where successful national campaigns were instituted to reduce prone sleeping.<sup>1-4</sup>

Despite the marked reduction in prone sleeping world-wide, some studies have shown that the prevalence of prone sleeping increases after the second

month of life.<sup>5-8</sup> More importantly, it has been reported in a few case series that some SIDS victims who were usually nonprone sleepers were put to sleep in the prone position shortly before they died.<sup>9,10</sup> There are also anecdotal reports of infants dying the first time that they were put prone to sleep,<sup>11</sup> or when they turned prone for the first time.<sup>12-14</sup> More recently, 3 case-control studies from the Scandinavian countries, The Netherlands, and New Zealand have highlighted the high risk of prone sleeping in infants who are usually nonprone sleepers.<sup>15-17</sup> However, the duration that the prone position was used before death, the caretaker who initiated the change in position, and the reasons for this decision remain uncertain. Such information is crucial for orienting campaigns to further reduce the incidence of SIDS.

The objective of our study was to determine, in our SIDS population, the incidence and timing of a change to prone sleeping, the reason for the change in position, and the caretaker responsible for the change.

## METHODS

Starting in September 1991, we began collecting data on the victims of sudden unexpected death whose families were followed at our Montreal center, the provincial center for all cases of sudden unexpected deaths in Quebec (Canada). Center personnel are advised of all infant deaths by provincial coroners and organize family support.

As part of the information gathered from each family, the nurse in charge of the families administered a questionnaire to all parents as soon as possible after the infant's death. This questionnaire developed from a standardized nursing-intake form included the following information: demographic data, prenatal and postnatal history, family history, and risk factors for SIDS including sleep position. There were a total of 54 questions and a narrative summary of the circumstances of death. The items concerning sleep position were embedded in the questionnaire along with many other standard questions related to the infant's health, sleep habits, and circumstances of death. More specifically, we wanted to know the usual sleep position of the infants, the position that they were last placed in, and any change in sleep position during the final month (spontaneous or imposed by the caretakers). In all cases in which infants died in the care of a person other than the parents (a secondary caretaker), we also interviewed that caretaker for information about the sleep position.

Although information was collected from all families who had lost an infant suddenly and unexpectedly in the first year of life, the present report examines only the data pertaining to infants who died of SIDS. A diagnosis of SIDS was retained after a review of the medical history, an investigation of the circumstances of death, and a complete autopsy that failed to reveal a cause of death.<sup>4,18</sup>

We obtained demographic data on all SIDS deaths in the province from the Institut de la statistique du Québec (the provincial government statistics office). The data comprised the date of birth and date of death, place of residence, gestational age, birth weight,

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order of birth in the family, age of the mother and father, and education attainment level of the mother. To link the 2 databases, we used the date of birth, date of death and place of residence. Our study was approved by our institution's review board, and we had approval from the Commission d'Accès à l'Information du Québec for the data obtain from the provincial statistics office.

### Data Presentation and Analysis

In the following sections, we will use the term "inexperienced, placed prone" for those infants who were always placed nonprone to sleep but were changed to prone within 1 month of their death. "Inexperienced, turned prone" will be used to describe those nonprone sleepers who were last placed nonprone but who had turned themselves into the prone position.

The data will be described using the median and interquartile range. To compare data from 2 groups (infants who died in the care of their parents vs those who died in the care of another person, for instance) we used the Mann-Whitney *U* rank sum test. To compare proportions between different groups, we used the  $\chi^2$  analysis or the Fisher's exact test, as indicated. Finally, to compare data from different groups, we used the Kruskal-Wallis analysis of variance by rank, followed by a pair-wise comparison using Dunn's method.

## RESULTS

From September 1991 to December 1997, 274 cases of SIDS occurred in the province of Quebec. One hundred eight families were not followed in our center because bereavement support could be performed in their own community facilities. Nine additional families declined the help of our center and the questionnaire was not administered. We had complete data on sleep position for the remaining 157 cases, the questionnaire having been administered within 1 to 14 days of the death, usually within a few days. The median age at death was 13.7 weeks (interquartile range: 9–17 weeks). There were 96 males representing 61% of the study sample. An excess of deaths occurred during the winter months: 58 cases compared with 42 during the summer months (winter months: mid-November to mid-March; summer months: mid-May to mid-September; years 1992–1997). From 1992 to 1995, the trend was consistent by year. After 1995, the seasonal trend was no longer seen probably because of the low number of cases. These characteristics (male gender predominance, age at death, and season of death) as well as the geographical distribution of the cases within the province and the other demographic data evaluated did not differ from those of the total SIDS group (274 SIDS deaths that occurred in the province during that period).

### Usual Sleeping Position

There was a high prevalence of prone sleeping in our SIDS population. Indeed, 93 infants slept prone, either as the sole position (78 infants; 49.7%) or in combination with other positions (15 infants; 9.6%). Of the 64 infants usually sleeping nonprone, only 7 slept supine (4.5%); 31 infants slept on their side and the rest slept in both nonprone positions. No significant age or gender differences were seen in the prevalence of the various sleeping positions. When the data were divided by complete years of study, no overall trends appeared in the proportion of infants sleeping in the various positions from 1992 to 1997. First-born infants were less likely to usually sleep

prone (14/40; 35%) than were later-born infants (79/117; 67%;  $P < .001$ ,  $\chi^2$  analysis). The age of the mother, her level of education, and the gestational age at birth were not significantly associated with usual sleep position.

### Position Found

Eighty-eight percent of SIDS victims were found prone (139 of the 157 infants). Eight infants were found on their side and all had been placed on their side. Ten infants, including 2 in car seats, were found supine; 2 of the infants found supine had been placed on their side for their last sleep.

For 104 of the 139 infants found prone, the position of the head was known with certainty to be as follows: face straight-down, 65 infants (62.5%); face near-straight-down, 5 infants (4.8%); and face to the side, 34 infants (32.7%). In the remaining cases, caretakers could not recall with certainty the exact position of the head, or the infant had been picked up or had his/her position changed before death was recognized. The proportion of infants found with different head positions did not depend on their experience as prone sleepers; 64% of inexperienced prone sleepers were found face straight-down, compared with 60% of experienced prone sleepers. The proportion of infants found with different head positions also did not depend on their age; the median age for infants found face straight-down was 12.7 weeks, compared with 12.5 weeks for the infants found face to side.

### Change to Prone Sleeping

A significant number of infants were found in a position different from that of their usual sleep position. Table 1 presents the data per years of study and divided by the usual sleeping position. We divided the data to highlight differences that might have occurred after the national campaign to avoid infant prone sleeping (1993–1994). Of the 64 infants who always slept nonprone, 52 were found prone (81%). Thirty-four infants had been changed to prone by their parents or by a secondary caretaker (baby-sitter, for instance) before death. Eighteen infants found prone were placed nonprone for their last sleep and turned to prone themselves. Of these, 15 had always slept nonprone, whereas 3 had been noticed to be able to turn to prone during sleep for a few days to a few weeks before death.

For the group of 34 inexperienced prone sleepers who had a change in position, the duration of the change varied from once or twice prone up to intermittent prone for 5 weeks (Table 2). SIDS occurred during the first prone-sleeping period in 27 infants; 12 infants had been put prone for the first time for their last sleep, and 15 were found prone for the first time, having been put nonprone for the last sleep. None had been observed to turn prone by themselves. There was no age difference between the group of first-time prone, compared with infants who never had any change in sleep position or with those who had a change that was longer.

A significant number of infants were positioned on their side for their last sleep but were found in an

**TABLE 1.** Distribution of Cases per Time Period

	1992–1993* <i>n</i> = 70	1994–1995 <i>n</i> = 58	1996–1997† <i>n</i> = 29
Usual prone sleepers ( <i>n</i> = 93)			
Found prone ( <i>n</i> = 87)	42	34	11
Found nonprone ( <i>n</i> = 6)	2	2	2
None prone sleepers ( <i>n</i> = 64)			
Found prone ( <i>n</i> = 52)			
Inexperienced, placed prone‡ ( <i>n</i> = 34)	15	14	5
Inexperienced, turned prone§ ( <i>n</i> = 18)	9	3	6
Found nonprone ( <i>n</i> = 12)	2	5	5

\* The year 1991 (which covers only the months of September through December) is included.

† The year 1996 was the first year with a significant drop in SIDS rates in the province of Quebec. There were ~50 cases per year before 1995 (rate of .5–.6/1000 live births); this drop to 27 cases in 1996 (a rate of .3/1000). By comparison, the Canadian data were .9/1000 in 1991 and .45/1000 in 1996. The campaign to avoid infant prone sleeping occurred between 1993 and 1994 in Canada and in the province of Quebec.

‡ “Inexperienced, placed prone” refers to those infants who were always placed nonprone to sleep but were changed to prone only a short time before their death.

§ “Inexperienced, turned prone” refers to those nonprone sleepers who were last placed nonprone but found dead in the prone position.

**TABLE 2.** Duration of Change to Prone Sleeping (Usual Non-prone Sleepers Changed to Prone Sleeping Position Before Death)

Duration of the Change	Number of Infants	Change Initiated by a Secondary Caretaker
First-time event	12 (35%)	6
Second-time event	4 (12%)	2
Three to 7 d duration	5 (15%)	3
Intermittent* (1–3 wk)	9 (26%)	5
Intermittent* (3–5 wk)	4 (12%)	3
Total	34	19†

\* Intermittent prone refers to the use of prone position for short period of time (day-time nap) intermittently either by the parents of a secondary caretaker.

† In all cases, the time spent under the care of the secondary caretaker is the same as the time during which prone position was used.

other position. Of the 28 infants placed on their side for their last sleep, 18 (64%) were found prone, 8 were found on their side, and 2 were found supine.

### Secondary Caretakers and Experience With Prone Sleeping

Deaths occurred under the care of a person other than the parents in 32 instances (20%). There were important differences between the group of infants who died under the supervision of a secondary caretaker, compared with those who died in the care of their parents. First, the usual sleeping position of the SIDS victims dying in the care of their parents was prone in 70% (81 of 116 SIDS victims). In contrast, only 21% of the victims dying while being supervised by a secondary caretaker usually slept prone ( $P < .001$ ,  $\chi^2$  analysis). However, in these 2 groups similar proportions of infants were put prone for their last sleep (75% and 81%, respectively, for infants in the care of their parents, compared with those in the care of a secondary caretakers).

Second, when a parent initiated the change in position, the reason given for the change was crying, irritability, or poor sleep (13 cases) or regurgitation (2 cases). When a secondary caretaker initiated the change (19 cases), the caretaker stated that they had

always placed other infants in the prone position and believed that infants sleep better in that position.

The caretaker responsible for the change in position was a daycare worker in 8 instances (4 in home daycare setting, 4 in institutional daycare), an occasional babysitter in 8 instances as well, and a relative in 3 instances.

### DISCUSSION

The major finding of our study is that 53% of SIDS victims (34/64) who had always slept in a nonprone position died shortly after they were put prone by a parent or another caretaker. We also found that when a change was made in the sleep position before death, a secondary caretaker was responsible for that change in 56% of the cases. These findings have very important implications for orienting campaigns aimed at further reducing the risk factors for SIDS. They could also have implications for understanding the relationship between SIDS and prone sleeping.

Three case-control studies reported a 14- to 19-fold increased risk of SIDS in infants sleeping prone for the last time, if they had not usually slept prone.<sup>15–17</sup> However, previous investigators did not inquire about the duration of the change to prone sleeping. We are then extending the findings of the case-control studies.

How could prone sleeping be so dangerous that only a short time in that position will lead to death? Hypotheses explaining prone sleeping as a risk factor for SIDS center on the facedown position causing asphyxiation by rebreathing and/or airway obstruction. It has been shown that normal infants, those usually sleeping prone, frequently adopt the facedown position, arouse, turn their head, and go back to sleep.<sup>19</sup> Although some evidence suggests that SIDS infants have an arousal deficit,<sup>20,21</sup> it seems unlikely that an arousal deficit per se would explain an increased incidence for inexperienced prone sleeping infants. However, head-turning is a key protective mechanism once an arousal has occurred.<sup>19,22</sup> Turning the head might be a learned behavior that recent or inexperienced prone sleepers have not yet acquired. Perhaps our recent findings of

neuronal damage to specific brainstem nuclei involved in key reflex responses to cardiorespiratory stimuli (trigeminal and vestibular nuclei) and in the hippocampus<sup>23</sup> will provide a clue to the mechanism of death. SIDS victims may have suffered repeated hypoxic episodes, as suggested from many histologic and biochemical findings in several organs.<sup>24–28</sup> Therefore, if episodes of hypoxemia damage specific brainstem nuclei as shown in our study, perhaps eventually only brief episodes of prone sleeping will lead to asphyxia, the infant being unable to react appropriately to the stress.

Our study also highlights the problem of infants being placed in the care of individuals (daycare personnel, relatives, and friends) who may not use the recommended supine sleep position, or may not even be aware of the latest advice concerning infant sleeping position. A recent study from Gershon and Moon<sup>29</sup> showed that nearly one half of the child care centers surveyed in the metropolitan Washington, DC area were still using the prone sleeping position for infants <6 months of age. Clearly, the campaign to reduce the risk of SIDS must target all caretakers.

Finally, because parents and other caretakers often cite promotion of better sleep as the reason for the change to prone sleeping, new strategies for dealing with sleep problems will be needed. Parents will need support if they are to avoid resorting to prone-sleeping solutions.

The next steps in campaigns to reduce SIDS rates will be to target the newly identified risk. One first step will be the avoidance of side sleeping. It has already been shown that this position carries a slightly higher risk than supine sleeping<sup>15,22</sup> presumably because a significant proportion of infants placed on their side turn prone. In our group of SIDS victims, 64% of the infants placed on their side turned prone. Clearly, the side position should be discouraged.

A more difficult problem are the infants who die after turning from supine to prone. One recommendation that merits support is to encourage the use of safe sleep surfaces and discourage the use of soft bedding because there is a strong interaction of these factors and the prone sleep position as SIDS risk factors. Devices have been marketed to prevent supine to prone turning but little is known about their safety, efficacy, or indications for appropriate use. Strategies to promote safe prone sleeping in case there is spontaneous change to that position should also be explored. One way might be to reinforce training in the prone position during daytime awake periods and for play activities. Whether this will have an impact and will decrease the risk of SIDS in infants who turn themselves prone remains unknown. As suggested by Mitchell et al,<sup>17</sup> great care should be taken that those infants not be left unattended because they might fall asleep in that position.

## CONCLUSION

In light of the results of our study and those of the 3 case-control studies showing the high risk of unaccustomed prone sleeping, it is imperative that par-

ents and all potential secondary caretakers be warned to avoid prone sleeping. Specifically, the risk of using the prone sleeping position for infants not accustomed to it should be made very explicit.

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## REFERENCES

1. Wigfield RE, Fleming PJ, Berry PJ, et al. Can the fall in Avon's sudden infant death rate be explained by changes in sleep position? *Br Med J*. 1992;304:282–283
2. Scragg LK, Mitchell EA, Tonkin SL, Hassall IB. Evaluation of the cot death prevention programme in South Auckland. *N Z Med J*. 1993;106:8–10
3. de Jonge GA, Burgmeijer RJF, Engelberts AC, et al. Sleeping position for infants and cot death in The Netherlands 1985–1991. *Arch Dis Child*. 1993;69:660–663
4. Côté A, Russo P, Michaud J. Sudden unexpected deaths in infancy: what are the causes? *J Pediatr*. 1999;135:437–443
5. Chessare JB, Hunt CE, Bourguignon C. A community based survey of infant sleep positioning. *Pediatrics*. 1995;96:893–896
6. Mitchell EA, Tuohy PG, Brunt JM, et al. Risks factors for sudden infant death syndrome following the prevention campaign in New Zealand: a prospective study. *Pediatrics*. 1997;100:835–840
7. Lesko SM, Corwin MJ, Vezina RM, et al. Changes in sleep position during infancy: a prospective longitudinal assessment. *JAMA*. 1998;280:336–340
8. Ottolini MC, Davis BE, Patel K, et al. Prone infant sleeping despite the "Back to Sleep" campaign. *Arch Pediatr Adolesc Med*. 1999;153:512–5177
9. Markestad T, Skadberg B, Hordvik E, et al. Sleeping position and sudden infant death syndrome (SIDS): effect of an intervention program to avoid prone sleeping. *Acta Paediatr*. 1995;84:375–378
10. Brooke H, Gibson A, Tappin D, et al. Case-control study of sudden infant death syndrome in Scotland, 1992–1995. *Br Med J*. 1997;314:1516–1520
11. Beal S, Porter C. Sudden infant death syndrome related to climate. *Acta Paediatr Scand*. 1991;80:278–287
12. Beal SM, Blundell H. Sudden infant death syndrome related to position in the cot. *Med J Aust*. 1978;2:217–218
13. Beal SM. Sudden infant death syndrome related to sleep position and bedding. *Med J Aust*. 1991;155:507–508
14. Kemp JS, Thach BT. Sudden death in infants sleeping on polystyrene-filled cushions. *N Engl J Med*. 1991;324:1858–1864
15. Oyen N, Markestad T, Skaerven R, et al. Combined effects of sleeping position and prenatal risk factors in sudden infant death syndrome: the Nordic Epidemiological SIDS study. *Pediatrics*. 1997;100:613–621
16. L'Hoir MP, Engelberts AC, van Well GT, et al. Risk and preventive factors for cot death in The Netherlands, a low-incidence country. *Eur J Pediatr*. 1998;157:681–688
17. Mitchell EE, Thach BT, Thompson JMD, Williams S. Changing infant's sleep position increases risk of sudden infant death syndrome. *Arch Pediatr Adolesc Med*. 1999;153:1136–1141
18. Willinger M, James S, Catz C. Defining the sudden infant death syndrome (SIDS): deliberations of an expert panel convened by the National Institute of Child Health and Human Development. *Pediatr Pathol*. 1991;11:677–681
19. Waters KA, Gonzalez A, Jean C, et al. Face-straight-down and face-near-straight-down positions in healthy, prone sleeping infants. *J Pediatr*. 1996;128:616–625
20. Schechtman VL, Harper RM, Wilson AJ, Southall DP. Sleep state organization in normal infants and victims of the sudden infant death syndrome. *Pediatrics*. 1992;89:865–870
21. Kahn A, Franco P, Scaillet S, Groswasser J, Dan B. Development of cardiopulmonary integration and the role of arousability from sleep. *Curr Opin Pulm Med*. 1997;3:440–444
22. Thach BT. How does prone sleeping increase prevalence of sudden infant death syndrome? *Pediatr Pulmonol Suppl*. 1997;16:115–116
23. Waters KA, Meehan B, Huang JQ, et al. Neuronal apoptosis in sudden infant death syndrome. *Pediatr Res*. 1999;45:166–172
24. Gillan JE, Curran C, O'Reilly E, Seamus FC, Unwin AR. Abnormal patterns of pulmonary neuroendocrine cells in victims of sudden infant

- death syndrome. *Pediatrics*. 1989;84:828–834
25. Rognum TO, Saugstad OD, Yasæter S, Olaisen B. Elevated levels of hypoxanthine in vitreous humor indicate prolonged cerebral hypoxia in victims of sudden infant death syndrome. *Pediatrics*. 1988;82:615–618
26. Valdes-Dapena M, Gillane MM, Catherman R. Brown fat retention in sudden infant death syndrome. *Arch Pathol Lab Med*. 1976;100:547–549
27. Williams A, Vawter G, Reid L. Increased muscularity of the pulmonary circulation in victims of sudden infant death syndrome. *Pediatrics*. 1979;63:18–24
28. Del Bigio MR, Becker LE. Microglial aggregation in the dentate gyrus: a marker of mild hypoxic-ischemic brain insult in human infants. *Neuropathol Appl Neurobiol*. 1994;20:144–151
29. Gershon NB, Moon RY. Infant sleep position in licensed child care centers. *Pediatrics*. 1997;100:75–78

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