

US Infant Injury Mortality

Secretary's Advisory Committee on Infant Mortality

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Health Resources and Services Administration
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Infant Injury Deaths

- What we know
- How the information is obtained
- What we need to know to support effective prevention

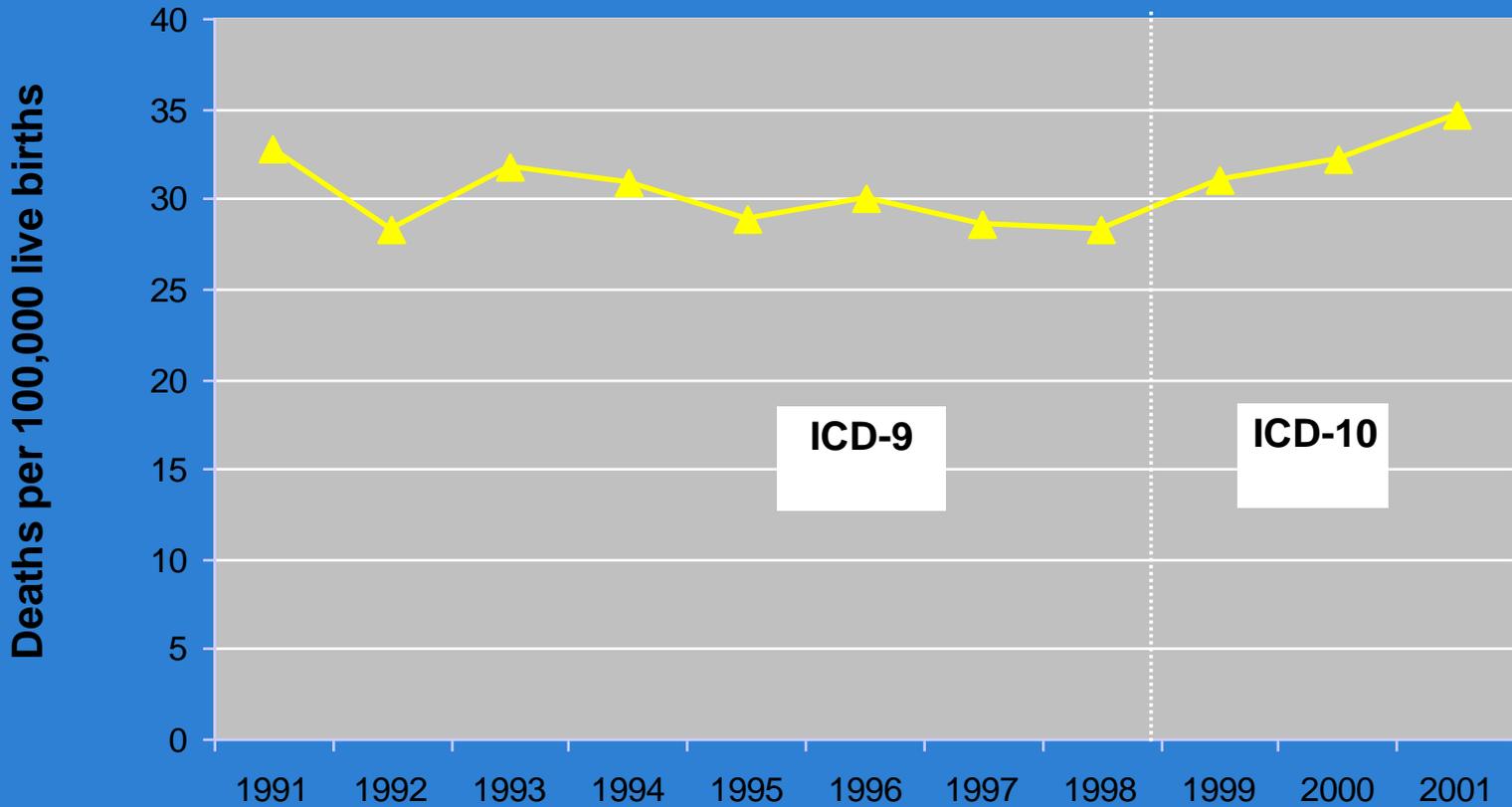
Manner of Infant Deaths

- Natural Deaths
 - Congenital malformations
 - Conditions related to short or complicated gestation, labor & delivery
 - SIDS
- Traumatic (Injury) Deaths

What is Injury?

- Injury is caused by acute exposure to energy, such as heat, electricity, or the kinetic energy of a crash, fall or bullet. (Gibson)
- Injury is caused by the sudden absence of essentials, such as heat or oxygen, as in the case of drowning. (Haddon)

Infant Injury Mortality Trends, US 1991-2001



Natural & Traumatic Deaths: Infants and Ages 1-4 Years

	<u>Infants</u>		<u>1-4 Years</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
Total, U.S.*	27,847	100%	5,112	100%
Natural	26,508	95%	2,850	56%
Traumatic	1,306	5%	2,237	44%

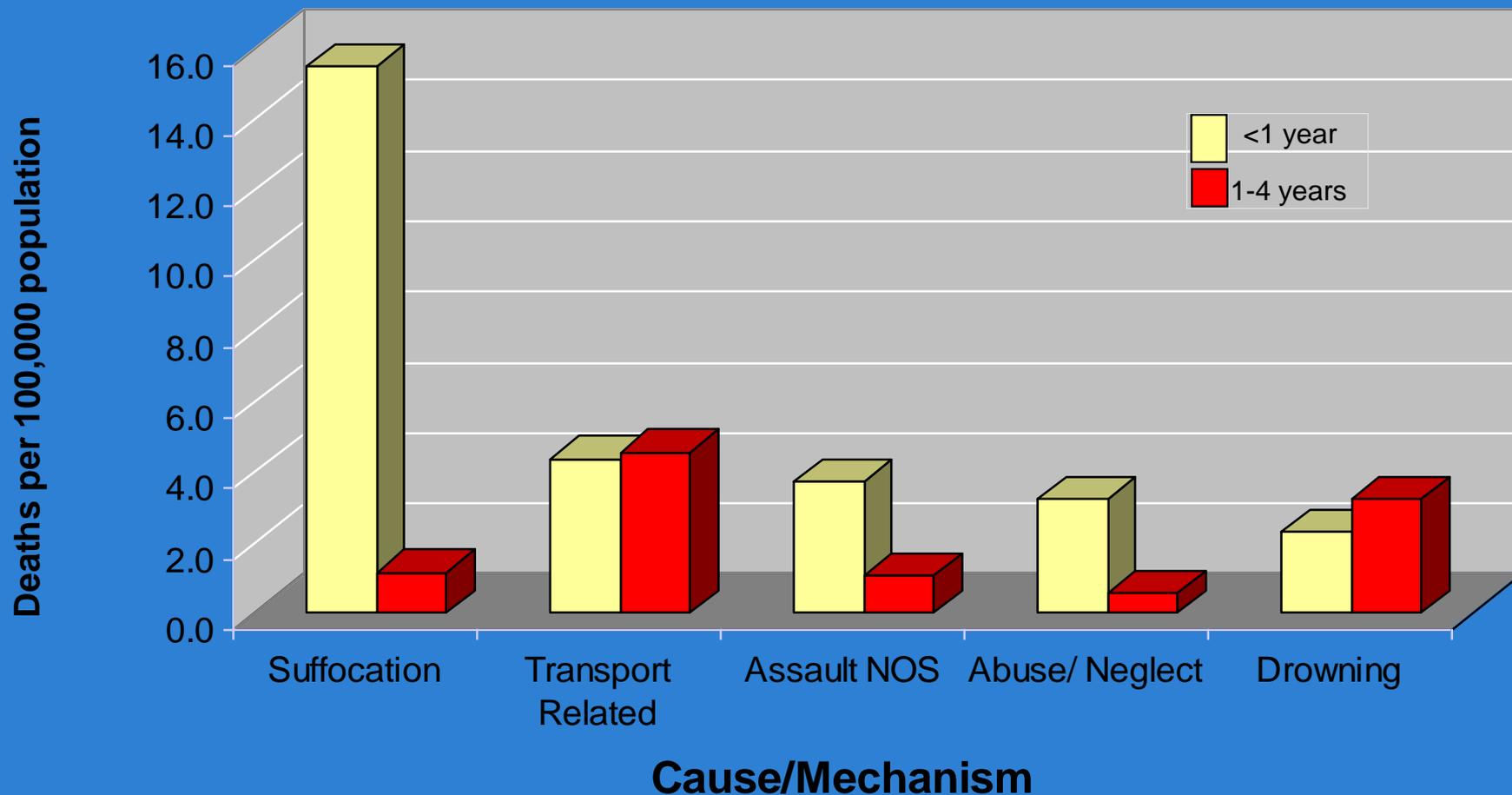
N = Average Annual Deaths, US, 1999-2001

** Total includes deaths due to complications of medical and surgical care*

National Sources of Injury Data

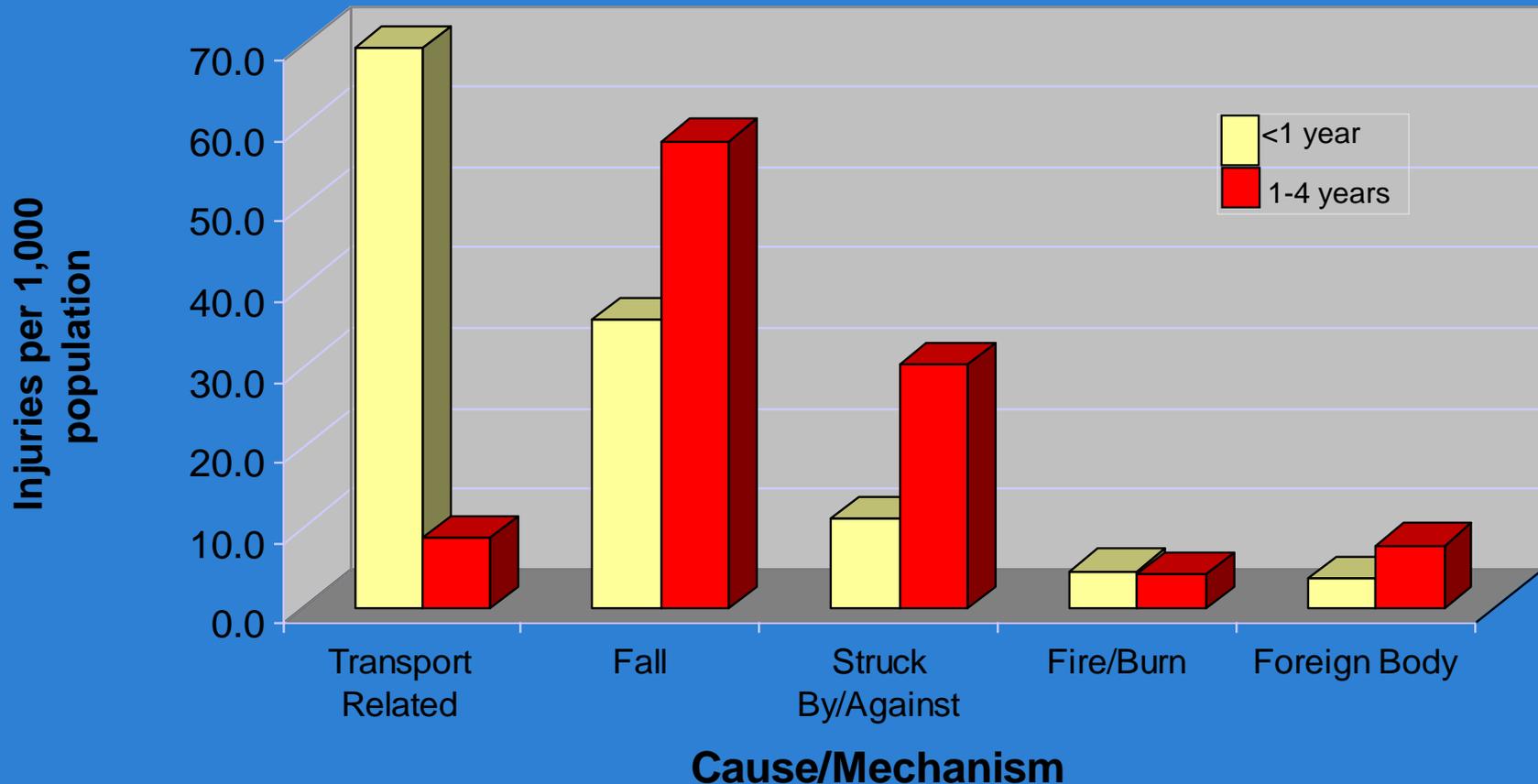
- Deaths
 - Death certificate
- Nonfatal
 - Medical treatment records
 - hospitalizations
 - emergency departments
 - physicians office surveys
- Personal surveys

Nature of Death for Leading Causes Infants and Ages 1-4 Years



US, 1999-2001

Nature of Nonfatal Injuries Infants and Ages 1-4 Years



Source: WISQARS, HCUP, US 2000

Contrast of Cause & Intent

- External Cause, examples:
 - drowning
 - suffocation (mechanical or inhalation/ingestion)
 - blunt force
 - motor vehicles
 - poisoning
 - firearms
 - exposures to cold or heat
- Any cause may be classified as intentional, unintentional, or undetermined intent

Determination of Cause

- Based on State requirements for examination of unexpected deaths
- State medical examiner/coroner systems
- Injury coding based on manner of death
 - external causes (ICD-9 ‘e-codes’)

Cause and Intent for Injury Deaths

- Differs from non-injury (natural deaths):
 - nature of death may not be included in e-codes
 - knowledge of both nature and cause needed
- Intent determined separately from nature

Determining Injury Intent on Death Certificates

- Unintentional (accidental)
- Intentional (homicide)
- Undetermined manner or intent
- Pending investigation

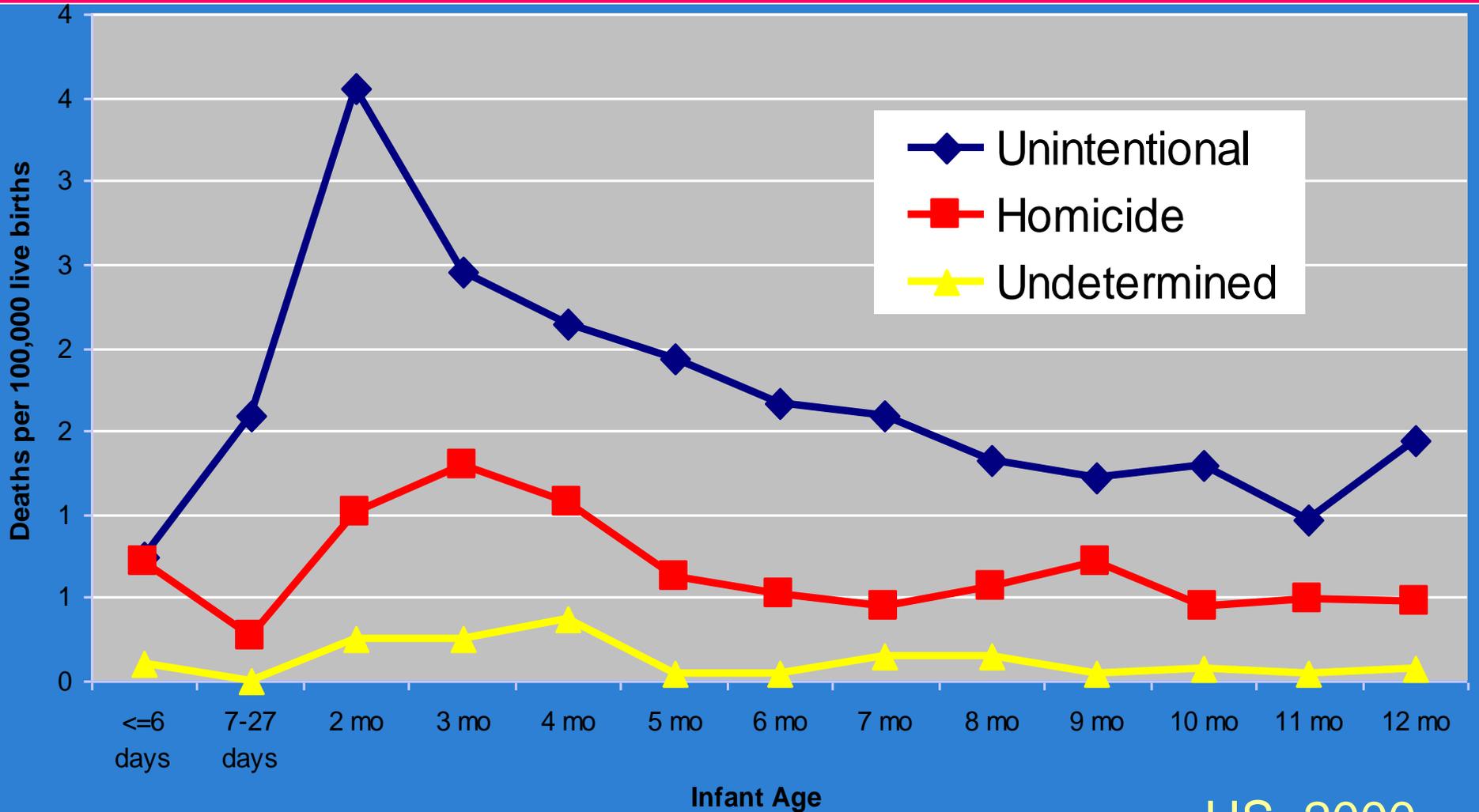
Infant Injury Deaths

Leading Causes by Intent

<u>Unintentional</u> N=901*		<u>Intentional/Suspicious</u> N=405*	
Cause	%	Cause	%
1. Suffocation/ strangulation in bed	46%	1. Child abuse/ neglect	31%
2. Other suffocation (specified nature)	26%	2. Assault (unknown nature)	31%
3. Transportation	19%	3. Suffocation	18%
4. Obstructive suffocation	8%	4. Drowning	5%
5. Drowning	8%	5. Firearm	3%
6. Fire/Burn	5%	6. Struck by/against	3%

**average annual deaths, 1999-2000; 2001 as available*

Infant Injury Deaths Intent by Age at Death



US, 2000

Risk Factors for Infant Injury Deaths

- Sources: Linked birth and death certificates
- Study by Brenner, et al, of about 10,500 deaths in linked files from 1983 to 1991
 - ranking: homicides, mechanical suffocation, motor vehicle, choking, fire, drowning

Risk Factors Identified on Birth Certificates

- Total deaths: Odds Ratios ≥ 2
 - maternal education <12 years
 - maternal age <20 years
 - no prenatal care
 - Native American ethnicity
 - at least 2 previous pregnancies

Unintentional Injury Deaths: Risk Factors Vary by Cause

- **Mechanical suffocation:**
 - found in bed or cradle
 - young maternal age & ≥ 2 prior pregnancies
- **Choking** (from inhalation of food & objects):
 - birth weight <1500 gm. or 1500-2400 gm.
- **Motor vehicle:**
 - being Native American

Source: Brenner et al., 1999

Homicide Risk Factors

- Factors for homicide and undetermined (suspicious) intent very similar
- 1/2 occur by 4th month of life; 2/3 by 6th month
- Being second or later child of a mother <17 or 17-19 years old
- No prenatal care
- Maternal education <12 years

Circumstances of Deaths

- No information on birth or death certificates
- No way to determine nature of deaths for many classified as child abuse/neglect or intentional assaults
- No information on circumstances to target specific interventions

Other Circumstances shown by State Record Reviews

- **Native American motor vehicle deaths due to use of pick-up trucks without needed infant seats as primary family vehicles**
- **Males more likely to be perpetrator in homicides after 1st week of life**

Circumstances of Deaths shown by State Record Reviews

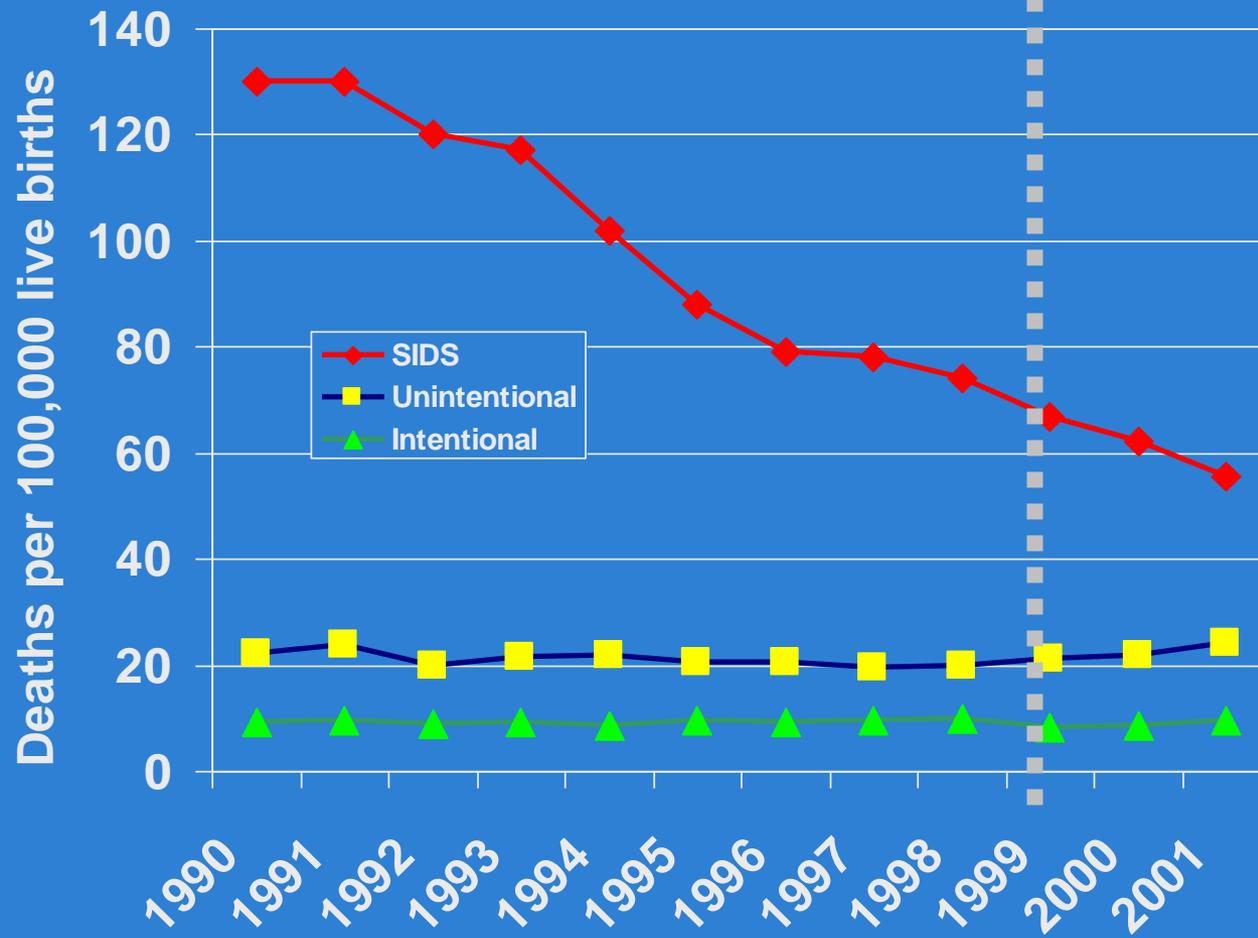
- US child abuse deaths underestimated by more than 60%***
- many deaths classified as SIDS or accidental suffocation probably child abuse or homicides***

*Herman-Giddens, 1999

Classification of SIDS

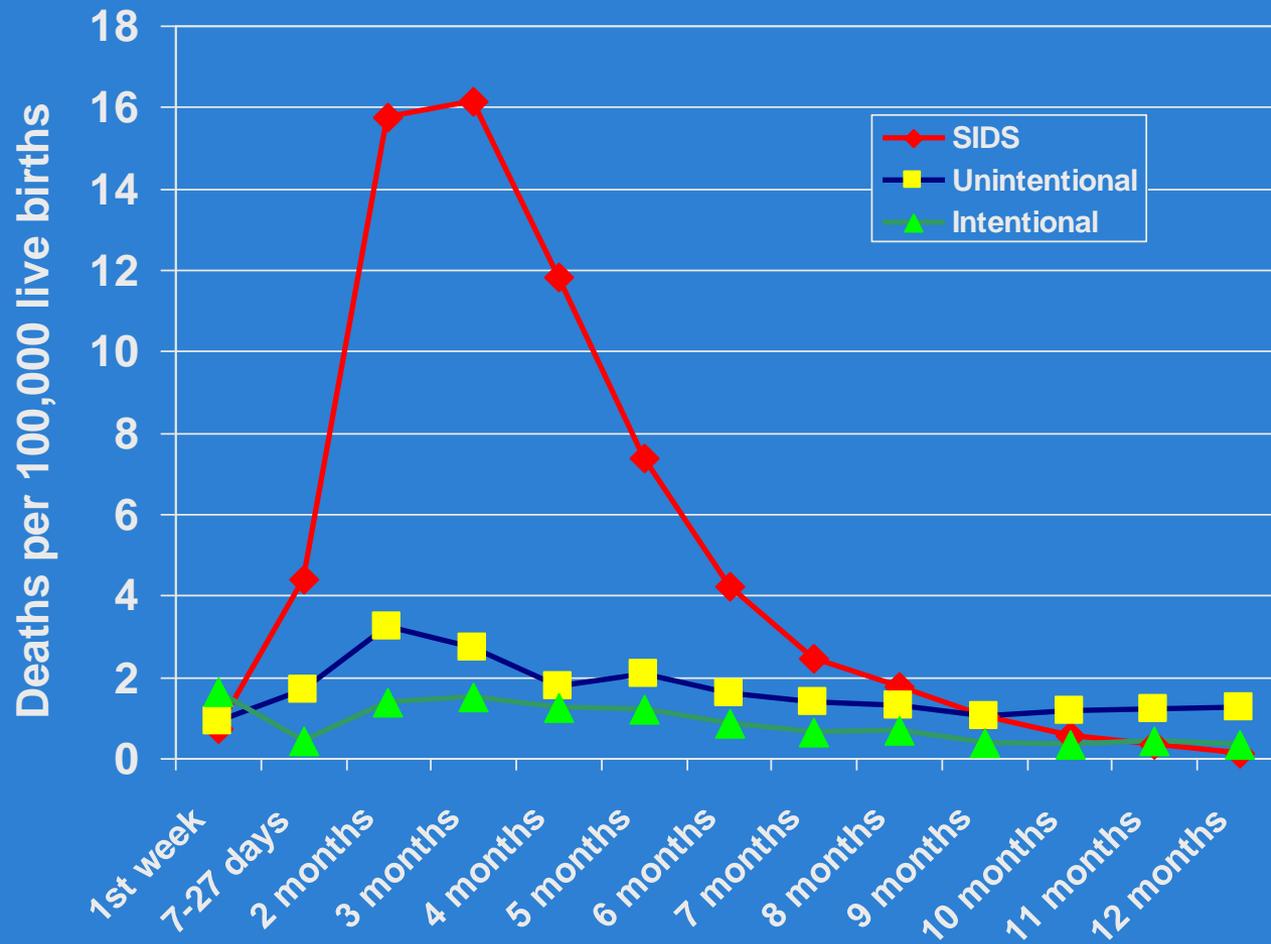
- More specific diagnosis applied recently
- Almost all SIDS cases autopsied
- Diagnostic shift from SIDS to non-specific 'R96' ICD classification:
 - **Other sudden deaths, cause unknown**
- More cases reassigned to trauma

Sudden Unexpected Deaths US, 1990-2001



SIDS and Injury Deaths

Cause by Age at Death, 1999-2001



Conclusions

- Infant and early childhood injury deaths are related to developmental stages
- Risk factors guiding prevention should be specific to cause and circumstances
- Need for more review of circumstances surrounding infant and child deaths
- Need for better classification alternatives for infant and early childhood deaths

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