

Signs of illness preceding sudden unexpected death in infants

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Abstract

Objective—To determine whether signs of illness reported by parents can be used to identify babies at risk from the sudden infant death syndrome.

Design—A two year prospective case-controlled study based in a geographically defined area.

Setting—Four health districts in Avon and north Somerset.

Subjects—Babies who had died suddenly and unexpectedly aged between 1 week and 2 years (index babies) and two control babies for each index baby selected from the same health visitor's list and matched for age, time of year of the interview, and area of residence.

Main outcome measures—Major and minor signs of illness during two weeks before the index babies' death, or before the interview for control babies, and consultations with the general practitioner during the same period.

Results—Parents reported major and minor signs of illness in the previous week in 66 of the 95 index babies compared with 77 of the 190 controls. No significant difference was found in the incidence of major signs reported (34 out of 95 index babies and 44 out of 190 controls), but a higher proportion of the index babies had been seen by their general practitioner during the previous week (17/95 *v* 11/190).

Conclusion—Major and minor signs of illness are neither a sensitive nor a specific indicator of sudden unexpected death of infants and have no predictive value. Better understanding of the reasons why a higher proportion of parents of babies who died took them to their general practitioners may help to identify babies at risk before death.

Introduction

It has been suggested that some sudden unexpected infant deaths could be prevented if general practitioners and parents were better at recognising early signs of illness.¹⁻⁴ An increased response to signs of illness would result in more babies being taken to a general practitioner and admitted to hospital, putting services under considerable pressure. Convincing evidence is therefore needed that signs of illness can be used to identify babies at risk of sudden unexpected infant death.

Stanton *et al* showed that signs of illness were more common in babies who had died suddenly and unexpectedly than in controls matched for age, major signs being reported in 48% of 145 infants who had died compared with only 12% of 154 controls during the previous 48 hours before interview.¹ As the control cases were not matched for time of year of interview or area of residence the increased incidence may simply have reflected seasonal variation in signs of illness.

We investigated whether signs of illness were reported more commonly for babies who had died suddenly and unexpectedly than control babies matched for age and area of residence and studied at the same time of year, and whether the parents' response to signs of illness had been appropriate, as reflected by their having consulted a general practitioner.

Subjects and methods

The two year study was based in a geographically defined area incorporating four health districts in Avon and Somerset. We investigated the history of babies who died suddenly and unexpectedly aged between 1 week and 2 years. We gave parents bereavement counselling in the days immediately after their child's death and recorded details of any signs of illness the infants had shown in the two weeks before they died. Open questions were followed up with specific questioning to determine the severity, duration, and associated features of any signs mentioned. Microbiological specimens were taken from each infant within a median of 3.5 hours after the discovery of death. Further swabs and tissue specimens were taken at necropsy, which was performed within a median of 25 hours after death.

For each index baby the next two babies on the same health visitor's list living in the same neighbourhood were selected as controls. Control babies were visited by RG within a median of three days from the discovery of the death of the index baby to assess recent signs of illness and collect microbiological specimens.

Using the classification system devised by Stanton *et al*¹ we grouped signs of illness into major and minor without reference to any pathological findings. Major signs were those considered to indicate serious illness that needed a medical opinion and included difficulty in breathing, wheezing, repeated coughing, drowsiness, vomiting (more than half a feed or persistent), fever, diarrhoea, and missing more than one feed. Evidence of irritability such as inconsolable crying was also recorded as a major sign. Minor signs included snuffles, occasional coughing, being off feeds but taking most of them, and crying that settled when the baby was comforted.

We used the method of Mantel and Haenszel⁵ to compare the index baby with two matched controls and the paired *t* test for continuous variables to compare index values with the mean values for the two matched controls.

Results

A total of 109 unexpected deaths occurred within the defined area during the two years, 95 of which were investigated. Fourteen cases were excluded, mainly because we were notified of them too late. Seven deaths were fully explained, being due to meningitis, septicaemia, Reye's syndrome, intracranial haemorrhage, severe gastroenteritis, a perforated stomach, and cardiac malformation. The remaining 88 deaths were certified as being due to the sudden infant death syndrome.

The median age of the index babies was 94 days (range 7-551) and that of the control babies 96.5 days (range 18-552); the median difference in ages between the two groups was 2.5 days (95% confidence interval 1.5 to 3.7 days). The mean birth weights were 3230 g (range 1310-4640) in the index group and 3400 g (range 1790-4840) in the control group, the mean difference being 170 g (*p*=0.03, 95% confidence interval 20 to 320 g). The male to female ratio in the index group was 1.6 compared with 1.0 in the control group.

The table shows the distribution of the signs of

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Interval before death (index infants) or interview (control infants)	No of infants who had died (index group) (n=95)	No of control infants (n=190)	Odds ratio	95% Confidence interval	p Value
<i>Major signs</i>					
2 Weeks	37	59	1.4	0.6 to 2.3	NS
1 Week	34	47	1.6	0.96 to 2.7	NS
24 h:					
All deaths	20	16	2.7	1.4 to 5.3	<0.05
Deaths from sudden infant death syndrome	14/88	15/176	1.9	0.9 to 3.9	NS
<i>Minor signs</i>					
2 Weeks	37	44	2.0	1.2 to 3.3	<0.01
1 Week	32	30	2.7	1.5 to 4.7	<0.001
24 h	22	10	5.2	2.5 to 11.1	<0.001
<i>Major or minor signs, or both</i>					
2 Weeks	74	103	2.5	1.5 to 4.2	<0.001
1 Week	66	77	3.1	1.9 to 5.1	<0.001
24 h	42	26	5.1	2.9 to 9.1	<0.001

*Infants who had died were compared with two controls, who were recruited within a median time of three days of the discovery of the index infant's death.

illness. Combining major and minor signs, we found that signs were reported more commonly for the babies who had died than for the controls throughout the two weeks before the index baby's death. Nevertheless, signs of illness were common in the control babies, 77 having had one or more signs during the week before the interview. Major signs during the previous one or two weeks were no more common in the babies who had died than in the control babies. A difference was found, however, in the reported major signs during the 24 hours before the death, but this was not significant (odds ratio 1.92, 95% confidence interval 0.9 to 3.9) when the analysis excluded the seven deaths that had been explained. Six of the seven babies who had died from explained causes had had major signs during the 24 hours before they died.

A higher proportion of the babies who had died had been seen by a general practitioner because of illness during the week before death (17/95 compared with 11/190 controls (odds ratio 2.6, 95% confidence interval 1.2 to 5.7)). Although in both groups over three quarters of consultations with general practitioners were on account of major signs, babies who died having had major signs were no more likely to have been seen by a general practitioner than controls with major signs during the previous week ($\chi^2=0.5$, $p>0.05$).

Among the infants who had died major signs were reported significantly more commonly for those in whom non-polio viruses were detected than those in whom they were not ($\chi^2=7.3$, $p<0.01$). For the control babies no relation could be shown between major signs and detection of non-polio viruses ($\chi^2=2.0$, $p>0.05$).

Two additional factors were independently represented more commonly among the babies who had died. Firstly, a higher proportion of the mothers of index babies had smoked during pregnancy (52/95 compared with 63/190 controls (odds ratio 2.5, 95% confidence interval 1.5 to 4.1)). Secondly, although the proportions of babies in socioeconomic groups I-V (registrar general's classification) were similar, 22 out of 94 of the babies who had died had had unsupported mothers or unemployed fathers compared with 20 out of 188 of the controls (odds ratio 3.2, 95% confidence interval 1.5 to 7.0; in one case the parents' employment state was unknown).

Discussion

Our results show that there was no significant difference in the incidence of major signs of illness between babies who had died from the sudden infant death syndrome and control babies during the week before the interview. In contrast, Stanton *et al* found that major signs had been more common in infants who

had died suddenly and unexpectedly than in controls during the previous 48 hours.¹ Cameron and Williams found that illness was reported more commonly over the previous two weeks for 208 infants who died suddenly compared with 393 age matched controls ($p=0.0003$).⁶ In a much larger study Hoffman *et al* found that coughing, vomiting, diarrhoea, and being listless and droopy were reported significantly more commonly for 757 babies who died from the sudden infant death syndrome than for an equal number of control babies matched for age and birth weight ($p<0.01$).⁷ None of these studies matched the control babies for district of residence or time of year. Their results may therefore simply reflect the fact that sudden unexpected death occurs more often during the winter months and in communities where infection is likely to be more prevalent. Although our findings differ from those of previous studies,^{1,6,7} our results had wide confidence intervals, particularly those for major signs reported during the 24 hours before the interview.

We found that minor signs were significantly more common in the index babies throughout the two weeks before death. A greater recall of recent events by parents whose baby had just died probably contributed to this difference. A second and perhaps more important finding was that major signs were common in control babies. It is clearly impracticable for general practitioners to try to identify the one in 400-500 babies at risk of sudden and unexpected death on the basis of signs that are present in up to a quarter of the young infant population during any one week. A study of infants taken to their general practitioner concluded that major signs were not sufficiently discriminating for use in general practice: major signs were reported in 84% of 126 consultations studied.⁸

Major signs reported by parents did not account for the higher rate of consultations with general practitioners by parents of babies who had died. Spencer suggested that the parents' assessment of degree of illness is the factor that prompts them to contact the medical services.⁹ Alternatively, the parents may have been responding to more specific signs that doctors had not necessarily appreciated. In another study the description of "droopy and listless" gave the highest relative risk for unexpected death, being reported in 8% of 757 index cases compared with 1% of 757 control babies matched for age and birth weight during the previous 24 hours. Droopy and listless is not a usual term for describing infants in the United Kingdom and might have been reported here as anything from "off colour" to "drowsy and lethargic." In our study being off colour would have been recorded as a minor sign and drowsy and lethargic as a major one and this could explain the lack of correlation between consultations with a general practitioner and major signs.

Our study suggests that, rather than failing to respond to signs of illness, the parents of babies who died were more likely to have taken them to a general practitioner than parents of control babies who had signs of illness. For this minority of babies who are seen by their general practitioner during the week before death better understanding of the factors prompting contact with the general practitioner may enable some of them to be identified as at risk from sudden unexpected death.

In conclusion, major and minor signs of illness seemed to have no predictive value for sudden unexpected death. Encouraging greater response by parents and general practitioners to such non-specific signs of illness is unlikely to affect the incidence of the sudden infant death syndrome.

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Synovium in AIDS: a postmortem study

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Inflammatory joint disease has been reported in patients infected with HIV, some already with and

others progressing to AIDS.¹ Arthritis has been described as predominantly oligoarticular and asymmetrical, mainly affecting the joints of the leg, often the knee.

With the increasing numbers of people infected with HIV a better knowledge of the likely changes in the synovium of major joints, especially those of the leg, would considerably help in the management of these patients. We describe the histopathology of synovium removed from the knee at necropsy on patients with AIDS.

