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Equipment

A. Nutritionist III, v. 6.0, analytic computer software. N-Squared Computing, 3040 Commercial St. SE, Salem, OR 97302; tel. (503) 364-9118.
B. SAS Institute, Inc., Cary, NC; tel. (919) 677-8000.

A Seasonal Association Between SIDS Deaths and Kindergarten Absences

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Synopsis

Data from linked birth and death certificates from the State of Oregon were used to determine the monthly distribution of deaths from sudden infant death syndrome (SIDS) for the years 1976 through 1984. The monthly number of SIDS deaths increased in winter and decreased in summer, when schools usually are not in session. Absences from kindergarten were determined from school records for the period 1979-84. School absences, previously shown to reflect incidence of predominantly infectious diseases, were found to be positively correlated with occurrences of SIDS.

The role of ordinarily nonlethal infections in occurrences of SIDS has been established by history, histology, and viral isolation. The authors concluded that the seasonality of SIDS is related to the seasonality of respiratory infections and that the seasonality is influenced by respiratory infections being spread from school children to infants during periods when schools are in session.

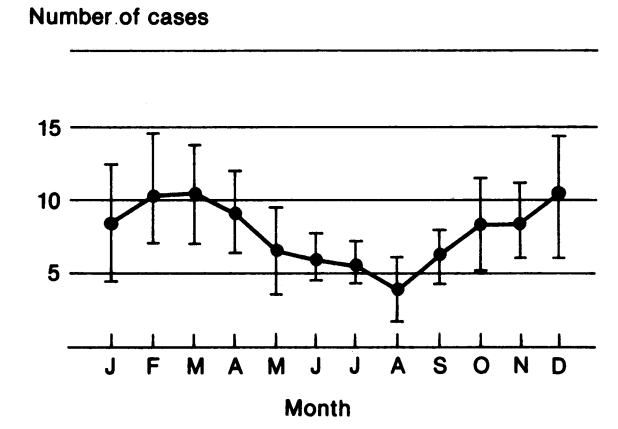
SINCE 1892, when Templeman reported an increase during winter months in what was then called overlaying (*1*), sudden infant death syndrome (SIDS), sometimes known as crib death, has been reported to have a greater incidence during winter than summer.

Templeman attributed the increased rate in Edinburgh to cold weather and the huddling of a family in a single bed, often of burlap sacks. As late as 1944, Abramson attributed SIDS to accidental suffocation by bedclothes, with an increase of both owing to cold weather (*2*). Beal argued that cold weather was directly involved in SIDS (*3*). The same seasonality for SIDS, however, has been observed for Hawaii, which has no truly cold weather, as for other parts of the country (*4*).

Beginning in 1945, some investigators attributed the seasonality of SIDS to the seasonality of respiratory infections (*5-7*). Many reports have similar conclusions, including Beal, based on data from Australia where winter months are June through August (*8*). Beal showed that the rate of SIDS paralleled the rate of respiratory infections for the preceding 2 weeks in the general population.

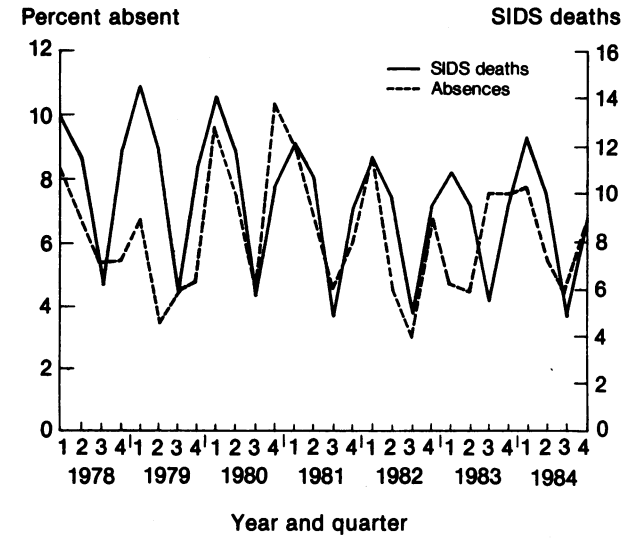
We analyzed data from the State of Oregon and determined a seasonality for SIDS and examined the relation of that seasonality to school schedules

Figure 1. Seasonality of 835 SIDS deaths of infants 1 week to 1 year of age by month in Oregon, 1976—84



NOTE: The mean is represented by the central cross-bar. The value representing plus and minus 1 standard deviation is enclosed by the vertical brackets.

Figure 2. Absences from kindergarten by school quarter expressed as a percentage of enrollment, and mean number of SIDS deaths, Oregon, 1978—84



NOTE: The third quarter represents only the values for the month of September for both variables. $r = 0.5404$, $P < 0.01$.

as an hypothesized link to the spread of infectious diseases.

Methods

Birth and death certificates from the State of Oregon for the years 1976 through 1984 provided linked data on occurrences of SIDS. Cases were included in the study on the basis of International Classification of Diseases code number 795.0 for the years 1975 through 1978 (*9*), and 798.0 beginning in 1979 (*10*). Oregon has a system of medical examiners with authority for autopsy; the rate of autopsy for the diagnosis of SIDS was greater than 90 percent during the period of this study. During this period, the definition of SIDS in use was that introduced by Beckwith in 1969, "The sudden death of any infant or young child, which is unexpected by history, and in which a thorough postmortem examination fails to demonstrate an adequate cause of death" (*11*). (Beckwith explicitly accepted mild inflammatory changes in the respiratory tract as compatible with a diagnosis of SIDS.) We presumed that in the unautopsied cases, the criterion for inclusion was the sudden death of an infant that was unexpected by history. To avoid confusion with perinatal deaths, we excluded, on the basis of epidemiologic consensus, infants who had died in their first week of life and children who had died after 1 year of age (*12*).

School absence records from the Oregon Department of Education were made available by Walter Koscher, Coordinator of School Finance and Data Information Services. Data for the years 1979–84 1978 were available only in quarterly summaries, from which we calculated the percentage of school absences based on days of absence and the total enrollment, averaged by quarter.

We used only data for kindergarten, an age group most likely to be associated with families with infants, considering the general trend toward clustered pregnancies. For the summer quarter, July through September, data on absences were for the month of September only, as school usually is in recess after early June. In calculating correlation coefficients, only deaths occurring in the month of September were used for the summer quarter. In Oregon, public schools regularly begin on the first Tuesday after Labor Day, which is the first Monday of September. The Christmas recess of the Oregon school system is regularly 2 weeks in duration, ending the first weekday after New Year's Day.

The data were analyzed using the statistical program SPSS\PC+, version 3.0 (*A*). Significance was expressed as a probability value.

Results

There were 835 deaths attributed to SIDS in the State of Oregon during the period 1976–84, with a rate of 2.18 per 1,000 live births. The mean age for death from SIDS was 2.7 months and the median was 2 months. Seasonality for death from SIDS by the month of death in Oregon for 1976–84 is

shown in figure 1. The number of deaths rises in winter and falls in summer. The monthly variations from the mean for death from SIDS are mathematically significant (chi-square, 60.57, 11 degrees of freedom, $P < 0.0005$). An additional trend, although not significant at the $P < 0.05$ level, was a drop in the number of SIDS deaths in January, after the Christmas recess, following a monotonic rise from August.

The percentages of enrolled students who were absent from kindergarten also varied in a seasonal fashion, with remarkable consistency for the years 1979–84 (figure 2). The trend of school absences generally followed the number of cases of SIDS ($r = 0.5404$, $P < 0.01$).

The seasonality of death from SIDS for infants younger than 3 months was not appreciably different from that of infants 3 months or older (figure 3). If anything, the peak number of cases of deaths from SIDS in winter was higher for the younger group compared to the older group.

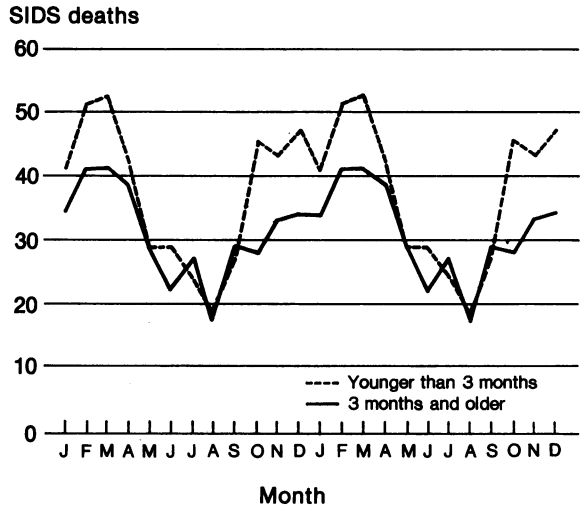
Finally, we analyzed the effect of annual and monthly variations in the birth rate on the number of SIDS deaths, since if more infants were born in some years or months, that would produce more infants at risk for SIDS. After adjusting the actual deaths per month for annual and monthly variations in birth rate, and replotting figure 1, there was no significant change in the seasonal distribution of SIDS deaths.

Discussion

Prior reports on the seasonality of SIDS deaths tended to lump several months together, some treating the seasons as strictly binary, summer and winter (*13*). Peterson and colleagues reported that 63 percent of the total deaths from SIDS occurred in winter, meaning September 15 through March 15. Treating continuously varying events as discontinuous may obscure effects that are not distributed equally in the two periods, such as a 9-month school schedule.

The drop in the number of SIDS deaths in January after a progressive rise from the low of August is not statistically significant, unlike the drop coinciding with the summer recess. Nevertheless, we speculate that this trend may relate to the recess of older siblings in the later part of December, which would reduce exposure of infants at home to new infection. In contrast, Australia has no corresponding 2-week recess in late June and no drop in SIDS deaths in July, but has a monotonic rise to a peak in August (*8, 14*).

Figure 3. Seasonality of 835 SIDS deaths of infants younger than 3 months and older than 3 months, by month, Oregon, 1978—84. The same 12-month period is repeated to demonstrate its sinusoidal nature



The association of SIDS deaths with infectious diseases has been observed for more than 40 years. Adelson and Kinney reported in 1956 that 63 percent of the SIDS deaths they observed had mild symptoms of respiratory infection, and 84 percent had histologic evidence of mild inflammatory changes in the respiratory tract (*12*). Many others have confirmed significantly high rates of minor infections in SIDS (*15–18*). Ray and coworkers were able to isolate ordinarily nonlethal viruses in post mortem examinations in 37.5 percent of SIDS deaths, and from fewer than 11 percent of healthy infants from their community during that same period (*13*). In a study of Washington, DC, 41 percent of SIDS cases yielded viral isolates from at least one anatomic site (*16*). Very recently, Forsyth and coworkers (*17*) reported grossly increased immunoglobulins in the lungs of SIDS victims, compared to a control group of infants, presumably as a response to viral infection. Considering that viral agents are widely active in the normal population of infants at a rate of 11 percent (*15*), but only 2 out of 1,000 succumb to SIDS, the viruses are probably not directly lethal, but may act as a trigger for the syndrome (*19*), probably by increasing the frequency and severity of apnea (*20*).

The effects of school attendance on infections in the family and in the community have been reported in Great Britain and this country (*21, 22*). Lidwell and Sommerville studied an isolated village, Bowerchalke; they found that the majority of infections in the community, particularly respira-

tory infections, were disseminated in the schools and from school children (*21*). Gatherings of large numbers of children who are at an age when their personal hygiene is limited to toilet training are ideal situations for transmitting infectious diseases. They found that infants were particularly susceptible to infections; they reported that infants in households with school age children had five times as many respiratory infections as adults in the same community (*21*).

Our data concerning school absences do not provide proof that infection is the cause of the absences. However, Mowat and White showed that 85 percent of school absences are from illness (*23*), rather than from weather. Seasonal variations are unlikely to occur in other causes of school absences, such as injuries. The incidence of infections, particularly viral respiratory infections, is known to increase in winter; on the basis of studies in Bowerchalke (*21*) and Cleveland (*22*), this seasonality is reasonably attributable to the almost universal scheduling of schools during this season.

We do not have data on the specific effect on rates of SIDS deaths of having school-aged children in the home, but there are population statistics that suggest such an effect. The average size of a family with an occurrence of SIDS death was 2.23 children, compared to 1.51 for the entire population during the period of our study. In addition, the rate of SIDS deaths in Oregon rises monotonically from 2.00 per 1,000 live births for the first-born to 4.61 per 1,000 for fifth-born (*24*). Even without school children at home, the seasonal increase in respiratory infections in the community while school is in session would predictably increase the exposure of parents, thereby increasing exposure of their infants to infection, judging from the Bowerchalke study (*21*).

The fact that in our population we demonstrated a seasonality of SIDS deaths among infants younger than 3 months of age disagrees with four previous reports (*8, 25-27*) and agrees with two (*13, 28*). Intuitively, there is no reason to expect that younger infants would be spared from this seasonality.

Our ecological study shares a limitation with all studies based on correlations; it cannot establish causation. Measures to reduce exposure of infants to infection, however, have no serious consequences, even if they are ineffective. Such measures might include improved isolation techniques in the home for the first 6 months of an infant's life, better isolation in the physician's office during well-child care, and frequent handwashing by parents when they are contagious. In addition, breast feeding should improve the resistance of infants to infection. If these measures proved effective, they might provide a modest reduction in the rate of sudden infant death.

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Equipment

A. SPSS\PC+, v. 3.0. SPSS, Inc., 444 N. Michigan Ave., Chicago, IL 60611; tel. (312) 329-3300.

Feasibility of Interactive Videodisc Technology To Teach Minority Youth About Preventing HIV Infection

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Synopsis

Hispanic and African American adolescents are more likely than white Anglo youth to harbor misconceptions about acquired immunodeficiency syndrome (AIDS) and are also more likely to engage in intravenous drug use and sexual intercourse. This paper describes the development of an AIDS prevention curriculum that uses an interactive videodisc program to teach skills for interventions. Focus group and expert panel studies yielded suggestions for intervention vignettes and scenes relevant to Hispanic and African American adolescents. The authors then developed and produced a sample curriculum, specifically designed for Hispanic youth. Content was designed to build knowledge, attitudes, and skills in handling situations where young persons are at risk for human immunodeficiency virus (HIV) infection.

The feasibility of the finished pilot product was tested with adolescents and with professionals who serve ethnic and racial minority youth. Adults and Hispanic adolescent viewers rated the videodisc as enjoyable, interesting, and likely to achieve positive effects with the intended target population. Findings suggest that the interactive videodisc is a useful way to interest and help Hispanic adolescents learn ways of reducing their risk of contracting and spreading HIV infection through lifestyle practices. This developmental research in the use of interactive videodisc also provides a basis for further investigation.