



## Pathology Biology Section – 2003

### **G2 Sudden Infant Death Syndrome in North Carolina From 1999-2000: The Prevalence of Risk Factors and Its Relation to 2000 Census Data on a County by County Basis**

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The goals of this presentation are to demonstrate the prevalence of risk factors for Sudden Infant Death Syndrome (SIDS) in North Carolina as related to type of sleeping surface, sleeping position, and co-sleeping and to show the relationship between the SIDS mortality rate per county and the 2000 census demographic data for each county.

Hypothesis: Reported risk factors for SIDS with regards to sleeping surface, sleeping position, and co-sleeping are highly prevalent in the population of SIDS deaths studied. Demographic data as presented in the 2000 census is significantly related to county SIDS mortality rates.

Methods: The North Carolina Office of the Chief Medical Examiner's autopsy and investigative records were retrospectively reviewed for all infants aged 0-1 years who died during 1999 and 2000 in which the cause of death was SIDS or undetermined. Demographic data with regards to age, sex, and county of death were tabulated. The place where the infant was sleeping, the infant's sleeping position, and the occurrence of co-sleeping were recorded when the data was available. The anatomic diagnoses on the autopsy reports were tabulated for all of the deaths. The 2000 census data for North Carolina counties was used to determine the number of 0-1 year old infants in each county so that population at risk for SIDS could be determined. State and county SIDS mortality rates for the population at risk were then calculated. The county death rates were then compared to county demographic data as reported by the 2000 census by a general linear model using a Poisson link function to see which data significantly correlated ( $p < 0.05$ ). The demographic data that was analyzed for each county included: birth rate; death rate; ethnicity; household, family, and per capita income; families, children, and persons below poverty; families with children under 16 with both parents in the workforce; female labor force participation rate; completion of high school or bachelors degree; persons who lived outside the U.S. 5 years ago or were born outside the U.S.; wood as principal heating fuel; and lacking complete plumbing.

Results: The authors examined 238 deaths. Of these, 131 (55.0%) were male and 107 (45.0%) were female. The ethnicity of the infants was 117 (49.2%) white, 104 (43.7%) black, 13 (5.5%) Hispanic, and 4 (1.7%) other. The ages ranged from 3 – 338 days with an average of 100 days. The causes of death were reported as 190 (79.8%) SIDS, 22 (9.2%) asphyxia, 7 (2.9%) other, and 19 (8.0%) undetermined. The manner of death was determined to be natural in 197 (82.8%), accidental in 24 (10.1%), and undetermined in 17 (7.1%). Prior to their deaths, the infants were placed in the following locations: adult mattress 68 (28.6%), crib/bassinet 51 (21.4%), couch/sofa 22 (9.2%), water bed 3 (1.3%), chair 1 (0.4%), playpen 1 (0.4%), other 15 (6.3%), and unknown 77 (32.4%). The position that the infants were in when found was: prone 85 (35.6%), supine 36 (15.1%), side 12 (5.0%), other 2 (0.8%), and unknown 103 (43.3%). Co-sleeping was present in 105 cases (44.7%), absent in 75 (31.9%), and no data were available in 55 (23.4%). If co-sleeping did occur, the number of adults and/or siblings sleeping in bed with the infant was 1 in 52 cases (49.5%), 2 in 48 cases (45.7%), and 3 in 4 cases (3.8%), and 5 in 1 case (1.0%). The mother was the most common person in bed with the infant as found in 89 cases (84.8%). Co-sleepers also included: the father in 48 (45.7%), siblings in 18 (17.1%), and others in 4 (3.8%).

Risk factors for SIDS have been reported elsewhere to include not sleeping in a crib, prone sleeping position, and co-sleeping. These risk factors were examined in the North Carolina infants by examining the 102 SIDS deaths in which data was available for all three. Of these 102, 67 (65.7%) were not in a crib, 63 (61.8%) were prone, and 48 (47.1%) were co-sleeping. However, 94 (92.2%) of these 102 had at least one of the three risk factors present (i.e., were prone or co-sleeping or not in a crib). Only 6 (5.9%) deaths were recorded for infants sleeping supine and alone in a crib. Only 2 (2.0%) deaths were noted for infants sleeping on their side and alone in a crib. Thus, the vast majority of SIDS deaths occurred in infants exposed to a known risk factor with regard to sleeping surface, position, or co-sleeping.

The following anatomic diagnoses were reported in the infant's autopsy reports: pulmonary congestion/edema/hemorrhage 107 (45.0%), mediastinal petechiae 102 (42.9%), pulmonary inflammation 22 (9.2%) (includes pneumonia, bronchitis, bronchiolitis, and interstitial inflammation), visceral congestion 22 (9.2%), heart malformations 17 (7.1%), liver pathology 13 (5.5%) (includes fatty change, hepatitis, and necrosis), acute/chronic tracheitis 9 (3.8%), neuropathology 7 (2.9%) (includes encephalopathy, edema, subdural hemorrhage, and gliosis), and aspiration 6 (2.5%).

The SIDS mortality rate in North Carolina was 1.0 deaths per 1000 infants per year; the rate for counties



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varied from 0 – 5.9 deaths per 1000 per year. The following county demographic factors were found to be significantly related to SIDS: death rate ( $p=0.007$ ), percent of families with children under 16 with both parents in the workforce ( $p=0.03$ ), and percent Native Americans ( $p=0.05$ ); birth rate had a borderline significance ( $p=0.07$ ). A general linear model with Poisson link function based on these 4 pieces of data explained 68% of the variance in the county SIDS mortality rate data. None of the other demographic data was found to be significantly related to county SIDS mortality rates.

Conclusions: This study has found that of the 238 SIDS deaths in the state of North Carolina during the years 1999 and 2000, 94 (92.2%) were exposed to a known risk factor (i.e., not sleeping in a crib, sleeping in the prone position, or co-sleeping). Only 6 (5.9%) deaths were reported for infants without a risk factor with regards to bed, position, or co-sleeping. The mortality rate for SIDS in North Carolina was 1.0 deaths per 1000 infants per year with county mortality rates that varied from 0 – 5.9 deaths per 1000 per year. The county SIDS mortality rate was significantly related to the following county demographic data as reported in the 2000 census: death rate ( $p=0.007$ ), percent of families with children under 16 with both parents in the workforce ( $p=0.03$ ), and percent Native Americans ( $p=0.05$ ); birth rate had a borderline significance ( $p=0.07$ ). The most common anatomic diagnoses found on postmortem exam of the infants were pulmonary congestion/edema/ hemorrhage and mediastinal petechiae.

**Sudden Infant Death Syndrome, North Carolina, 2000 Census**