Sudden infant death syndrome in child care settings in the Netherlands

G A de Jonge, C I Lanting, R Brand, J H Ruys, B A Semmekrot, J P van Wouwe

Background: In the Netherlands, there is a very low incidence of sudden infant death syndrome (SIDS) due to effective preventive campaigns.

Methods: During the period September 1996 to August 2002, nationwide 161 deaths from SIDS (about 85% of all cases of SIDS during that time) were investigated by the Cot Death Committee of the Dutch Paediatric Association.

Results and Discussion: Over 10% of cases of SIDS took place during some type of child care. From a national survey carried out in 2000/01 information was available on the child care attendance of 2000 Dutch infants aged 3–6 months. Based on the hours usually spent in child care by these infants, the number of similarly aged infants that died from SIDS while attending child care was 4.2 times higher than expected. Remarkably, the prevalence of known risk factors for SIDS, such as sleeping position and parental smoking, was favourable in the SIDS cases in child care settings. The adherence of child care facilities to the safe sleeping recommendations is high in the Netherlands, and no explanation as to why child care settings may be associated with an increased risk of SIDS is apparent. The possibility of other explanations, such as stress and change in routine care, is hypothesised.
Infants of the control group, who participated in child care, stayed on average 17.1 hours per week in the CCC or CCH. However, 73% of these control infants did not attend any child care centre or home, so the average weekly stay in child care was only 4.5 hours for all control infants (table 1). Assuming some underestimation of the time spent in child care, we presume that on average six hours per week or 6 out of 45 (5.69) hours were spent in child care. This ratio 6:45 is used as an (externally defined) reference ratio to compare the observed and expected numbers of SIDS in and outside child care settings using a $\chi^2$ test. The accepted level of significance was $p$, 0.05. Confidence intervals of the percentages of observed numbers of SIDS in child care settings were calculated.

For the sake of comparability the results of this study group are focused on SIDS cases of 3–6 months of age because the control group consisted of infants of the same age. However, older SIDS cases are shown as well in table 2.

Risk factors for SIDS were divided into three categories: non-preventable factors (sex, birth order, birth weight, low social level) and preventable factors (sleeping position, bed materials, parental smoking habits), as established in a series of Dutch research projects. Since 1987 the prevalence of these risk factors among infants in the general population has been established by representative national surveys in well-baby clinics every two years. Results of the survey of 1261 infants in 1999 which have been used in this study are presented in table 3.

### RESULTS

#### Incidence

During the six years of study 17 SIDS cases (aged 3–10 months) of a total of 161 cases took place in a child care setting (nine cases in CCC and eight cases in CCH) within the defined time period. A complete examination (both a paediatric examination and a postmortem examination) was performed in 12 cases, an incomplete examination in five cases. In all cases the standardised interviews were completed (table 2). In the same period, 19 cases of SIDS (16 cases 2–9 months of age and three cases 16–22 months old) occurred on a working day, as calculated between 8:00 am and 5:00 pm outside child care settings (table 2).

Of the total of 36 SIDS cases, 25 were in the same age group as the control group of 3–6 months. Of these 25 cases, 14 died in child care. Based on the reference ratio of hours spent in child care of 6:45, the observed number of 14 cases was 4.2 times higher than the expected number of 3.3 cases.

### Table 1

<table>
<thead>
<tr>
<th>Age (mth)</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>3–6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total no. of infants</td>
<td>647</td>
<td>618</td>
<td>476</td>
<td>259</td>
<td>2000</td>
</tr>
<tr>
<td>Infants in CCC</td>
<td>113</td>
<td>125</td>
<td>114</td>
<td>50</td>
<td>402</td>
</tr>
<tr>
<td>Infants in CCC or CCH</td>
<td>160</td>
<td>170</td>
<td>140</td>
<td>63</td>
<td>533</td>
</tr>
<tr>
<td>Hours/week in CCC</td>
<td>2022</td>
<td>2202</td>
<td>2083</td>
<td>874</td>
<td></td>
</tr>
<tr>
<td>Hours/week in CCH</td>
<td>758</td>
<td>620</td>
<td>430</td>
<td>168</td>
<td></td>
</tr>
<tr>
<td>Hours/week in CCC or CCH</td>
<td>2780</td>
<td>2822</td>
<td>2513</td>
<td>1042</td>
<td>9187</td>
</tr>
<tr>
<td>Average hours/week in CCC or CCH</td>
<td>17.4</td>
<td>16.6</td>
<td>18.0</td>
<td>16.5</td>
<td>17.1</td>
</tr>
<tr>
<td>Per participant in child care</td>
<td>4.30</td>
<td>4.56</td>
<td>5.28</td>
<td>4.02</td>
<td>4.54</td>
</tr>
<tr>
<td>Per infant of control group</td>
<td>4.30</td>
<td>4.56</td>
<td>5.28</td>
<td>4.02</td>
<td>4.54</td>
</tr>
</tbody>
</table>

### Table 2

<table>
<thead>
<tr>
<th>Age (mth)</th>
<th>Cases of SIDS</th>
<th>In child care setting</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>At home</td>
<td>Child care</td>
<td>Observed (%)</td>
<td>Expected (%)</td>
</tr>
<tr>
<td>2½–22</td>
<td>36</td>
<td>19</td>
<td>17</td>
<td>17 (47)</td>
<td>4.8 (13)</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>1</td>
<td>6</td>
<td>14 (56)</td>
<td>3.3 (13)</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3 (33)</td>
<td>1.2 (13)</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*$\chi^2$ test, $p<0.10$.

†95% confidence interval of the observed percentage.

‡Data mentioned for completeness, based on the assumption that the ratio of 6:45 also holds for the group aged 7 months and older.
births in 1986 to 12 per 100,000 in 2000. As a consequence, infants with SIDS at home.

After the national campaign “Back to Sleep” which started in October 1987 in the Netherlands, the registered incidence of SIDS (0 to <1 year) decreased from 104 per 100,000 live births in 1986 to 12 per 100,000 in 2000. As a consequence of this steep decrease, the number of patients in this study is rather small.

SIDS during office hours is not a rare phenomenon in the Netherlands: in six years (September 1996 to August 2002), 36 cases occurring on working days between 8:00 am and 5:00 pm comprised 22% of a total of 161 SIDS cases.

The incidence of SIDS in child care settings on working days between 8:00 am and 5:00 pm was significantly higher than at home, especially in the age group 3–6 months. It is improbable that this finding is caused by underestimating the participation in child care based on a national surveillance in 2000/01, since child care participation has steadily increased from 1996 until recently. Thus the average participation over the entire period (September 1996 to August 2002) was certainly not higher than established in 2000/01 (table 1).

SIDS in child care now amounts to over 10% of the total incidence of SIDS (17/161) and is about four times higher than expected for infants of 3–6 months of age (table 2).

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Risk factors
Table 3 shows the characteristics of SIDS in the groups aged 3–6 months inside and outside child care. To facilitate comparison the relevant prevalences of risk factors for SIDS in the general population aged 3–6 months are also noted. Although the groups are too small to reach definite conclusions, the number of unfavourable risk factors in 14 infants with SIDS in child care was much lower than in 11 infants with SIDS at home.

**Table 3** Characteristics of SIDS inside and outside child care settings at the age of 3–6 months, Monday–Friday 8:00 am–5:00 pm (Netherlands, 1.9.1996–31.8.2002), and the prevalence of risk factors for SIDS in the general population (n = 1261) at the age of 3–6 months in November/December 1999–2000.

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Child care 3–6 mth</th>
<th>At home 3–6 mth</th>
<th>National survey 3–6 mth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male sex</td>
<td>7 / 14</td>
<td>4 / 11</td>
<td>5 / 14</td>
</tr>
<tr>
<td>Birth order &gt;1</td>
<td>6 / 6</td>
<td>7 / 7</td>
<td>53 / 11</td>
</tr>
<tr>
<td>Birth weight &lt;2500 g</td>
<td>2 / 2</td>
<td>2 / 2</td>
<td>7 / 7</td>
</tr>
<tr>
<td>Low social level</td>
<td>0 / 0</td>
<td>4 / 4</td>
<td>5 / 5</td>
</tr>
<tr>
<td>Put prone to sleep</td>
<td>2 / 14</td>
<td>3 / 9</td>
<td>8 / 2</td>
</tr>
<tr>
<td>Put on a side to sleep</td>
<td>1 / 7</td>
<td>1 / 9</td>
<td>5 / 7</td>
</tr>
<tr>
<td>Use of a quilt</td>
<td>0 / 0</td>
<td>3 / 27</td>
<td>18 / 27</td>
</tr>
<tr>
<td>Use of a pillow</td>
<td>0 / 0</td>
<td>1 / 9</td>
<td>2 / 2</td>
</tr>
<tr>
<td>Bed sharing</td>
<td>0 / 0</td>
<td>1 / 9</td>
<td>7 / 7</td>
</tr>
<tr>
<td>Maternal smoking</td>
<td>0 / 0</td>
<td>4 / 36</td>
<td>21 / 36</td>
</tr>
<tr>
<td>Paternal smoking</td>
<td>2 / 14</td>
<td>6 / 55</td>
<td>32 / 55</td>
</tr>
</tbody>
</table>

Generally the child care centres and homes in the Netherlands now keep very strictly to the advice of the Dutch national consensus “Prevention of cot death”. Against this advice two infants were put down to sleep in a prone position (one in a CCC, one in a CCH). In both cases this occurred after the explicit request of the parents, who placed their infant prone at home as a remedy for excessive crying. Even if these two cases were allocated to the at home group our results do not change.

One infant was put down on its side, because the child care attending person felt this was better since it had a cold. The infant was found in a side position, nearly face down.

Non-smoking rules were fully respected in both CCC and CCH.

**DISCUSSION**

After the national campaign “Back to Sleep” which started in October 1987 in the Netherlands, the registered incidence of SIDS (0 to <1 year) decreased from 104 per 100,000 live births in 1986 to 12 per 100,000 in 2000. As a consequence of this steep decrease, the number of patients in this study is rather small.

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SIDS in child care now amounts to over 10% of the total incidence of SIDS (17/161) and is about four times higher than expected for infants of 3–6 months of age (table 2).

There is no evidence for the hypothesis that daytime SIDS is a separate entity and occurs in a different subpopulation of SIDS. Age distribution, gender, and birth order of daytime SIDS were not clearly different from the distribution in the general population.

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From the Cot Death Committee (Landelijke Werkgroep Wiegendood) of the Dutch Paediatric Association

REFERENCES

A carer’s salute to dying children

Children should be the inheritors of our future so adults rightly view their early death as tragedy. But dying may expose qualities including love and concern for others.

People may see their physical discomfort, but it often seems unencumbered by the adult dread of perpetual non-existence. As death approaches, most children face it frontally.

A patient, waiting without hope for operation and knowing his older brother died in the same situation of the same disease, still successfully started a business.

Another, warned against caring for children still opted for that and died early, graciously and rightly proud at death of the professional qualification she achieved.

Adults may have difficulty with their decisions but refusing treatment for apparently trivial reasons or the advanced gifting of coveted toys indicates personal and proper control.

Apt deaths in comfort and happy trust occur especially at home in the bosom of family. One, thus secured, died when brushing her hair some hours after playing scrabble with the boyfriend.

We are privileged to relate to them as unpretentiously they teach how to live death. All success is relative, rarely what could be wished so celebrate them, even dying, despite the anguish.

F Carswell
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