

Il sistema classificativo del CDC di Atlanta (2014): come applicarlo nel nostro contesto? Risultati

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Regione Piemonte

S.I.D.S

S.U.I.D



U.S.U.I.D

E.S.U.I.D

S.U.I.D



Sudden Unexpected

Infant Death

S.U.I.D



S.I.D.S

Morti improvvise
non spiegate

E.S.U.I.D

Morti improvvise
ed inaspettate spiegate

U.S.U.I.D

Morti improvvise ed inaspettate
non classificabili

S.I.D.S.

Sudden Infant Death Syndrome

SUID
**(Morte improvvisa
del lattante)**
INSPIEGATA

**Non è il principale
obiettivo della
nostra analisi**



Sudden Infant Death Syndrome and Unclassified Sudden Infant Deaths: A Definitional and Diagnostic Approach

Henry F. Krous, J. Bruce Beckwith, Roger W. Byard, Torleiv O. Rognum, Thomas Bajánowski, Tracey Corey, Ernest Cutz, Randy Hanzlick, Thomas G. Keens and Edwin A. Mitchell
Pediatrics 2004;114:234-238
DOI: 10.1542/peds.114.1.234

The online version of this article, along with updated information and services, is located on the World Wide Web at:
<http://www.pediatrics.org/cgi/content/full/114/1/234>

1969

1989

Krous HF, *Pediatrics*, 2004

“la morte improvvisa ed inaspettata di un bambino di età inferiore a 12 mesi che si verifica durante il sonno e che resta priva di spiegazione dopo un’attenta analisi del caso che comprende l’effettuazione di un’autopsia completa e la revisione delle circostanze del decesso e della storia clinica della vittima”.

DEFINIZIONE E CLASSIFICAZIONE DI SIDS: A WORK IN PROGRESS

Perché?

**Rapida evoluzione
delle conoscenze epidemiologiche,
anatomopatologiche, fisiopatologiche e
cliniche del fenomeno**

DEFINIZIONE E CLASSIFICAZIONE DI SIDS: A WORK IN PROGRESS

Con quali obiettivi

- **Ampliare** la descrizione del fenomeno tenendo conto delle nuove conoscenze e delle variabili cliniche (età, stato comportamentale ecc)
- **Stratificare** il fenomeno in precise sottocategorie per separare i casi con caratteristiche differenti
- **Approfondire** l'indagine clinica, medico legale ed anatomopatologica di ogni singolo caso in modo da migliorare la capacità diagnostica
- **Confrontare** i singoli eventi e le casistiche internazionali grazie ad un'analisi dei casi sempre più omogenea e standardizzata
- **Pianificare** le strategie preventive locali ed internazionali
- **Indirizzare** la ricerca scientifica sfruttando la suddivisione degli eventi in sottogruppi ben differenziati

Ampliare

Stratificare

Indirizzare

Approfondire

**LA SORVEGLIANZA
EPIDEMIOLOGICA
E' UN ELEMENTO
INDISPENSABILE PER
RAGGIUNGERE
QUESTI OBIETTIVI**

Confrontare

Pianificare

DEFINIZIONE E CLASSIFICAZIONE DI SIDS: A WORK IN PROGRESS

1969

“morte improvvisa di un lattante o bambino piccolo che avviene inaspettatamente rispetto alla storia clinica della vittima e resta inspiegata dopo l'esame autoptico”

1989

Viene definita in modo più preciso l'età <12 mesi e viene ampliata l'indagine per escludere una causa integrando la storia clinica e l'autopsia con il sopralluogo

2004

Beckwith promuove un meeting internazionale a San Diego tra anatomo patologi, medici legali e pediatri per riesaminare la classificazione in uso e creare una stratificazione con dei sottotipi di SIDS

“The sudden unexpected death of an infant < 1 year of age, with the onset of the fatal episode apparently occurring during sleep, That remains unexplained after a thorough investigation including performance of a complete autopsy and review of the circumstances of death, and of the clinical history.”

Krous HF, Pediatrics, 2004

Sudden Infant Death Syndrome and Unclassified Sudden Infant Deaths: A Definitional and Diagnostic Approach

Henry F. Krous, MD*; J. Bruce Beckwith, MD‡; Roger W. Byard, MD§; Torleiv O. Rognum, MD, PhD||;
Thomas Bajanowski, MD¶; Tracey Corey, MD#; Ernest Cutz, MD*; Randy Hanzlick, MD‡‡;
Thomas G. Keens, MD§§; and Edwin A. Mitchell, MD|||

<i>Category</i>	<i>SIDS IA</i>
	<i>SIDS IB</i>
	<i>SIDS II</i>
	<i>Unclassified Sudden Infant Death</i>
	<i>Postresuscitation Cases</i>

SIDS IA

Classificazione SIDS
Krous HF,
Pediatrics, 2004

Casi che aderiscono perfettamente alla definizione

Clinica

Bambino sano con un'età ben precisa (21 giorni - 9mesi) con una storia familiare silente

Indagine completa delle circostanze della morte

-Sopraluogo

-Valutazione dell'ambiente di sonno

Autopsia completa di:

- esame macroscopico e microscopico

tossicologico

microbiologico

radiologico

del corpo vitreo

metabolico



**Nessuna
spiegazione
al decesso**



**No patologie
No segni di
traumi od abusi**

Ammesso riscontro di:
- lieve flogosi respiratoria
-petecchie intratoraciche

SIDS IB

Classificazione SIDS

Krous HF,
Pediatrics, 2004

Quando manca qualcosa

No sopralluogo

oppure

Autopsia incompleta di 1 o >1 dei seguenti esami:

- esame microscopico

Tossicologico

microbiologico

radiologico

del corpo vitreo

metabolico

SIDS II

Quando c'è qualcosa di particolare

Nella clinica

- Età atipica (<21 gg e >9 mesi)
- Familiarità (altri casi simili tra i parenti stretti)
- Prematuranza

Nell'indagine delle circostanze della morte

- Sospetta asfissia o soffocamento

Nell'autopsia :

- anomalie di crescita o sviluppo
- marcato processo infiammatorio o anomalie non sufficiente a determinare con certezza la morte

Unclassified Sudden Infant Death

Classificazione SIDS

Krous HF,
Pediatrics, 2004

Né SIDS né altra causa certa

- Mancano i criteri per la diagnosi di SIDS
- Mancano gli elementi per la diagnosi di certezza di un'altra causa di morte (naturale o innaturale)

Oppure

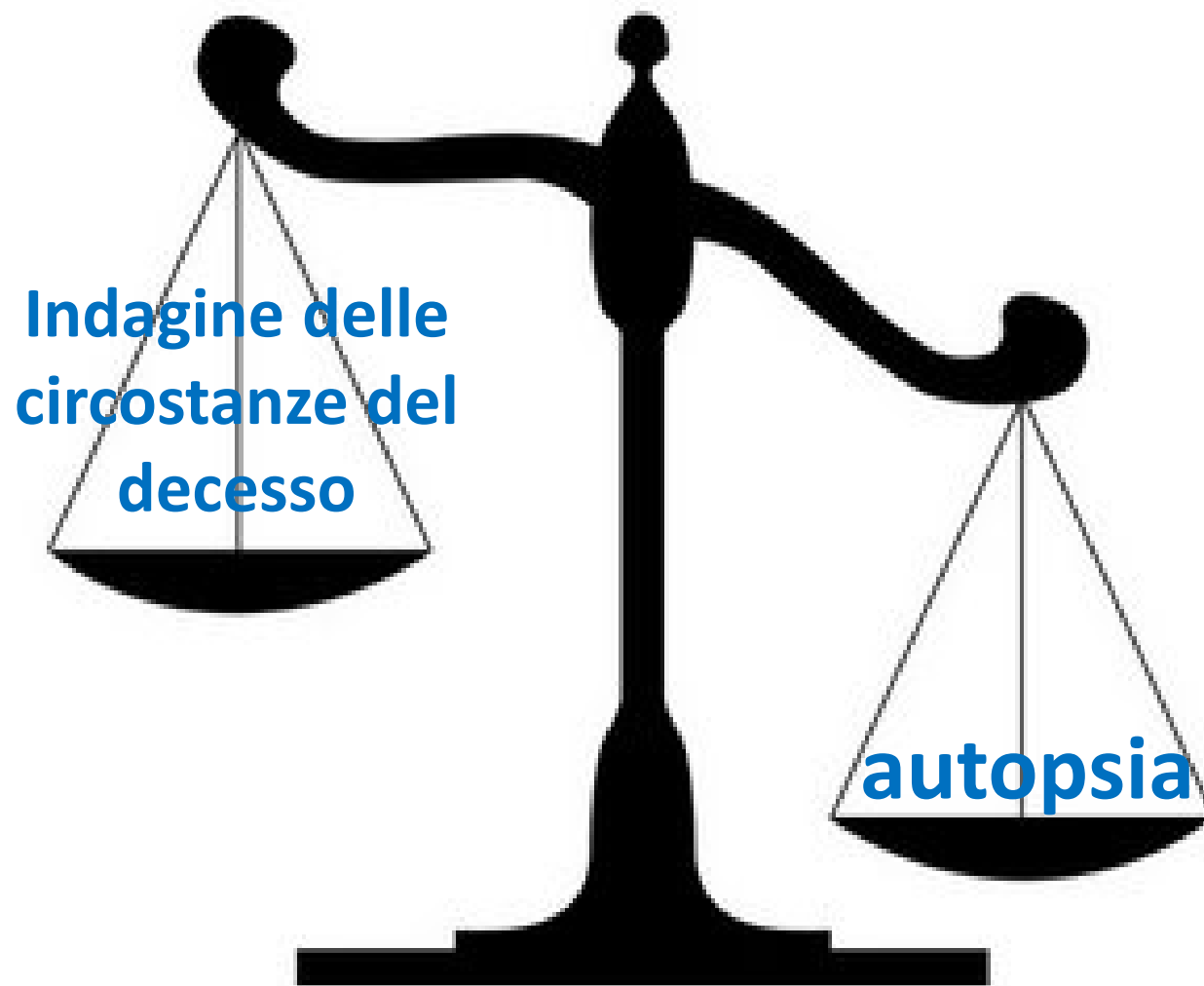
- Non è stata eseguita l'autopsia

Postresuscitation Cases

La SIDS interrotta

**Casi in cui il decesso avviene
dopo la rianimazione**

KROUS 2004



I dolori dell'anatomia patologica...

SIDS I : Minor respiratory system inflammatory infiltrates are acceptable;

SIDS II: Marked inflammatory changes or abnormalities not sufficient to be unequivocal causes of death

Unclassified: alternative diagnoses of natural conditions are equivocal....

...Il rapporto causa-effetto

- **Come essere sicuri che un'anomalia riscontrata all'esame autoptico abbia causato la morte?**
- **A volte è facile (es., malformazione cardiaca incompatibile con la vita) > morte improvvisa spiegata**
- **Tante volte, no (es. classico, un focolaio di polmonite)**

Classificazione SIDS

Krous HF,
Pediatrics, 2004

SIDS

Absence of potentially fatal pathologic findings.

**intrathoracic petechial hemorrhage is a
supportive but not obligatory or diagnostic
finding.**

***Assenza di markers anatomopatologici
patognomonici***

Classificazione SIDS

Krous HF,
Pediatrics, 2004

Morti dopo la rianimazione???

Postresuscitation Cases

Infants found in extremis who are resuscitated and later die (“temporarily interrupted SIDS”) may be included in the aforementioned categories, depending on the fulfillment of relevant criteria.

- “interrotte” per quanto tempo???
- come riconoscere i criteri anatomopatologici ed epidemiologici delle SIDS I e II???

Classificazione SIDS

Krous HF,
Pediatrics, 2004



Morti in veglia???

SIDS

Classificazione SIDS

Krous HF,
Pediatrics, 2004

Risultato negativo dell'autopsia completa di:

esame macroscopico e microscopico

tossicologico

microbiologico

radiologico

del corpo vitreo

metabolico

....e genetico, se c'è l'indicazione

2004 -2014 work in progress



A practical classification schema incorporating consideration of possible asphyxia in cases of sudden unexpected infant death

**Brad B. Randall · Sabbir A. Wadee · Mary Ann Sens ·
Hannah C. Kinney · Rebecca D. Folkerth ·
Hein J. Odendaal · Johan J. Dempers**

Accepted: 12 March 2009 / Published online: 31 May 2009
© Humana Press 2009

**2009 l'analisi del sonno non sicuro
per distinguere SIDS da morti accidentali da
possibile asfissia**

Study of 206 sudden infant deaths in Detroit, Michigan, reported **circumstances consistent with asphyxia in approximately 85% of such deaths**

These circumstances included:

- prone or face-down sleep position
- soft bedding
- bed sharing
- overlaying
- sofa deaths
- facecovering.

Pasquale-Styles MA, Tackitt PL, Schmidt CJ.

Infant death scene investigation and the assessment of potential risk factors for asphyxia: a review of 209 sudden unexpected infant deaths.

J Forensic Sci. 2007;52(4):924–9

Classification System for the Sudden Unexpected Infant Death Case Registry and its Application

Carrie K. Shapiro-Mendoza, Lena Camperlengo, Rebecca Ludvigsen, Carrie Cottengim, Robert N. Anderson, Thomas Andrew, Theresa Covington, Fern R. Hauck, James Kemp and Marian MacDorman

Pediatrics 2014;134:e210; originally published online June 9, 2014;

DOI: [10.1542/peds.2014-0180](https://doi.org/10.1542/peds.2014-0180)

**the Centers for Disease Control
and Prevention (CDC) created the
SUID Case Registry in 2009**

**solo decessi privi di spiegazione certa
o indeterminati**

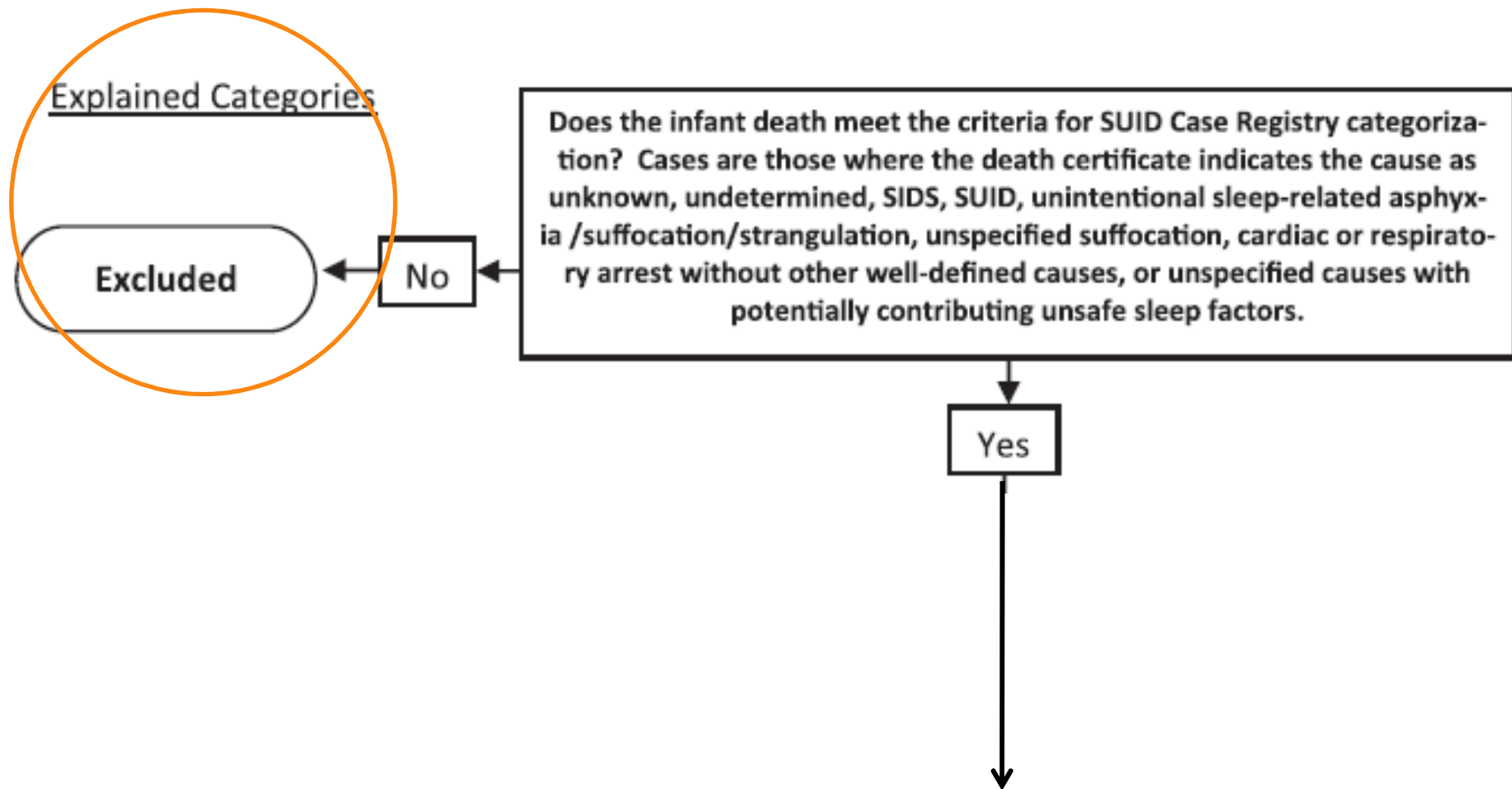


TABLE 1 Definitions and Criteria for Assigning Cases to SUID Case Registry Categories

Category	Criteria That Must Be Met
Unexplained: no autopsy or death scene investigation	<ol style="list-style-type: none"> 1. Death is unexplained. 2. No death scene investigation or post-mortem examination information reported.
Unexplained: incomplete case information	<ol style="list-style-type: none"> 1. Death is unexplained. 2. Incomplete death scene investigation or autopsy information reported (including reports pending further investigation). 3. Lack of detailed information about how the body was found OR 1 of 3 tests: (1) toxicology, (2) radiography, and (3) pathology was not performed and documented. Pathology can include histology, microbiology, or forensic toxicology, such as drug testing, but not solely gross examination.
Unexplained: no unsafe sleep factors	<ol style="list-style-type: none"> 1. Death is unexplained after complete case investigation.^a 2. Death may or may not occur during sleep. For those deaths that occur during sleep, the sleeping environment is free of unsafe sleep factors^b or other suffocation or strangulation hazards. <p>Note: case may or may not have other potentially fatal findings, concerning conditions,^c or competing cause of death, but how these factors contribute to death is uncertain.</p>
Unexplained: unsafe sleep factors	<ol style="list-style-type: none"> 1. Death is unexplained after complete case investigation.^a 2. Found in an unsafe sleep environment, but role of the unsafe sleep environment in causing or contributing to the death is uncertain. Examples of unsafe sleep practices are soft objects or loose bedding (eg, pillow, blanket), not in a crib, cot, or crib, or on a flat, hard, sleep surface, found non-supine. 3. No factors that might indicate suffocation were present. No evidence of face pressed into or obstructed by soft bedding (eg, pillow, egg crate foam, sleeping bag, or couch), witnessed overlay, entrapment, or wedging. <p>Note: case may or may not have other potentially fatal findings, concerning conditions,^c or competing cause of death, but how these factors contribute to death is uncertain.</p>
Unexplained: possible suffocation with unsafe sleep factors	<ol style="list-style-type: none"> 1. Death is unexplained after complete case investigation.^a 2. Scene investigation provides evidence of suffocation or asphyxiation caused by an external airway obstruction. Examples include overlay, entrapment or wedging, or face pressed into and airway fully occluded by soft bedding (eg, pillow, egg crate foam, cushion, sleeping bag, or couch). 3. Event was not witnessed or there was a conflicting account of full external obstruction of both nose and mouth, or external compression of the neck or chest. <p>AND/OR</p> <p>Potentially fatal findings or concerning medical conditions^c were present at postmortem examination.</p> <p>AND/OR</p> <p>Although there was strong evidence of suffocation, suffocation does not seem probable given the infant's age and likely stage of development (eg, otherwise healthy 11-month-old infant found face down on pillow).</p>
Explained: suffocation with unsafe sleep factors	<ol style="list-style-type: none"> 1. Death is explained after complete case investigation.^a 2. Scene investigation provides sufficient evidence of suffocation or asphyxiation caused by an external airway obstruction. Examples include witnessed overlay, entrapment or wedging, or face pressed into and airway fully occluded by soft bedding (eg, pillow, egg crate foam, cushion, sleeping bag, or couch). Suffocation must be probable given the infant's age and likely stage of development. 3. Evidence of full, external obstruction of both nose and mouth or external compression of the neck or chest. 4. Event was reliably witnessed and there were no conflicting accounts of full external obstruction of both nose and mouth or external compression of the neck or chest. 5. Potentially fatal findings or concerning^c medical conditions were not present at postmortem examination.

SUIDS

TABLE 1. Definitions and Criteria for Assigning Cases to SIDS Case Registry Categories

Category	Criteria (Must be)
Unexplained infant death	1. Death is unexpected. 2. Death is uninvestigated or investigation is incomplete. (Examples of incomplete investigations include: pending reports pending further information, or reports pending further information.)
Unexplained, incomplete case	1. Death is unexpected. 2. Death is uninvestigated or investigation is incomplete. (Examples of incomplete investigations include: pending reports pending further information, or reports pending further information.)
Unexplained, possible suffocation	1. Death is unexpected after complete case investigation. 2. Found in an unsafe sleep environment, but the role of the unsafe sleep environment in causing or contributing to the death is uncertain. (Examples of unsafe sleep factors are soft objects or loose bedding (eg, pillow, blanket, hat, etc), crib or bassinet, shared sleep surface, found non-supine.) 3. No factors of suffocation were present. No evidence of face pressed into or obstructed by soft bedding (mattress foam, sleeping bag, or couch), witnessed overlay entrapment, or wedging. 4. Case may or may not have other potentially fatal findings, concerning conditions, ¹ or competing cause of death, but how these factors contribute to death is uncertain.
Unexplained, unsafe sleep factors	1. Death is unexpected after complete case investigation. 2. Found in an unsafe sleep environment, but the role of the unsafe sleep environment in causing or contributing to the death is uncertain. (Examples of unsafe sleep factors are soft objects or loose bedding (eg, pillow, blanket, hat, etc), crib or bassinet, shared sleep surface, found non-supine.) 3. No factors of suffocation were present. No evidence of face pressed into or obstructed by soft bedding (mattress foam, sleeping bag, or couch), witnessed overlay entrapment, or wedging. 4. Case may or may not have other potentially fatal findings, concerning conditions, ¹ or competing cause of death, but how these factors contribute to death is uncertain.
Unexplained, possible suffocation	1. Death is unexpected after complete case investigation. 2. Found in an unsafe sleep environment, but the role of the unsafe sleep environment in causing or contributing to the death is uncertain. (Examples of unsafe sleep factors are soft objects or loose bedding (eg, pillow, blanket, hat, etc), crib or bassinet, shared sleep surface, found non-supine.) 3. Event was not witnessed or there was a conflicting account of full external obstruction of both nose and mouth, or external compression of the neck or chest. 4. Potentially fatal findings or concerning ¹ medical conditions were not present at postmortem examination.
Unexplained, unsafe sleep factors	1. Death is unexpected after complete case investigation. 2. Found in an unsafe sleep environment, but the role of the unsafe sleep environment in causing or contributing to the death is uncertain. (Examples of unsafe sleep factors are soft objects or loose bedding (eg, pillow, blanket, hat, etc), crib or bassinet, shared sleep surface, found non-supine.) 3. Evidence of full, external obstruction of both nose and mouth or external compression of the neck or chest. 4. Event was reliably witnessed and there were no conflicting accounts of full external obstruction of both nose and mouth or external compression of the neck or chest. 5. Potentially fatal findings or concerning ¹ medical conditions were not present at postmortem examination.



Lascia spazio ad ulteriori stratificazioni a seconda delle necessità e delle possibilità analitiche dei singoli casi

TABLE 1. Definitions and Criteria for Assigning Cases to SIDS Case Registry Categories

Category	Criteria That Must Be Met
Unexplained sudden death with some information	1. Death is unexplained. 2. Incomplete death scene investigation or autopsy information reported (including reports pending further investigation).
Unexplained sudden death with complete information	1. Death is unexplained after complete case investigation. 2. Some investigation provides sufficient evidence of suffocation or asphyxiation caused by an external airway obstruction (e.g., face pressed into mattress, bedding, or soft surface; external airway obstruction caused by clothing, blanket, or other bedding; or face pressed into and airway fully occluded by cushion, sleeping bag, or couch). Suffocation must be probable given the infant's age and developmental stage. 3. Evidence of full, external obstruction of both nose and mouth or external compression of the neck or chest. 4. Event was reliably witnessed and there were no conflicting accounts of full external obstruction of both nose and mouth or external compression of the neck or chest. 5. Potentially fatal findings or concerning medical conditions were not present at postmortem examination.
Unexplained possible suffocation with small sleep factors	1. Death is unexplained after complete case investigation. 2. Some investigation provides evidence of suffocation or asphyxiation caused by an external airway obstruction (e.g., face pressed into mattress, bedding, or soft surface; external airway obstruction caused by clothing, blanket, or other bedding; or face pressed into and airway fully occluded by cushion, sleeping bag, or couch). Suffocation must be probable given the infant's age and developmental stage. 3. Evidence of full, external obstruction of both nose and mouth or external compression of the neck or chest. 4. Event was reliably witnessed and there were no conflicting accounts of full external obstruction of both nose and mouth or external compression of the neck or chest. 5. Potentially fatal findings or concerning medical conditions were not present at postmortem examination.
Unexplained possible suffocation with small sleep factors	1. Death is unexplained after complete case investigation. 2. Some investigation provides evidence of suffocation or asphyxiation caused by an external airway obstruction (e.g., face pressed into mattress, bedding, or soft surface; external airway obstruction caused by clothing, blanket, or other bedding; or face pressed into and airway fully occluded by cushion, sleeping bag, or couch). Suffocation must be probable given the infant's age and developmental stage. 3. Evidence of full, external obstruction of both nose and mouth or external compression of the neck or chest. 4. Event was reliably witnessed and there were no conflicting accounts of full external obstruction of both nose and mouth or external compression of the neck or chest. 5. Potentially fatal findings or concerning medical conditions were not present at postmortem examination.

Spostamento di obiettivo

Dalla ricerca di un fenomeno ben preciso (SIDS) attraverso l'esclusione soprattutto anatomopatologica di una malattia



Alla classificazione del maggior numero possibile di SUID attraverso un'analisi completa e dettagliata (ambientale, clinica, anatomopatologica)

Unexplained: no autopsy or death scene investigation

Casi con informazioni lacunose

- 1. Morte inspiegata**
- 2. No valutazione della scena del decesso o
no autopsia**

Unexplained: incomplete case information

Casi con informazioni incomplete

1. **Morte inspiegata**
2. **Valutazione della scena del decesso o autopsia incomplete**
3. **Informazioni sul luogo di ritrovamento e sulla posizione del corpo incomplete o assenza di uno dei 3 test:**
 - **tossicologico**
 - **radiologico**
 - **patologico***

*** Istologico o microbiologico o altro (es. genetico)**

Unexplained: no unsafe sleep factors

Casi con ambiente di sonno sicuro

- 1. Morte inspiegata dopo un esame completo del caso***
- 2. Morte in sonno o in veglia.**
Se in sonno: ambiente di sonno sicuro

NB: possibile presenza di condizioni che possono essere fatali, ma con ruolo incerto nell'aver potuto causare il decesso.

**ESAME COMPLETO DEL CASO =*

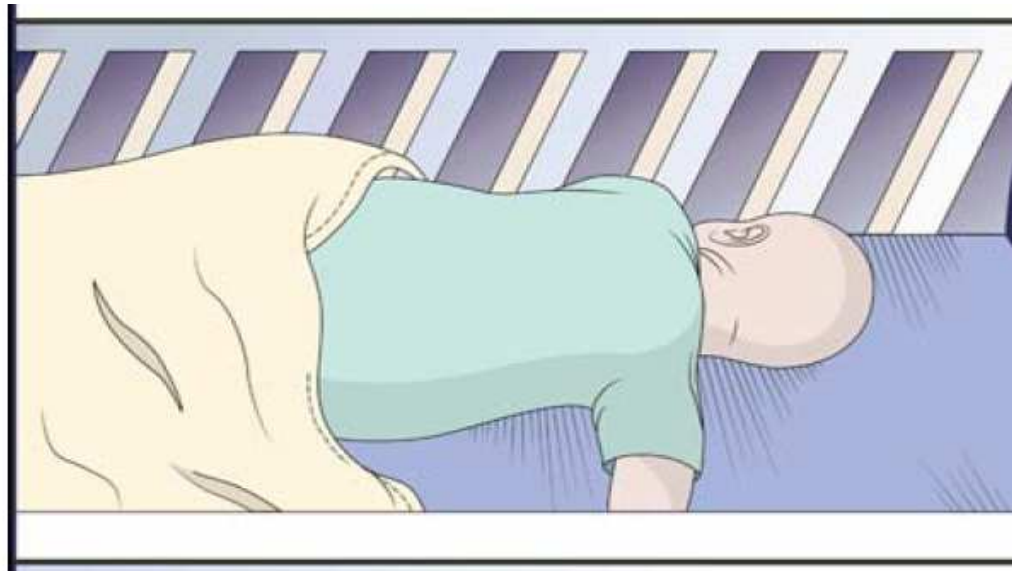
- Valutazione del luogo del decesso*
 - ✓ Dove e come il corpo é stato trovato*
- Autopsia che comprende*
 - ✓ Esame macroscopico+ 1 dei 3 test*
 - 1) Tossicologico*
 - 2) Radiografico*
 - 3) Patologico che può includere*
 - 1. Istologia*
 - 2. microbiologia*
 - 3. altro (es. genetica)*

Unexplained: unsafe sleep factors

Casi con ambiente di sonno NON sicuro

1. Morte inspiegata dopo un esame completo del caso*
2. Ambiente di sonno non sicuro, ma con incerto ruolo causale nel decesso
3. Assenza di fattori che potrebbero indicare un soffocamento

NB Possibile compresenza di altri elementi potenzialmente letali, ma con ruolo causale incerto



Unexplained: possible suffocation with unsafe sleep factors

1. **Morte inspiegata dopo un esame completo del caso***
2. **Evidenze di soffocamento o asfissia nella scena del decesso a causa ostruzione delle alte vie aeree, MA**
 - a. **Assenza di testimoni o**
 - b. **Dubbia entità dell'ostruzione o della compressione del torace o del collo o**
 - c. **compresenza di anomalia patologica con dubbio ruolo letale**
 - d. **Soffocamento dubbio per età e sviluppo corporeo**



Explained: suffocation with unsafe sleep factors

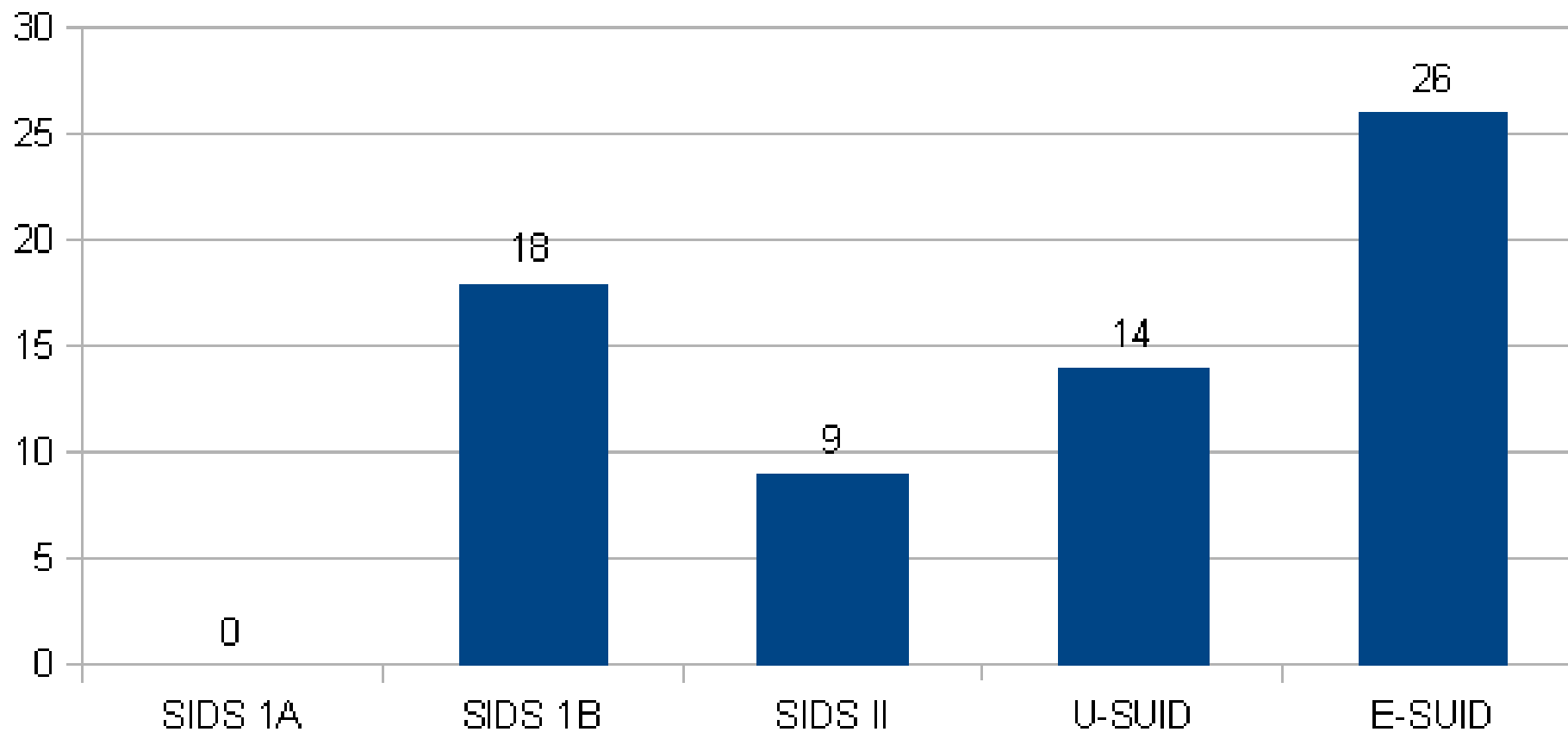
1. Morte **spiegata** dopo un esame completo del caso*
2. Evidenza di soffocamento o asfissia nella scena del decesso
3. Segni di ostruzione completa di naso e bocca o compressione di torace o collo
4. Presenza di testimone affidabile e assenza di dubbi sull'entità di ostruzione della alte vie aeree o compressione di torace o collo
5. Assenza di anomalie potenzialmente fatali all'autopsia



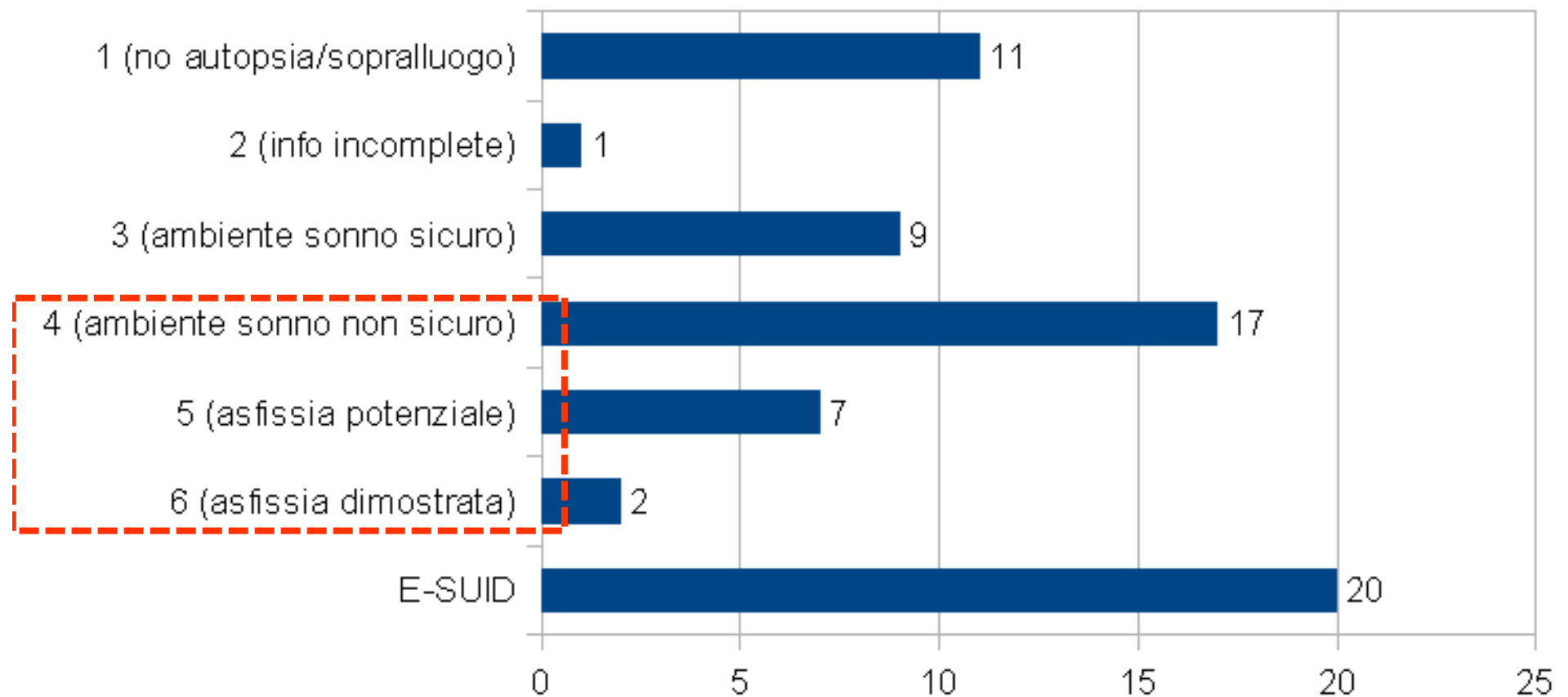
**ESAME COMPLETO DEL CASO =*

- *Valutazione del luogo del decesso*
 - ✓ *Dove e come il corpo é stato trovato*
- *Autopsia che comprende*
 - ✓ *Esame macroscopico+ 1 dei 3 test*
 - 1) *Tossicologico*
 - 2) *Radiografico*
 - 3) *Patologico che può includere*
 1. *Istologia*
 2. *microbiologia*
 3. *altro (es. genetica)*

MORTI IMPROVVISE - CLASSIFICAZIONE SECONDO KROUS (2004)



MORTI IMPROVVISE - CLASSIFICAZIONE CDC ATLANTA 2014



**ESAME COMPLETO DEL CASO =*

- *Valutazione del luogo del decesso*
 - ✓ *Dove e come il corpo é stato trovato*
- *Autopsia che comprende*
 - ✓ *Esame macroscopico+ 1 dei 3 test*
 - 1) *Tossicologico*
 - 2) *Radiografico*
 - 3) *Patologico che può includere*
 1. *Istologia*
 2. *microbiologia*
 3. *altro (es. genetica)*

Obiettivi della nostra sorveglianza

- Fornire ai familiari risposte ed eventuali consigli genetici
- Pianificare un programma di prevenzione

