Short Note

Are Infants Sharing a Bed With Another Person at Increased Risk of Sudden Infant Death Syndrome?

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The recent publication by Professor James McKenna and colleagues in *Sleep* speculates that co-sleeping may protect some infants from sudden infant death syndrome (SIDS) (1). The article briefly comments on our work, which found that infants sharing a bed with another person were at increased risk of SIDS compared with those sleeping alone (2), but ignores other studies that also suggested it to be a risk factor.

The aim of this presentation is to review the epidemiological evidence linking bed sharing with SIDS and to argue that the association may be causal. Bed sharing is a more satisfactory definition than co-sleeping, as co-sleeping may refer to sharing the bed, an infant sleeping in the arms of another person or even to close proximity but without bodily contact.

OTHER STUDIES

From biblical times to the end of the last century, sudden unexpected death in infancy was believed to be due to overlaying by the mother. Earlier this century, accidental mechanical suffocation—especially by bedding—was the diagnostic label for unexpected deaths in infancy. Both theories became unpopular, partly to avoid the suggestion of parental blame. Recently, the low SIDS rate in Hong Kong (3), Japan (4) and Bangladeshi infants in the U.K. (5), where there is close proximity of the infant and other household members (including bedsharing), has been used to support McKenna et al.’s proposal that infant bed sharing may decrease the risk of SIDS (1). It should, however, be noted that these populations have low prevalences of known risk factors, such as maternal smoking and prone sleeping position of the infant, which possibly accounts for the low mortality rates.

In contrast, blacks in the United States (6) and Maori in New Zealand (7) have high SIDS mortality rates and are more likely to bed share. Both these ethnic minority groups are socioeconomically disadvantaged and have higher maternal smoking rates, which may override any possible benefit of bed sharing or may, indeed, contribute to the higher SIDS mortality.

A number of case series in the United States (8), Finland (9), Sweden (10) and New Zealand (11) have described bed sharing occurring in SIDS cases. Maternal alcohol or drug intoxication has been implicated in some cases. These studies have been useful to generate hypotheses, but do not provide sound evidence one way or the other.

Case control studies provide stronger evidence of an association. The studies are summarized in Table 1 (2,12–14).

THE NEW ZEALAND COT DEATH STUDY

The New Zealand Cot Death Study is a large nationwide case control study, which prospectively enrolled cases over a 3-year period (1 November 1987–31 October 1990). There were 485 SIDS cases who were compared with 1,800 control infants. The control infants were randomly sampled and were representative of all live births. Control families were interviewed so that the age distribution of controls was that expected for the cases. Control subjects were also randomly allocated a time so that the distribution of this nominated time matched that of the estimated time of death for SIDS cases.

In the study, we asked whether the infant shared a bed with another person at any time in the previous 2 weeks and for the sleep when death occurred or for the nominated sleep for controls. Bed sharing varied considerably by time of day and ethnicity (15). As expected, bed sharing was uncommon during the day. Maori and Pacific Islanders were more likely to bed share compared with Europeans. Furthermore, bed...
The putative risk factor must precede the outcome. Obviously, the criteria are met.

**Consistency of finding.** There are now several case control studies that support an association between bed sharing and SIDS (Table 1). Our new finding that exposure to maternal smoking is required for bed sharing to be associated with an increase risk of SIDS may account for the low mortality rates seen in Hong Kong (3), Japan (4), Bangladeshi infants in the United Kingdom (5) and Pacific Island infants in New Zealand, where bed sharing is common but maternal smoking is rare.

**Strength of the association.** The stronger the association, the more likely there is to be a causal relationship. There appears to be a threefold increased risk associated with bed sharing. This is the same order as the increased risk seen with prone sleeping position.

**Biological gradient.** The existence of a dose-response curve makes a causal interpretation more plausible. Our study found that for infants of maternal smokers, the risk of bed sharing increased with duration of bed sharing to a maximum risk among infants who shared for >5 hours (OR = 6.58 adjusting for ethnicity).

**Biological plausibility.** Is there a biological explanation for the increased risk associated with bed sharing? Two mechanisms have been proposed. The first relates to accidental mechanical suffocation through overlaying. The second relates to hyperthermia (17). The parent’s body would act as a heat source and reduce the ability of the infant to lose heat. However, our study does not support these mechanisms and suggests the mechanism is related to passive smoking. The effect may relate to an effect of exposure to tobacco in utero rather than postnatally, as the increased risk of bed sharing did not vary with the number of cigarettes smoked by the mother, and neither was it related to cigarette smoking by the father.

### CAUSALITY

A number of criteria have been proposed to show causation in observational studies (16). These are:

**Temporal relationship.** The putative risk factor varying considerably in duration; half of those reporting bed sharing did so for <2 hours per 24-hour period.

Our initial analysis found that 24.0% of SIDS cases died in bed with another person compared with 10.5% sharing the bed in the control group (OR = 2.70; 95% confidence index (CI) = 2.02, 3.62) (2). After controlling for a wide range of potential confounders (including ethnicity, maternal educational level, occupation, birthweight, breast feeding, sleep position, maternal smoking), the relative risk associated with this behavior was still statistically significant.

In a subsequent analysis of factors that might explain the higher mortality from SIDS among Maori infants, we found bed sharing to be a risk for Maori infants (OR = 2.96; 95% CI = 1.93, 4.55) but not for non-Maori infants (7). This suggested the presence of an important interaction. More detailed analysis found bed sharing to be a significant risk factor among infants of mothers who smoked, and the risk increased with duration of bed sharing (15). For infants of nonsmoking mothers, bed sharing was not associated with a significant increased risk. Although coroners’ reports and two published case series (8,10) have suggested that bed sharing is a risk when parents have consumed large amounts of alcohol, we found maternal alcohol consumption did not interact with bed sharing to increase the risk of SIDS, and neither was it a risk factor by itself. Although we cannot exclude an increase of risk of SIDS for infants of mothers who do not smoke, any increase in risk is likely to be small.

### TABLE 1. Case control studies of bed sharing and sudden infant death syndrome (SIDS)

<table>
<thead>
<tr>
<th>Date of study</th>
<th>Region</th>
<th>Bed sharing</th>
<th>SIDS %</th>
<th>Control</th>
<th>OR 95% CI</th>
<th>SIDS n</th>
<th>Control n</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986–1987</td>
<td>Hong Kong</td>
<td>12</td>
<td>28</td>
<td>0.37</td>
<td>(0.03, 2.19)</td>
<td>16</td>
<td>32</td>
<td>Lee et al. (14)</td>
</tr>
<tr>
<td>1987–1990</td>
<td>New Zealand</td>
<td>24</td>
<td>10</td>
<td>2.70</td>
<td>(2.20, 3.62)</td>
<td>391</td>
<td>1,584</td>
<td>Mitchell et al. (2)</td>
</tr>
<tr>
<td>1984–1989</td>
<td>Newcastle, U.K.</td>
<td>17</td>
<td>2</td>
<td>8.70</td>
<td>(2.98, 24.73)</td>
<td>41</td>
<td>649</td>
<td>Bacon (personal communication)</td>
</tr>
<tr>
<td>1985–1989</td>
<td>London, U.K.</td>
<td>8</td>
<td>6</td>
<td>1.52</td>
<td>(0.16, 7.04)</td>
<td>24</td>
<td>319</td>
<td>Bacon (personal communication)</td>
</tr>
</tbody>
</table>

Abbreviations: OR = odds ratio; CI = confidence index.
COT DEATH PREVENTION PROGRAM IN NEW ZEALAND

The national cot death program in New Zealand was launched formally in February 1991 (18). This program is attempting to reduce the risk of SIDS by reducing the prevalence of three risk factors: prone sleeping position, smoking in pregnancy and around the infant for the first year of life and not breastfeeding. Last year we added another message: “Do not sleep with your baby”.

The prevention program has not discouraged infants being taken to bed with the parents for comforting or for breastfeeding, but we advise that when the parents are about to go to sleep, the baby should be returned to his or her own cot. We suggest placing the cot next to the parent’s bed if the parent does not wish to get out of bed.

A major concern was whether there were any disadvantages if bed sharing was discouraged. Bed sharing has been recommended by some lactation consultants to promote breastfeeding, although there is no published evidence that it has this effect. Conversely, some studies have suggested that bed sharing is associated with sleep problems in the child (19,20). Whether this is cause or effect has not been ascertained.

CONCLUSIONS

The epidemiological data consistently show an increased risk of SIDS with bed sharing. We have argued that this association is causally related. We acknowledge the evolutionary perspective but believe co-sleeping may have outlived its historical usefulness. The studies of McKenna et al. showing the physiological interaction between infants and mothers when sleeping together are interesting and may provide an explanation for the increased risk of SIDS (21).

We do concede that bed sharing may be protective for a small group of infants. However, at present there is no method of identifying this group. There is naturally a call for more information and research, but in public health decisions often have to be made on incomplete evidence. Although a randomized control study would be the ideal way of demonstrating an increased risk, it is probably not feasible or ethical.

REFERENCES