MAINE STATE LEGISLATURE

REPORT OF THE

MAINE CHILD DEATH &

SERIOUS INJURY REVIEW PANEL

1998 – 2003

All data analysis and writing for this report was completed by Emily M. Douglas, PhD,
Staff Assistant to the Maine Child Death and Serious Injury Review Panel
Updates for 2002/2003 completed by Vickie Jacobs, LSW, Staff Assistant

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CASE REVIEWS, FINDINGS & RECOMMENDATIONS

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EXECUTIVE SUMMARY

The numbers below outline some of the key aspects of this report by the Maine Child Death and Serious Injury Review Panel.

1. Between 1998-2003 the Panel reviewed 45 deaths and serious injuries. Twenty-nine of these cases were child deaths; sixteen were serious injuries to children.

2. The most common causes of death or serious injury were head trauma or asphyxia.

3. 20% of all Maine children, who died between 1998-2003, were under the age of one.

4. The Panel outlined five key findings in the systemic response to child maltreatment:

    - Professionals and residents of Maine alike often failed to recognize signs of child abuse and neglect when they were present.

    - Child welfare workers sometimes failed to accurately identify and articulate the emotional and physical threats of harm and risks of harm in a child's home environment.

    - Some psychological evaluations that were intended to assess a person's capacity to parent his or her children were of poor quality.

    - Relying on an exclusively strength-based approach to the assessment of and service delivery to families often results in the very issues that caused or allowed the abuse and neglect to occur, go unresolved.

    - While the Panel is aware of the cultural importance of firearms in many Maine families, it is important that their presence be considered in a context of risks and benefits.

FORWARD

This report documents cases that were reviewed between 1998 and 2003 by the Maine Child Death and Serious Injury Review panel. The mission of the Panel, now in its twelfth year, is to provide multidisciplinary, comprehensive case review of child fatalities and serious injuries to children in order to promote prevention, to improve present systems and to foster education of both professionals and the general public. Furthermore, the panel strives to collect facts and to provide opinion and articulate them in a fashion, which promotes change. The final mission of the Panel is to serve as a citizen review panel for the Department of Human Services as required by the federal Child Abuse Prevention and Treatment Act, P.L. 93-247.

One year-old "Tammy" was upset and crying. Her new step-father was unable to console her and he became enraged. He picked her up and threw her head first to the floor. Testing later revealed that Tammy had multiple bruises, cuts and bone fractures in various stages of healing. In fact, at one time when both of Tammy's arms were broken the only way she could eat was to lower her head to her high-chair tray. Tammy's mother said that she was "just being lazy." Tammy died from the head trauma perpetrated by her step-father.

The Child Abuse and Serious Injury Review Panel follows the review protocol outlined below.

1. The Panel conducts reviews of cases of children up to age eighteen, who were suspected to have suffered fatal child abuse/neglect or to have suffered serious injury resulting from child abuse/neglect.

2. The Panel conducts comprehensive, multidisciplinary reviews of any specific case. Reviews may be initiated by the Bureau of Child and Family Services, by the Commissioner of the Department of Human Services, or by any member of the multidisciplinary review panel.

3. Cases may be selected from a monthly report that includes major injuries and deaths in the preceding month, as well as a summary of deaths and major injuries from the preceding year.

4. All relevant case materials are obtained by the Department of Human Services staff and disseminated to the members of the review panel.

5. After review of all confidential material, the review panel will provide a confidential summary report of its findings and recommendations to the Commissioner of the Department of Human Services.

6. The review panel may develop, in consultation with the Commissioner of the Department of Human Services, periodic reports on child abuse fatalities and major injuries, which are consistent with state and federal confidentiality requirements.

The Maine Child Death and Serious Injury Review Panel is comprised of representatives from many different disciplines. Its composition, which is mandated by state law, includes the following disciplines.

1. Judiciary
2. Forensic pathology
3. Forensic and community mental health
4. Pediatrics
5. Family practice
6. Nursing
7. Public health
8. Civil and criminal law
9. Law enforcement
10. Public child welfare
11. Doctoral candidates completing their clinical or field placements regularly participate in these case reviews as part of their education and training

Each member of the Panel volunteers his or her time to review extensive case records in preparation for monthly retrospective reviews.

There are several unique functions of the Panel. Most states only review child fatalities; Maine's panel reviews serious child abuse and neglect injuries, as well as child abuse and neglect fatalities, or suspicious deaths. Some states have multiple local review panels in addition to a central state-level panel. In such cases, only selected cases are reviewed by the state-level team. Because the state of Maine is less populous than other such states, the full, central, state-level team reviews all cases. The centralized forensic medical examiner system and representation on panel promotes standardized forensic child death investigations and post mortem exams. The State of Maine has specialized medical examiner training for child death investigation units of law enforcement, which include Maine State Police, Bangor and Portland Police Departments. Representatives from this training sit on the Panel. The Panel is established in state statute that permits confidentiality of the Panel's work and grants the Panel the power to subpoena relevant case documentation and testimony. This latter feature allows the Panel to conduct in-depth retrospective reviews of all relevant records, supplemented by oral presentations by key, involved service providers. Finally, the Maine Child Death and Serious Injury Review Panel belongs to the consortium of Northern New England Child Fatality Review Teams.

Newborn baby "Todd" was brought home to live with his mother, as his parents had recently separated. The home was not properly heated, did not have running water, the floor was littered with animal feces and his mother, who already had a history of depression and multiple suicide attempts, had pneumonia and was caring for a special-needs sibling. Four weeks later his mother put her hand over his mouth and nose and suffocated him.

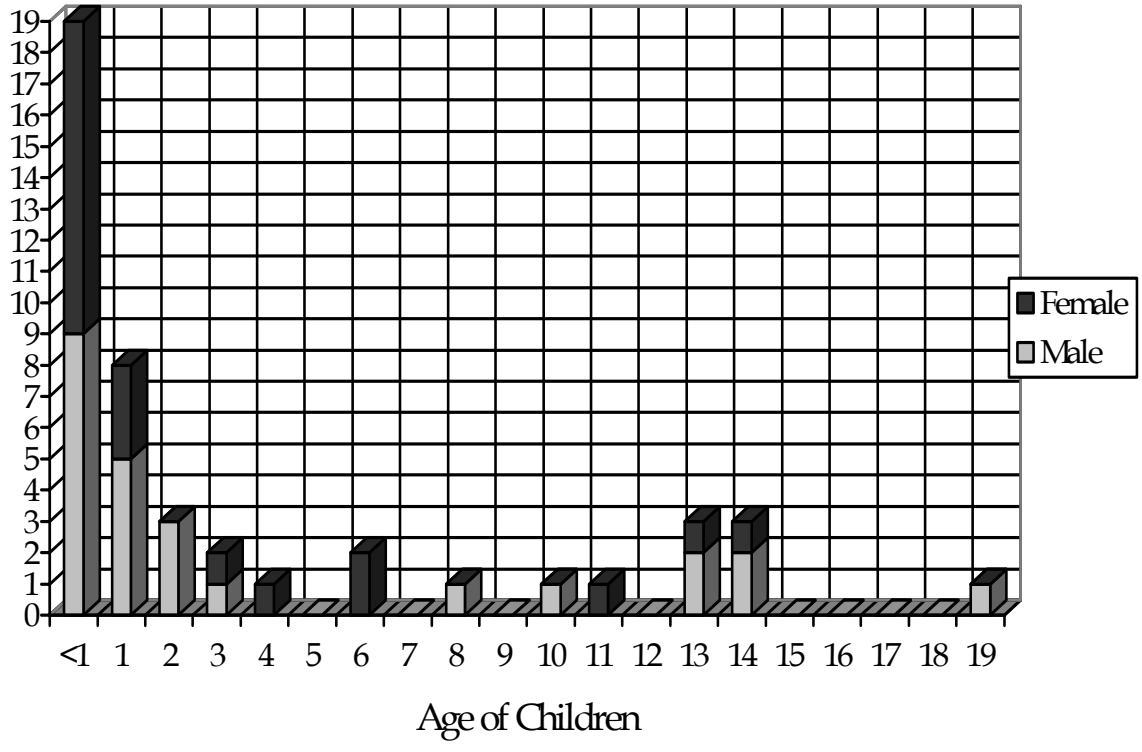
CASE DEMOGRAPHICS: CASES REVIEWED BY THE MAINE CHILD DEATH AND SERIOUS INJURY REVIEW PANEL 1998-2003

Between 1998 and 2003, the Maine Child Death and Serious Injury Review Panel reviewed forty-five (45) cases. Below is a summary of these cases, including demographic information about the children and families reviewed, causes of the deaths and injuries, and summaries of finding and recommendations of the Panel.

Demographic Information

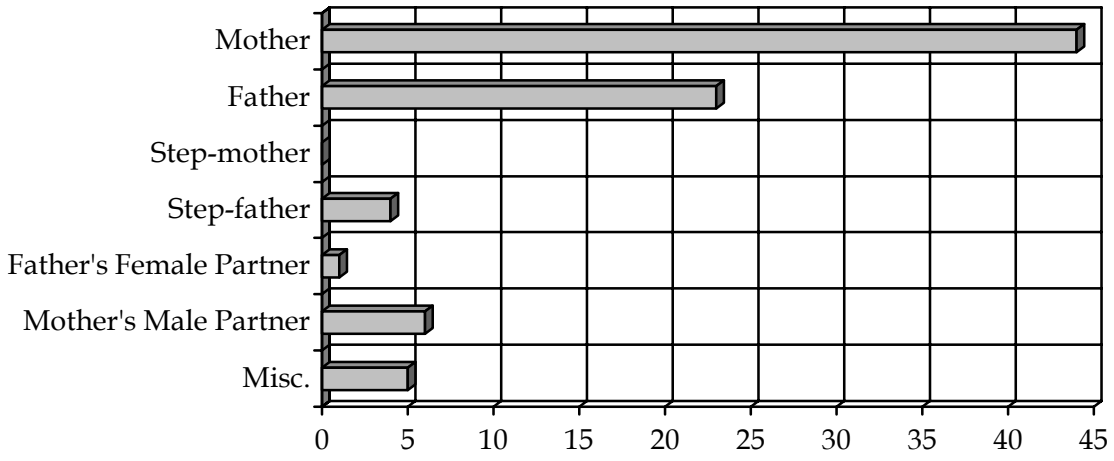
The ages of the children in the cases reviewed by the Panel ranged from newborn to nineteen years; eighteen (18) cases involved children under the age of one and eight involved children one year of age. Twenty-five of the cases, or 56% focused on male children.

Table 1: Age and Sex of Children in Cases Reviewed (n=45)



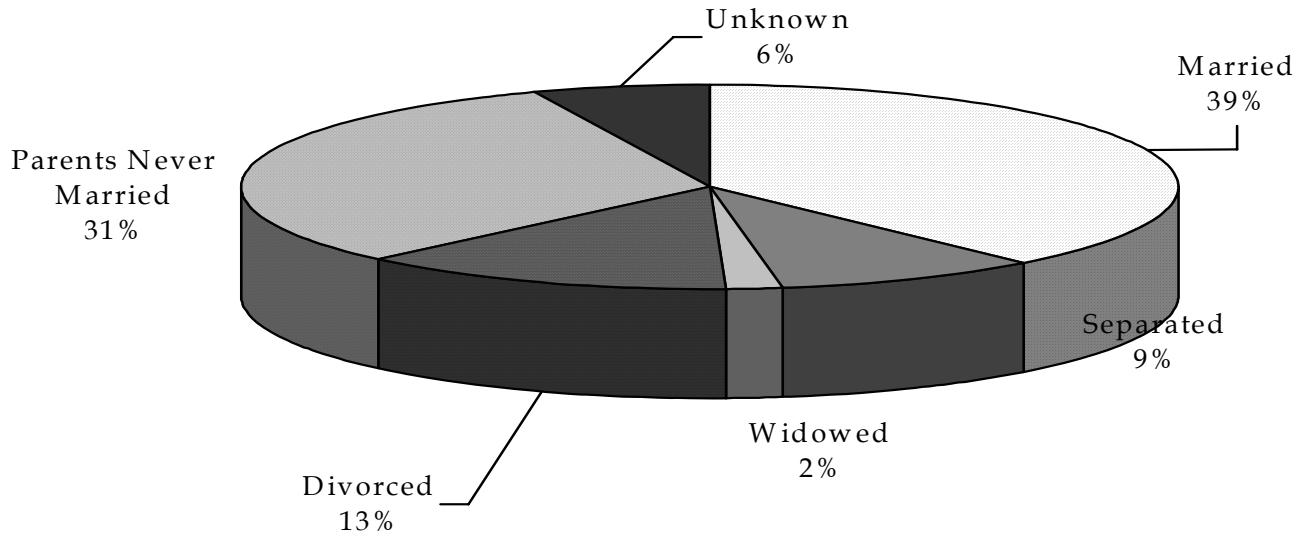
Most of the children from the cases that the Panel reviewed lived in homes with two caregivers. In the majority of cases the caregivers were the biological mother and father. In 98% (n=45) cases reviewed, children lived with their biological or adoptive mothers; 51% (n=23) of the time, children lived with their biological or adoptive fathers. Eleven children resided with their parents' partners. More specifically, 8% (n=4) of children lived with a step-father; 2% (n=1) lived with the father's female partner; and 13% (n=6) lived with their mother's male partner. In 11% (n=5) of cases reviewed there were other non-related persons residing with their family. (Note that these percentages do not total 100%; there is considerable overlap among these categories.)

Table 2: Members of Household in Cases Reviewed (n=45)



There was an average of four people living in the households of cases that the Panel reviewed. In 60% (n=27) of cases, there were other children living in the home. The average age of these children was 7 years (median = 5.5; standard deviation = 5.4). The average age of caregivers in the cases that were reviewed was 30 (median = 28; standard deviation = 9.7). The caregivers who held legal custody of the children were most often married (38%); followed by parents who were never, or not married (31%) and parents who were divorced (13%).

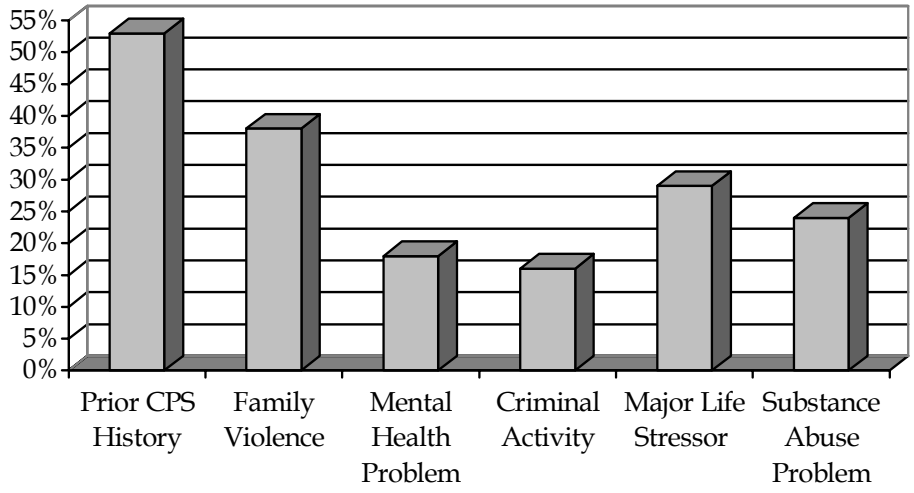
Figure 1: Marital Status of Person with Legal Custody



Parental Risk Factors

The caregivers in the cases that reviewed presented with a multitude of significant risk factors. Fifty-three percent (n=24) of the cases had prior histories or open cases with child protective services. Thirty-eight percent (n=17) of the cases had a history of, or a current problem with violence in the household and 29% (n=13) had experienced a major life stressor within the twelve months prior to the child's death or serious injury. Twenty-four percent (n=11) of cases had parental caregivers with substance abuse problems, 16% (n=7) had a history of criminal activity and finally, 18% (n=8) of the cases involved at least one caregiver with a mental health problem.

Table 3: Family Risk Factors in Cases Reviewed (n=45)



Nature and Causes of Deaths and Serious Injuries

The Panel reviewed a total of forty-five (45) cases between 1998-2003. Twenty-nine (29) of these cases were fatalities and sixteen (16) were serious injuries. The causes of the injuries, along with the age of the children at the time of the event are listed in the tables below. Tables 4-A and 4-B list the causes of injuries or deaths along with the age and sex of the victim and perpetrator, while Table 5 summarizes the incidents according to injury or cause of death.

Table 4-A: Causes of Deaths and Serious Injuries in Cases Reviewed			
DEATHS			
Victim Age	**Cause of Injury**	**Perpetrator – Relation to Victim**	**Perpetrator Age**
1 year	Undetermined	Unknown	--
11 days	Severe acute pulmonary hemorrhage; cause unknown; co-sleeping	Unknown	--
13 years	Firearm wound to head	Brother	17
4 weeks	SIDS (co-sleeping)	None	--
4 years	Blunt force head trauma	Mother	32
10 years	Hypoxia and cardiac arrest resulting from house fire	None	--
4 months	Shaken baby injury	Mother's boyfriend	25
1 year	Drowned in home while parents at home	None	--
1 year	Accidental suffocation – collapsed bed; children left alone for 13 hours	None	--
3 years	Undetermined	Unknown	--
4 weeks	Asphyxia – smothered	Father	33
5 months	Positional asphyxia	None	--
9 months	Respiratory failure – medication error by mother	None	--
13 years	Self-inflicted firearms wound	Self	--
11 years	Asphyxia due to strangulation	Step-father	36
4 weeks	Undetermined	Unknown	--
2 years	Left in running vehicle for several hours	Mother	27
4 weeks	Smothered	Mother	25
1 year	Shaken-impact injury	Step-father	28
19 years	Aspiration pneumonia	None	--
13 years	Self-inflicted firearms wound	Self	--
14 years	Self-inflicted hanging	Self	--
2 years	drowning	None	--
3 years	Suffocation	Foster father	Unknown

Table 4-A: Causes of Deaths and Serious Injuries in Cases Reviewed			
17 days	Possible unintentional asphyxiation	Mother	Unknown
6 years	Suffocation	Foster mother	40years
6 years	Empyma and pneumonia	----	----
8 weeks old	SIDS	-----	----
5 ½ weeks	unknown	unknown	

Table 4-B: Causes of Serious Injuries and Deaths in Cases Reviewed			
SERIOUS INJURIES			
Victim Age	**Cause of Injury**	**Perpetrator – Relation to Victim**	**Perpetrator Age**
6 weeks	17 bone fractures	Father	24
8 years	Self-inflicted burns	None	--
1 year	Fracture of tibia; cause unknown	Unknown	--
2 years	Major trauma to head; bruises to body	Mother's boyfriend	28
4 weeks	Non-organic failure to thrive; parent could not meet child's basic needs	Mother	26
Newborn	Newborn in toilet bowl	Mother	20
5 months	Left in vehicle for five hours on warm day	Father	45
1 year	Burns – fire started by parent to kill self and child	Mother	43
1 year	Shaken-impact injury	Child care provider	34
6 months	Shaken Baby Syndrome	Mother	25
5 months	Cigarette burns and fractures	Mother's boyfriend	25
14 years	Factitious Illness by Proxy	Mother	34
14 years	Suicide	----	----
15 months	Extensive burns	Unknown	----
10 weeks	Shaken Baby Syndrome	Father	23
4 week old	Failure to Thrive	Mother	22

Table 5: Cases of Serious Injuries and Deaths		
Cause of Injuries or Deaths	*Number of Cases*	
Bone Fracture		3
Head Trauma		7
SIDS		3
Injuries Resulting from Fire		3
Drowning		2
Asphyxia		8
Firearms		3
Hanging		2
Failure-to-Thrive		2
Left in Vehicle		2
Undetermined		3
Miscellaneous		5
Factitious Illness by Proxy		1
Extensive Burns		1
TOTAL		45

The most common causes of injury or death were head trauma perpetrated by a caregiver or asphyxia. Those categories with few events include SIDS, drowning, hanging and failure to thrive. In 48% (n=15) of the cases, the event, which caused a serious injury or death, was witnessed by at least one person. Fifteen (n=48%) of these cases were inflicted injuries. The Panel determined that 71% (n=22) of the time the injuries or deaths could have been prevented.

FINDINGS & RECOMMENDATIONS OF THE PANEL 1998-2003

The Panel focuses on systemic problems, the management of and conceptualizations of child abuse cases and responses to child maltreatment in Maine. Therefore, most of the findings and recommendations are specific to the Maine child welfare system. Other findings concern social service providers and agencies, which also have regular contact with at-risk or abused and neglected children and their families. Below is a discussion of the Panel's most consistent conclusions.

Significant Concerns of the Panel

Inability to Recognize Signs of Risk to Children

In more than a third of the cases that the Panel reviewed, there were significant problems with the inability of professionals to recognize or take action concerning serious risk to the physical and emotional safety of children in their care. The Panel encountered this across numerous professions, including education, child welfare, medicine, mental health, child-care and community intervention providers. Such events usually occur in one of two ways. First, despite the fact that such providers have had training about child maltreatment, they often miss or overlook important risk factors. Even though these providers see the symptoms they are not able to sum the components into a picture that indicates danger for the child.

There are also providers who know that children are at risk and they do not take action. Often this is because providers worry that a report to child protective services may terminate a relationship with a family and that they will no longer be able to monitor the family if the Department of Human Services does not take action. Other times providers may have a good rapport with a family and they may be reluctant to "turn the family in." One provider reported to the Panel that even though his client's child was in danger, he felt that it would be "blaming the mother" to make a report about the abusive nature of the father. That child is now dead.

The Panel strongly urges all Maine residents, whether providers, citizens or relatives, to make reports about suspected or known child maltreatment. The Panel further recommends that mandated reporters follow their legal obligation to report all suspected and known child maltreatment.

Failure to Conceptualize a Case

In a high proportion of cases, the Panel concluded that the response of child protective services could have been stronger. There are a number of ways in which this was true. Sometimes a case was "screened out" as it was determined to be a low risk case, when in fact it proved be a moderate or high risk case. Other times caseworkers failed to gather pertinent information about the child, such as a full review of medical records. However, the most frequent finding in this category was that child protective services misjudged the protective capacity of caregivers or failed to accurately identify and articulate the emotional and physical risk of the family environment.

Child protective services has made improvements in this area since the initiation of the Panel in 1992, in part, because clinical consultation has been made available to child protection teams and in part, because safety and risk assessment tools have been improved. Despite this progress, this matter remains of significant concern to the Panel; the members support all efforts of the Department of Human Services to bring about changes in practice and policy to alleviate this problem.

Moderate Concerns of the Panel

Psychological Evaluations

In a small number of the cases that the Panel reviewed, the psychological evaluations conducted on the abusive or neglectful parents were of poor quality. In most instances the evaluator failed to focus on the capacity of parents to protect their children from abuse and neglect. There was also a tendency to overlook risk factors or to minimize the severity of these factors.

In some instances this problem can be ameliorated by better communication between child protective workers and mental health evaluators. Caseworkers need to be more forthcoming about the specific concerns they need to have addressed and evaluators should have complete understanding of the purpose of the evaluation before starting an evaluation.

It is also important for child welfare workers and mental health professionals to recognize that the evaluation of an individual's capacity to parent his or her children is a professional specialization and cases should be referred only to people who are demonstrated experts in this arena. Finally, state sponsored trainings in this area of specialization would result in a larger pool of individuals capable of performing such evaluations.

"Strength-Based" Approach

The Department of Human Services contracts with Community Intervention Programs to provide services to low and moderately low risk families. These contract agencies do not perform child protective assessments on families. However, their caseworkers have regular contact with families, which enable them to monitor family functioning. They are also able to assist in finding appropriate services, such as housing, parenting classes, medical and mental health treatment and so forth. This opportunity to use additional resources has been a great asset to the Department because it means that almost all families that are considered "appropriate" for an assessment receive some kind of service, even if the Department is unable to send a child protective worker to their home. Since this contractual service is relatively new to child protective work, the Panel has only reviewed a few such cases. These cases clearly demonstrated that Community Intervention Programs use a "strength-based" approach when providing services to their clients. The success of a strength-based model appears to be dependent upon the ability of the family to accurately identify the areas in which they need help to support and protect their children. This runs a risk of falling short in families where parents lack insight or are not able to be honest with their providers regarding areas where their children have needs for care and protection, and which they are unable to independently meet.

Children's Access to Firearms

The Panel reviewed four cases where children killed themselves or others with a firearm. While the Panel is aware of the cultural importance of firearms in the homes of many Maine families, it is important that their presence be considered in a context of risks and benefits. It is clear from the work of the Panel that locking guns away or storing them unloaded does not prevent children from gaining access to firearms and harming themselves or others.

Accomplishments Worthy of Praise

The year 2004 marks the Panel's twelfth year of case reviews. Since its inception, the Panel has witnessed considerable progress in many areas, such as more complete assessments of families in the child protective system, higher quality psychological evaluations of maltreating parents, increases in sentencing for child abusers who kill children and so forth. However, the one area that consistently improves is the collaboration between multiple agencies, which respond to the abuse, neglect or death of children. Especially fine work has been noted between child protective workers and law enforcement officers, medical examiners and law enforcement, medical professionals, child protective workers and law enforcement and excellent work between local police departments and state police. Their

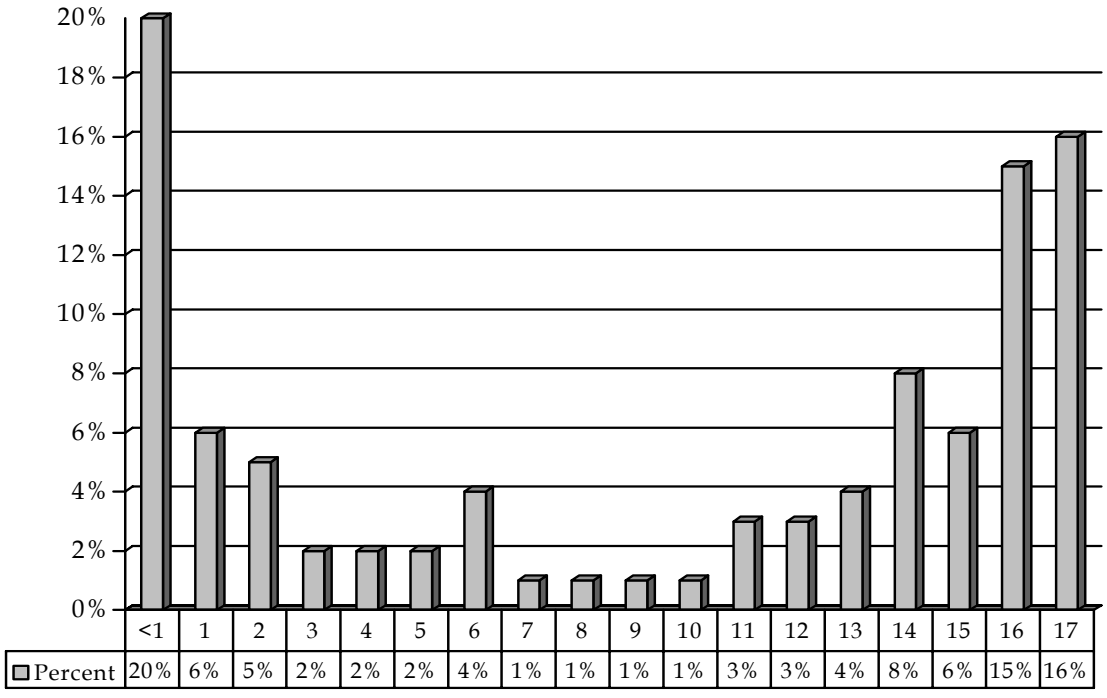
collaborative work is often of highest quality and is worthy of the Panel's recognition.

ALL CHILD DEATHS IN MAINE 1998-2003
STATE OF MAINE OFFICE OF CHIEF MEDICAL EXAMINER

Total Deaths

Between 1998 and 2003, 382 children died in the state of Maine. 20% of these children were under the age of one, and 16% were 17 years of age. Half of the deaths were the result of accidents, while five percent were homicides. Sixty-four percent of the children were male. More deaths occurred in Cumberland County than any other region, followed by Penobscot County.

Table 6: Ages of Children who Died in Maine 1998-2003



	<1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Percent	20%	6%	5%	2%	2%	2%	4%	1%	1%	1%	1%	3%	3%	4%	8%	6%	15%	16%

Age of Children

Figure 2: Manner of Deaths of Maine Children 1998-2003

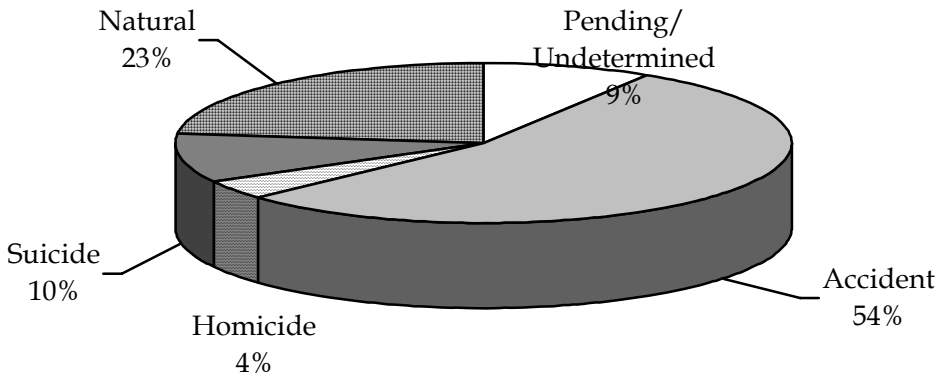


Table 7: Maine Deaths 1998-2002 by County	
County	**Percent**
Androscoggin	8%
Aroostook	5%
Cumberland	20%
Franklin	2%
Hancock	3%
Kennebec	9%
Knox	3%
Lincoln	3%
Oxford	4%
Penobscot	15%
Piscataquis	3%
Sagadahoc	2%
Somerset	6%
Waldo	5%
Washington	2%
York	10%
Total	100%

Deaths By Abuse or Neglect
Between 1998 and 2001, ten children died at the hands of their caregivers. Their stories are below.

- A one year-old girl died when her stepfather, in a rage, threw her head-first onto the ground. *1998*
- A two-year boy was left in a running vehicle for several hours while the mother "partied" with friends. The child died from hypothermia. *1998*
- Two children, ages two and four were shot by their father in a double-murder-suicide. *1998*
- A sixteen year-old girl was beaten and strangled by her stepfather. *1998*
- A one-month-old girl was suffocated by her father. He placed her body in a box and hid it in a bedroom closet. Her body was found several weeks later. *1998*
- A four-month old boy was shaken to death by his baby sitter when he would not stop crying. *1998*
- An eleven year-old girl was raped and then strangled by her stepfather during a summer evening walk. *1999*
- A girl, almost two years old, died after weeks of being beaten by her mother's boyfriend. *2000*
- A five-year-old girl was bound to a chair with duct tape by her foster mother. Tape was placed over her airways and she suffocated. *2001*

CRIMINAL JUSTICE OUTCOMES IN CASES OF CHILD FATALITIES 1998-2002
STATE OF MAINE

In the 1999 report of the Maine Child Death and Serious Injury Review Panel, we examined the criminal justice outcomes in cases of fatal child abuse or neglect. Some of those cases were pending and have since been resolved. Below are the outcomes of cases between 1998 and 2001, followed by a graph depicting incarceration terms since 1994.

In the last 8 years, only 3 of the 15 child abuse and neglect deaths have resulted in murder convictions.

Table 8: Incarceration Terms in Cases of Fatal Child Abuse in Maine 1994-2002

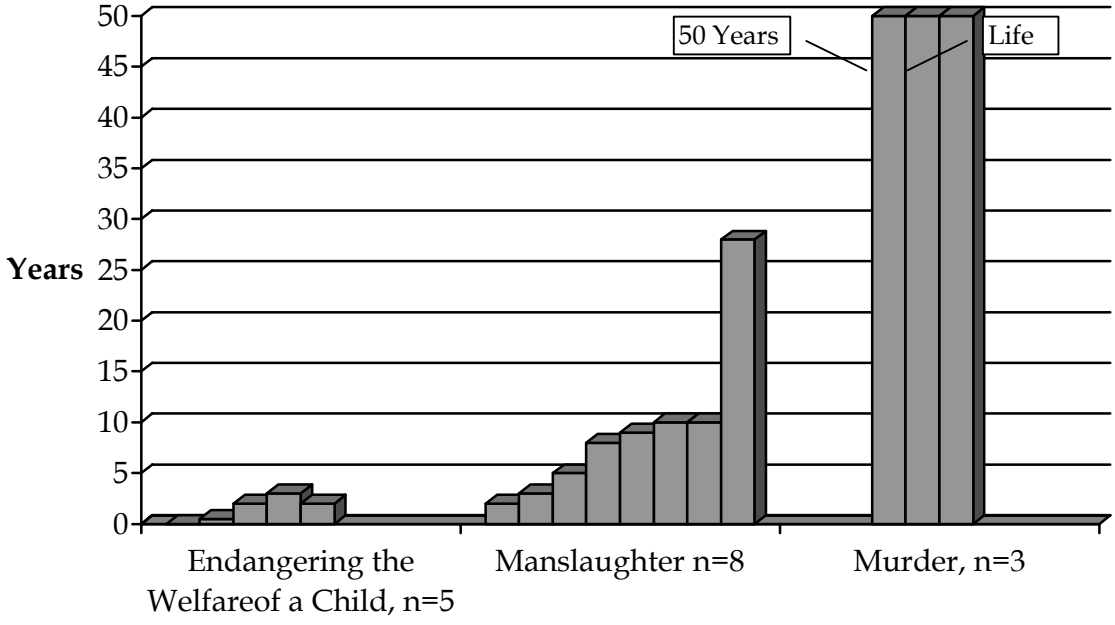


Table 9: Fatal Child Abuse Outcomes in Maine 1998-2001							
Date of Death	**VICTIM**		**OFFENDER**		**Relation to Victim**	**Status of Case**	**Sentence**
	Age	**Sex**	**Age**	**Sex**			
1998	1 mo.	F	35	M	Father	Conviction: Manslaughter	25 year jail term, all but 20 suspended
1998	1 yr.	F	28 22	M F	Step-father Mother	Conviction: Manslaughter Conviction: Endangering the welfare of a child	10 year jail term 3 year jail term
1998	16 yrs.	F	28	M	Step-father	Conviction: Murder	Life
1998	2 yrs.	M	29	F	Mother	Conviction: Endangering the welfare of a child	Suspended 9-month jail term; 1 year probation; 520 hours community service
1998	4 yrs.	F	34	M	Father	Closed: Murder-suicide	
1998	2 yrs.	M	34	M	Father	Closed: Murder-suicide	
1998	4 mos.	M	44	F	Child care provider	Conviction: Manslaughter	10 year jail term
1999	11 yrs.	F	35	M	Step-father	Conviction: Murder	50 year jail term
2000	2 yrs.	F	29	M	Mother's boyfriend	Conviction: Murder Mother's conviction: Endangering the life of a child	28 years to Life Mother received 2 years
2001	5 yrs.	F	40	F	Foster mother	Conviction: Manslaughter	28 years, all but 20 suspended

"JAKE'S LAW"

In March, 2000 Governor Angus King signed into law a statute that requires judges to consider the ages of victims who die as a result of abuse or neglect. More specifically, the law mandates that courts give special consideration to the age of a victim when determining length of incarceration terms. Named for infant-victim Jake Belisle, "Jake's Law" was proposed by Jake's mother, Pamela, who fought tirelessly for the passage of the statute. This policy now states that when a victim of child abuse fatality is under the age of six, this fact may be used to help determine the length of a jail term.

Similar laws have been adopted in half the states across the country. These so-called "child fatality" laws are intended to increase the jail terms of offenders who take the lives of children through abuse or neglect.

The original bill for Jake's Law outlined much harsher penalties for offenders than the version that was adopted into law. This 1999 legislative action requested a mandate of murder for all persons who have killed a child under the age of four by means of abuse or neglect. Such a law would have resulted in a sentence of no less than 25 years for this crime. The bill was amended, and now requires judges to *consider the age of the victim* rather than mandating a uniform sentence for child abuse fatalities. The resulting laws are stated below.

Crime of Murder: *"In setting the length of imprisonment, if the victim is a child who had not in fact attained the age of 6 years at the time the crime was committed, a court shall assign special weight to this objective fact in determining the basic sentence in the first step of the sentencing process." [Title 17-A, Chapter 51§1251]*

Other Crimes: *"In using a sentencing alternative involving a term of imprisonment for a person convicted of the attempted murder, manslaughter, elevated aggravated assault or aggravated assault of a child who had not in fact attained the age of 6 years at the time the crime was committed, a court shall assign special weight to this objective fact in determining the basic term of imprisonment as the first step in the sentencing process." [Title 17-A, Chapter 51§1252-5B]*

Jake's Law was successfully used for the first time in the fall of 2002 to lengthen the sentence of a woman found guilty for manslaughter in the death of her foster child.

STATE OF MAINE CHILD PROTECTIVE ACTIVITIES 1998-2003
DEPARTMENT OF HUMAN SERVICES

Activities Based on Reports

Between 1998 and 2003 the State of Maine child protective system received 92696 reports about the well being of Maine children. Over that period of time, 42% of the reports did not concern allegations of abuse or neglect and were determined inappropriate for action from child protective services (CPS). In 1998, 43% of reports that were determined to be appropriate for CPS intervention were not assigned for assessment because of insufficient staff. However, by 2002, only 2% of appropriate reports were unassigned because of insufficient staff. Beginning in 1998, the Department of Human Services began referring low to moderately low risk cases, for which there was insufficient staff, to Community Intervention Programs. Although these agencies do not perform child protective assessments on families, agency case workers have regular contact with families and therefore are able to monitor family functioning. They are also able to assist in finding appropriate services, such as housing, parenting classes, medical and mental-health treatment and so forth.

Table 10: State of Maine Child Protective Activities 1998-2003

Category	1998	1999	2000	2001	2002	2003	Total all years
Inappropriate reports	5958	6167	6044	5894	6865	8083	38971
Appropriate report, assigned to community intervention programs	353	3012	4116	4901	4664	4181	21227
Appropriate report, not assigned due to insufficient staff	3438	1318	241	205	124	23	5349
Appropriate report, assigned for assessment	4121	4263	4833	4794	4294	5007	27312
TOTAL Reports made about the well-being of children	13870	14760	15234	15794	15774	17294	92696

Family Assessments and Findings

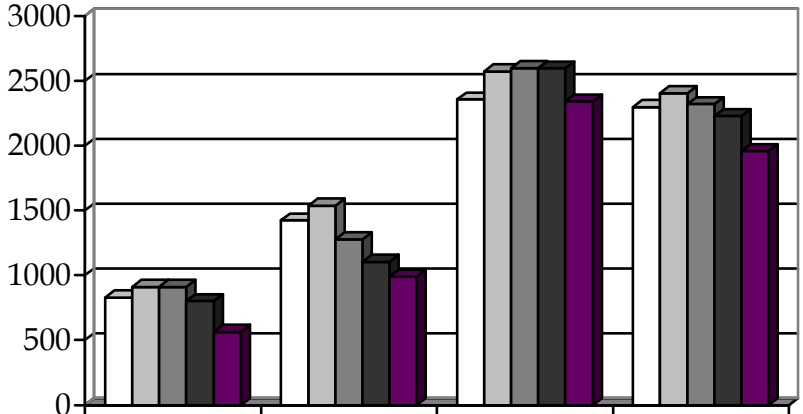
Between 1998 and 2002, the Department of Human Services conducted 17657 assessments on Maine families suspected of abusing or neglecting their children. Through these assessments the Department substantiated that maltreatment occurred an average of 53.6% of the time. (See the following table for rate of substantiation for each individual year.)

Table 11: Department of Human Services
Child Maltreatment Substantiation Rate: 1998-2002

Year	1998	1999	2000	2001	2002	Average
Rate of Substantiation	61%	59%	52%	50%	46%	53.6%

Maine state law defines child abuse as "a threat to a child's health or welfare by physical, mental or emotional injury or impairment, sexual abuse or exploitation, deprivation of essential needs or lack of protection from these by a person responsible for the child" *(Title 22, MRSA, Chapter 1071§4002).* With this in mind, the Department assesses for several different kinds of abuse when interviewing families, including sexual abuse, physical abuse, neglect and emotional maltreatment. Between 1998-2002, Maine's child protective system substantiated an average annual number of 803 cases of sexual abuse, 1267 cases of physical abuse, 2494 cases of neglect and 2242 cases of emotional abuse.

Table 12: Substantiated Cases of Child Maltreatment: 1998-2002

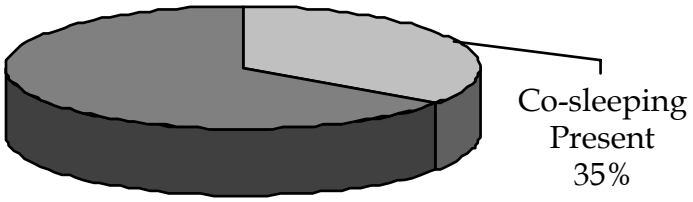


	Sexual Abuse	Physical Abuse	Neglect	Emotional Abuse
1998	830	1424	2357	2297
1999	910	1537	2574	2405
2000	910	1278	2599	2321
2001	802	1106	2596	2229
2002	565	990	2342	1959

CO-SLEEPING AND INFANT DEATHS IN MAINE: 2001-2002

Within the last decade there has been increasing concern among experts in the medial and child welfare professions about a possible relationship between infant deaths and co-sleeping between infants and their caregivers. Although there are benefits associated with co-sleeping, such as synchronizing sleep patterns and encouraging breastfeeding, statistics suggest that, under certain conditions, co-sleeping increases the risk for sudden death in infants. Recent data from the Office of the Chief Medical Examiner in the State of Maine revealed that between January 2001-September 2002, seven of the twenty sudden death cases in the state of Maine, or 35%, involved co-sleeping with a caregiver.

Figure 3: Presence of Co-Sleeping in Sudden Death Cases Among Infants, January 2001-September 2002



To help provide guidance for medical and child welfare professionals, the American Academy of Pediatrics has developed guidelines about reducing the level risk to infants who co-sleep with their caregivers.[1]

1. Unless otherwise directed by a physician, healthy infants should be placed on their back regardless of their sleeping environment.
2. Cribs are designed to meet safety standards for infants. Adult beds are not so designed and may carry a risk of accidental entrapment and suffocation.
3. If infants sleep with their caregivers, special care should be taken to avoid soft sleeping surfaces. Quilts, blankets, pillows or comforters should not be placed under infants.
4. Caretakers sharing a bed with children must not smoke while in bed. It is also unwise for caretakers who are obese, overtired or who have used alcohol or drugs that may impair arousal, to co-sleep with infants.
5. Co-sleeping with multiple individuals can increase the risk of suffocation.

[1] "Does Bed Sharing Affect the Risk of SIDS?" Pediatrics, Volume 100, No. 2, 1997.

APPENDIX

No one knew that "Jane" was pregnant. She gave birth to her second child in secrecy. After delivery, Jane wrapped a sock around the baby's neck and strangled her. She put the body in a garbage bag and several weeks later asked her boyfriend to throw it in the woods. The body was found. Jane was charged with manslaughter and sentenced to two years in jail.

ABUSIVE HEAD TRAUMA IN MAINE INFANTS: MEDICAL, CHILD PROTECTIVE, AND LAW ENFORCEMENT ANALYSIS[2]

Lawrence Ricci, MD (a)
Amy Giantris, MD (b)
Phyllis Merriam, LMSW (c)
Sandra Hodge LSW (c)
Lieutenant Timothy Doyle, (d)

Introduction

In the United States, physical abuse is the leading cause of both serious head injury and of injury-related death in infants (American Academy of Pediatrics, 1993). In 1974, Caffey introduced the term "whiplash shaken baby syndrome" to describe head injury in infants secondary to what he believed were acceleration-deceleration stresses from shaking (Caffey, 1974). The clinical features he described included subdural hemorrhages, retinal hemorrhages, and little or no external evidence of injury. The term shaken baby syndrome (SBS) has come to describe the medical sequelae of such violent shaking of infants. Recently, the term Abusive Head Trauma (AHT) has been introduced describe nonaccidental head injury in infants and toddlers. (Jenny, Hymel, Ritzen, Reinert, & Hay, 1999) AHT is defined as inflicted cranial injury irrespective of whether shaking or impact or both have been found to have been the cause.

Despite the extensive literature on SBS as summarized by Duhaime, Christian, Rorke, & Zimmerman (1998), no study has attempted to describe the findings of the full investigative process (medical, child protective, and law enforcement) associated with inflicted head trauma in infants. In response to the recommendations in the first report of the Maine Child Death and Serious Injury Review Panel in 1994, this retrospective review was undertaken to identify the medical, psychosocial, and criminal justice characteristics of inflicted head trauma in Maine children.

[2] Acknowledgements: This study was conducted with the assistance of the Office of the Chief Medical Examiner, the Maine Child Death and Serious Injury Review Panel, the Maine State Police, the Maine Department of Human Services, Bureau of Child and Family Services and Bureau of Health, and the Maine Childhood Injury Prevention Program with grant support from The Maine Department of Human Services, Bureau of Health, Division of Community and Family Health. Thanks also to Robert Reece, MD and Carole Jenny, MD for their valuable comments on an earlier draft of this manuscript.

(a) From the Spurwink Child Abuse Program, Portland, Maine 04103
(b) From Department of Pediatrics, Yale-New Haven Medical Center, New Haven, Connecticut 06520
(c) From Maine Department of Human Services Bureau of Child and Family Services, Augusta, Maine 04333
(d) From the Maine State Police Augusta, Maine 04333

Methods

All records from Maine's two tertiary pediatric care medical centers, Maine Medical Center in Portland and Eastern Maine Medical Center in Bangor, were screened using the following ICD-9 N-Codes:

N348.5 .....Cerebral edema
N362.81 .....Retinal hemorrhages
N800-801.9 .....Skull fracture
N803-804.9 .....Other skull or face fractures
N850-854.1 .....Intracranial injury
N905 .....Late effects of skull fractures
N907 .....Late effects of intracranial injury
N995.5 .....Battered child syndrome

In addition, records from the Maine Medical Examiner's office were reviewed for any deaths during the study period not identified in the hospital records.

Ninety-five admissions of children 24 months of age or less were identified using these codes from 1991 through 1994. From these, 20 hospitalizations (20/95, 21%) involving 19 children were selected as likely abuse related using the following criteria: the presence of intracranial trauma such as extra axial blood and/or parenchymal injury plus one or more of the following: admitted or witnessed assault, inconsistent history, suspicious bruises, suspicious fractures, or extensive retinal hemorrhages. Determination of inconsistency in the history and/or suspiciousness of the injuries were made by the primary author (LRR) using a model similar to Duhaime et al. (1992).

Medical records including autopsy reports were reviewed by one of the authors (LRR) and the following information was collected: age, sex, length of hospitalization, presenting complaint, signs and symptoms on presentation, changing history, delay in seeking treatment, past history (injury, medical symptoms or medical evaluations), results of radiographic studies, results of lumbar puncture, diagnosis regarding abuse, whether and when CPS and/or law enforcement were notified, final disposition, and sequelae. Information about prior symptoms and signs were taken from the inpatient medical records and when available from primary care records.

Child Protective Service (CPS) records were reviewed by one of the authors (PM) and the following information was collected: prior CPS history, family constellation, risk factors (substance abuse, prior abuse allegations, child abuse in the caretaker's childhood, domestic violence, mental illness, history of unrealistic expectations, history of attachment disorder), history of child stressors (such as colic or feeding difficulties), whether abuse was substantiated, whether a perpetrator was identified, whether a triggering event occurred, and the final disposition of the child.

Law Enforcement records were reviewed by one of the authors (TD) and the following information was collected: whether or not a perpetrator was identified, perpetrator demographics; previous criminal history of the perpetrator; whether criminal prosecution was attempted and the results of that prosecution, whether there was a confession, and what, if any, were the identified impediments to investigation.

The study was reviewed and approved by the Institutional Research Review Committees of the participating hospitals.

Medical Results

Twenty head injury hospitalizations involving 19 children (one child was admitted twice with acute AHT from the same home and will be counted twice for some of the tables) were identified as abuse related (Table 1). The mean age of the children at the time of hospitalization was 7.5 months with a standard deviation of 5.7 months and an age range of 2 weeks to 17 months. Eleven of the 19 children (58%) were male.

Table 1

Demographics of children with AHT

Number of hospital admissions	20
Number of children	19
Mean age	7.5 months
Age range	2 weeks to 17 months
Males	58% (11/19)
Average age of males	8.2 months
Females	42% (8/19)
Average age of females	6.6 months

The chief complaint on presentation was a minor injury (e.g. fall less than 4 feet) for 12 children (60%). Eight of the 12 injuries (67%) were described as witnessed. However, none were witnessed by more than one adult. There was a history of prior injury in 6 (30%), a history of prior symptoms suspicious for abuse in retrospect in 9 (45%), and a history of prior medical evaluations for signs and symptoms possibly abuse related in 13 (65%).

Of the 9 children with prior symptoms, all had a history of irritability (100%), while 2 (22%) had vomiting and 4 (44%) lethargy. Of the 13 children who had been evaluated previously for medical conditions, 3 (23%) presented previously with irritability and lethargy, 1(8%) with irritability and vomiting, 2 (15%) with seizures, 1 (8%) with increasing head circumference, and 4 (31%) with injuries, including 1 child with a bruise at 6 weeks of age and 1 with a fractured femur at 2 months of age (Table 2). None of these 13 children were suspected by the primary care provider as abused during those outpatient presentations.

Table 2

Signs and symptoms during prior evaluations for medical conditions (n=13)

Irritability and lethargy	3	23%
Irritability and vomiting	1	8%
Seizures	2	12%
Increasing head circumference	1	8%
Injuries (e.g. bruising, fractures)	4	31%

At hospital presentation, nine children (45%) were in coma, six (30%) were apneic, and 11 (55%) had a tense anterior fontanel and/or enlarged head circumference. Twelve children (60%) had bruising specific for inflicted trauma (face, arms, chest and/or bilateral and/or in a specific fingerprint pattern). Fifteen (75%) had either evidence of prior injuries in the form of healing bruises, healing fractures or old intracranial injuries, or a history of prior injury. Nineteen children (95%) had retinal hemorrhages (typically extensive and severe). Nine children (45%) received a lumbar puncture. All nine (100%) were positive for blood and of these five (55%) were described as positive for xanthochromia. The medical records of the remaining four did not note either the presence or the absence of xanthochromia.

The most common radiographic finding was a skull fracture which was present in 9 of the 20 children (45%). Rib fractures were seen in 3 children (15%) and metaphyseal fractures in 2 (10%). In addition to skull, rib, and metaphyseal fractures, 2 children had long bone shaft fractures. Thirteen children (65%) received bone scans, 2 (15%) revealed findings not seen on the radiographic survey. One was a subtle tibial fracture while the other was a recent rib fracture.

Nineteen children (95%) received a CT scan of the head (the one exception was a child who died in the emergency room). Three children (15%) also received an MRI of the brain. Brain imaging studies revealed subdural hematomas in 19 (100%), cerebral edema in 10 (53%), and parenchymal injury in 6 (32%).

In 16 of 20 cases (80%), the hospital identified the child as a victim of abuse. Two children (10%) who died prior to diagnostic assessment at the medical facility were later identified by the medical examiner as abused. Of the two misidentified cases (10%), one appeared to be a result of medical providers feeling that the family presented well even though the injuries were suspicious, and the other the result of the providers believing the history of an accidental injury. However, Child Protective Services was called in all

cases, immediately in 16 (80%). Law enforcement was called by medical personnel in only 1 case.

Of the 20 children hospitalized, three (15%) died, 8 (40%) were discharged to foster care, 5 (25%) went home without the alleged perpetrator in the home, while 4 (20%) went back to the original home environment. In one of these cases the hospital thought the child had been abused but felt that the parents did not seem capable of abuse. In another, the diagnosis of abuse was missed. This child later returned with a new inflicted head injury. In the third case, because of conflicting medical opinion about whether the injury was abusive, child protective services decided that they had insufficient evidence to remove the child. In the fourth case, the child was discharged to another state, where child protective services apparently felt the home was safe.

Community or Public Health Nursing was involved in only 5 families (26%). Two of these 5 families (10%) had identified minor social problems. None was identified as high risk for abuse.

Child Protective Services Results

Child Protective Services in Maine investigated 18 of the 20 cases (90%). One case not investigated involved a child who died without surviving siblings while the other was a child who resided out of state. Only 2 of 20 cases (10%) had any prior CPS history. CPS found that 14 children (70%) resided with both their mother and father while 2 (10%) resided with mother and stepfather, 1 (5%) with mother and boyfriend and 2 (10%) with mother alone. The average maternal age was 24.7 years while the average age of father or father figure was 27.5 years. Only 2 cases (10%) involved a teenage parent. Both caretakers were employed in 7 of the 19 homes (37%). Father alone was employed in one home (5%) and mother alone was employed in 4 homes (21%).

A number of parental risk factors were identified by CPS in the 19 homes (Table 3). Substance abuse was present in 10 households (53%) and domestic violence in 8 (42%).

Table 3

Parental risk factors for abuse identified by CPS (n=19)

Substance abuse	10	(53%)
Domestic violence	8	(42%)
Unrealistic expectations of child	8	(42%)
Parent abused as a child	7	(37%)
Attachment problems	6	(32%)
Criminal history	6	(32%)
Mental health history	3	(16%)
Unemployment	1	(5%)
No risk factors identified	4	(21%)
Only 1 risk factor present	3	(16%)
Risk factors inadequately assessed	10	(53%)

In 7 cases (37%), at least one parent had been abused as a child. A criminal history was present in 6 (32%), and a mental health history in 3 (16%). Unemployment was identified as a risk factor in 1 household (5%). In 4 homes (21%), no risk factors were identified, and only one risk factor was present in 3 (16%). In 10 homes (53%) however, risk factors were incompletely assessed and/or incompletely documented.

An attempt was made to identify child risk factors and abuse triggers from the CPS records. In 5 homes (27%), the child was described as "difficult," particularly for the father, while in an additional 4 homes (21%), the child was described as persistently crying. Attachment problems, although not clearly defined, were described in 6 homes (32%) and in 8 homes (42%) there were unrealistic expectations of the children's ability to control their own behavior. A trigger for the abuse could be documented in 12 cases (63%). These included crying in 8 of the 12 cases (67%), toileting issues in 3 (25%), and vomiting in 1 (8%).

CPS substantiated abuse in 18 cases (90%). In 2 cases abuse could not be substantiated. In one there were conflicting medical opinions, while in the other the medical providers said that the child had not been abused.

Law Enforcement Results

Law Enforcement identified a perpetrator in 15 of 19 cases (79%) (Table 4). In 10 of the 15 cases (66%), the father was the identified perpetrator. Other identified perpetrators included the stepfather in 1 case (7%), boyfriend in 1 (7%), mother in 1 (7%), and sitter (1 male and 1 female) in 2 (13%). Overall thirteen of the 15 identified perpetrators (87%) were male, with an average age of 26. Six of these (40%) had a previous criminal history. In the 15 cases where a perpetrator was identified by law enforcement, that person was alone with the child at symptom onset in 14 cases (93%).

Table 4

Law Enforcement Findings

Perpetrator identified by law enforcement	15/19	79%
Perpetrator alone with child at symptom onset	14/15	93%
Perpetrator confessed to inducing injury	4/19	21%
Number of cases prosecuted	13/19	68%
Found guilty	2/13	15%
Pled guilty	7/13	54%
Acquitted	3/13	23%
Died prior to trial 1/13 8%		

In 4 of the 19 cases (21%), a perpetrator confessed to injuring the child. One child was shaken because of apparent jealousy, one was shaken because of crying, one was shaken because of a toileting accident and one child was slammed down in anger.

Thirteen cases (68%) were prosecuted. Two individuals (15%) were found guilty at trial while 7 (54%) pled guilty, 3 (23%) were acquitted, and one died prior to trial.

Law Enforcement noted the following barriers to investigation: there was a delay notifying police in 6 of the 20 cases (30%), there were multiple possible suspects in 10 cases (50%), and there were conflicting medical expert opinions in 3 cases (15%).

Discussion

One in five children (21%) less than 24 months of age admitted for head trauma to the two Maine tertiary care pediatric hospitals during the study period was a victim of AHT. These results are similar to those of Reece and Sege (2000) who reported that 19% of 287 children age 1 week to 6.5 years admitted with head injuries were victims of AHT.

The presentation of AHT is often dramatic and obvious yet sometimes subtle and confusing. In our study, as well as in an earlier study (Ludwig & Warman, 1984), the majority of victims presented to the hospital and/or medical office with serious central nervous system symptoms such as apnea, seizures, or coma, often accompanied by a tense fontanel and/or enlarged head circumference.

In some instances however, the diagnosis of shaken baby syndrome can be missed by the health care provider, in part, because of the subtlety of the presentation. The American Academy of Pediatrics (1993) has stated that victims of SBS can present with signs as subtle as poor feeding, vomiting, lethargy or irritability occurring for days or weeks prior to the time of initial health care contact. Greenes and Schultzman (1998) reported that 19 of 101 (19%) infants who had evidence of intracranial injuries such as skull fractures and subdural hematomas were asymptomatic. Jenny and colleagues (1999) reported that 31% (51 of 173) children under the age of three who presented to the hospital with AHT were missed by a health care provider during an earlier presentation for signs or symptoms likely related to AHT. This study also reported that AHT was more likely to be missed in very young children, in white children, in children from intact families, and in children who present without respiratory compromise or seizures. In our study, 65% of children had been previously seen by a medical provider for signs and symptoms that could arguably have been abuse related.

Bruising is an important though not universal finding in the physically abused head injured child. Caffey's original paper (1974) noted infrequent bruising. On the other hand, we found that bruising that was suggestive of physical abuse (i.e., in abusive locations such as the upper arms, face, or chest; in an abusive pattern such as fingerprint; or in an abusive distribution such as bilateral) occurred in over half of the cases. Nonspecific bruising was found in 25% of the children in our study, similar to the findings of Ludwig and Warman (1984), who reported that 7 out of 20 children with SBS were found to have nonspecific bruising. It is important to remember however that

any bruising in an infant who has not yet begun to ambulate is suspicious. (Sugar, Taylor & Feldman, 1999)

Similar to other studies (Duhaime et al., 1987; Alexander, Sato, Smith, & Bennett, 1990), evidence of blunt head injury was present in over half of our cases. Notably, evidence of prior injuries (in the form of healing bruises, fractures, subdurals and retinal hemorrhages or a history of prior suspicious injury) was present in 15 of 20 (75%) of our cases. Evidence of prior injury, also described by Alexander, Crabbe, Sato, Smith, & Bennett (1990), coupled with the frequency with which these children were seen by medical providers for suspicious signs and symptoms indicates both that abuse rarely occurs as a single episode and that it may be preventable in its more severe recurrent forms if closer attention is paid during the medical visit to possible indicators of abuse.

Nine children received a lumbar puncture (LP), typically because head trauma was not initially suspected. Of the nine specimens, all were positive for blood and at least 5 were also positive for xanthochromia, a finding, if present in a freshly spun specimen, indicating that blood is not from a traumatic tap but rather from older subarachnoid blood (Apolo 1987). Yet, the significance of this finding was never noted in the records of these children.

Little has been written about family risk factors specifically associated with AHT. Goldstein, Kelly, Bruton, & Cox (1993), in a series of 14 cases of severe inflicted head trauma, found that at least two of the following three findings were present in each case: an inconsistent history, retinal hemorrhages, or parental risk factors as defined by parental age, educational level, marital status, welfare status, history of substance abuse, history of spousal abuse, and previous referral to child protective services. In an earlier study, Goldstein, Eguiguren, Feldman, Cox, & Todres (1991) found that the combination of parental risk factors with either retinal hemorrhage or an inconsistent history was 100% predictive of abuse. Dashti, Decker, Razzaq, & Cohen (1999) found a history of alcohol or drug abuse in 16% of families of children with head trauma. Although Goldstein et al. (1993) reported a correlation between AHT and parents under the age of 18 who were single or unmarried, in our study, AHT rarely occurred in homes where the caretakers were teenagers (10%) and often occurred in homes where the parents were married (70%).

We found that risk factors for abuse were present in at least two thirds of families where AHT occurred. However no risk factors were found in 16%, while only one factor was found in an additional 21%. The absence of identifiable risk factors in a significant minority of these families suggests that any attempt to prevent AHT should look beyond seemingly high-risk families. Disturbingly, child protective risk factor assessment was inadequately documented if not inadequately assessed in fully half of these families. When assessed, substance abuse and domestic violence were the most common risk factors for abuse.

Christian (1992) reported that certain factors in the child increase the risk of abuse. These include complex medical problems, developmental delays, an unwanted child, and a "difficult" child (e.g., colic or hyperactivity). Shaking in such circumstances may represent frustration resulting from the infant's crying. We found that shaking most commonly occurred when the father found the child difficult to care for, particularly if the child was crying.

In this study, only 2 of 20 (10%) children with AHT had any prior family CPS history. This surprising finding suggests perhaps that CPS is not being notified of infants at risk or that some children are at risk for AHT without preexisting recognizable red flags.

Identification and prosecution can be challenging. The child cannot give a history and rarely is there a witness or a confession. In this study only 4 of 20 perpetrators confessed to shaking or slamming the child. Absent a confession or a witness, exclusive opportunity for one individual to have committed the crime offers the best prosecutorial opportunity. Establishing exclusive opportunity is often contingent on forensically skilled medical providers identifying the time frame during which the injuries could have occurred. We found that in 50% of our cases exclusive opportunity could not be established. Even so, after careful law enforcement investigation, a perpetrator was identified in 15 of 19 cases, and of these, prosecution occurred in 13. Three of 5 jury trials ended in acquittal with many jurors reporting that they could not distinguish between alternative suspects even though they believed that abuse had occurred. Sentencing of those who were convicted or who pled guilty was inconsistent, with some convicted perpetrators receiving sentences of several months while other received sentences of few to several years.

In Caffey's original report (1974), the majority of SBS perpetrators were female. Since then, however, several studies, including this one, have documented an overwhelming predominance of male perpetrators of AHT. Lazoritz and Baldwin (1977) found the perpetrator more often to be male. Starling, & Holden (1995) found that fathers were responsible for 37% of AHT in children and mother's boyfriends were responsible for 20%. In a follow up study, Starling and Holden (2000) found a similar gender distribution in a study of a southern population of perpetrators as in the original western population. Morris, Smith, Cressman, & Ancheta (2000) reported a predominance of male abusers and also noted that female babysitters were of concern in two of nine cases. Lancon, Haines, and Parent (1998) stated that in both military and civilian populations, up to 90% of perpetrators are male with the biological father being the most common perpetrator, followed by the mother's boyfriend and child-care providers.

We are aware of a number of potential limitations of this study. The small number of cases presented here precludes statistical analysis and limit broader conclusions. Additionally, since only two hospitals in Maine were screened for cases of inflicted

head injury, it is possible that a few cases were seen in smaller community hospitals and not identified for this research. Adding such cases could increase the percentage of head injured children who were abused. However, given that one author (LRR) is notified of virtually every serious child abuse case in the state, this seems unlikely. We also did not look at children with accidental head injuries admitted to other than the two tertiary care hospitals in Maine. Adding such cases would likely decrease the percentage of head injured children who were abused. The risk analysis of the 19 families suffered from incomplete data in the CPS records. Thus, the findings of the study should be considered a conservative estimate of the frequency of various risk factors. Finally, the analysis and profile of likely perpetrators could suffer from circular reasoning. For example, although in 14 of 15 cases the identified perpetrator was with the child at the time of symptom onset, it may be that the person who was with the child at the onset of symptoms was identified as the most likely perpetrator. Likewise, although there is a clear predominance of males identified in this and other studies (Starling et al., 1995; Jenny et al., 1999) such identification could be influenced by a biased perception that males are the most likely perpetrators.

Conclusion

If Maine, with a population of 1.2 million, averages 5 identified cases of AHT per year then it is likely that there are over a thousand cases of AHT medically identified and treated per year in the United States. The actual incidence of AHT could be far greater since is difficult to know how many cases of AHT are never medically evaluated or, if evaluated, are not correctly diagnosed.

The role of the medical provider in child abuse diagnosis and treatment includes suspicion for abuse (particularly for subtle signs and symptoms), identification of abuse when present with at least enough certainty to fulfill mandatory reporting requirements, completion of the appropriate medical-legal evaluation, documentation of all injuries, and reporting to child protective services and law enforcement. We found that many children with AHT have been seen by medical providers for signs and symptoms possibly related to abuse, yet, were not identified as possible abuse victims, that at least in these cases the medical workup and reporting at two tertiary care teaching hospitals was well done.

The role of the mandated child protective agency is to investigate child abuse reports, assess underlying risk factors, determine if child abuse has occurred, assess parental capacity and determine how best to protect children from abuse. Frequently and disturbingly, CPS in Maine had no forewarning that a particular child was at risk of AHT. Our study found that, in Maine, the initial assessment of safety was well done but that risk factor assessment was often incomplete. In response to these and other concerns, the Maine Department of Human Services had developed a specific risk assessment tool.

The role of law enforcement is to investigate a crime, identify a perpetrator, and present the case to the state's attorney for prosecution. An important role of law enforcement is to obtain the initial history for comparison with the medical forensic opinion of the case. Rarely did the hospital call law enforcement and despite protocols for law enforcement to be called by CPS in some cases such calls were delayed. Finally, our study suggests that law enforcement should look particularly closely at the individual with the child at symptom onset.

As a result of this study and other work by the Maine Child Death and Serious Injury Review Panel, Maine has enacted procedures for early multidisciplinary notification of law enforcement, child protective workers and forensic medical child abuse specialists; improved educational programs for medical providers emphasizing early identification of at risk children; improved child protective risk assessment tools and improved public community education programs, particularly targeting the male caretaker in the home both to educate caretakers about the dangers of shaking babies and to teach them ways to deal with the stress of managing a crying baby.

Practical Implications

Medical providers should think of abusive head trauma whenever an infant presents with irritability, vomiting, altered level of consciousness, increasing head circumference, or any bruises or fractures. If a spinal tap reveals blood, xanthochromia should be looked for as a possible sign of trauma. Both law enforcement and child protective services should be called by medical providers for any suspect serious physical abuse case. Child protective services should look closely at family risk factors but not be swayed by the absence of risk factors. Law enforcement should look closely but not exclusively at the individual alone with the child at the time of symptom onset.

References

Alexander, R., Crabbe, L., Sato, Y., Smith, W., & Bennett, T. (1990). Serial abuse in children who are shaken. *American Journal of Diseases of Children*, 144, 58-60.

Alexander, R., Sato, Y., Smith, W., & Bennett, T. (1990). Incidence of impact trauma with cranial injuries ascribed to shaking. *American Journal of Diseases of Children*, 144, 724-726.

American Academy of Pediatrics (1993). Shaken baby syndrome: inflicted cerebral trauma. *Pediatrics*, 92, 98-101.

Apolo, J.O. (1987). Bloody cerebrospinal fluid: Traumatic tap or child abuse? Pediatric Emergency Care, 3, 93-95.

Caffey, J. (1974). The whiplash shaken infants syndrome: manual shaking by the extremities with whiplash-induced intracranial and intraocular bleedings, linked with residual permanent brain damage and mental retardation. *Pediatrics*, 54, 396-403.

Christian, C.W. (1992). Etiology and prevention of abuse: family and individual factors. In S. Ludwig & A.E. Kornberg (Eds.), Child abuse: a medical reference, 2nd edition (pp. 39-47). New York: Churchill Livingstone.

Dashti, S.R., Decker, D.D., Razzaq, A., & Cohen, A.R. (1999). Current patterns of inflicted head injury in children. *Pediatric Neurosurgery*, 31, 302-306.

Duhaime, A.C., Alario, M.D., Lewander, M.D., Schut, L., Sutton, L.N., & Seidl, T.S. (1992). Head injuries in very young children: mechanisms, injury types, and ophthalmologic findings in 100 hospitalized patients younger than 2 years of age. *Pediatrics*, 90, 179-185.

Duhaime, A.C., Christian, C.W., Rorke, L.B., & Zimmerman, R.A. (1998). Nonaccidental head injury in infants: the "shaken baby syndrome" *New England Journal of Medicine*, 338, 1822-1829.

Duhaime, A.C., Gennarelli, T.A., Thibault, L.E., Bruce, D.A., Margulies, S.S., & Wiser, R. (1987). The shaken baby syndrome: a clinical, pathological, and biomechanical study. *Journal of Neurosurgery*, 66, 409-415.

Goldstein, B., Eguiguren, L., Feldman, Cox, C., & Todres, I.D. (1991). Early identification of child abuse and neglect in critically ill children. *Clinical Intensive Care*, 2, 266-269

Goldstein, B., Kelly, M.M., Bruton, D., & Cox, C. (1993). Inflicted versus accidental head injury in critically injured children. *Critical Care Medicine*, 21, 1328-1332.

Greenes, D.S., & Schutzman, S.A. (1998). Occult intracranial injury in infants. *Annals of Emergency Medicine*, 32, 680-686.

Jenny, C., Hymel, K.P., Ritzen, A., Reinert, S.E., & Hay, T.C. (1999). Analysis of Missed cases of abusive head trauma. *Journal of the American Medical Association*, 281, 621-626.

Lancon, J.A., Haines, D.E., & Parent, A.D. (1998). Anatomy of the shaken baby syndrome. *The New Anatomist*, 253, 13-18.

Lazoritz, S., & Baldwin, S. (1997). The whiplash shaken infant syndrome: has Caffey's syndrome changed or have we changed his syndrome? *Child Abuse & Neglect*, 21, 1009-1014.

Ludwig, S., & Warman, M. (1984) Shaken baby syndrome: a review of 20 cases. *Annals of Emergency Medicine*, 13, 104-107.

Morris, M.W., Smith, S., Cressman, J., & Ancheta, J. (2000). Evaluation of infants with subdural hematoma who lack external evidence of abuse. *Pediatrics*, 105, 549-553.

Nashelsky, M.B., & Dix, J.D. (1995). The time interval between lethal infant shaking and onset of symptoms. *American Journal of Forensic Medicine and Pathology*, 16, 154-157.

Reece, R.M., & Sege, R. (2000). Childhood head injuries: accidental or inflicted? Archives of Pediatric and Adolescent Medicine, 154, 11-15.

Starling, S.P., Holden, J.R., & Jenny, C. (1995) Abusive head trauma: the relationship of perpetrators to their victims. *Pediatrics*, 95, 260-262.

Starling, S.P., & Holden, J.R. (2000). Perpetrators of abusive head trauma: a comparison of two geographic populations. *Southern Medical Journal*, 93, 463-465.

Sugar, N.F., Taylor, J.A., & Feldman, K.W. (1999). Bruises in infants and toddlers: those who don't cruise rarely bruise. *Archives of Pediatric and Adolescent Medicine,* 153, 399-403.

MEMBERS OF THE PANEL

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Lawrence Ricci, M.D., *Chair of the Panel*
Spurwink Child Abuse Program

Douglas Jorgensen, D.O.
Manchester Osteopathic Healthcare

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Maine District Court

State Law Enforcement
Lt. Timothy Doyle
Maine State Police

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Criminal Division

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Department of Corrections

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Office of the District Attorney

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Department of Human Services

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Kennebec Valley Mental Health Center

Ann LeBlanc, Ph.D.
State Forensic Service

Staff Assistant to the Panel
Vickie Jacobs, LSW
Muskie Institute

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Changing Concepts of Sudden Infant Death Syndrome: Implications for Infant Sleeping Environment and Sleep Position

TASK FORCE ON INFANT POSITIONING AND SIDS, 1998-1999
John Kattwinkel MD, Chairperson
John G. Brooks MD
Maurice E. Keenan MD
Michael Malloy MD
CONSULTANTS
Marian Willinger[1]
N.J. Scheers PhD[2]

[1]National Institute of Child Health and Human Development
[2]US Consumer Product Safety Commission

ABSTRACT.

The American Academy of Pediatrics has recommended since 1992 that infants be placed to sleep on their backs to reduce the risk of sudden infant death syndrome (SIDS). Since that time, the frequency of prone sleeping has decreased from >70% to ~20% of US infants, and the SIDS rate has decreased by >40%. However, SIDS remains the highest cause of infant death beyond the neonatal period, and there are still several potentially modifiable risk factors. Although some of these factors have been known for many years (e.g., maternal smoking), the importance of other hazards, such as soft bedding and covered airways, has been demonstrated only recently. The present statement is intended to review the evidence about prone sleeping and other risk factors and to make recommendations about strategies that may be effective for further reducing the risk of SIDS. This statement is intended to consolidate and supplant previous statements made by this Task Force.

ABBREVIATION.

SIDS sudden infant death syndrome.

Sudden infant death syndrome (SIDS) is a disease of unknown cause. Despite recent decreases in the incidence of SIDS, SIDS is still responsible for more infant deaths in the United States than any other cause of death during infancy beyond the neonatal period.[1]

SIDS is defined as:
"The sudden death of an infant under 1 year of age, which remains unexplained after a thorough case investigation, including performance of a complete autopsy, examination of the death scene, and review of the clinical history."[2]

The occurrence of SIDS is rare during the first month of life, increases to a peak between 2 and 4 months old, and then declines. The following have been consistently identified across studies as independent risk factors for SIDS: prone sleep position, sleeping on a soft surface, maternal smoking during pregnancy, overheating, late or no prenatal care, young maternal age, prematurity and/or low birth weight, and male sex.[3-11] Blacks and American Indians have consistently higher rates, 2 to 3 times the national average. The risk factors with the greatest potential for modification include prone sleep position, sleeping on a soft surface, maternal smoking, and overheating. National campaigns aimed at reducing prone sleeping have resulted in a dramatic decrease in the incidence of SIDS in the United States (Fig 1) and numerous other countries.[12-17] A Back to Sleep campaign was initiated in the United States in 1994, as a joint effort of the US Public Health Service, the American Academy of Pediatrics, the SIDS Alliance, and the Association of SIDS and Infant Mortality Programs (800-505-CRIB). Despite the success of the current campaign, several modifiable risk factors remain that require increased attention. The purposes of this statement are to reemphasize the importance of infant positioning for sleep as an effective modifiable risk factor for SIDS, to focus increased attention on other modifiable environmental factors, to describe complications that may have arisen from modifying risk factors, and to make recommendations about other strategies that may be effective for further reducing the risk of SIDS.

Figure 1. SIDS rate in the United States (line) from National Center for Health Statistics (NCHS) data and prone-positioning rate from the National Institute for Child Heath and Human Development (NICHD) surveys (bars). The American Academy of Pediatrics (AAP) recommendation was made at the April 1992 Spring Meeting and was published in June 1992. The Back to Sleep campaign was begun in mid-1994.

MODIFIABLE RISK FACTORS

Prone Sleeping

Prone sleeping has been recognized as a major risk factor for SIDS, with odds ratios ranging from 1.7 to 12.9 in various well designed epidemiologic studies.[6,14,18-21] The plausibility of a causal association between prone sleep positioning and SIDS is made most compelling by the observation that in countries, including the United States, in

which campaigns to reduce the prevalence of prone sleeping have been successful, dramatic decreases in the SIDS rates have occurred. The association is further strengthened by observations that in cultures in which prone sleeping is rare, SIDS rates historically have been very low.[22,23] In addition, several studies have documented that the statistical relationship between prone positioning and SIDS often strengthens when corrections are made for confounding variables.[6,24,25]

The original 1992 sleeping position recommendation from the American Academy of Pediatrics identified any nonprone position (ie, side or supine) as being optimum for reducing SIDS risk.[26] Subsequent studies from England[11] and New Zealand[27] have shown that side sleeping has a slightly higher risk than the supine position, although the side-sleeping position still seems to be considerably safer than prone. The higher risk for SIDS among infants placed on their sides may relate to the relative instability of this position. Although infants placed on their sides usually roll to their backs, the risk of rolling to the prone position from the side is significantly greater than rolling to the prone position from the back.[11,12,28]

Strategies to decrease prone sleeping in the United States have included the following: 1) disseminating information to hospital nurseries and physicians, 2) targeting child care education programs, and 3) initiating public media campaigns. Although some countries have almost abolished prone sleeping,[15,29,30] ~20% of US infants continue to sleep prone at the highest risk age range for SIDS.[12] Of concern is that black infants are twice as likely to be placed prone as white infants. In addition, nearly 20% of caregivers apparently switch from placing infants in the nonprone to prone sleep position between 1 and 3 months old, the peak age range for SIDS.[31,32] Also, although parents may know of the recommendation, many other child caregivers, such as child care center workers, do not.[33] There is also some evidence that infants who are accustomed to sleeping supine are at particularly high risk for SIDS when they subsequently are placed in a prone position for sleep.[34-36]

Soft Sleep Surfaces and Loose Bedding

Polystyrene bead-filled pillows were among the first soft sleep surfaces identified as contributing to the deaths of young infants[37] and subsequently were removed from the market following action by the US Consumer Product Safety Commission. Additional epidemiologic studies identified other soft surfaces, such as pillows, quilts, comforters, sheepskins, and porous mattresses, as a significant risk factor, particularly when placed under the sleeping infant.[6,25,38-42] Several reports described that in a significant number of SIDS cases, the heads of the infants, including some infants who slept supine, were covered by loose bedding. Many of these studies found loose bedding to be an epidemiologic risk factor for SIDS.[11,30,36,38,40,43,44]

Overheating

There is some evidence that the risk of SIDS is associated with the amount of clothing or blankets on an infant, the room temperature, and the season of the year.[6,45-48] The increased risk associated with overheating is particularly evident when infants sleep

prone[6] but is less clear when they sleep supine. It is unclear whether the relationship to clothing and climate is an independent factor or merely a reflection of the use of more clothing, quilts, and other potentially asphyxiating objects in the sleeping environment during cold weather. The SIDS statistics always have shown a distinct seasonality, with higher rates recorded during winter months. It may be that the seasonality reflects increased infections, which also are known to be more frequent during cold weather. A significant decrease has been observed in the seasonal association of SIDS as prone sleeping has decreased and SIDS rates have decreased, thus suggesting an interaction among environmental factors.

Smoking

Maternal smoking during pregnancy has emerged as a major risk factor in almost every epidemiologic study of SIDS.[9,10,49,50] No intervention studies have documented a decrease in SIDS associated with a decrease in maternal smoking, although changing such behavior has been far more difficult to accomplish than changing infant sleep position. Smoke in the infant's environment after birth has emerged as a separate risk factor in a few studies,[10,51] although separating this variable from maternal smoking before birth is problematic.

Bed Sharing

There are some reports of infants being suffocated by overlying by an adult, particularly when the adult is in an unnaturally depressed state of consciousness, such as from alcohol or mind-altering drugs. Co-sleeping on sofas has emerged as a major risk factor in 1 study (Peter J. Fleming, Department for Child Health, Bristol, UK, unpublished data presented at a meeting convened by US Consumer Product Safety Commission, Bethesda, MD, December 9, 1998). Others[52] have shown bed sharing with multiple family members in an adult bed to be particularly hazardous for the infant. Although overlying may be the mechanism in some of these cases, soft sleep surfaces, entrapment, and the likelihood of rolling to the prone position in such circumstances also may have a role. The risk of SIDS associated with co-sleeping is significantly greater among smokers.[11,53-55] Some behavioral studies have demonstrated that infants have more arousals and less slow-wave sleep during bed sharing,[56,57] but no epidemiologic evidence exists that bed sharing is protective against SIDS.

Preterm Birth and Low Birth Weight

Infants born before term or who are low birth weight are at increased risk for SIDS, and risk increases with decreasing gestational age or birth weight.[4,5] The increased risk cannot be explained by a greater likelihood of apnea of prematurity among preterm SIDS victims while they are in the hospital after birth.[4] It is unclear whether other complications of prematurity, such as bronchopulmonary dysplasia that has been associated with SIDS, can explain a significant amount of the increased risk associated with prematurity.[58] There are no data suggesting that strategies designed to reduce risk in full-term infants should not also be applied to premature infants. The relationship to

prone sleeping, for example, has been shown to hold for infants of low birth weight as well as for those born with a normal birth weight at term.[24]

Factors Thought to Protect Against SIDS

Although several retrospective studies have demonstrated a protective effect of breastfeeding on SIDS,[3,59] other analyses and prospective cohort studies failed to find such an effect after adjustment for confounding variables.[60-64] Although breastfeeding is beneficial and should be promoted for many reasons, the Task Force believes that evidence is insufficient to recommend breastfeeding as a strategy to reduce SIDS.

Four recent studies have reported a substantially lower SIDS incidence among infants who used pacifiers than among infants who do not.[11,36,65,66] Although this association has been strong and consistent, it does not prove that pacifier use prevents SIDS. Mechanisms by which pacifiers might protect against SIDS have been proposed, such as stinting of the upper airway, but data are lacking to demonstrate that any of them are relevant to SIDS. Conversely, other studies have demonstrated that pacifier use can be linked to a shortened duration of breastfeeding, increased susceptibility to otitis media, and increased dental malocclusion. The Task Force believes that additional outcome studies are required before a specific recommendation about pacifiers can be made.

OTHER CAUSES OF INFANT DEATH SOMETIMES MISTAKEN FOR SIDS

SIDS Among Siblings

Several studies that have evaluated SIDS among siblings have found that having a sibling who died of SIDS is a significant risk factor.[4] However, others have failed to find such a relationship[67] or have shown that siblings of infants who have died of SIDS are at risk for all causes of infant death, not just SIDS.[68,69] In addition, most of the studies reporting familial SIDS have the limitation of having been conducted during a period when case and scene investigations were not routine and assignment of the SIDS diagnosis may have been flawed. Thus, the true risk is unknown.

Infanticide

The large majority of SIDS cases have no evidence of parental psychiatric disease or neglect of the infant. However, recent publications have documented that a few mothers of infants with a history of acute life-threatening events have been observed trying to harm their infants,[70,71] and several cases previously thought to be multiple cases of SIDS within a family[72] actually were cases of multiple homicide.[73] As the number of cases of true SIDS has decreased in recent years, the proportion of cases attributable to infanticide may be increasing.[74] Estimates of the incidence of infanticide among cases designated as SIDS have ranged from <1% to as much as 10%.[71,75-78] A thorough investigation of the case and scene is critical in every case because it improves the chances for an accurate diagnosis.[79] When 2 infants in the same family reportedly have died of SIDS, immediate concern should be raised about the cause of the deaths.

Cardiac Arrhythmias

A recent publication reported that a significant number of SIDS cases in Italy had prolongation of the QT interval on a screening electrocardiogram, which may have led to a fatal cardiac arrhythmia.[80] However, questions about the study methods have been raised,[81-88] and it is unlikely that this abnormality will explain more than a small minority of SIDS cases. Despite a call to the contrary,[89] there seems to be little justification for a widespread program of electrocardiographic screening to identify potential SIDS victims.

COMPLICATIONS OF NONPRONE SLEEPING

When the Academy first suggested that infants be placed for sleep in a nonprone position,[25] concerns were expressed that undesirable complications would ensue. Aspiration pneumonia, gastroesophageal reflux, plagiocephaly, and developmental delay were some of the feared complications.[90] Conversely, there is some direct and indirect evidence that infants who vomit are at greater risk of choking if they are sleeping face down.[91,92] There is no evidence of an increase in aspiration or increased complaints of vomiting since the incidence of supine sleeping has increased dramatically.[91] Although gastroesophageal reflux has been reported to occur less frequently in the prone position,[93-95] there has been no increase in infant deaths attributable to aspiration in the United Kingdom with the change from prone to supine sleeping for infants.[96] Several reports have suggested an increase of occipital plagiocephaly since prone sleeping has become more frequent,[97,98] and there has been concern that this increase has led to an increase in unnecessary operations for craniosynostosis, perhaps secondary to a misdiagnosis of plagiocephaly as craniosynostosis (American Academy of Pediatrics, Committee on Practice and Ambulatory Medicine, Section on Plastic Surgery, and Provisional Section on Neurosurgery, Positional skull deformities, Statement in preparation). Several studies have evaluated the relationship of developmental milestones and sleep position. Attainment of gross motor milestones seems to occur slightly later in infants who sleep supine than in infants who sleep prone; however, a difference is no longer detectable by 18 months old.[99,100] There is some concern that caregivers may not be allowing infants to lie prone even while awake. Prone positioning when awake and observed (tummy time) is recommended for development of upper shoulder girdle strength and avoidance of occipital plagiocephaly. These reminders should become a part of routine office anticipatory guidance.

PROPOSED MECHANISMS OF SIDS

It is generally accepted that SIDS may be a reflection of a variety of causes of death. A leading hypothesis for a large proportion of SIDS cases is that SIDS may reflect a delayed development of arousal or cardiorespiratory control. Examinations of the brainstems of infants who died with a diagnosis of SIDS have revealed hypoplasia or decreased neurotransmitter binding of the arcuate nucleus, a region thought to be

involved with the hypercapnic ventilatory response, chemosensitivity, and blood pressure responses.[101,102] The hypothesis is that certain infants, for reasons yet to be determined, may have a maldevelopment or delay in maturation of this region, which would affect its function and connectivity to regions regulating arousal. When the physiologic stability of such infants becomes compromised during sleep, they may not arouse sufficiently to avoid the fatal noxious insult or condition. One theory proposes that rebreathing and associated hypoxia and hypercarbia provide the noxious stimulus, while another proposes hyperthermia, perhaps in combination with asphyxia, as the stimulus. The argument has been made that prone sleep position on soft sleeping surfaces and covering of the head increase the likelihood of rebreathing, hyperthermia, or both.[6,15,30,37,42,45,103-105] Numerous animal and some human models have been developed to test these hypotheses.[8,6,27,102,106-110] In addition, protective responses to other life-threatening stimuli have been compared in the prone and supine position. The rate of swallowing to clear the airway of stimuli to the laryngeal chemoreflex (a reflex that leads to apnea and bradycardia) is diminished in the prone position.[111] Arousal responses to the laryngeal chemoreflex and the baroreceptor reflex are also diminished in active sleep in the prone position.[111,112]

RECOMMENDATIONS

During the past decade, a variety of strategies have been developed that reduce the risk of SIDS. The following list includes a modification and expansion of the recommendations made by this Task Force since 1992. It should be emphasized that the recommendations are intended for sleeping infants and primarily for well infants. Individual medical conditions may warrant a physician to recommend otherwise, after weighing the relative risks and benefits.

1. Infants should be placed for sleep in a nonprone position. Supine (wholly on the back) confers the lowest risk and is preferred. However, while side sleeping is not as safe as supine, it also has a significantly lower risk than prone. If the side position is used, caretakers should be advised to bring the dependent arm forward to lessen the likelihood of the infant rolling to the prone position.

2. A crib that conforms to the safety standards of the Consumer Product Safety Commission and the ASTM (formerly the American Society for Testing and Materials) is a desirable sleeping environment for infants. (Although many cradles and bassinets also may provide safe sleeping enclosures, safety standards have not been established for these items.) Sleep surfaces designed for adults often are not free of the aforementioned hazards and may have the additional risk of entrapment between the mattress and the structure of the bed (eg, the headboard, footboard, side rails, and frame), the wall, or adjacent furniture, as well as between railings in the headboard or footboard.[113]

3. Infants should not be put to sleep on waterbeds, sofas, soft mattresses, or other soft surfaces.

4. Avoid soft materials in the infant's sleeping environment.
   - Soft materials or objects, such as pillows, quilts, comforters, or sheepskins, should not be placed under a sleeping infant.
   - Soft objects, such as pillows, quilts, comforters, sheepskins, stuffed toys, and other gas-trapping objects should be kept out of an infant's sleeping environment. Also, loose bedding, such as blankets and sheets, may be hazardous. If blankets are to be used, they should be tucked in around the crib mattress so the infant's face is less likely to become covered by bedding. One strategy is to make up the bedding so that the infant's feet are able to reach the foot of the crib (feet to foot), with the blankets tucked in around the crib mattress and reaching only the level of the infant's chest. Another strategy is to use sleep clothing with no other covering over the infant.

5. Bed sharing or cosleeping may be hazardous under certain conditions.[54,113-115]
   - As an alternative to bed sharing, parents might consider placing the infant's crib near their bed to allow for more convenient breastfeeding and parent contact.
   - If a mother chooses to have her infant sleep in her bed to breastfeed, care should be taken to observe the aforementioned recommendations (nonprone sleep position, avoidance of soft surfaces or loose covers, and avoidance of entrapment by moving the bed away from the wall and other furniture and avoiding beds that present entrapment possibilities).
   - Adults (other than the parents), children, or other siblings should avoid bed sharing with an infant.*
   - Parents who choose to bed share with their infant* should not smoke or use substances, such as alcohol or drugs, that may impair arousal.

6. Overheating should be avoided. The infant should be lightly clothed for sleep, and the bedroom temperature should be kept comfortable for a lightly clothed adult.[11] Overbundling should be avoided, and the infant should not feel hot to the touch.
7. A certain amount of tummy time while the infant is awake and observed is recommended for developmental reasons and to help prevent flat spots on the occiput. Positional plagiocephaly also can be avoided by altering the supine head position during sleep. Techniques for accomplishing this include placing the infant to sleep with the head to 1 side for a week or so and then changing to the other and periodically changing the orientation of the infant to outside activity (eg, the door of the room).
8. Although various devices have been developed to maintain sleep position or to reduce the risk of rebreathing, such devices are not recommended, because none have been tested sufficiently to show efficacy or safety.[117]

9. Electronic respiratory and cardiac monitors are available to detect cardiorespiratory arrest and may be of value for home monitoring of selected infants who are deemed to have extreme cardiorespiratory instability. However, there is no evidence that home monitoring with such monitors decreases the incidence of SIDS. Furthermore, there is no evidence that infants at increased risk of SIDS can be identified by in-hospital respiratory or cardiac monitoring.[118] There are no new data that would lead to a change in the recommendations made in the 1985 statement of the American Academy of Pediatrics on prolonged infantile apnea or the 1986 National Institutes of Health consensus statement on the value of home monitors.[119,120]
10. There is concern that the annual rate of SIDS, which has been decreasing steadily since 1992, now appears to be leveling off, as has the percentage of infants sleeping prone (Fig 1). The national campaign for reducing prone sleeping (Back to Sleep) should continue and be expanded to emphasize the safe characteristics of the sleeping environment, including safe bedding practices, and focus on the portion of the population that continues to place their infants prone. Other potentially modifiable risk factors, such as avoidance of maternal smoking, overheating, and certain forms of bed sharing, should be included as important secondary messages.

REFERENCES

1. Guyer B, MacDorman MF, Martin JA, Peters KD, Strobino DM. Annual summary of vital statistics 1997. *Pediatrics*. 1998;102:1333-1349
2. Willinger M, James LS, Catz C. Defining the sudden infant death syndrome (SIDS): deliberations of an expert panel convened by the National Institute of Child Health and Human Development. *Pediatr Pathol*. 1991;11:677-684
3. Hoffman HJ, Damus K, Hillman L, Krongrad E. Risk factors for SIDS: results of the National Institute of Child Health and Human Development SIDS Cooperative Epidemiological Study. *Ann N Y Acad Sci*. 1988;533:13-30
4. Hoffman HJ, Hillman LS. Epidemiology of the sudden infant death syndrome: maternal, neonatal, and postneonatal risk factors. *Clin Perinatol*. 1992;19:717-737
5. Malloy MH, Hoffman HJ. Prematurity, sudden infant death syndrome, and age of death. *Pediatrics*. 1995;96:464-471
6. Ponsonby AL, Dwyer T, Gibbons LE, Cochrane JA, Wang Y-G. Factors potentiating the risk of sudden infant death syndrome associated with prone position. *N Engl J Med*. 1993;329:377-382
7. Kemp JS, Nelson VE, Thach BT. Physical properties of bedding that may increase risk of sudden infant death syndrome in prone-sleeping infants. *Pediatr Res*. 1994;36:7-11
8. Chiodini BA, Thach BT. Impaired ventilation in infants sleeping face down: potential significance for sudden infant death syndrome. *J Pediatr*. 1993;123:686-692
9. MacDorman MF, Cnattingius S, Hoffman HJ, Kramer MS, Haglund B. Sudden infant death syndrome and smoking in the United States and Sweden. *Am J Epidemiol*. 1997;146:249-257
10. Schoendorf KC, Kiely JL. Relationship of sudden infant death syndrome to maternal smoking during and after pregnancy. *Pediatrics*. 1992;90:905-908
11. Fleming PJ, Blair PS, Bacon C, et al. Environment of infants during sleep and risk of the sudden infant death syndrome: results of 1993-5 case-control study for confidential inquiry into stillbirths and deaths in infancy. *Br Med J*. 1996;313:191-195

12. Willinger M, Hoffman HJ, Wu K-T, et al. Factors associated with the transition to nonprone sleep positions of infants in the United States: the National Infant Sleep Position Study. *JAMA*. 1998;280:329-335
13. Mitchell EA, Grunt JM, Evard C. Reduction in mortality from sudden infant death syndrome in New Zealand. *Arch Dis Child*. 1994;70:291-294
14. Platt MJ, Pharoah POD. Child health statistical review, 1996. *Arch Dis Child*. 1996;75:527-533
15. Dwyer T, Ponsonby A-L, Blizzard L, Newman NM, Cochane JA. The contribution of changes in prevalence of prone sleeping position to the decline in sudden infant death syndrome in Tasmania. *JAMA*. 1995;273:783-789
16. Wennergren G, Alm B, Oyen N, et al. Irgens LM, on behalf of the Nordic Epidemiological SIDS Study: the decline in the incidence of SIDS in Scandinavia and its relation to risk-intervention campaigns. *Acta Paediatr*. 1997;86:963-968
17. Hoyert DL, Kochanek KD, Murphy SL. *Deaths: Final Data for 1997. National Vital Statistics Report, XLVII*. No 10. Hyattsville, MD: National Center for Health Statistics; 1999
18. Dwyer T, Ponsonby A-L, Newman NM, Gibbons LE. Prospective cohort study of prone sleeping position and sudden infant death syndrome. *Lancet*. 1991;337:1244-1247
19. Mitchell EA, Scragg RK, Stewart AW, et al. Results from the first year of the New Zealand cot death study. *N Z Med J*. 1991;104:71-76
20. Irgens LM, Markestad T, Baste V, Schreuder P, Skjaerven R, Oyen N. Sleeping position and sudden infant death syndrome in Norway 1967-91. *Arch Dis Child*. 1995;72:478-482
21. Taylor JA, Drieger JW, Reay DT, et al. Prone sleep position and the sudden infant death syndrome in King County Washington: a case-control study. *J Pediatr*. 1996;128:626-630
22. Davies DP. Cot death in Hong Kong: a rare problem? *Lancet*. 1985;2:1346-1348
23. Lee NN, Chan YF, Davies DP, Lau E, Yip DC. Sudden infant death syndrome in Hong Kong: confirmation of low incidence. *Br Med J*. 1989;298:721
24. Oyen N, Markestad T, Skjaerven R, et al. Combined effects of sleeping position and prenatal risk factors in sudden infant death syndrome: the Nordic epidemiological SIDS study. *Pediatrics*. 1997;100:613-621
25. Mitchell EA, Thompson JMD, Ford RPK, et al. Sheepskin bedding and the sudden infant death syndrome. *J Pediatr*. 1998;133:701-704
26. Kattwinkel J, Brooks J, Myerberg D. Positioning and SIDS. AAP Task Force on Infant Positioning and SIDS. *Pediatrics*. 1992;89:1120-1126
27. Mitchell EA, Scragg RK. Observations on ethnic differences in SIDS mortality in New Zealand. *Early Hum Dev*. 1994;38:151-157
28. Waters KA, Gonzalez A, Jean C, Morielli A, Brouillette RT. Face-straight-down and face-near-straight-down positions in healthy, prone-sleeping infants. *J Pediatr*. 1996;128:616-625
29. Her Majesty's Stationery Office. *Report of the Chief Medical Officer's Expert Group on the Sleeping Position Cot Death*. London, UK: Her Majesty's Stationery Office; 1993
30. Markestad T, Skadberg B, Hordvik E, Morild I, Igrens L. Sleeping position and sudden infant death syndrome (SIDS): effect of an intervention programme to avoid prone sleeping. *Acta Paediatr*. 1995;84:375-378
31. Lesko SM, Corwin MJ, Vezina RM, et al. Changes in sleep position during infancy: a prospective longitudinal assessment. *JAMA*. 1998;280:336-340
32. Brenner RA, Simons-Morton BG, Bhaskar B, et al. Prevalence and predictors of the prone sleep position among inner-city infants. *JAMA*. 1998;280:341-346
33. Gershon NB, Moon RY. Infant sleep position in licensed child care centers. *Pediatrics*. 1997;100:75-78
34. Mitchell EA, Thach BT, Thompson JMD, Williams S. Changing infant's sleep position increases risk of sudden infant death syndrome. *Arch Pediatr Adolesc Med*. 1999;153:1136-1141
35. Skadberg BT, Morild I, Markestad T. Abandoning prone sleeping: effect on the risk of sudden infant death syndrome. *J Pediatr*. 1998;132:197-198
36. L'Hoir MP, Engleberts AC, van Well GTJ, et al. Risk and preventive factors for cot death in the Netherlands, a low incidence country. *Eur J Pediatr*. 1998;157:681-688

37. Kemp JS, Thach BT. Sudden death in infants sleeping on polystyrene-filled cushions. *N Engl J Med*. 1991;324:1858-1864
38. Ponsonby A-L, Dwyer T, Couper D, Cochrane J. Association between use of a quilt and sudden infant death syndrome: case-control study. *Br Med J*. 1998;316:195-196
39. Scheers NJ, Dayton CM, Kemp JS. Sudden infant death with external airways covered. *Arch Pediatr Adolesc Med*. 1998;152:540-547
40. Brooke H, Gibson A, Tappin D, Brown H. Case-control study of sudden infant death syndrome in Scotland, 1992-5. *Br Med J*. 1997;314:1516-1520
41. Mitchell EA, Scragg L, Clements M. Soft cot mattresses and the sudden infant death syndrome. *N Z Med J*. 1996;109:206-207
42. Kemp JS, Kowlaski RM, Burch PM, Graham MA, Thach BT. Unintentional suffocation by rebreathing: a death scene and physiological investigation of a possible cause of sudden infant death. *J Pediatr*. 1993;122:874-880
43. Wilson CA, Taylor BJ, Laing RM, Williams SM, Mitchell EA, New Zealand Cot Death Study Group. Clothing and bedding and its relevance to sudden infant death syndrome: further results from the New Zealand Cot Death Study. *J Paediatr Child Health*. 1994;30:506-512
44. Beal SM, Byard RW. Accidental death or sudden infant death syndrome? *J Paediatr Child Health*. 1995;31:269-271
45. Fleming PJ, Gilbert R, Azaz Y, et al. Interaction between bedding and sleeping position in the sudden infant death syndrome: a population based case-control study. *Br Med J*. 1990;301:85-89
46. Gilbert R, Rudd P, Berry PJ, et al. Combined effect of infection and heavy wrapping on the risk of sudden unexpected infant death. *Arch Dis Child*. 1992;67:171-177
47. Ponsonby A-L, Dwyer T, Gibbons L, Cochrane JA, Jones ME, McCall MJ. Thermal environment and SIDS: case-control study. *Br Med J*. 1992;304:277-282
48. Williams SM, Taylor BJ, Mitchell EA. Sudden infant death syndrome: insulation from bedding and clothing and its effect modifiers. *Int J Epidemiol*. 1996;25:366-375
49. Malloy MH, Kleinman JC, Land GH, Schramm WF. The association of maternal smoking with age and cause of infant death. *Am J Epidemiol*. 1988;128:45-55
50. Haglund B, Cnattingius S. Cigarette smoking as a risk factor for sudden infant death syndrome: a population-based study. *Am J Public Health*. 1990;80:29-32
51. Mitchell EA, Ford RPK, Stewart AW, et al. Smoking and the sudden infant death syndrome. *Pediatrics*. 1993;91:893-896
52. Hauck FR, Kemp JS. Bedsharing promotes breastfeeding and AAP Task Force on Infant Positioning and SIDS. *Pediatrics*. 1998;102:662-663. Letter
53. Kloneff-Cohen H, Edelstein S. Bed sharing and the sudden infant death syndrome. *Br Med J*. 1995;311:1269-1272
54. Scragg RK, Mitchell EA, Taylor BJ, et al. Bed sharing, smoking, and alcohol in the sudden infant death syndrome. *Br Med J*. 1993;307:1312-1318
55. Scragg RK, Mitchell EA. Side sleeping position and bed sharing in the sudden infant death syndrome. *Ann Med*. 1998;30:345-349
56. Mosko S, McKenna J, Dickel M, Hunt L. Parent-infant co-sleeping: the appropriate context for the study of infant sleep and implications for the sudden infant death syndrome (SIDS) research. *J Behav Med*. 1993;16:589-610
57. Mosko S, Richard C, McKenna J, Drummond S. Infant sleep architecture during bedsharing and possible implications for SIDS. *Sleep*. 1996;19:677-684
58. Gray PH, Rogers Y. Are infants with bronchopulmonary dysplasia at risk for SIDS? *Pediatrics*. 1994;93:774-777
59. Ford RP, Taylor BJ, Mitchell EA, et al. Breastfeeding and the risk of sudden infant death syndrome. *Int J Epidemiol*. 1993;22:366-375
60. Kraus JF, Greenland S, Bulterys M. Risk factors for sudden infant death syndrome in the US collaborative perinatal project. *Int J Epidemiol*. 1989;18:113-120

61. Ponsonby A-L, Dwyer T, Kasi SV, Cochrane JA. The Tasmanian SIDS case-control study: univariable and multivariable risk factor analysis. *Paediatr Perinat Epidemiol*. 1995;9:256-272
62. Gilbert RE, Wigfield RE, Fleming PJ, Berry PG, Rudd PT. Bottle feeding and the sudden infant death syndrome. *Br Med J*. 1995;310:88-90
63. Henderson-Smart DJ, Ponsonby A-L, Murphy E. Reducing the risk of sudden infant death syndrome: a review of the scientific literature. *J Paediatr Child Health*. 1998;34:213-219
64. Mitchell EA, Tuohy PG, Brun JM, et al. Risk factors for sudden infant death syndrome following the prevention campaign in New Zealand: a prospective study. *Pediatrics*. 1997;100:835-840
65. Arnestad M, Andersen M, Rognum TO. Is the use of a dummy or carry-cot of importance for sudden infant death? *Eur J Pediatr*. 1997;156:968-970
66. Mitchell EA, Taylor BJ, Ford RPK, et al. Dummies and the sudden infant death syndrome. *Arch Dis Child*. 1993;68:501-504
67. Irgens LM, Skjaerven R, Peterson DR. Prospective assessment of recurrence risk in sudden infant death syndrome siblings. *J Pediatr*. 1984;104:349-351
68. Peterson DR, Sabotta EE, Daling JR. Infant mortality among subsequent siblings of infants who died of sudden infant death syndrome. *J Pediatr*. 1986;108:911-914
69. Guntheroth WG, Lohmann R, Spiers PS. Risk of sudden infant death syndrome in subsequent siblings. *J Pediatr*. 1990;116:520-524
70. Rosen CL, Frost JD, Bricker T, et al. Two siblings with recurrent cardiorespiratory arrest: Munchausen syndrome by proxy or child abuse? *Pediatrics*. 1983;71:715-720
71. Southall DP, Plunkett MCB, Banks MW, Falkov A, Samuels MP. Covert video recordings of life-threatening child abuse: lessons for child protection. *Pediatrics*. 1997;100:735-760
72. Steinschneider A. Prolonged apnea and the sudden infant death syndrome: clinical and laboratory observations. *Pediatrics*. 1972;50:646-654
73. Firstman R, Talan J. *The Death of Innocents: A True Story of Murder, Medicine, and High-stakes Science*. New York, NY: Bantam; 1997
74. Meadow R. Unnatural sudden infant death. *Arch Dis Child*. 1999;80:7-14
75. Reece RM. Fatal child abuse and sudden infant death syndrome: a critical diagnostic decision. *Pediatrics*. 1993;91:423-429
76. Bass M, Kravath RE, Glass L. Death-scene investigation in sudden infant death. *N Engl J Med*. 1986;315:100-105
77. American Academy of Pediatrics, Committee on Child Abuse and Neglect. Distinguishing sudden infant death syndrome from child abuse fatalities. *Pediatrics*. 1994;94:124-126
78. Kukull WA, Peterson DR. Sudden infant death and infanticide. *Am J Epidemiol*. 1977;106:485-486
79. Centers for Disease Control and Prevention. Guidelines for death scene investigation of sudden, unexplained infant deaths: recommendations of the Interagency Panel on Sudden Infant Death Syndrome. *Morb Mortal Wkly Rep CDC Surveill Summ*. 1996;45:1-22
80. Schwartz PJ, Stramba-Badiale M, Segantini A, et al. Prolongation of the QT interval and the sudden infant death syndrome. *N Engl J Med*. 1998;338:1709-1714
81. Lucey JF. Comments on a sudden infant death article in another journal. *Pediatrics*. 1999;103:812
82. Martin RJ, Miller MJ, Redline S. Screen for SIDS: a neonatal perspective. *Pediatrics*. 1999;103:812
83. Guntheroth WG, Spiers PS. Prolongation of the QT interval and the sudden infant death syndrome. *Pediatrics*. 1999;103:813
84. Hodgman J, Siassi B. Prolonged QTc as a risk factor for SIDS. *Pediatrics*. 1999;103:814
85. Hoffman JIE, Lister G. The potential relationship between prolonged QT interval and sudden infant death syndrome. *Pediatrics*. 1999;103:815
86. Tonkin SL, Clarkson PM. A view from New Zealand: comments on the prolonged QT theory of SIDS causation. *Pediatrics*. 1999;103:818
87. Shannon DC. Method of analyzing QT interval can't support conclusions. *Pediatrics*. 1999;103:819
88. Southall DP. Examine data in Schwartz article with extreme care. *Pediatrics*. 1999;103:819
89. Towbin JA, Friedman RA. Prolongation of the QT interval and the sudden infant death syndrome. *N Engl J Med*. 1998;338:1760-1761

90. Orenstein SR, Mitchell AA, Ward SD. Concerning the American Academy of Pediatrics recommendation on sleep position for infants. *Pediatrics*. 1993;91:497-499. Commentary
91. Hunt L, Fleming P, Golding J, the ALSPAC Study Team. Does the supine sleeping position have any adverse effects on the child? I. Health in the first 6 months. *Pediatrics*. 1997;100(1). URL: http://www.pediatrics.org/cgi/content/full/100/1/e11
92. Pickens DL, Schefft GL, Thach BT. Pharyngeal fluid clearance and aspiration preventative mechanisms in sleeping infants. *J Appl Physiol*. 1989;66:1164-1171
93. Orenstein SR, Whitington PF. Positioning for prevention of gastroesophageal reflux. *J* Pediatr. 1983;103:534-537
94. Meyers WF, Herbst JJ. Effectiveness of positioning therapy for gastroesophageal reflux. *Pediatrics*. 1982;69:768-772
95. Vandenplas Y, Sacre-Smits L. Seventeen-hour continuous esophageal pH monitoring in the newborn: evaluation of the influence of position in asymptomatic and symptomatic babies. *J Pediatr Gastroenterol Nutr*. 1985;4:356-361
96. Fleming PJ. Understanding and preventing sudden infant death syndrome. *Curr Opin Pediatr*. 1994;6:158-162
97. Turk AE, McCarthy JG, Thorne CH, et al. The "Back to Sleep Campaign" and deformational plagiocephaly: is there cause for concern? *J Craniofac Surg*. 1996;7:12-18
98. Argenta LC, David LR, Wilson JA. An increase in infant cranial deformity with supine sleeping position. *J Craniofac Surg*. 1996;7:5-11
99. Dewey C, Fleming P, Golding J, the ALSPAC Study Team. Does the supine sleeping position have any adverse effects on the child? II. Development in the first 18 months. *Pediatrics*. 1998;101(1). URL: http://www.pediatrics.org/cgi/content/full/101/1/e5
100. Davis BE, Moon RY, Sachs HC, Ottolini MC. Effects of sleep position on infant motor development. *Pediatrics*. 1998;102:1135-1140
101. Kinney HC, Filiano JJ, Sleeper LA, Mandell F, Valdes-Dapena M, White WF. Decreased muscarinic receptor binding in the arcuate nucleus in sudden infant death syndrome. *Science*. 1995;269:1446-1450
102. Panigrahy A, Filiano JJ, Sleeper LA, et al. Decreased kainate binding in the arcuate nucleus of the sudden infant death syndrome. *J Neuropathol Exp Neurol*. 1997;56:1253-1261
103. Skadberg BT, Markestad T. Consequences of getting the head covered during sleep in infancy. *Pediatrics*. 1997;100(2). URL: http://www.pediatrics.org/cgi/content/full/100/2/e6
104. Skadberg BT, Oterhals X, Finborud K, Markestad T. CO_2 rebreathing: a possible contributory factor to some cases of sudden infant death? *Acta Paediatr*. 1995;84:988-995
105. Nelson EAS, Taylor BJ, Weatherall IL. Sleeping position and infant bedding may predispose to hyperthermia and the sudden infant death syndrome. *Lancet*. 1989;1:199-201
106. Campbell AJ, Taylor BJ, Bolton DPG. Comparison of 2 methods of determining asphyxial potential of infant bedding. *J Pediatr*. 1997;130:245-249
107. Lijowska AS, Reed NW, Chiodini BAM, Thach BT. Sequential arousal and airway-defensive behavior of infants in asphyxial sleep environments. *Am J Respir Crit Care Med*. 1995;151:A151. Abstract
108. Kemp JS, Thach BT. Quantifying the potential of infant bedding to limit CO_2 dispersal and factors affecting rebreathing in bedding. *J Appl Physiol*. 1995;78:740-745
109. Galland BC. The micro-environment of the sleeping newborn piglet covered by bed clothes: gas exchange and temperature. *J Paediatr Child Health*. 1994;30:144-150
110. Kemp JS, Thach BT. A sleep position-dependent mechanism for infant death on sheepskins. *Am J Dis Child*. 1993;147:642-646
111. Jeffrey HE, Megevand A, Page M. Why the prone position is a risk factor for sudden infant death syndrome. *Pediatrics*. 1999;104:263-269
112. Galland BC, Reeves G, Taylor BJ, Bolton DP. Sleep position, autonomic function, and arousal. *Arch Dis Child Fetal Neonatal Ed*. 1998;78:F189–F194
113. Nakamura S, Wind M, Danello MA. Review of hazards associated with children placed in adult beds. *Arch Pediatr Adolesc Med*. 1999;153:1019-1023

114. American Academy of Pediatrics, Task Force on Infant Positioning and SIDS. Does bed sharing affect the risk of SIDS? *Pediatrics*. 1997;100:272
115. Byard RW. Is breast feeding in bed always a safe practice? *J Paediatr Child Health*. 1998;34:418-419
116. Drago DA, Dannenberg AL. Infant mechanical suffocation deaths in the United States. *Pediatrics*. 1999;103(5). URL: http://www.pediatrics.org/cgi/content/full/103/5/e59
117. Carolan PL, Kemp JS, Wheeler WB. Effect of CO_2 dispersal rate of commercial products marketed to reduce sudden infant death syndrome risk. *Pediatr Res*. In press
118. Malloy MH, Hoffman H. Home apnea monitoring and sudden infant death syndrome. *Prev Med*. 1996;25:645-649
119. American Academy of Pediatrics, Task Force on Prolonged Infantile Apnea. *Pediatrics*. 1985;76:129-131
120. National Institutes of Health Consensus Development, Conference on Infantile Apnea and Home Monitoring. Consensus statement. *Pediatrics*. 1987;79:292-299

The recommendations in this statement do not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate. *It should be noted that the US Consumer Product Safety Commission is on record as opposing bed sharing by an infant and an adult, particularly if there is more than 1 adult in the bed. Many cases of infant suffocation have been reported during bed sharing. However, it is recognized that a significant portion of the population practices bed sharing between mother and infant as a strategy to facilitate breastfeeding and that the presence of the father in the bed will be common. It is the consensus of the Task Force that there are insufficient data to conclude that bed sharing under carefully controlled conditions is clearly hazardous or clearly safe.

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CHALLENGING CASE: FAMILY RELATIONSHIPS AND ISSUES

Cosleeping (Bedsharing) Among Infants and Toddlers*

Martin T. Stein[1] MD
Calvin A. Colarusso[2] MD
James J. McKenna[3] PhD
Nancy G. Powers[4] MD

[1] Professor of Pediatrics, Division of Primary Care Pediatrics and Adolescent Medicine, University of California, San Diego, San Diego, California
[2] Clinical Professor of Psychiatry, University of California, San Diego, San Diego, California
[3] Professor of Anthropology, Director, Center for Behavioral Studies of Mother-Infant Sleep University of Notre Dame, South Bend, Indiana
[4] Clinical Associate Professor, Department of Pediatrics University of Kansas School of Medicine, Wichita, Kansas

CASE

Jaquette, a 4-month old African-American infant, is brought to the pediatrician for a health supervision visit. She was born full term after a healthy gestation, labor, and delivery. She nurses vigorously, developmental milestones are normal, and her physical examination reveals an emotionally robust, active, and physically healthy child. When the pediatrician inquires about her sleep-wake pattern, the mother informs him that she nurses Jaquette frequently through the night in the bed they share. Both parents state that they are comfortable with this arrangement.

CASE

Paul, an 18-month-old toddler, has always slept in the same bed with his mother. A single professional woman who read extensively concerning child rearing before Paul's birth, his mother was aware that most child health specialists recommend separate sleeping areas for children and parents. At previous visits to her pediatrician, she intentionally avoided the subject. Although she stated that she enjoyed nursing Paul on demand while sharing a bed, she was beginning to feel ambivalence. She wanted to wean him from the breast, but she was unclear about how to initiate the process, especially at night.

Dr. Martin T. Stein

Patterns of child rearing reflect cultural values and contemporary circumstances. The Old Testament tells the stories of beloved infants and children sacrificed so that a mother or

father could demonstrate allegiance to a spiritual deity. The sacrifice usually meant a death, e.g. the willingness of Abraham to kill his son, Isaac; at other times, the outcome of a maternal sacrifice was unknown (the baby Moses sent down a river by a loving mother in hopes of a better life). Other examples are found in historical and contemporary child rearing practices. For example, circumcision of children had its origin in religious doctrines as well as the cultural belief that removing the foreskin in a boy or altering the genitalia of a girl would dampen innate sexual energy. Pacifiers became popular as a way to soothe infants only after industrialization meant that more women worked outside the home and that mother's breast milk was not always available. Without the availability of formula, wet nurses ensured an adequate milk supply when a mother was ill, dead, or could not successfully nurse. The invention of infant formulas, which had the secondary effect of diminishing breastfeeding, was a result of technological advances in nutritional chemistry.

These childcare practices did not evolve and flourish in a vacuum; culture and technology guided their acceptance and persistence. This sociological perspective might bring clinical insight to the practice of bedsharing or cosleeping found in the families of Jaquette and Paul. Cosleeping is the practice of having an infant or young child share a bed with his or her mother (and often, father as well); the child often is nursed intermittently through the night. It has been suggested that cosleeping had an important evolutionary survival value, i.e., as a way to assure adequate nutrition and physical safety. In the late 20th century, some child development theories generate tension among parents and clinicians concerning the appropriateness of cosleeping.

Does cosleeping impede the developmental task of independence? It is more appropriate in a society that encourages dependency in childhood and interdependence as adults? Is cosleeping associated with more sleep disturbances in the child and parent? Does it impair the adult sexual relationship? Is it physically dangerous to infants? These questions need to be asked by clinicians when they are faced with the situations described in this challenging case. Frankly, in the recent past, I thought I knew the answer to many of these questions. As a pediatrician trained to understand the necessary developmental steps taken in the first 3 years of life, from a dependent, emotionally attached infant to an independent, psychologically separated child, cosleeping seemed counterproductive to developmental growth. I found this perspective more difficult to defend, however, with the emergence of new studies on cosleeping coupled with the discovery that more patients than I had imagined were cosleeping with their parents. Can data change (or at least challenge) a 25-year practice pattern? I hope so!

Three professionals with different training and clinical experiences commented on the two cases. Dr. Calvin A. Colarusso, a clinical professor of psychiatry at the University of California, San Diego, is a child psychiatrist and psychoanalyst with more than 30 years of experience in practice and teaching. He is a training analyst at the San Diego Psychoanalytic Institute and past director of the child psychiatry residency and fellowship program at the University of California, San Diego. Dr. James J. McKenna is a professor of anthropology and the director of the Center for Behavioral Studies of Mother-Infant Sleep at the University of Notre Dame, South Bend, Indiana. He pioneered the use of the sleep

physiology laboratory for the study of neurobehavioral characteristics of infants and mothers. He evaluated the effect of cosleeping on breastfeeding, sleep patterns (including maternal-infant synchrony of arousal), prone versus supine infant sleep preferences, and sudden infant death syndrome. Dr. Nancy G. Powers is a clinical associate professor in the department of pediatrics at the University of Kansas School of Medicine – Wichita, and she is also the medical director of lactation services at Columbia Wesley Medical Center in Wichita, Kansas. She has had an extensive clinical experience as a lactation consultant and teacher. Dr. Powers coauthored a recent lactation guide for clinicians in *Pediatrics in Review*.

Dr. Calvin A. Colarusso

These two case vignettes will be familiar to pediatricians, child psychiatrists, and psychologists because the issue of cosleeping is so frequently encountered in clinical practice. These two cases could be considered as one because of the movement from comfort with cosleeping at 4 months of age to the presence of ambivalence and uncertainty in the 2nd year of life.

Human infants cannot care for themselves at birth and require parental care to survive. Nine months of physical and psychological attunement during pregnancy and a desire to love, bond with, enjoy, and stimulate this new life, this extension of themselves, promotes the normal parental desire to care for their offspring, sometimes in the form of cosleeping. From birth onward, and certainly by 3 to 4 months of age, there is discernable evidence that the healthy infant is engaged in a separation-individuation process[1]. As infants creep, crawl, walk, and talk, they move away from mother and father physically and psychologically. Stimulated by physical maturation, language and cognitive development, the toddler develops a constantly growing capacity for physical autonomy and a sense of self as distinct from mother and father.

Sleeping alone facilitates the emergence and development of these profoundly important mental capacities. Cosleeping, particularly when it continues into the 2nd year of life and beyond, impedes the development of this necessary movement toward autonomy and independence and encourages an unhealthy exaggerated dependence on mother and father. During the 2nd and 3rd years of life, in the process of developing a sexual identity, toddlers become aware of anatomical differences between the sexes and how they relate to each other. This normal process develops most easily when the child is not overstimulated by nightly contact with parental bodies but is allowed gradually, during the course of the childhood and adolescent years, to integrate an awareness of sexuality consonant with their constantly evolving physical and psychological maturation. A third reason mitigating against cosleeping is its interference with the resumption and elaboration of parental sexuality and intimacy. In addition to the pathological effect on the child's development, a third person in the sexual bed is at least a distraction and always a competitor for the concern, attention, and affection, of one or both of the sexual partners.[2]

For these reasons, I recommend that infants and young children not occupy the parental bed from birth onward. During the first several months of life a bassinet beside the parental bed will provide convenience and facilitate bonding. Beyond that a separate

room, or at least a separate bed, will promote infant and parental psychological development.

Dr. James J. McKenna

When practiced safely and by choice, mothers and infants sleeping side-by-side (cosleeping) is potentially ideal for promoting breastfeeding and healthy social relationships among family members. Where bedsharing (a specific type of cosleeping) and breastfeeding occur together in a nonsmoking environment, both mother and infant can derive physiological benefits from the arrangement.[1] The situation desribed in Case 1 seems to be an example in which the pediatrician can and should be supportive of the family's choice to bedshare.

Recent child care contributions, which before industrialization could only have been provided if every mother breastfed and maintained night-time contact with her infant. This, however does not alter the human infant's extreme developmental immaturity at birth and a baby's ability or need to respond to a mother's night-time touches, smells, sound, and movements. These sensory experiences were designed by evolution throughout hundreds of thousands of years before technology supplanted the mother's night-time nurturing. These responses by infants to maternal contact might still regulate and benefit the infant's development either in the short or long run, although these regulatory effects are not necessarily easily observed, as work by Hofer suggests.[2] For example, compared with breastfeeding solitary sleeping infants, routinely bedsharing infants at this age breastfed twice as much for three times the duration.[3] This increased nocturnal breastfeeding could increase the effectiveness of the mother's nutritional and protective immunological contributions to her infant, including average daily weight gains, and at the same time potentially lengthen the time before the mother's next pregnancy. Recent evidence supports the hypothesis that the mother's ability to ovulate is suppressed by the increased prolactin levels maintained by more feeds and reduced breastfeeding intervals, i.e., by the structure of breastfeeding, not breastfeeding itself.[4] Moreover, compared with routinely solitary sleeping mother and infants, routinely bedsharing mothers and infants exhibit increased sensitivity to each other while bedsharing, as indicated by briefly arousing to each other's movements and sounds.[5]

The 4-month-old Latino infants we studied spent more time asleep while bedsharing than they did when sleeping in separate rooms, and their mothers also slept as much if not more, contrary to popular understandings! Perhaps more surprising is that routinely bedsharing mothers evaluate their sleep more positively than do breastfeeding mothers sleeping in different rooms than their infants.[6] In fact, when cosleeping is created or preferred by a family, such as in Case 1, infant-parent sleep struggles are nonexistent or significantly reduced. This is not the case, however, if parents do not choose to bedshare but do so only as a response to the child's unwillingness to sleep alone.[7]

Some important additional safety information should be communicated to the parents. Bedsharing without breastfeeding and combined with maternal smoking increases the

risk of sudden infant death syndrome.[8] Therefore, if mothers smoke, bedsharing should be avoided just as it should if mothers take drugs or are otherwise sedated by medications or alcohol. No infant sleep environment is risk free. For example, like crib mattresses, soft mattresses should not be used for adult-infant bedsharing. Moreover, cosleeping should not occur on couches where babies can become trapped against the back and fall into a crevice created by the seat cushion. A baby's head should never be blanketed any more heavily than the adult. To prevent infants from slipping between a mattress and the bed frame or headboard, there should be a tight fit at all mattress-fram intersections, and care should be taken to make sure that an infant cannot roll out of the bed.

Weaning a bedsharing toddler during the night is not very different from weaning a child who sleeps separately. Surely, any one technique does not work for all mother-child pairs. One method is to breastfeed the child before bedtime (waking the child if necessary) and outside of the bed itself. The mother should be less willing to meet the child's night-time requests for food in the bed during the sleep period. For example, some mothers make the child get out of bed and go to another room to eat if a request is made. Lengthening the intervals between feedings will also have the effect of more rapidly drying up the milk, especially at this age, during which the child is eating substantial amounts of solid food. In addition to this, the mother could give the child a night-time snack just before bed that can more fully sedate the child, thereby reducing the probability of an early morning request.

In our expanding multicultural society, it is unfortunate that so many parents like the one in Case 2, who choose to bedshare, are made to feel so unsupported in their choice that they feel it necessary to hide their decision from their physician. Surely, this limits the physician's effectiveness. In this case, one wonders if the mother's ambivalence concerning her arrangement stems not from her own evaluation but from her increasing discomfort with the threat of disapproval or censure. This mother might well be correct in thinking that her physician assumes that bedsharing is always less healthy than solitary sleeping arrangements, even though this widely held view has never been scientifically substantiated.

In part, this view represents a personal and arbitrary judgment that anyone is entitled to make as long as it is not passed on as scientific fact. Such judgments are based on Western values favoring the perception of how individualism and infant autonomy are best promoted and obtained. No study has shown, however, that the goals for separateness and independence (or happiness, for that matter) are obtained in the individual by, among other things, separate sleeping arrangements for parents and children, nor do any studies demonstrate negative consequences for children or parents who choose to cosleep for ideological or emotional purposes, except when cosleeping is part of a larger psychologically disordered set of family relationships or when cosleeping occurs under dangerous social or physical circumstances. The only studies of the psychological or social effects of cosleeping reveal not negative but positive consequences. One study among military families revealed that cosleeping children

receive higher evaluations of their comportment from their teachers than do solitary sleeping children and are under-represented among psychiatric populations, when compared with children who do not cosleep.[9] Lewis and Janda[10] found that college-age students who coslept as children were better adjusted and more satisfied with their sexual identities and behavior than college-age students who did not cosleep. Clearly we need to change our conception concerning what constitutes a normal or healthy childhood sleep pattern!

Dr. Nancy G. Powers

What could be more normal than a healthy 4 month-old infant who is exclusively breastfed? The American Academy of Pediatrics and the World Health Organization recommend "around 6 months" of exclusive breastfeeding, followed by the gradual introduction of weaning foods, with continued breastfeeding for 1 to 2 years or longer. Yet, when informed by a parent that she sleeps with her infant, many health professionals express a negative response. The pediatrician's perspective has been that infant and parents sleep better if infants are in their own beds. Furthermore, there is a belief that sleep disturbances and bedsharing are linked. The current widespread movement to encourage sleep training for young infants by teaching them to fall asleep on their own at an early age reflects this point of view. [1] [2] There is also a widespread belief by parents and professionals that bedsharing is physically dangerous and a strong cultural bias that cosleeping interferes with parental sexual relations. Another concern is that children who sleep with their parents will become to dependent or spoiled.

Recently, some of these beliefs were tested in a sleep laboratory, in which physiologic parameters of a nursing infant and mother were measured simultaneously. Bedsharing was associated with enhanced infant arousals and synchronicity in infant and maternal arousals.[3] Cosleeping was also associated with an increase in the duration and frequency of breastfeeding.[4] Breastfeeding allows rapid response to infant hunger cues. Responsive and contingent caregiving promotes the development of trust and fosters security in young children. In addition, the La Leche League International, an organization of knowledgeable breastfeeding mothers, advocates the family bed as a legitimate option for parenting.[5]

Breastfeeding is a demanding activity in the first months of life; the mother must feed as often as 8 to 12 times every 24 hours. Bedsharing allows the mother to feed without fully awakening, contributing to her total sleep. Some working mothers find that night feedings are the only realistic way to maintain milk production, and sleeping with the infant is the only way to combine breastfeeding, working, and sleep!

The parental sexual relationship is certainly a consideration. A decision to sleep with the infant is merely one aspect of the changing roles that parents must communicate and negotiate with each other. If the infant is sleeping in their bed, they will no doubt create other opportunities for sexual activity that do not directly expose the child to such activity. Many couples put the infant in its own bed for part of the night.

What about the breastfeeding toddler? Biological determinants indicate that breastfeeding in humans would "naturally" continue for between 2.5 to 7 years, as stated by Dettwyler." Nursing toddlers in the United States are much more common than most people think. . . . but you do not see or hear about them for several reasons. By the time a child is more than 2 years old, she or he is probably only nursing a few times a day . . . People outside the family just assume that the child has been weaned. More importantly, because women know that our society is not supportive of nursing toddlers . . . it is easier to tell people that "yes, the child has been weaned." [6] Because of the criticism they anticipate, many women keep this relationship secret.[7]

Finally, there are some practical aspects of bedsharing with night feedings that deserve comment. A safe sleeping surface for the infant is essential: a firm mattress and no small areas between mattress and bed frame where the infant might become wedged. The height of the bed and positioning of the baby is important to minimize the chance of injury from falling out of bed. In addition, frequent night feedings might contribute to dental caries. Proper dental care and fluoride supplementation (if indicated) once the teeth have erupted should be ensured.

Parents will want to consider at what age to move the child to its own bed, and how to accomplish this maneuver. This task is relatively easy to accomplish between 4 and 9 months, but becomes more difficult as the older infant becomes more vocal and sleep routines are more habituated. To wean a toddler either from the parental bed or from breastfeeding, a discussion concerning parental motivation is critical. The parent must have no ambivalence concerning the decision and can then follow through with any of the gradual weaning methods outlined in numerous child care publications

Cosleeping is a normal part of breastfeeding and human behavior. We must revise our view of mother-infant interaction in the context of the intimate nature of the breastfeeding relationship. If we expect families to accomplish the breastfeeding goals we set, we must give parents permission to sleep with their child during the breastfeeding years. We can then congratulate and support the parents in these two cases for successful breastfeeding experiences

Dr. Martin T. Stein

The two cases of an infant and toddler cosleeping and breastfeeding illustrate a common clinical practice that challenges some traditional pediatric perspectives on early childhood development. Dr. Colarusso noted that a major task of parents is to assist young children in the process of separation-indviduation. This is a particularly useful clinical construct that provides a framework for a multitude of physical, physiological, and psychological events that provide an impetus to defining oneself as separate from parents.[1] Erikson's notion of psychological autonomy that characterizes the 2nd and 3rd years of development is an expression of this goal, i.e., to separate and individuate into autonomous toddlers who begin to recognize their own individuality.[2]

To assume that specific events or developmental milestones are *required* for a successful separation and individuation oversimplifies both theory and practice. For example, the deaf child might not develop adequate expressive language to communicate verbally in early childhood, but a variety of other developmental skills (including play experience, self regulation in feeding and falling to sleep, and gross motor skills that encourage exploration) are available to psychologically separate from parent and discover a personal self. Another example is illustrated by toddlers who have not given up their bottles at nap and night time and who still use a pacifier occasionally for soothing themselves during stressful moments. Is it correct to assume that these children have experienced a developmental arrest? Certainly not before more information is obtained. If for example, these toddlers are usually outgoing, engage with peers, enjoy sustained play with their toys, and feed themselves comfortably, there is adequate evidence that they are successfully negotiating the skills that reflect psychological autonomy. In context, the residual use of a bottle and pacifier might not be viewed as developmentally harmful. They might even be useful transitional objects for these children.[3]

Dr. McKenna's observations that cosleeping enhances neurophysiologic aspects of sleep in a manner that synchronizes arousal states between a cosleeping infant and mother is fascinating to pediatricians trained to observe associations between neurological function and behavior. That these synchronized arousals lead to an increased frequency and duration of breastfeeding, as well as other potential benefits to the child and mother (Table 1), challenges traditional developmental tenets.

TABLE 1 – Potential Benefits Derived From Coslleeping
Benefits to Infant
Breastfeeding increased (in frequency and total duration)
Sleep time increased
Mother's nurturing through sensations (touch, smell, sound, movements)
Synchronized sleep arousal with mother
Occurrences of Sudden Infant Death Syndrome decreased (controversial)[4]
Benefits to Mother
Sleep time and quality improved
Ovulation decreased
Number of sleep disturbances/disruptions decreased

It could be argued that, although cosleeping might inhibit independence and the separation process as noted by Dr. Colarusso, the practice of bedsharing and nursing could solidify the bond between mother and child. With the emergence of many other social, language, and motor milestones noted above that fuel the drive toward individuation, cosleeping into the 2nd year of life might maintain and strengthen the maternal-child attachment at night while the toddler experiments with independence during daytime hours. This kind of diurnal-nocturnal specialization of tasks might allow greater psychological energy to be directed to daytime functions that lead to separation and individuation while simultaneously maintaining a means for nocturnal refueling. Cosleeping could be conceptualized, in Margaret Mahler's terminology, as a continuous psychological refueling or rapprochement, potentially available from birth through at least the first 2 years of life.[1]

Cosleeping is a case study that illustrates the importance of understanding a health care tradition in the context of both contemporary and historical values and needs. The new field of ethnopediatrics encourages a critical analysis of the cultural context of medical practices that affect children.[5] Rather than look to developmental theory as a sounding board for child care practices, ethnopediatrics encourages an analysis of practices found in both pre- and post-industrialized society for clues to optimal child rearing. Whether modern conveniences (formula, home temperature control, home safety) and societal trends (working mothers, emphasis on independence in early childhood) have adversely changed infant toddler sleeping patterns away from cosleeping is an important question for families and professionals concerned with optimal health practices. If cosleeping is the "natural ecological setting" for sleep, as described by Dr. McKenna[6] and supported by Dr. Powers, perhaps it is time to re-evaluate our recommendations to parents.

REFERENCES

[1] Mahler M, Pine F, Bergman A: The Psychological Birth of the Human Infant. New York, NY, Basic Books, 1975
[2] Colarusso CA: Fulfillment in Adulthood: Paths to the Pinnacle of Life. New York, NY, Plenum, 1994

REFERENCES

[1] McKenna J, Mosko S, Richard C, et al: Mutual behavioral and physiological influences among solitary and cosleeping mother-infant pairs: Implications for SIDS. Early Hum Dev 38:182-201, 1994 Abstract
[2] Hofer M: Parental contributions to the development of offspring, in Gubernick D, Klopfer P (eds): Parental Care in Mammals. New York, NY, Academic Press, 1981, pp. 77-115
[3] McKenna J, Mosko S, Richard C: Bedsharing promotes breastfeeding. Pediatrics 100:214-219, 1997 Full Text
[4] Ellison P: Breastfeeding, fertility and maternal condition, in Stuart-Macadem P, Dettwyler K (eds): Breastfeeding: Biocultural Perspectives. New York, NY, Aldine de Gruyer, 1995, pp. 305-346
[5] Mosko S, Richard C, McKenna J, Drummond S: Infant arousals in the bedsharing environment: Implications for infant sleep development and SIDS. Pediatrics 100:841-849, 1997 Full Text
[6] Mosko S, Richard C, McKenna J: Maternal sleep and arousals during bedsharing with infants. Sleep 20:142-150, 1996
[7] Madansky D, Edelbrock C: Cosleeping in a community of 2- and 3-year-old children. Pediatrics 86:198-203, 1990 Abstract
[8] Fleming P, Blair P, Bacon C, et al: Environments of infants during sleep and the risk of the sudden infant death syndrome: Results of 1993-1995 case control study for confidential inquiry into stillbirths and deaths in infancy. BMJ 313:191-195, 1996 Abstract
[9] Forbes JF, Weiss DS: The cosleeping habits of military children. Mil Med 157:196-200, 1992 Abstract
[10] Lewis RJ, Janda H: The relationship between adult sexual adjustment and childhood experience regarding exposure to nudity, sleeping in the parental bed, and parental attitudes towards sexuality. Arch Sex Behav 17:349-363, 1988 Abstract

REFERENCES

[1] Ferber R: Solve Your Child's Sleep Problems. New York, NY, Simon & Schuster, 1985
[2] Weissbluth M: Sleep learning: The first 4 months. Pediatr Ann 20:228-238, 1991 Citation
[3] McKenna JJ, Mosko S: Sleep and arousal, synchrony and independence among mothers and infants sleeping apart and together (same bed): An experiment in evolutionary medicine. Acta Pediatr Scand Suppl 397:94-102, 1994
[4] McKenna J, Mosko S, Richard C: Bedsharing promotes breastfeeding. Pediatrics 100:214-219, 1997 Text
[5] Le Leche League International: The Womanly Art of Breatfeeding. Franklin Park, IL, La Leche League International, 1981
[6] Dettwyler KA: A time to wean: The hominid blueprint for the natural age of weaning in modern human populations, in Stuard-Macadam P, Dettwyler KA (eds): Breastfeeding: Biocultural Perspectives. New York, NY, Aldine de Gruyter, 1995, pp. 39-73
[7] Wrigley EA, Hutchinson SA: Long-term breastfeeding: The secret bond. J Nurs Midwifery 35:35-41, 1990

REFERENCES

[1] Mahler M, Pine F, Bergman A: The Psychological Birth of the Human Infant. New York, NY, Basic Books, 1975
[2] Erikson EH: Childhood and Society, 2nd ed. New York, NY, Norton 1963
[3] Winnicott DW: Transitional objects and transitional phenomena, in Collected Papers. London, England, Tavistock Publishing, 1958, pp. 229-242
[4] American Academy of Pediatrics Task Force on Infant Positioning and SIDS: Does bedsharing affect the risk of SIDS? Pediatrics 100:272, 1997 Full Text

[5] Barr R: Infant crying behavior and colic: An interpretation in evolutionary perspective, in Trevathan W, McKenna JJ, Smith EO (eds): Evolutionary Medicine. New York, NY, Oxford University Press, 1997
[6] McKenna JJ: Cosleeping, in Carskadon MA (ed): Encyclopedia of Sleep and Dreaming. New York, NY, Macmillan, 1993, pp. 145-148

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