

Rhode Island Child Death Review: Sudden Infant Death and Sudden Unexpected Infant Deaths, 2008-2009

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In the United States, in 2006, sudden infant death syndrome (SIDS) was the 3rd leading cause of death in infants under 1 year of age (behind congenital malformations (1st) and disorders relating to prematurity/low birth weight (2nd); and ahead of results of maternal complications of pregnancy (4th); and accidents-unintentional (5th)).¹ In Rhode Island, during 2008-2009, SIDS is the 2nd leading cause of death for children under 1 year of age. (Figure 1) SIDS is defined as the sudden death of an infant under 1 year of age, which remains unexplained after a thorough case investigation, which includes performing a complete autopsy, examination of the death scene, and review of the clinical history.²

Improved postmortem examination and testing have resulted in improved cause of death determination in some infants with metabolic or cardiac disorders, but many causes are undetermined.³ To recognize this trend, the term **sudden unexpected infant deaths or deaths in infants (SUID or SUDI)** has been introduced. Most recent estimates are that 4,600 SUID deaths occur annually in the US, 50-80% of which can be classified as SIDS.⁵ Because of the inability to determine actual single cause of some SUID cases, many states report these deaths as “undetermined” or modify death certificates to include environmental findings such as “undetermined – co-sleeping” or “SIDS – co-sleeping”. Because of a resulting code or diagnostic shift, SIDS rates are declining while undetermined/ unspecified/unknown are reported more often.^{3, 4}

The most important risk factors for SIDS/SUID are: prone sleeping position, sleep on a surface not designed for infants, bed-sharing, maternal and/or paternal smoking, excessive environmental temperature, premature birth, and concurrent respiratory illness.^{5, 6, 7} The first three are thought to contribute to accidental asphyxia, and the occurrence of strangulation associated with inappropriate sleep surface has resulted in the reporting of some of these deaths as **accidental suffocation and strangulation in bed (ASSB)**.^{3, 5} Since 2007, the **Office of the State Medical Examiner (OSME)** has adopted death scene investigation and scene re-enactments in order to more fully understand factors contributing to SUID in R.I. infants. Recent detailed review of deaths in infants under one year of age has revealed a pattern of SUID which lends itself to intervention.

METHODS

The Rhode Island Child Death Review Team (RICDRT) reviewed deaths of infants (birth through < 1 year of age) that occurred in Rhode Island during 2008-2009. Only cases reported to the OSME were reviewed. Out-of-state deaths were

not included. Detailed analysis was done on those cases classified as SIDS, SUID, and undetermined. These data are provisional.

Demographic, clinical, and death scene information was abstracted from source documents contained in the OSME record including autopsy and toxicology reports, police reports, perinatal records, existing medical records, Newborn Developmental Risk Assessments, primary care records, and other information as available.

RESULTS

During 2008-2009 there were 88 deaths of infants 0 to 1 year of age (48 in 2008, 40 in 2009). Forty were due to the effects of extreme prematurity, 22 to an undetermined cause (15 of the 22 had a specific notation of SIDS or SUID on the death certificate), 15 to congenital disorders, 10 to perinatal complications, and 1 to homicide. (During this period, no deaths resulted from falls, fire, drowning, **motor vehicle accidents (MVA)**, or infection.) (Figure 1)

In depth analysis was done on the 22 undetermined. Twelve of the infants (55%) were female, six (27%) were breastfed, and 21 (95%) died within the first 6 months of life. Regarding sleep related risk factors: 15 (68%) were co-sleeping with one or more adults, 8 (36%) were sleeping in a prone position, and 17 (77%) were sleeping on structures not designed for infant use; e.g., futons, couches, waterbeds, loungers, and other sleep surfaces designed for adult use. At least 14 (64%) had a suitable crib or bassinette available at the time of death; 3 (14%) of the infants did not have a surface designed

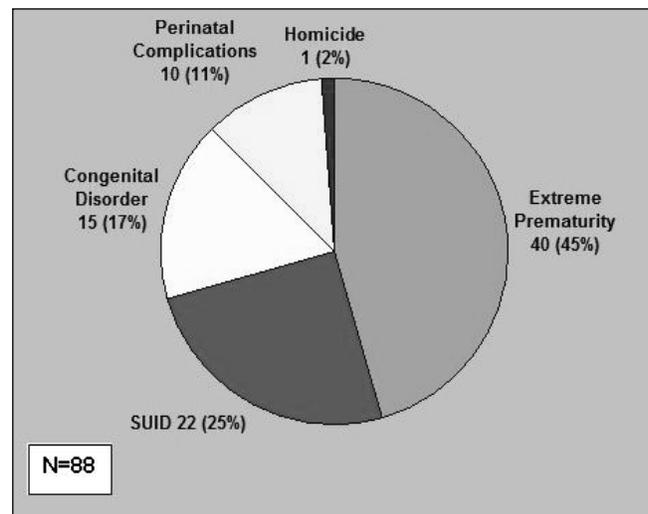


Figure 1. Rhode Island Infant Deaths, Age 0 to 1, 2008-2009.

for proper sleep available; and in 5 (23%) cases, the availability was unknown. Information pertaining to alcohol, cigarette, and/or drug use was incomplete so it was not possible to determine the importance of these factors.

All newborns are screened prior to discharge from the birth hospital for risk factors that can impact development as part of the Department of Health's Newborn Developmental Risk Assessment Program. Risk-positive mothers and babies are offered home visits. Of the 22 infants with SUID, 19 (86%) were risk

positive. Most of the infants, 17 (77%), were covered by public insurance (RiteCare/Medicaid), 4 (18%) by commercial plans, and 1 infant was uninsured. There were no known previous cases of SIDS or SUID in these families. (Table 1)

DISCUSSION

Increasingly, investigators are applying a triple-risk model in describing the confluence of events that lead to SIDS/SUID and ASSB deaths.⁵ The model provides a framework to understand the interaction of multiple risk factors for death: infants who may be vulnerable for unknown reasons, at a particular developmental phase when external environmental factors can conspire to cause death. In Rhode Island's population, the most common risk factors were: age under 6 months (95%), surfaces not designed for infant sleep (77%), non-supine sleeping positions (64%), and bed-sharing (68%). It should be noted that at least 64% (14 of the 22 cases) had a suitable sleep structure available for use in the household at the time of death. Of the 22 cases, 21 (95%) had at least one identified unsafe sleep environment risk factor and 16 (73%) had 2 or more (e.g. prone sleep, surface not designed for infant sleep, or co-sleeping with 1 or more persons).

Populations generally considered most vulnerable include low-income families (82% had public or no health insurance), birth weights under 2500 grams (23% of infants), and risk-positive status at newborn developmental risk screenings (86% of infants). These screenings provide a potential opportunity for focused individual-level intervention by home visitor support programs, such as First Connections (a program of the RI Department of Health and Department of Human Services).

All primary care providers should reinforce parents' understanding and knowledge of proper sleep conditions for their infants, particularly in the first year of life. Additional education and outreach to infant

Table 1. Rhode Island Sudden Infant Death and Sudden Unexpected Infant Death Characteristics, Infants 0 to 1 Year of Age, 2008-2009

		2008	2009	N	%
Total		13	9	22	100
Gender	<i>Male</i>	7	3	10	45%
	<i>Female</i>	6	6	12	55%
Age (in Months)	<1	3	2	5	23%
	1 to <2	4	1	5	23%
	2 to <3	2	4	6	27%
	3 to <4	1	2	3	14%
	4 to <5	1	0	1	5%
	5 to <6	1	0	1	5%
	6 to <7	1	0	1	5%
	7 to <8	1	0	1	5%
Bed Sharing	1 or More Adults	8	7	15	68%
	None	5	2	7	32%
Baby's Sleep Surface	Surface Designed for Infant Sleep (ie.-Crib, Bassinette, Playpen)	3	2	5	23%
	Surface Not Designed for Infant Sleep (ie.-Adult bed, Couch, Chair, Sling)	10	7	17	77%
Other Sleep Structure Available	Crib or Bassinet	7	7	14	64%
	None	2	1	3	14%
	Unknown	4	1	5	23%
Sleep Position	Supine	5	0	5	23%
	Prone	2	6	8	36%
	In Arms	2	2	4	18%
	Other	2	0	2	9%
	Unknown	2	1	3	14%
Breast Feeding	Yes	5	1	6	27%
	No	8	8	16	73%
Birth Weight <2500 grams	Yes	2	3	5	23%
	No	11	6	17	77%
Neonatal Risk Assessment Positive	Yes	11	8	19	86%
	No	2	1	3	14%
Insurance	RiteCare/Medicaid	9	8	17	77%
	Commercial Insurance	3	1	4	18%
	None	1	0	1	5%
Manner of Death (Death Certificate)	Undetermined (with additional SIDS or SUID Notation)	11	6	17	77%
	Natural (with additional SIDS or SUID Notation)	8	4	12	55%
		2	3	5	23%
		1	2	3	14%

caregivers may increase awareness of SIDS / SUID / ASSB and help to reduce the number of sleep-related deaths. Additionally, making a safe sleep structure available for the families who don't have one would be useful, but not sufficient if the family does not use the structure.

The information presented here pertains to infant **mortality** in Rhode Island. The short and long-term **morbidity** associated with unsafe sleep arrangements is unknown except by anecdote: transport of infants suffering "near miss" events or acute life threatening events (ALTEs) some of which might be attributable to inappropriate sleep situations. The RI CDRT will continue to review child deaths to identify risk factors, trends, and priorities for prevention. Comprehensive and systematic review of child death data can inform policy change and the development of prevention strategies with the goal of reducing child morbidity and mortality.

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The authors have no financial interests to disclose.

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