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Cindie Carroll-Pankhurst and Edward A. Mortimer, Jr

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Sudden Infant Death Syndrome, Bedsharing, Parental Weight, and Age at Death

Cindie Carroll-Pankhurst PhD, MPA,* and Edward A. Mortimer, Jr, MD‡

ABSTRACT. *Objective.* To assess the role of parental bedsharing in sudden infant death syndrome (SIDS)-like deaths, this study examines the hypothesis that, compared with other SIDS cases, the age distribution of deaths associated with bedsharing should be lower in younger, less vigorous infants.

Methods. For 84 SIDS cases in Cleveland, Ohio, 1992 to 1996, age at death, maternal weight, and other risk factors for SIDS were compared for cases grouped according to bedsharing status.

Results. Mean ages at death were 9.1 weeks for 30 bedsharing and 12.7 for 54 nonbedsharing cases, counting 10 with missing information as nonbedsharing. Mean pregravid weights of bedsharing mothers exceeded those of nonbedsharing mothers (84.1 vs 67.0 kg). Mean ages at death for nonbedsharing infants, bedsharing infants of smaller mothers, and bedsharing infants of larger mothers were 12.7, 10.3, and 7.6 weeks, respectively. Large maternal size did not affect age at death in the absence of bedsharing.

Conclusions. By demonstrating that among an urban population at high risk for SIDS, bedsharing is strongly associated with a younger age at death, independent of any other factors, this study provides evidence of a relationship between some SIDS-like deaths and parent-infant bedsharing, particularly if the parent is large. *Pediatrics* 2001;107:530–536; *infant mortality, sudden infant death, bedsharing, parental obesity, asphyxia.*

ABBREVIATIONS. SIDS, sudden infant death syndrome; IMR, infant mortality rate; IMRP, Infant Mortality Review Program; SD, standard deviation.

In recent years, clinical and epidemiologic studies of sudden infant death syndrome (SIDS) have provided convincing direct and indirect evidence that explains some deaths that would have been formerly classified as idiopathic. These observations are important for 2 reasons. First, these identified causes offer opportunities for prevention. Second,

removal from consideration of cases of recognized causation should reduce blurring of results of research directed at the cause of true idiopathic SIDS. The belief that misclassification of cases continues to dilute SIDS research in the United States is reinforced by Knobel, Chien-Jen, and Liang's 1995 statement: "Suffocation as cause of death is rarely recorded in western countries. The situation in Asia is essentially different. Taiwan and Japan both record suffocation rates that are higher than SIDS rates, and together these two causes of death sum up to values similar to those for SIDS in western countries. We include accidental suffocation diagnoses in SIDS, taking the view that from a western perspective both terms would be 'synonymous.'"¹

These points are exemplified by accumulating evidence that some proportion of sudden unexplained infant deaths classified as SIDS is attributable to infants sleeping in the prone position, with hypothesized mechanisms being airway obstruction, re-breathing, and overheating, often in association with other risk factors.^{2–4} As a result, several countries launched campaigns to foster the supine sleeping position for infants with apparent reductions of ~50% in SIDS rates.^{2–4} In the United States it is estimated that SIDS rates have dropped >40% since the 1992 American Academy of Pediatrics recommendation to avoid the prone sleep position.⁵ However, many SIDS cases are not explained by the prone sleep position; indeed, 1 study from California failed to show any effect of prone position.⁶ Other contributing factors have been suggested by some studies, including singly or in combination, parental smoking,^{7–12} parental drug or alcohol abuse,^{11,13,14} unsafe bedding,^{15–17} and infanticide.^{18,19} A recent assertion that some SIDS may be caused by congenital cardiac electrical instability (the long-QT syndrome)²⁰ has been severely challenged.⁵ Accidental suffocation by parental overlying with bedsharing has also been suggested as a cause.^{11,13,18,21–23} One recent study found that 33% of SIDS deaths occurred while bedsharing whereas only 7% of parents routinely bedshared, an observation not commented on by the authors.²⁴ Some studies indicate an increased SIDS risk for bedsharing infants, especially when linked to smoking by the parent.^{12,25} Other reports do not support this suggestion and indeed some claim that bedsharing protects against SIDS by increasing the number of arousals and reducing the slow-wave sleep.^{26–29} However, in its March 2000 statement on sleep environment and sleep position, the American

From the *Mandel School of Applied Social Sciences and the ‡Department of Epidemiology and Biostatistics, Case Western Reserve University, Cleveland, Ohio.

During the conduct of this study, Dr Carroll-Pankhurst was a graduate student in the Department of Epidemiology and Biostatistics.

Preliminary reports of the first 64 cases were presented at the annual meeting of the American Public Health Association, San Diego, CA; October 29, 1995–November 2, 1995, and at the annual meeting of the American Epidemiological Society, Atlanta, GA; March 22, 1996.

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Reprint requests to (C.C.-P.) Case Western Reserve University, School of Medicine, Department of Epidemiology and Biostatistics, 10900 Euclid Avenue, Cleveland, OH 44106-4945. E-mail: cxc15@po.cwru.edu

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Academy of Pediatrics notes that these behavioral studies do not provide any epidemiologic evidence that bedsharing reduces SIDS risk.⁵ Subsequently, 2 case series using data from the Consumer Product Safety Commission have implicated parental overlying as a not infrequent cause of death of young infants,^{30,31} and the Academy has reiterated concern about the risk of bedsharing³²; discussion of this concern has reached the public press.^{33,34} One recent study from Britain found an increased risk, which the authors interpreted as being attributable to so-fasharing but not to bedsharing.³⁵

To assess the role of parental bedsharing in SIDS-like deaths, we examined the hypothesis that, compared with other SIDS cases, the age distribution of deaths associated with bedsharing should be lower in younger, less vigorous infants, particularly if the bedsharing parent was obese, possibly caused by overlying.

PATIENTS AND METHODS

Patients

Eighty-four cases classified as SIDS were accrued serially from October 1, 1992, through January 30, 1996. All SIDS deaths that occurred during that time, and for which the review process was complete, were included. All unexplained infant deaths in this county are autopsied by the coroner, a board certified forensic pathologist. All deaths in this report met standard clinical and pathologic criteria for SIDS and were so designated by the coroner on the death certificate.

Methods

Cleveland, Ohio (population 506 000) has approximately 10 000 resident births annually, and in recent years an infant mortality rate (IMR) twice the national rate. In 1994, Cleveland's IMR was 16.1 per 1000 live births,³⁶ compared with the US rate of 8.0,³⁷ and the incidence of SIDS was ~2.6, compared with the national rate of 1.0. In 1991, the City of Cleveland received a 5-year federal award to reduce its infant mortality rate and that of a small contiguous community with high infant mortality through comprehensive outreach and educational efforts for mothers pre- and postnatally and their infants. As an evaluation component of these efforts the Infant Mortality Review Program (IMRP), based at Case Western Reserve University, conducted in-depth reviews of all infant deaths that occurred in Cleveland and adjacent Warrensville Heights with approximately 10 000 and 260 annual births respectively. The purposes of this review process were to define as precisely as possible the causes of infant deaths and contributing factors, to assess the potential preventability of each death, and to recommend appropriate interventions. The process, described in detail elsewhere,³⁸ included exhaustive case finding to capture all infant deaths. Each death was evaluated by extensive examination of all pertinent maternal and infant medical records (prenatal, delivery, well-child care, and emergency department), vital statistics (birth and death certificates), social service records, autopsy reports, emergency medical services reports, and fire and police records. The data were collected in a standard manner by trained, experienced research nurses. Parent interviews were not conducted and there was no standard death scene investigation at the time of the study. The study was approved by the University's Institutional Review Board for Human Investigation and the boards of involved hospitals.

The determination of bedsharing status was based on complete review of all records of the case. Any case for which emergency medical service, emergency department, or other records reported that the infant was sleeping with 1 or both parents at the time of death was classified as bedsharing. Any piece of furniture (bed, couch, sofa, or other) on which the parent and infant were sleeping was considered to be a bed for this analysis. Information on sleep position (prone or supine) was reported in fewer than one third of the cases and was therefore not analyzed. Maternal pregravid weights (the only consistently available measurement)

were ascertained from records of prenatal care visits for 76 (91%) of the cases and for 6 from birth certificates; 2 were not recorded. Weights were used in analyses as both continuous and dichotomous variables. For those tests requiring a dichotomous variable, 79.5 kg (175 lbs) was arbitrarily selected as the cutoff point before initiation of the analysis. The infant's age at death was computed from the dates of birth and death. Generally, smoking, alcohol use, and illicit drug use were ascertained as self-reports in medical records. In some instances, but not uniformly, drug use was based on urine toxicology screening. Substance (drug and/or alcohol) use was treated as a dichotomous variable.

Study Design

The infant mortality review was originally designed as a descriptive case series and not as an analytic (causative) epidemiologic study. In the course of the review process, an impression developed that cases reported as SIDS were frequently associated with bedsharing with an obese parent. Accordingly, factors surrounding these 84 deaths ascribed to SIDS were compared retrospectively for 30 bedsharing and 54 nonbedsharing infants. This investigation, therefore, can be described as a case-comparison study.¹⁷

Statistics

The data were analyzed using the Student's *t* test, χ^2 , Fisher's exact test, Kruskal-Wallis nonparametric 1-way analysis of variance, and the life-table survival method with a Kaplan-Meier log rank test of significance. All tests are reported with 2-tailed probabilities. All analyses were performed using SPSS/PC+.

RESULTS

As of January 30, 1996, the IMRP had reviewed 462 infant deaths that occurred since October 1992, including 84 designated as SIDS by the coroner based on classic clinical and pathologic findings. Table 1 shows the characteristics of non-SIDS and SIDS deaths with the latter group subdivided by sleeping status at death and maternal weight. No significant differences were found, except that black mothers were more likely than white mothers to be sleeping with their infants at the time of death ($P < .01$). Additionally, bedsharing mothers of SIDS cases were less apt to be married than nonbedsharing mothers ($P < .05$) and had fewer prenatal care visits. The differences in birth weight and gestational age are explained by the high incidence of prematurity in the non-SIDS group.

Of the 84 SIDS cases, 30 were reported to be bedsharing and 44 were sleeping elsewhere. For 10 cases, information on sleep status was not available, and to be most conservative these were included with the nonbedsharing group in the analyses. Because it is possible that some of these infants were cosleeping, this would cause a nondifferential misclassification of exposed into the nonexposed group. It has been argued that such misclassification, even in the presence of polychotomous exposure variables, biases the results toward the null hypothesis.³⁹⁻⁴² Separate analysis with these 10 cases excluded confirms this assumed effect. The mean age difference between bedsharing and nonbedsharing was 4.2 weeks ($P = .026$) and among larger women this difference was 7.8 weeks ($P = .018$). In both instances the age difference is greater and the results are more significant. Additional analyses using alternative assumptions about the distribution of bedsharing status also failed to alter the results or conclusions (data not shown). In 2 instances, 1 bedsharing and 1 nonbed-

TABLE 1. General Characteristics of the SIDS Study Population, Cleveland, 1992 to 1996

Variable	All Non-SIDS Infant Deaths	SIDS				
		All SIDS Deaths	All* Nonbedsharing	All Bedsharing	Bedsharing*	
					≥79.5 kg§	<79.5 kg§
Number	378	84	54	30	14	12
Male infant (%)	59	57	59	53	50	58
Black (%)	76	68	56 (++)	90	79	100
Married (%)	20	25	32 (+)	13	29	0
Smoked during pregnancy (%)	40	61	63	57	43	75
Drank alcohol during pregnancy (%)	22	17	17	17	0 (+)	36
Use drugs during pregnancy (%)	19	19	15	27	0 (+++)	50
Any substance use	29	26	24	30	0 (+++)	58
Age-appropriate education level (%)‡	73	61	67	50	43	58
At least 1 previous infant death (%)	9	10	7	17	29	8
Previous history of SIDS (%)	n/a	7	6	13	21	0
Maternal pregravid weight (kg) (SD)§	68.3 (19.0)	73.0 (26.3)	67.0 (19.5) (+)	84.1 (33.1)	108.7 (30.3) (+++)	58.8 (8.8)
Mother's age (y) (SD)	24.7 (6.3)	23.9 (5.2)	23.6 (5.1)	24.4 (5.4)	25.8 (3.9)	24.0 (6.9)
Gravidity (SD)	3.7 (2.5)	3.6 (2.0)	3.7 (2.1)	3.4 (1.8)	3.2 (1.8)	3.6 (1.8)
Prenatal care visits (SD)	4.0 (3.6)	5.5 (3.8)	6.1 (3.7) (+)	4.4 (3.8)	5.7 (3.5) (+)	2.8 (3.6)
Gestational age (wk) (SD)	28 (7.9)	38 (3.2)	37.8 (3.4)	38.3 (2.8)	39.2 (1.5)	37.3 (3.5)
Infant's birth weight (g) (SD)	1291 (1130)	2869 (737)	2836 (752)	2929 (716)	3176 (605) (+)	2601 (811)

(+) P value < .05 (++) P value < .01 (+++) P value < .001

* Ten of 84 cases with unspecified bedsharing status were considered to be nonbedsharing.

§ For 1 nonbedsharing and 1 bedsharing mother, weight was not recorded and 3 others were sleeping with someone other than the mother. Among the non-SIDS deaths, weight was not available on 57.

‡ Completion of 12th grade or within 1 year of appropriate grade if <19 years old.

sharing, prepregnancy weights were not available. In 4 instances the infant shared a bed with someone other than the mother. These 4 were excluded from analyses related to maternal weight. In 10 instances the infant was sleeping on a couch rather than a bed. The couch was shared with the mother in 5 cases (once with a sibling as well) and in 1 case with the father. For purposes of analysis, couchsharing was included with bedsharing. In 4 cases the infant was alone on a couch. The mean (standard deviation [SD]) pregravid weights of the bedsharing and the nonbedsharing mothers differed significantly, being 84.1 (33.1) and 67.0 (19.5) kg respectively ($P < .05$).

Table 2 shows that the mean (SD) age in weeks at death for all 84 SIDS cases was 11.4 (8.0). However, age at death for the 30 bedsharing infants of 9.1 (5.4) weeks was significantly lower than 12.7 (9.1) weeks for the nonbedsharing infants ($P = .048$). This difference is additionally supported by the survival curves in Fig 1, which show that bedsharing infants died significantly earlier than their nonbedsharing counterparts ($P = .044$). When bedsharing cases with mothers weighing <79.5 kg were compared with those at or above 79.5 kg, there was no difference ($P = .24$) between mean (SD) ages at death of 10.3 (5.0) and 7.6 (5.9) weeks respectively (Table 2).

The relationship of bedsharing, age at SIDS, and maternal weight is supported by other approaches to data analysis. Considering only cases with mothers >79.5 kg, Table 2 also shows a significantly younger age at SIDS for infants of bedsharing mothers than for those of nonbedsharing mothers ($P = .01$). In contrast, there was no significant difference in age at SIDS related to bedsharing for mothers of lesser

TABLE 2. Relationship of Age at SIDS to Maternal Weight and Bedsharing, Cleveland, 1992 to 1996

Sleeping Status (Number)	Mean Age at Death in Weeks (SD)	Difference	P Value
All cases (84)*	11.4 (8.0)		
Bedsharing (30)	9.1 (5.4)		
Nonbedsharing (54)	12.7 (8.9)	3.6	.048
Bedsharing (26)**			
Large mothers (14)†	7.6 (5.9)		
Small mothers (12)‡	10.3 (5.0)	2.7	.24
Nonbedsharing (53)			
Large mothers (13)	15.1 (7.6)		
Small mothers (40)	12.2 (9.3)	-2.9	.32
Large mothers (27)			
Bedsharing (14)	7.6 (5.9)		
Nonbedsharing (13)	15.1 (7.6)	7.5	.01
Small mothers (52)			
Bedsharing (12)	10.3 (5.0)		
Nonbedsharing (40)	12.2 (9.3)	1.9	.5

* Ten of 84 cases with unspecified bedsharing status were considered to be nonbedsharing.

** Three of the 30 bedsharing infants were excluded from weight-related analyses because they were sleeping with someone other than the mother. One was omitted because of missing weight information.

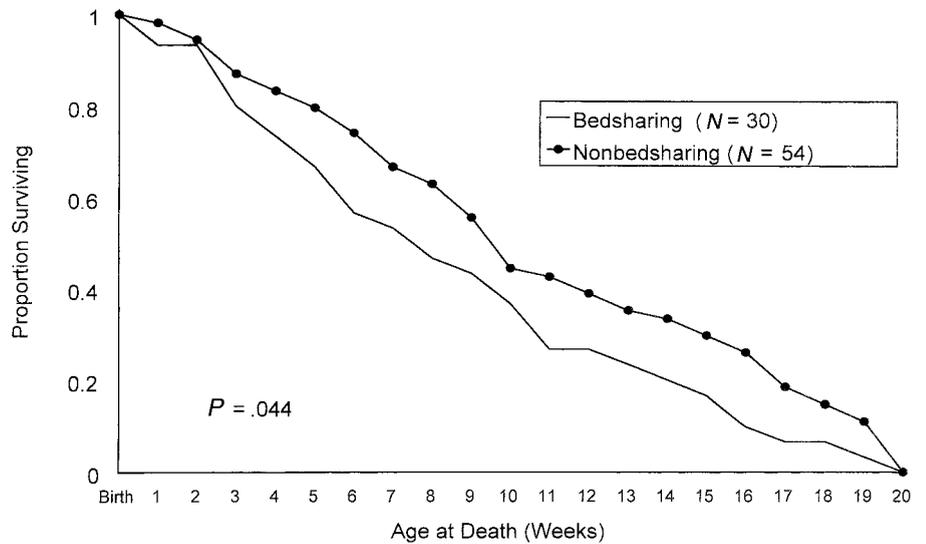
† Large designates pregravid weight ≥79.5 kg.

‡ Small designates pregravid weight <79.5 kg.

One woman in each bedsharing group had unknown weight.

weight. Limiting the analysis to nonbedsharing mothers, no difference in mean age at death related to maternal weight was observed. Thus, large maternal size in this study was not associated with an increased risk of earlier SIDS-like death in the absence of bedsharing. Furthermore, although a significant effect of bedsharing in the absence of large

Fig 1. Survival analysis of SIDS deaths by bedsharing status, Cleveland, 1992 to 1996.



maternal size was not found, the comparison of mean (SD) ages at death for all 3 groups (nonbedsharers, lower weight bedsharers, and heavier bedsharers) of 12.7 (9.1), 10.3 (5.0), and 7.6 (5.9) weeks respectively indicates a graded response to the risk factors (nonparametric 1-way analysis of variance, $P = .048$). Of interest is the fact that nearly half (14 of 27) of the heavier mothers were bedsharing, compared with less than a quarter of the mothers of lesser weight (12 of 52) ($P = <0.05$).

Because bedsharing might pose a greater risk of SIDS from overlying if the mother is using drugs or alcohol, reported substance use during pregnancy (used as a surrogate measure for use at the time of infant's death) was examined. Among the 84 cases, 21 (25%) were identified as using either drugs or alcohol (or both) during pregnancy, including 9 (30%) and 13 (24%) of the bedsharing and nonbedsharing mothers respectively. However, among bedsharing cases, illicit drug and/or alcohol use during pregnancy was noted significantly more often among lower weight mothers than heavier mothers (Table 1). However, because alcohol and drug use were not found in the group of heavier mothers, no conclusions can be drawn about the possible effects of substance abuse in this study.

Other factors that might have influenced these results were assessed by univariate tests that compared race, gestational age, prenatal care (none versus some), and maternal age with bedsharing status, age at death, and maternal pregravid weight (above and below 79.5 kg). With the exceptions of the associations of bedsharing with race, marital status, and prenatal care, the results of these comparisons were nonsignificant. There was no association between race and age at death, or between gestational age at delivery and age at death. Seasonal differences in the occurrence of SIDS or in the frequency of bedsharing were not found. To ensure that no interaction between race and bedsharing affected the age at death, multivariate models were constructed that included weight, bedsharing, age, and race and their interactions as well as gestational age (data not shown). In all models tested the only significant factor identified

was bedsharing alone, or the dummy variable representing bedsharing in the presence of a pregravid weight >79.5 kg. Although 61% of mothers of SIDS cases were smokers compared with 40% of mothers whose infants died of other causes (Table 1), no significant difference in age at death between infants of smokers and nonsmokers was found (data not shown). Also, there were no significant differences in maternal smoking among SIDS cases grouped by bedsharing and maternal weight.

DISCUSSION

The suggestion that some SIDS-like deaths are attributable to adult-infant bedsharing and consequent suffocation is not new, and 2 recent reports using data from the Consumer Product Safety Commission have stimulated heightened interest.^{30,31} The first of these described 2178 mechanical suffocation deaths of infants during the 16 years, 1982 to 1995, most often related to bed structure or bedding, but in 180 attributed to parental overlying on the death certificates.³⁰ The second report concerned only the deaths of 515 children <2 years old while sleeping in adult beds, 1990 through 1997.³¹ Of these, 394 were ascribed to mechanical entrapment and 121 to overlying by a bedsharing adult. Of interest in relation to our report is that in both of these studies, the ages at death attributed to overlying were significantly lower than those resulting from entrapment and other causes. Although these reports are uncontrolled, the statements regarding overlying at death provided by the parents leave little doubt that the majority, if not all, of these deaths were caused by suffocation. Indeed, as the authors note, the numbers of cases are likely to be grossly underestimated. In this population we found that 30 (41%) of the 74 infants for whom bedsharing status was known were sleeping with 1 or more persons at the time of death. Because there have been no published reports on the prevalence of this practice in this or a comparable US population <6 months old, the significance of this observation is unclear.

A recent population-based study from 5 regions in England compared 325 SIDS cases with 1300 healthy

controls using data obtained by parental interviews.³⁵ Univariate analysis showed a significantly increased risk associated with cosleeping on a bed or sofa with a parent. However, the authors found that the significance of the risk of bedsharing but not that of sofa sharing disappeared after multivariate adjustment for certain parental and environmental factors. However, this lack of significance is subject to challenge because the multivariate analysis adjusted for factors associated with bedsharing but not directly related to SIDS, such as parental fatigue, alcohol use, and household overcrowding. These factors enhance the likelihood of bedsharing or of failing to recognize overlying of the infant, but cannot be considered causes of SIDS by themselves. An additional problem is that 20% of cases reported as sudden unexplained death in infancy by local authorities were eliminated from the study for reasons that were not specified.

This study conclusively demonstrates significantly different survival curves and significantly younger mean age at death of the bedsharing groups within this cohort. Hoffman and Hillman have stated that "since the age at death distribution of SIDS is one of its most characteristic features, it is important to examine other risk factors by age at death. Any risk factor found to shift the age at death to either an earlier or later mean age could have important etiologic implications."⁷ In view of this, these results suggest that bedsharing by an infant and an adult may be a risk factor for SIDS-like deaths. Our evidence provides an epidemiologically plausible construct based on 3 interrelated observations. First, SIDS-like deaths occurred significantly earlier in the presence of parent-infant bedsharing than in the absence of bedsharing. Second, the data suggest that SIDS in association with bedsharing occurred earlier if the bedsharing parent was heavy. Third, large mothers of SIDS infants were significantly more likely to be bedsharing at death than were small mothers of SIDS babies. It is important to recognize that none of these observations supports our conclusion by itself; it is the combination of the 3 that is meaningful. This construct is additionally supported by the lack of a demonstrated association between young age at death in the presence of large maternal size without bedsharing and only a marginal association between bedsharing in the absence of large maternal size. Assuming that these results reflect causation in some instances, the most likely mode of death is respiratory restriction caused by overlying, and/or suffocation. Thus, the results meet criteria for causation including consistency of the results of different analytic approaches to these data, the strength of the association which makes chance unlikely, and coherence (biological and clinical plausibility).⁴³ Additional support for the bedsharing hypothesis is the lack of alternative explanations for our results, particularly explanations that would fit the strong relationships found among bedsharing, age at death, and maternal weight.

We believe that these relationships make other explanations unlikely; as an example, there might be a propensity for mothers to take younger infants to bed with them, and accordingly younger victims of

idiopathic SIDS would be more apt to be bedsharing at death. However, the fact that bedsharing was associated significantly more often with early death in infants of heavy mothers but not with infants of small mothers makes this explanation highly unlikely. We discarded the possibility that, for some unknown reason, infants of obese mothers are at enhanced risk of SIDS including its occurrence at an earlier age because of the disparity in age at death between infants of bedsharing and nonbedsharing heavy mothers. Another explanation considered and rejected is the use of drugs and/or alcohol during pregnancy, in part because it was reported significantly more often among smaller mothers than among heavier bedsharing mothers of SIDS infants. Substance abuse is associated with lower prepregnancy weight and poor weight gain in pregnancy.^{44,45} Although substance use among bedsharing women of lower weights might also predispose to overlying or suffocation because of impaired maternal responses to stimuli, the data do not show a significant difference in age at death associated with drug use. Because of the absence of any drug or alcohol users in the group of larger bedsharing women, this study provides no information on the potential combined effect of size and substance related impairment.

The relationship of race and bedsharing is difficult to assess in this study because race-related prevalence data on bedsharing for this age group do not exist. However, these findings are in general agreement with those reported by Lozoff et al⁴⁶ who found that black mothers in Cleveland were more likely to start bedsharing when their infants were newborns. Although the average age of SIDS is reported to be 5 to 7 days earlier for black infants than for white infants,⁴⁷ no significant race-related difference was observed in this study. The facts that blacks were more likely to sleep with their infants but that race does not confound the relationship between bedsharing and age at death raises the question of whether these results reflect a cultural practice among a population at high risk of SIDS or whether the practice itself contributes to that high risk. The former is unlikely to explain the observed phenomenon given the demonstrated weight relationship. The relationship to weight has additional implications, in that there is strong evidence, at least in the United States, of secular increases in obesity in adults of childbearing age.⁴⁸

A limitation of these results is that the population studied is urban and disproportionately minority and low income. This is clearly an important high-risk group for SIDS, but extrapolation to other populations requires caution. Additionally, for some data, such as substance use, maternal self-reporting had to be relied on in the majority of cases. The effect, if any, of classifying 10 infants as nonbedsharing in the absence of specific information on this factor would be to produce a conservative statistical estimate by creating a bias toward the null.⁴⁰

An additional limitation of this study is the lack of a control group and hence the inability to estimate the magnitude of the increased risk introduced by

bedsharing. However, a major problem in determining whether parent-infant bedsharing sometimes results in suffocation of the infant is the difficulty in selecting a meaningful control group. Undoubtedly, the vast majority of parents bedshare with their infants with frequencies ranging from rarely to always and for periods of time varying from a few minutes to the entire night, thus blurring the distinction between bedsharing and nonbedsharing situations. Therefore, the practice is not a dichotomous variable, and would be nearly impossible to quantitate in controls.³¹ However, in the absence of classical controls, as pointed out by Freedman,⁴⁸ descriptive epidemiologic studies often provide data to answer specific questions.

The size of the cohort studied was limited, but it was sufficient to produce statistically significant results, and did comprise all cases of SIDS deaths during the study period. The accrual of additional cases was compromised by the initiation of aggressive local educational efforts, which altered ascertainment and classification of these deaths. The 88 infant deaths in which bedsharing was identified as a possible contributor since the cutoff date for this study cannot be included for these reasons.

Another consideration is whether the lack of maternal interviews by study personnel weakens the conclusions. However, it is established practice for the initial attendants at such unfortunate and unexpected events as SIDS to collect pertinent information. It is unlikely that this information, obtained immediately, is inaccurate. The results obtained from later interviews, in contrast, might be understandably colored by guilt, denial, or other sources of bias.

Although this study indicates that bedsharing is related to a proportion of SIDS-like deaths, it does not explain the mechanism of death. At least 4 possibilities exist singly or in combination, including direct airway obstruction as a result of full or partial overlying, restrictive compression of the infant's chest by the weight of the adult, hypoxia and/or hypercapnea from rebreathing, and overheating; the first 2 being the most probable.

Our interpretation of these results does not conflict with previous findings, such as the role of prone sleeping, and is supported by other studies. Furthermore, our data are consonant with studies regarding smoking and SIDS. We believe that our study provides additional evidence that the spectrum of deaths classified under the rubric of "SIDS" is not a single entity. Instead, there are cases of SIDS-like deaths that have alternative explanations that require supplementing clinical and pathologic studies with thorough pursuit of the circumstances surrounding the death. We do not suggest that idiopathic SIDS is nonexistent, but rather that a proportion of SIDS deaths is related to external factors including bedsharing as well as sleep position, and may be preventable. Furthermore, although it may be desirable to designate these deaths as SIDS and thus provide comforting reassurance to the parents, misclassification compromises pursuit of the causes of true SIDS.⁴⁹

CONCLUSIONS

By demonstrating that bedsharing is strongly associated with a younger age at death among an urban population at high risk for SIDS, independent of any other factors, this study provides evidence of a relationship between some SIDS-like deaths and mother-infant bedsharing, particularly if the mother is large. Because they are significantly younger at the time of death, the group of bedsharing infants is very likely to include cases of infant deaths that are not SIDS, but rather accidental suffocation resulting from full or partial overlying, or another form of airway obstruction. Given the recently published findings that the mortality rate for overlying increased sixfold between 1986 and 1995³⁰ and the evidence of potential hazards of bedsharing from the US Consumer Product Safety Commission,³¹ and, most importantly, because the risks for accidental suffocation by overlying or airway obstruction can be modified, this is an area that deserves far more attention.

These results suggest that it may be prudent, perhaps erring on the side of caution, to discourage parental bedsharing with young infants. We do not propose that in all cases of SIDS that occur in the presence of bedsharing that suffocation is the cause of death, or that this research supports suffocation as a cause of SIDS. We feel that the 2 are distinct, although difficult to differentiate, causes of death. Therefore, this study leads us to urge more comprehensive investigations of infant deaths that include examination of the scene and questions on the sleep environment, and to promote an interest in additional studies into infant sleep behaviors. Such efforts could save lives and improve SIDS research.

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Cindie Carroll-Pankhurst and Edward A. Mortimer, Jr

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