

# Navigating the Acronyms of Infant Deaths in North Carolina

SIDS, SUID, ASSB and USE

There is a vast array of terms and definitions associated with infant deaths. This guide is designed to define and clarify the pathological definitions for causes of death, categories representing types of infant deaths, and the practical usage of terms affiliated with infant death investigations.

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Infant deaths, in the context of Sudden Infant Death Syndrome and unsafe sleep environments, have historically been the most inconsistently ruled death cases across the country. Lack of consistent and thorough scene investigations, non-uniform terminology, and absence of definitive pathological findings at autopsy in some cases have created challenges in separating Sudden Infant Death Syndrome and asphyxiation deaths in infants. North Carolina has been at the forefront of infant death investigations, providing training to investigative personnel since 2001. In 2006 we participated in the National SUDI Academy Train the Trainers program for Infant Death Scene Reconstruction. At that time, we spent one year training investigators in 75% of the counties in North Carolina on how to properly conduct a scene reconstruction and began our mission to provide training and obtain the most accurate information for all infant fatality cases. We had some of the highest training numbers in the country and have continued to provide this block of training to both law enforcement and medical examiners. In 2011, the North Carolina Office of the Chief Medical Examiner refined the recommendation for

It is crucial from a data perspective to ensure we are using the definitions related to infant sleep environments and death correctly.

Too many terms are used by too many professionals interchangeably, while they may actually mean different things.



pathologists on how infant deaths were to be ruled, specifically that any circumstances or history that suggested an unsafe sleep environment (USE) or co-sleeping, would be considered undetermined pending final autopsy results and investigation. If asphyxiation could definitively be proven, then the case would be ruled accident/asphyxiation, but if not, then the case would remain undetermined for both cause and manner of death. This applies only to those deaths where other circumstances are not suspected, and pathological findings are nonspecific or absent. With the expansion in training, further defining terms used system-wide, and refining how investigative information is collected, OCME data now reflects a more accurate picture of the relationship between the sleep environment and infant deaths over the past decade.

The following guidelines will provide the reader with a working knowledge not only of the varied definitions and terms related to these cases, but also a practical understanding of how the causes and manners of death are determined.

## Definitions

### Sudden Infant Death Syndrome (SIDS)

SIDS refers to the death of an infant under the age of one year, typically during a sleep period (nighttime or nap); which includes, from the medical examiner's perspective, no significant medical history to account for the death, no cause of death at autopsy, and a negative thorough scene investigation that excludes all other causes and manners of death.

A negative history includes infants who are put to sleep, either for a nap or for the night in a safe sleep environment and are found unresponsive/deceased. Typically, no precipitating event is witnessed. There will be no significant medical history. If questionable medical issues or previous sibling deaths are discovered during the investigation, they must be ruled out as concerns. Any part of the history that indicates an unsafe sleep environment negates a certification of SIDS.

A negative autopsy means pathological findings may be present, and often similar findings in these particular infants are found, but they do not account for the death. Any findings present, to include questionable toxicology, fractures, or external or internal indicators of trauma, will lead to an alternative determination of cause and manner of death.

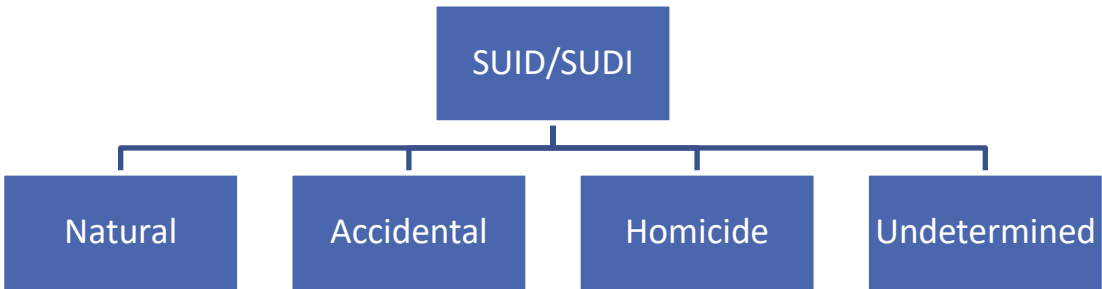
A negative scene includes an infant sleeping alone, in a safe sleep position, with no sleep hazards or evidence of unsafe sleep environment.

## Sudden Unexpected Infant Death/Sudden Unexpected Death in Infancy (SUID/SUDI)

It is important to note that SUID/SUDI are categories of deaths that do not relate exclusively to infant deaths in unsafe sleep environments. As defined, it is *all* unexpected infant deaths including those in safe and unsafe sleep environments.

SUID/SUDI/SUDC are age-based arbitrary subsets of unexpected deaths. They refer to the deaths of infants under one year of age (SUID/SIDS), or one year of age or older (SUDC – Sudden Unexpected Death in Childhood). After a full forensic death investigation is conducted, these deaths are certified as a variety of causes and manners of death. Natural causes could include pneumonia, metabolic disorders, myocarditis, and SIDS. Accidental mechanisms could include asphyxia, poisoning, or drowning. Homicidal mechanisms could also fall under this category as the mechanism of death is not known at the onset, so this would also include asphyxiation, drowning, poisoning as well as trauma. When a definitive cause of death cannot be found, or there are questionable aspects to the case (either pathologically or circumstantially), the cause and manner of death will be ruled as undetermined. As the chart below shows, while they begin as unexpected/unexplained the investigation and pathology determine the actual cause and manner of death.

The subsets SUID/SUDI/SUDC were created and defined by the National Association of Medical Examiners and are not causes of death, therefore are not used on death certificates.



## Terms

These are common terms used by various disciplines and defined by different organizations (National Institutes of Health, Center for Disease Control, American Academy of Pediatrics). They are being defined here as they are applied to medical examiner infant death investigations and how the NC OCME may use in the determinations of cause and manner of death.

### Accidental Suffocation and Strangulation in Bed (ASSB)

While this is a code used for statistical purposes, its use can be confusing. It is a subsection of ICD-10 codes referencing unintentional suffocation injuries. Suffocation and strangulation are two separate mechanisms of asphyxiation. It is unclear if this encompasses other mechanisms and terms including overlay, traumatic asphyxia, or positional asphyxia. This code is not assigned by the medical examiner's office and relies on others to interpret death certificate information. The death certificate and associated medical examiner reports can provide accuracy when assessing mechanism of death.

### Co-Sleeping

Co-sleeping for the purposes of the NC OCME includes any location/person, including another child or infant, sleeping with an infant at any time. Regardless of the sleep location, they are sharing a sleep surface with an infant at the time of the death. The circumstances surrounding the sleep environment are collected from various sources (hospital, law enforcement, medical examiner) and must be confirmed during the investigation for the pathologist. Reconstructions are requested to solidify the details and positions.

### Room Sharing

There is no shared sleep surface under this term, but the infant sleeps in the same room as another individual, including a caregiver or another child or infant, in a separate sleep space (crib, bassinet, playpen, etc.).

### Bed Sharing

A self-explanatory term that is a form of co-sleeping, indicates the infant was sharing the same bed sleep surface with another individual, including a caregiver or another child or infant. Other locations would be labeled co-sleeping, whether couch, chair, floor, etc.

### Pending

This term indicates that a case has not been finalized by the OCME, investigation is ongoing, death certificate is not yet complete, and reports have not yet been released. It is the preliminary cause of death on the death certificates. A pending death certificate will be updated with a supplemental death certificate once the investigation and reports have been completed and the cause and manner of death are determined.

## Undetermined

Undetermined can be a cause of death, manner of death, or both a cause and manner of death. A cause of death can be known, while the manner remains unclear. The manner of death can be determined, while a clear cause of death is unknown. When both cause and manner are ruled as undetermined, it often means that circumstances and findings surrounding how an infant died are unclear.

## Practical Applications

Using the same death history scenario of a "3-month-old infant found unresponsive at home. Parents called 911, paramedics attempted resuscitation and infant pronounced at hospital," we will explore the process of final determinations of cause and manner of death.

It is important to note that the NC OCME only uses SIDS, asphyxiation, and undetermined for pathological purposes when ruling cases involving infant unsafe sleep environments (USE).

### SIDS

This is a very typical history for most of our infant deaths. How do we take this general information and arrive at a final determination of SIDS? Our first contact is with law enforcement to ensure they are aware of the death and are initiating a scene investigation. A reconstruction is typically requested either by the local medical examiner or the OCME/Regional Autopsy Center (RAC), is performed by either law enforcement or the local medical examiner and is voluntary for families. Once it is determined that the infant was sleeping alone, the focus turns to sleep positions, the sleep environment, and developmental ability of the infant. A full review of the medical history of the infant is conducted. This review will include available birth and pediatric records, emergency department records, Emergency Medical Services reports, and newborn metabolic screens. A comprehensive toxicology screen is conducted on all infants under one year of age when applicable. In addition to the full law enforcement investigation, we also check with the county Division of Social Service agencies for any history on the family and/or infant. Once the complete forensic autopsy process is complete (initial autopsy, examination of microscopic slides, toxicology), and records have been reviewed by the pathologist, a final determination of cause and manner is assigned. Every aspect of the investigation must rule out any alternative explanations for the death for the case to be ruled as SIDS. Currently, the number of SIDS deaths per year in North Carolina is 15 or fewer.

### SUID

The death of a 3-month-old is by definition a SUID as it is sudden and unexpected. Following the same thorough investigative procedures as above, the final determination of death could be

natural, accidental, undetermined or homicide. Pairing SUID with unsafe sleep related deaths from a data perspective is a misrepresentation of the term. Undetermined cause and manner of death captures the true unexpected/unexplained infant deaths. Once the investigation reveals the underlying cause, it is no longer unexplained. SUID is a category of infant death, it does not apply to the final cause of death. The acronym/term may be seen on autopsy reports in a narrative as the pathologist explains their findings and conclusions. However, the final cause and manner would be undetermined.

## Accidental Asphyxiation

Again, following the same investigative procedures, investigators make the same notifications and requests, and examine the same medical records. Because the autopsy is typically negative in these cases, pathologists are dependent on the scene information and investigations conducted by outside agencies. The OCME may ask different questions depending on the type of asphyxiation case it may be. For example:

Co-sleeping – Positions of everyone in the bed, how many people were in the bed, sizes of those in the bed, type of sleep surface/size, and developmental abilities of the infant are documented. Was the infant breast or bottle fed and was it being fed at the time? Clothing of co-sleepers is examined for stains, as is the bedding. Occasionally the event is witnessed, where someone finds the infant under the caregiver, or the caregiver admits to waking on top of the infant. Reconstructions are always requested in these cases, but not necessarily done in every case. Most of these deaths occur between birth and three months of age, commonly through six months of age, but less commonly after the age of 12 months.

Positional Asphyxiation – These cases involve infants sleeping alone but in unsafe positions (prone) or environments. They may have gotten themselves into the position or were placed in the position by a caregiver. Unsafe sleep environments can include heavy/soft bedding, cushions, parents' chest, plastic bags, clothing, etc. The possibilities are endless. Head control is a primary factor in these deaths, and they typically occur before the age of four months. There is also the risk of the neck being hyperflexed, or slightly pitched forward, causing asphyxiation. Recommendations now address infants lying completely flat, not elevating the head, to avoid this position. Certain products have been removed from the market because of the potential to slightly pitch the head forward.

Wedging/Mechanical Asphyxiation – While different pathologists refer to this in different ways, the result is an infant being found stuck or wedged in a space. Most often this is between the bed and a wall but can be anywhere where the infant was placed to sleep. As all infants can wiggle and scoot around on a sleep surface, and especially when they begin to roll, these deaths can occur in any sleep environment. From an investigative perspective, these are straight forward with a caregiver providing a description of finding the infant wedged and

confirming that with the scene investigation. Sometimes there may be external pressure marks on the infant indicating how they were wedged in the space, but the autopsy itself may not be definitive.

Other types of asphyxiation could include choking and strangulation and are less common than those involving unsafe sleep.

## Undetermined

A ruling of undetermined cause and manner for the above case would likely be due to a few scenarios:

- Co-sleeping without indications of overlay
- USE (unsafe sleep environment) without indications of asphyxiation
- Findings present at autopsy (healing fracture that is unexplained, questionable toxicology, external findings indicative of trauma, internal findings indicative of trauma) that did not necessarily cause the death but should not be present.
- Questionable history or investigative findings, with possibly the timeline being off, statements by caregivers are inconsistent, CPS involvement/concerns, etc. Likely it would be enough information for the pathologist to rule out accidental or natural, but not enough to suggest homicide.

## Summary

All pediatric deaths 17 years of age and younger are investigated and reviewed by the Child Fatality Team at the OCME, and infant deaths typically represent the highest number of fatalities investigated and are also the most complicated. There are so many factors that impact the final determinations. From the initial call to EMS, to the hospital and actions of personnel, to law enforcement involvement and ultimately what the pathologist can do with all the pieces of the puzzle. A solid investigation requires communication and collaboration at each level, and interdisciplinary training to all agencies that may have contact with an infant death. The NC CFPT and OCME make every effort to ensure the appropriate agencies receive training. It is imperative that data gathered from these investigations is accurate and interpreted appropriately. Prevention of child deaths fall on all of us, and this guide is intended to help all of our partners in prevention understand how terms and words used around infant deaths are applied in North Carolina so we can be powerful advocates for the health and safety of all children.



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