

Infant Death Scene Investigation

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ABSTRACT

The sudden unexpected death of an infant is a tragedy to the family, a concern to the community, and an indicator of national health. To accurately determine the cause and manner of the infant's death, a thorough and accurate death scene investigation by properly trained personnel is key. Funding and resources are directed based on autopsy reports, which are only as accurate as the scene investigation. The investigation should include a standardized format, body diagrams, and a photographed or videotaped scene recreation utilizing doll reenactment. Forensic nurses, with their basic nursing knowledge and additional forensic skills and abilities, are optimally suited to conduct infant death scene investigations as well as train others to properly conduct death scene investigations. Currently, 49 states have child death review teams, which is an idea avenue for a forensic nurse to become involved in death scene investigations.

KEY WORDS:

child death review; sudden infant death syndrome; sudden unexpected infant death; sudden unexplained infant death

When an infant dies suddenly and unexpectedly, outside the direct care of a physician in a hospital or other healthcare setting, the death scene investigation is critical. Infant death scene investigation (DSI) is especially challenging when an apparently healthy infant unexpectedly dies and there is no obvious cause of death (COD). Infant DSI is not a process that lends itself to a definitive step-by-step approach because of the myriad of possible circumstances surrounding an infant's death. In addition, there are jurisdictional and statutory responsibilities associated with each discipline involved in DSI. However, there are strategies that are known to improve the process and, therefore, the accuracy and consistency of DSI, which is the first step in determining the COD and manner of death (MOD).

Overview of Infant DSI

Historically, DSIs have varied from state to state and even within a state from jurisdiction to jurisdiction. In the past, similar DSI techniques were applied to all ages. As the understanding of the different variables associated with sudden

unexpected infant death (SUID) investigations has evolved, the practice applied to investigating these deaths began to change in the 1980s and has continued to be refined over the past several decades.

SUID investigation (SUIDI) is a complex process involving multiple agencies. The medical legal investigation often falls under the jurisdiction of a specific discipline. Depending on the state, this responsibility falls to the medical examiner (ME), the coroner, or a mixed ME–coroner system. To add to the confusion, each of these roles are defined by the individual state. For instance, an ME in one state may be required to be a forensic pathologist, whereas in another state, any type of medical doctor may be qualified, while in other states, the ME may not have any medical training or education. On the other hand, coroners' positions may be held by lay people, who are elected or appointed to their posts, depending on state statutes. The coroners' office may or may not have medical training or education requirements. In other states, law enforcement personnel are responsible for infant DSI.

As of 2014, 49 states have begun utilizing multiagency, multidisciplinary, professional teams to perform comprehensive child death reviews (CDRs). The various agencies/professionals involved vary from state to state, between jurisdictions, and even among specific case types. Disciplines that serve on CDRs may include, but are not limited to, law enforcement, emergency medical services, pediatricians and other medical personnel, child protective services, public health personnel, and prosecuting attorneys. The CDR process has enhanced child death investigation by identifying information that is necessary to collect in infant and child

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death investigations to improve the identification of factors and circumstances associated with case-specific deaths (National Center for the Review and Prevention of Child Deaths, 2011).

The Research Related to SUID

According to Shapiro-Mendoza and Camperlengo (2009), approximately 4,600 SUID cases occur in the United States each year. In some of these deaths, the COD is discovered at autopsy. Others rely on the additional information obtained through DSI, such as sleep environment. Schnitzer, Covington, and Dykstra (2012) report that approximately half of SUID cases are classified as sudden infant death syndrome (SIDS), 14% are because of accidental suffocation, 6% are definitively identified (such as congenital abnormalities, poisoning, homicide), and 30% have a manner and means that remain undetermined. Despite a decline in the number of cases over the past four decades, research has indicated that the number of SIDS deaths appears to have hit a plateau (Shapiro-Mendoza & Camperlengo, 2009; Shapiro-Mendoza, Kimball, Tomashek, Anderson, & Blanding, 2009). However, since 1992, accidental suffocation and undetermined deaths both have drastically increased (Schnitzer et al., 2012) with professionals postulating different theories for these changes. One of the most plausible theories is the increased emphasis on conducting consistent and thorough DSIs.

As the study of sudden and unexpected infant deaths has grown more detailed and complex, it is necessary to point out the terminology and the impact of the changing terms and definitions in the field. SIDS is a diagnosis of exclusion and was the standard term for sudden and unexplained infant deaths for decades. Definitions were established in 1969 and 1989 and were reexamined in 1993 and 2004 (Corey, Hanzlick, Howard, Nelson, & Crouse, 2007). SUID can be a source of confusion as it is an acronym for two slightly different terms with very different meanings. Shapiro-Mendoza and Camperlengo (2009) report that SUID is an acronym for “sudden unexpected infant death” and is used at the beginning of a death investigation as an overarching category, not a final COD. SUID cases are then classified in other categories after an autopsy and investigation. The MOD in SIDS cases is natural; whereas the MOD in SUID can be accidental, homicide, natural, or undetermined. To add to the confusion, deaths where sleep environment risk factors were identified can reflect MODs including SIDS (natural), accidental (suffocation), or undetermined. SUID can also represent a final COD statement “sudden unexplained infant death,” which is utilized when a COD is not found after autopsy, DSI, and medical record review (Corey et al., 2007).

A caveat for the above is that these phrases are among a dozen or so variations of death certificate statements that contain the words “sudden,” “infant,” “unexplained,” or “unexpected” and “cot” or “crib” death that will be collapsed into a single diagnostic code from the World Health Organization’s International Classification of Diseases

(ICD-10) “R95: Sudden infant death syndrome” (Shapiro-Mendoza & Camperlengo, 2009). Therefore, when a certifier has the intention of classifying a death as undetermined, they may inadvertently use terminology that results in the death being coded as SIDS, resulting in falsely inflated SIDS rate.

“Accidental Suffocation & Strangulation in Bed” is also a diagnostic code from the World Health Organization’s ICD (Shapiro-Mendoza et al., 2009) and refers to accidental asphyxiation deaths that occur in sleep environments (traditional or not). The term can be somewhat misleading in understanding these deaths as it implies the asphyxiation occurred in a bed rather than on one of a number of appropriate or inappropriate surfaces upon which people choose to place their infant to sleep. Accidental asphyxiation can be further broken down based on mechanisms (overlying or positional asphyxiation or wedging) that are important for analysis and targeted prevention strategies. “Undetermined” is the listed MOD after an autopsy, complete DSI, and review of infant’s medical history are negative. Undetermined is used when one COD cannot be determined to the exclusion of all other possibilities. These deaths fall under the ICD-10 code of “R99: Other ill-defined and unspecified causes of mortality.”

The growing interest in sudden and unexpected infant death is shown by the increasing number of publications that are being produced. An examination of literature through Google Scholar (Ragan, 2012) found that the appearance of the phrases “sudden infant death syndrome” and “sudden unexpected infant death” in documents from the periods of 1995–1999 and 2005–2009 more than doubled from 5,070 to 10,800 and 102 to 222, respectively. In addition, the term “accidental suffocation and strangulation in bed” was not found in any publications from 1995 to 1999; however, it was found in 32 articles from 2005 through 2009. Since 2010 and in less than 2.5 years, there have been 37 publications that have included the phrase. Whereas past research focused on determining the “causes” and risk factors of SIDS (Schnitzer et al., 2012), emerging research focuses on what leads to a classification and how that information is collected and utilized.

As the terminology is clarified and investigations become more refined and research in this field increases, the classification and coding of these deaths continues to evolve. Some researchers report that there may have been a true decline in SIDS after an American Academy of Pediatrics recommendation in 1992 and the Back to Sleep campaign in 1994 but that the decline from 1999 to 2001 (Shapiro-Mendoza, Tomashek, Anderson, & Wingo, 2006) was more likely related to diagnostic shifts and changes in the way that these infant deaths are reported (Hargrove & Bowman, 2007; Schnitzer et al., 2012; Shapiro-Mendoza et al., 2009). Shapiro-Mendoza et al. (2009) also suggest that a strict adherence to the SIDS definition has increased the number of cases classified as undetermined. Literature has attributed the increase in SUID

classifications to improved investigations, shifts in diagnostic practices, and the implementation of CDR programs (Schnitzer et al., 2012; Shapiro-Mendoza & Camperlengo, 2009). Adding to an already complex issue is the introduction of new classification systems, either for classifying a COD or for research purposes that vary from study to study. Clinically, the COD of SIDS should never be used unless there was a complete infant DSI, autopsy, and review of medical records.

A procedure that also affects the reported number of deaths is the coding of the deaths from the COD statement. Much prior research on infant deaths relied on death certificate data (Schnitzer et al., 2012), which does not allow for more in-depth information about circumstances, sleep environment, and other possible factors. With over a dozen terms being collapsed into a single code of SIDS, it may be hard to determine the intent of the certifier. It is also possible that undetermined deaths may be overreported. Researchers warn about the effect of classification and coding on the data and use of the data. Randall, Donelan, Koponen, Sens, and Krous (2012) noted that reliability may be lacking when attempting to compare current SUID data to past SIDS deaths and cautions against future comparisons as well. They advise that it may be better to utilize overall SUID rates in prevention while increasing the identification of risks associated with such deaths. Senter, Sackoff, Landi, and Boyd (2011) also indicate that variations in SUID classifications and interpretations have created a barrier in understanding the impact of sleep-related factors on infant mortality.

Beyond classification and coding schemes, some believe that the foundation of identifying the proper COD and MOD starts long before the death certificate is signed. Researchers report that changes in causes of SUIDs have occurred because of better investigations, which have identified more cases with a known COD. For example, cases that may have been ruled SIDS are now being identified as asphyxia deaths or deaths where asphyxia cannot be ruled out (Hargrove & Bowman, 2007). Randall et al. (2012) stated that, in their review of 117 SUID cases, the death scene contributed to or caused the infant's death in 32%–50% of the cases including 40%–59% of the 83 cases originally identified as SIDS cases.

The importance of death investigations in infant deaths is also underscored by findings that the autopsy cannot always distinguish asphyxiation deaths from SIDS (Shapiro-Mendoza et al., 2009) and that investigations provide the necessary information to accurately provide a COD and MOD (Shapiro-Mendoza & Camperlengo, 2006). Bowman and Crowe (2007) reported that there were at least 13 different types of investigators ranging from those with no or little training to highly trained professionals. Shapiro-Mendoza and Camperlengo (2009) also stated that a thorough death investigation includes scene photos, a scene reconstruction and completion of an SUIDI report form, autopsy, toxicology, radiology and histology, and a review of maternal and infant medical records. The Scripps Howard News report on sudden

infant deaths indicated that geography was a better indicator for a COD of SIDS over medical evidence (Hargrove & Bowman, 2007). They noted that the training for those involved in investigations, the thoroughness of the investigations, and the level of oversight were variable across the country and could vary from county to county within a state. Research also suggests that the increased awareness about unsafe sleep environments may have contributed to the increase in SUIDs being classified as accidental asphyxiation deaths (Shapiro-Mendoza et al., 2006). Recognizing the importance of CDR, the Scripps Howard report also stated that cases of SUIDs were more likely to be called something other than SIDS in states where intensive death review boards exist (Hargrove & Bowman, 2007).

Research into SUID continues to increase every year. Although SIDS is still a main research priority, other SUIDs are being studied as well. Emerging themes about classification and coding are predicated on the importance of investigations and training. Studies have found that improved or required infant DSIs lead to more accurate causes of death and classifications of infant deaths (Shapiro-Mendoza et al., 2009; Schnitzer et al., 2012). The most prominent movement to address all of the above issues is the Centers for Disease Control and Prevention's (CDC's) Sudden Unexpected Infant Death Investigation initiative and development of a case registry system that aims at standardizing and improving data collection through proper scene investigation, promoting a consistent COD diagnosis, improving reporting of infant death cases, and finally, developing prevention strategies for these deaths (Shapiro-Mendoza & Camperlengo, 2009). It is only through identification of the factors identified in infant deaths that we will be able to accomplish prevention or risk reduction goals in this public health issue.

Barriers to Effective Infant DSIs

Investigating SUID in the United States serves as one of the many challenges facing law enforcement officers and medical-legal death investigators. Federal, state, and local investigators may have minimal or no SUID training and may not fully understand their specific role in an SUIDI. Criminal investigators may be reluctant to initiate a thorough investigation at an infant death scene unless they believe there was criminal activity and instead depend on the MEs or coroners to perform the DSI without their participation.

Regardless of the disciplines involved, there are a multitude of factors that may potentially compromise a thorough infant DSI, occurring both within and between variable agencies. This includes, but is not limited to, education and training, protocols, and personal biases (see Table 1).

Best Practices

As barriers have been identified and recognition regarding the importance of conducting comprehensive infant DSIs has evolved, several areas of best practice have emerged.

Table 1. Barriers to Effective Infant DSI

Education and training issues
Lack of training (SUID, SIDS, infant DSI) and/or equipment (doll for scene recreation)
The assumption that the death is SIDS, based on lack of education and/or premature assumptions and conclusions
Lack of comprehensive investigative techniques
Lack of knowledge related to infant developmental capabilities
Protocols
Improper or late notification of an infant death
Lack of protocols and inconsistent reporting forms for infant DSI
Supervisory personnel do not support DSI for infants
Removal of deceased infant before DSI
Lack of coordination/collaboration between multiple agencies possessing relevant information
Personal issues
Lack of comfort in questioning grieving parents
Discomfort with utilizing a doll for scene recreation
Responders often feel they need to give the parents time to grieve and delay the investigation, thereby potentially compromising critical evidence
Cultural, religious, and personal beliefs, biases, and emotions
Belief that the family has suffered enough
Disbelief that a parent would intentionally cause or allow the death of their child
DSI = death scene investigation; SUID = sudden unexpected infant death; SIDS = sudden infant death syndrome.

Standardization

Standardization of infant DSI will increase accuracy in the determination and reporting of the COD and MOD and subsequently contribute to the overall quality and quantity of data. Additionally, standardization will:

- identify risk and protective factors associated with cultural practices, products, and public health issues;
- augment the identification, development, and implementation of evidence-based prevention strategies;
- develop and enforce quality measures and controls;
- provide timely and accurate information to epidemiologists and agencies with a vested interest in the welfare of children; and
- provide consistent terminology (CDC, 2012; Valdes-Dapena, 1992).

Training

The multiple disciplines involved in infant DSI should include infant growth and development, SIDS, SUID, and infant DSI; utilization of the SUIDI Reporting Form (SUIDI-RF); and doll reenactment. Clear role definitions and expectations for each discipline involved in DSI investigation for collaboration and coordination of efforts should be developed and

agreed upon by the involved agencies. Multidisciplinary personnel may include, but are not limited to, emergency medical services, medical personal, law enforcements, coroners/MEs, pathologists, medical legal death investigators, and/or child protective services.

Scene

The scene must be secured, and the integrity of the scene must be protected. It is also important to have a scene that is safe to the family and responders. The following points ensure integrity and safety while optimizing the DSI process.

- Law enforcement should secure the scene as soon as possible to provide scene preservation, ensure the integrity of evidence, and initiate the chain of evidence log.
- The integrity of the scene should be preserved. An altered scene compromises the investigation, especially when the body has been removed from the scene before the investigation. Robinson, Trelka, and Cina (2011) report that an altered scene changes the microenvironment and materials may be displaced or deposited before the investigator arrives.
- Emergency medical services personnel at the scene should give priority to assessing and treating the patient. In the event of obvious death, they should avoid disturbing the patient and scene.
- The physical environment and caregiver/witness/bystander behaviors should be noted.
- Tools such as the SUIDI-RF, or jurisdictional equivalent, can guide investigators in gathering relevant information and evidence (CDC, 2012).
- Items such as bedding, medicines, formula, and any other items that may be helpful in determining the COD and MOD should be collected and sent along with the decedent to the autopsy (CDC, 2012).

Interviews

Shapiro-Mendoza (2007) suggests that “parents and other caregivers deserve an investigation that is sensitive to their grieving state and not one that is accusatory or insensitive to the emotions they are feeling” (p. 14). If the investigation appears to be headed into a criminal investigation, then appropriate techniques should be employed at that time. Parents or caregivers may not cooperate if they feel as though they are being interrogated. In addition, witnesses should be interviewed.

Documents

Documentation of the DSI should include scene diagrams, photos, recordings and/or videotape, individual agency reports, and the SUIDI-RF (or jurisdictional equivalent). The most recognized tool associated with infant DSI is the SUIDI-RF developed by the CDC. The form, along with a protocol manual, is available online in PDF version from <http://www.cdc.gov/sids> (Diebold, 2007). At the very least, the National Association of Medical Examiners list of the

25 most important questions should be ascertained in relation to investigating an SUID (Corey et al., 2007).

Scene Reenactment With Doll

When the person who conducts the autopsy is not at the death scene, the investigator must be the “eyes and ears” for the pathologist. The autopsy begins at the scene, even if the infant has been transported to the hospital or is no longer at the death scene (U.S. Department of Justice, 2005). There are three parts to what eventually becomes a death investigation: the location/time/people present when the infant experienced the emergency, the determination of a deceased infant, and the gathering of all relevant information from before (i.e., medical records) and after (i.e., the autopsy) the death.

At this time of loss, the parent or caregiver may have difficulty in adequately answering questions. According to Diebold (2007), for best results, the investigator should explain the doll reenactment process, emphasize the value of the reenactment, and answer questions that arise. It is very important that the investigator handle the doll with respect and be sensitive to the emotional state of the parents or caregivers; however, the doll should not be handled like a real baby (CDC, 2012). The doll reenactment should be performed by the person who found the infant unresponsive or deceased or who witnessed the found position. During the doll reenactment, the individual will show the infant's placed position, the position when the infant was last known to be alive, and the discovery position. It is important to photograph the doll in each of the positions and infant's sleep surface and bedding (Diebold, 2007). Photographs of the entire doll reenactment and the entire death scene are essential to ensure a thorough investigation. Accurate photographs allow the pathologist to visualize the death scene environment and obtain critical information to assist in accurately determining COD and MOD (CDC, 2012; Diebold, 2007).

An often overlooked yet vital component of the infant DSI is the debriefing of the family. It is important to thank the parents or caregivers for their cooperation, offer your condolences, and provide them with written follow-up instructions that include contact name and numbers (and case number, if applicable). Reiterate that their cooperation and assistance will assist in understanding what happened to their baby.

Autopsy

An autopsy usually includes an external head-to-toe examination with documentation of injuries, examination of internal organ systems, grossly and microscopically, toxicology, histology, radiology, and blood chemistries. In addition, there may be case-specific tests and screenings that are needed to accurately determine the COD and MOD (CDC, 2012; Corey et al., 2007).

Collaboration

A thorough and comprehensive infant DSI is optimally obtained through the synergy and input of multidisciplinary professionals who have a direct role in the health, safety, and welfare of infants.

Infant Death Review

Infant death reviews can assist in the determination and reporting of accurate infant COD and MOD and subsequently contribute to the identification of risk and protective factors. The review process, which is essentially a social autopsy, allows for augmentation in the development and implementation of evidence-based intervention and prevention strategies. Reviews provide timely and accurate information to epidemiologists and agencies with a vested interest in the welfare of children (CDC, 2012; Valdes-Dapena, 1992).

Infant DSI and the Forensic Nurse

Forensic nurses can enhance the infant DSI and provide unique skills and knowledge to this evolving practice. First of all, nurses have knowledge and skills in patient assessment, comprehensive documentation, pathophysiology, anatomy and physiology, epidemiology, trauma, child abuse and neglect, knowledge of infant growth and development, integration of public health concepts, and the ability to work with multidisciplinary partners. Most importantly, nurses practice holistic, biopsychosocial patient care. Specific knowledge, skills, and abilities that forensic nurses contribute to infant DSI are outlined in Table 2.

Table 2. Forensic Nurses and Infant DSI

Develop protocols and training related to near-death cases
Develop intervention and prevention strategies
Educate and train multidisciplinary professionals
Participate in multidisciplinary professional case reviews
Develop evidence-based practices and protocols
Conduct an infant DSI, complete an SUIDI Reporting Form, and conduct a doll reenactment
Work on laws affecting the health and safety of infants based on DSI findings and infant death reviews
Serve as a coroner or deputy coroner (depending on state statutes)
Assist agencies in refining policies and procedures related to infant DSI
Provide education in areas such as newborn and infant growth and development
Conduct research
Apply prevention strategies to prevent future fatalities
DSI = death scene investigation; SUIDI = sudden unexpected infant death investigation.

Forensic nurses have the ability to be a catalyst for positive change, and although DSI does not prevent the current death, comprehensively understanding causative, contributory, and protective factors can be utilized to prevent future tragedies.

Conclusion

According to Healthy People 2020 (2014), approximately one third of the objectives listed are measured using mortality data, thereby highlighting the importance of accurately determining the COD and MOD. Surveillance systems also utilize mortality data including National Vital Statistics System, National Death Index, Substance Abuse and Mental Health Services Administration, The Medical Examiners and Coroners Alert Project (within the Consumer Product Safety Commission), The Food and Drug Administration Medical Products Program, The Fatality Analysis Reporting System, The National Violent Death Reporting System, and the Electronic Death Registration.

As the accuracy of DSIs increases, then MOD and COD will proportionally increase in accuracy. Proper certification of deaths impacts civil and criminal court proceedings and has a significant impact on public health strategies and the allocation of resources. Forensic nurses, as responsible stewards of healthcare dollars, need to be fiscally responsible, which begins with decisions based on accurate and complete data.

As the field of forensic nursing continues to expand, the option of providing direct and indirect services in the area of death investigation also expands. Infant DSI is an area that needs champions that can coordinate and collaborate with multiple disciplines and ensure that proper protocols are utilized. In addition, nurses can bring infant DSI full circle and identify prevention strategies that can benefit our most vulnerable population.

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