Journal of Research in Philosophy and History
Vol. 9, No. 1, 2026
www.scholink.org/ojs/index.php/jrph
ISSN 2576-2451 (Print) ISSN 2576-2435 (Online)

Original Paper

Swedish Physicians' Reasoning about Suspected Shaken Baby Syndrome—A Qualitative Study

Niels Lynøe[1*], Niklas Juth[1,2], & Anders Eriksson[3]

[1] Centre for Healthcare Ethics, Karolinska Institutet, Stockholm, Sweden

[2] Centre for Research Ethics and Bioethics, Department of Public Health and Caring Sciences, Uppsala University, Uppsala, Sweden

[3] Department of Clinical Sciences, Forensic Medicine, Umeå University, Umeå, Sweden

[*] Niels Lynøe, Centre for Healthcare Ethics, Karolinska Institutet, Stockholm, Sweden

Received: March 3, 2026 Accepted: March 22, 2026 Online Published: April 14, 2026

doi:10.22158/jrph.v9n1p59 URL: http://dx.doi.org/10.22158/jrph.v9n1p59

Abstract

Background: The diagnostic procedure in suspected shaken baby syndrome (SBS) is the subject of a scientific controversy. Traditionally, isolated "triad findings" [encephalopathy symptoms, subdural hemorrhage, and retinal hemorrhages without signs of trauma] are considered highly specific of shaking. Recent theories suggest that trauma is not necessary to explain the findings, and a systematic review revealed that there was insufficient scientific evidence to predict violent shaking.

Aims: To explore how involved Swedish physicians reason about the diagnostic procedure.

Methods: 400 pediatricians, 400 ophthalmologists, and 400 radiologists were randomly selected– together with all forensic pathologists in Sweden (n=69) – to participate in a questionnaire-based study. Qualitative content analysis was applied to the 595 free text comments.

Results: Three main themes and 8 categories were identified: I) Causality issues, with the categories a) Robustness of the diagnostic accuracy, b) Paradoxical phenomena; II) Diagnostic procedures, with the categories a) Reasons for judgement, b) Emotional impact; III) Physician's professional role, with the categories a) Assessing trustworthiness, b) Assessing learning and training, c) Duties and ethical dilemmas and d) Legal consequences.

Conclusions: To optimize the diagnostic procedure, we suggest improvement of the diagnostic process by raising research quality and taking the guardian's narrative into greater consideration.

Keywords

Shaken baby syndrome, diagnostic reasoning, social consequences, stress and burnout

1. Introduction

Before 2001, the traditional shaken baby syndrome (SBS) hypothesis was not questioned in the scientific literature and actually referred to as a verified theory. This hypothesis implies that when the three findings of subdural hemorrhage (SDH), retinal hemorrhages (RH) and symptoms of encephalopathy (e.g., seizures) are present in the absence of relevant signs of trauma, it can be concluded that the infant has been violently shaken (Squier, 2011). This is under the condition that other, "acceptable" etiologies have been ruled out. According to this hypothesis, shaking is considered to disrupt bridging veins which in turn cause SDH; to cause vitreoretinal traction which causes RH; and to disrupt brain nerve fibers to cause immediate encephalopathy symptoms (Squier, 2011). Usually, such cases exhibit no signs of relevant trauma, and the outcome can be either fatal or non-fatal (Parks et al., 2012a and Parks et al., 2012b). What triggered shaking is mostly assumed to be the baby's inconsolable crying (Adamsbaum et al., 2010; Edwards et al., 2020).

The legal and social consequences associated with the traditional SBS hypothesis is that a caregiver (often the father) becomes the designated perpetrator. If the father denies shaking or claims that shaking was exercised as a revival attempt, he is expected to be disbelieved (Hettler & Grenes, 2003). A prosecutor can in some countries offer the father a plea bargain, i.e. offered a change in the crime classification if he confesses, and thereby a shorter prison sentence (Gertner, 2015).

In 2001-2009, the English neuropathologist Jennian Geddes and coworkers published neuropathological studies in which they examined infant fatalities allegedly caused by violent shaking (Geddes et al., 2001a, Geddes et al., 2001b. Geddes et al., 2003, Geddes et al., 2004a, Geddes et al., 2004b). No case without signs of impact exhibited signs of disrupted nerve fibers (Geddes et al., 2001a; Geddes et al., 2001b). Instead, hypoxic changes only were detected, and a cascade of hypoxia, brain swelling, and increased intracranial pressure was suggested to explain the SDH and RH (Geddes et al., 2003; Geddes et al., 2004a; Geddes et al., 2004b). This mechanism is supposed to be triggered by a spontaneously developed breathing stop due to the infant's immature brain (Uscinski & McBride, 2008). Hypoxia and increased intracranial pressure are supposed to cause oozing of blood from small vessel walls into the subdural space and the retina, respectively (Geddes et al., 2003). Hence, shaking is according to this hypothesis not necessary for the development of isolated triad findings (Geddes et al., 2004b).

1.1 Development and Deepening of a Scientific Controversy

The reaction to the hypoxia hypothesis from pediatric scientists and clinicians came rather promptly when presented in court proceedings (Punt et al., 2004), and was eventually found to be ''not credible'' in the Court of Appeal (Supreme Court, 2005). This negative reaction was the first sign of a scientific controversy and indicated that questioning the traditional SBS hypothesis is controversial, in both pediatric research and clinical and legal settings.

During 2014-2016 the Swedish Agency for Health Technology Assessment and Assessment of Social Services (Swedish acronym: SBU) conducted a systematic literature review with the aim of to

determine with what accuracy it can be claimed that isolated triad findings are caused by shaking. The results of this report were that the scientific evidence for triad findings to predict shaking is *insufficient* (Elinder et al., 2018). A critical analysis of the literature allegedly supporting the diagnostic process in "abusive head trauma" (AHT), a concept into which SBS was incorporated in 2009 (Christian et al., 2009), was conducted in 2025, and these researchers arrived at similar results as the SBU report (Brook et al., 2025).

1.1.1 AIMS

The aim of the present study was to analyze how involved Swedish physicians reason about the diagnostic procedure in isolated triad cases.

2. Methods

The present qualitative study was part of a national questionnaire-based study within four relevant medical specialties in Sweden; pediatrics, ophthalmology, radiology and forensic medicine (Lynøe et al., 2025).

The participants were presented with a case of a 2-month-old infant with isolated triad findings, where the father stated that he had shaken the infant, but only as a revival attempt *after* the baby had suddenly stopped breathing. The participants were randomly exposed to either a fatal or a non-fatal outcome of the same case presentation – in all other respects, the case presentations were identical.

Seven statements with fixed response options were presented in the questionnaire, all with opportunities to comment the statement, as well as a final opportunity to comment on the study as a whole. We applied qualitative content analysis of all free text comments to each statement (Morse, 2008; Graneheim & Lundman, 2011; Malterud, 2012; Hsieh & Shannon, 2005).

In total, 391 participants responded to the questionnaire, of whom 205 made a total of 595 comments (range 1–8 comments per respondent). Of all the respondents, 70% stated that they had *some* medical experience of managing suspected child abuse cases, whilst 30% stated that they had *no* personal experience with the issue (Lynøe et al. 2025). Also, the latter group was included - to elucidate theoretical and practical training within the child abuse area.

2.1 Content Analysis

Both manifest and latent content analyses deal with interpretations which vary in depth and level of abstraction. In the present content analysis, we applied the following procedures (Graneheim & Lundman, 2011, Malterud, 2012). Firstly, we considered the text condensation by choosing the units of analysis, here the values and attitudes among the included physicians. Creating categories is the core feature of qualitative content analysis and we used categories which answered the question "What?" and themes as responding to the question "How?" Our point of departure was that a theme is supposed to be an underlying meaning through all condensed meaning units, categories or subcategories, but can also be an expression of the latent content of the text.

When conducting the analysis, we developed condensed meaning units associated with the core issue, going back and forth between the whole and the part of the text. A theme is supposed to be an underlying meaning through all condensed meaning units, and categories. Themes are not necessarily mutually exclusive; a condensed meaning unit or a category can fit into more than one theme (Malterud, 2012). Accordingly, we created condensed meaning units, categories, and themes.

2.2 Research Ethical Considerations

As no sensitive personal data were involved, this study was not encompassed by the Ethical Review Act. Therefore, the Swedish Ethical Review Authority presented an advisory statement only, declaring that there were no ethical obstacles to conducting the study (Swedish Ethics Review Authority, Decision nr 2022-05281).

3. Results

The qualitative content analysis of the free text comments resulted in 3 themes, 8 categories, and 40 condensed meaning units. The three main themes were: I) Causality issues, II) Diagnostic procedures, and III) Physicians' professional role (Table 1).

3.1 Causality Issues

This theme deals mainly with hypotheses regarding possible causes of isolated triad findings, but also with empirical evidence supporting the mechanism hypothesis. Under the traditional SBS hypothesis, cases with isolated triad findings are supposedly caused by violent shaking. Under the hypoxia hypothesis, isolated triad findings are supposedly caused by hypoxia.

3.2 Assessing Robustness

Several respondents, mainly pediatricians and ophthalmologists, stated that the traditional SBS hypothesis was supported by very robust scientific evidence. In particular, ophthalmologists claimed that *"If bilateral RH, then it is SBS".* Some ophthalmologists applied another point of departure "*Triad findings cannot appear spontaneously".*

Among those who stated that the traditional SBS hypothesis was not evidence-based, some declared that in the absence of evidence, there is a high risk that one's own personal opinion will influence the reasoning about causes and/or empirical associations. Moreover, it was also suggested that one should, in the absence of evidence, "S*tick to one's own long personal experience or continue decision-making as usual".* Several participants stated that the SBU report was biased and that they preferred to lean on general consensus. On the other hand, one radiologist said that "*Science is more important than personal experience – otherwise, we would end up in medieval times*."

3.3 Paradoxical Phenomena

Some respondents stated that revival shaking was not enough to create the forces necessary to cause isolated triad findings. This could indicate that the respondent either believed the father in the case report was untruthful, or did not fully accept the SBS hypothesis, or that even soft shaking can cause triad findings. Another respondent stated that the father actually "*confessed*" having shaken the baby.

Also here, the respondent either believed that revival shaking had caused the triad findings, or that the father was lying and had shaken the infant *before* its collapse.

Another paradox, mentioned by an ophthalmologist, was "*Why would the vitreous body move due to shaking and cause bleedings?"* This statement can indicate that the traditional SBS hypothesis was not considered quite consistent regarding RH.

Some respondents stated that an "apparently life-threatening event" (ALTE) – associated with respiratory arrest and neonatal apnea – should also be considered. This view was questioned by, e.g., a pediatrician who claimed to have seen many near-SIDS (sudden infant death syndrome) cases and infants with apnea but that such cases do not display triad findings.

Several respondents asked about the validity of the hypoxia hypothesis, and an ophthalmologist stated: "*Do we have scientific evidence that SDH, encephalopathy and RH appear due to respiratory arrest? If not, the infant should be separated from its family."* It was also stated that "*There is a huge need for more research within this area*."

3.4 Diagnostic Procedures

3.4.1 Reasons for Judgements

A diagnostic procedure usually begins with an interview of the caregiver, a clinical examination of the infant, and lab tests. If no explanation for the infant's condition is identified, a CT scan will probably follow, and if SDH is found, the radiologist is supposed to raise a red flag concerning possible abuse. One ophthalmologist considered the radiologist's assessment ending with the question "*Shaking?*" to be a strong signal and felt it was difficult not to be influenced of "*If shaking is noted in a record, one is inclined to judge the parent already in the emergency room*."

Another ophthalmologist stated that what they had learned as a junior doctor was that if RH were present and a (senior) ophthalmologist stated that the cause was shaking, then the cause *was* shaking. One ophthalmologist considered it important to look at "*the bigger picture*".

3.4.2 Emotional Impact

A forensic pathologist asserted that the traditional SBS diagnostic procedure was influenced by groupthink, emotions, and considerations regarding career progression. Respondents also referred to "*gut feelings*", which were argued to provide important information "*If you don't have any 'bad vibrations' when examining the infant and when talking to the parents, then the assumption is that the parents are telling the truth*."

Although the word "emotion" was mentioned only by one respondent, some participants also indicated that emotional reactions or moral stress could occur when they were exposed to ethical dilemmas.

3.5 Physicians' Professional Role

3.5.1 Assessing Trustworthiness

Several respondents stated that it is not the physician's task to assess if a parent is truthful, but the task of police, social services, and courts. Other respondents commented in detail on how to evaluate the father's narrative. One of the respondents stated that as there is a strong incentive to deny having

shaken a baby, and that underreporting of shaking can be suspected. Another reason for assuming that the father was not telling the truth was: "*Shaking in order to revive an infant should NOT result in this infant's injuries*."

Several participants who endorsed the traditional SBS hypothesis concluded that the father had made up his story about revival shaking – some ophthalmologists found it "*odd*" to try to revive a collapsed baby through shaking. It was also declared that "*everybody knows that one should never shake a baby*" and suggested calling 112 (the emergency number in Europe) as an alternative. A few of those who did not accept the father's reaction were inclined to recommend a psychiatric examination.

Other participants stated that revival shaking was a relevant reaction from a parent in panic and accepted that the father was not expected to know how to manage such a situation. A few (ophthalmologists) stated that an ALTE and neonatal apnea should be considered and that "*The respiratory arrest came first and then the father shook the baby, which caused the triad findings*". Moreover, it was also stated that "*As an experienced pediatrician I have seen many ALTE/respiratory arrest cases but have never seen severe consequences of the parents' actions or ALTE in itself*."

3.6 Assessing Learning and Training

Several participants commented on how they were trained theoretically and practically during residency. One radiologist commented on the traditional SBS hypothesis and stated that "*This is how I have been educated to think during the specialist training to become a radiologist*." Another radiologist explained why he/she had raised a "*red flag*"; "*This is based on the ('sad') personal/practical allegedly 'proven experience' during my residency.*" A radiologist found what was presented about the SBU report to be interesting and stated "*I did not know that.*" Another radiologist made a more general comment about having a critical stance: "*Where would we have been as physicians if we had not questioned established guidelines now and then?*"

3.6.1 Duties and Ethical Dilemmas

In Sweden and many other countries, a physician has a statutory duty to report any suspicion of child abuse or negligence to social services. Several respondents, (most) pediatricians and ophthalmologists) also explicitly stated that "*The first priority is the safety and protection of infants and children.*" It was also stated that "*a suspicion of abuse must always be present*" when dealing with infants and children, because "*abuse must never be missed*".

One ophthalmologist criticized the SBU report as being biased and ascribed the following intent to the SBU report "*To free perpetrators rather than to save infants' lives*".

However, there are also situations where the physician trusts the parent, and doubts that abuse has occurred – despite isolated triad findings. Even in such a situation, the pediatrician might feel forced to prioritize the safety and protection of the infant. This can lead to over-diagnosing of abuse, with negative consequences for both the infant and its family. Realizing this, such physicians described ending up in an ethical dilemma, feeling forced to choose the alternative which appeared least bad. One

of them stated that *"If shaking has not actually taken place, the consequences for the family will be disastrous.*"

The interpretation of a radiologist's question "*Shaking?*" can have consequences as one ophthalmologist stated that "*To assume that the child has been abused and to record this assumption in the medical records, weighs very heavily in the question of guilt, and the risk is that the parent is convicted already in the emergency room.*"

Several respondents clarified the awareness of an ethical dilemma and recommended that the least bad choice seems to always be to "*prioritize the best interests of the infant*".

3.6.2 Legal Consequences

Several comments indicated awareness that applying the traditional SBS hypothesis could result in separation of the infant – and perhaps also its siblings – from its family, and that one or both parents could be arrested and face charges for having shaken the baby. It was also explicitly stated that embracing the traditional SBS hypothesis implied that the parent/caregiver had to prove his/her innocence – as opposed to the generally accepted judicial principles of "innocent until proven guilty" and that guilt must be proven by the prosecutor. This is contrary to the claim by a radiologist that Sweden has a culture "*to protect violent parents rather than infants*", a claim underlined also by a respondent who seemed not to identify ethical nor legal dilemmas "*Those who accept weak and unscientific casuistry for SDH in order to help abusive parents are accessorily responsible if the same infant later arrives in the hospital abused to death and should be convicted of deliberately having assisted murder*."

Table 1. The 3 themes, 8 categories, and 44 condensed meaning units. EBM = evidence-based medicine, F = forensic pathologist, O = ophthalmologist, P = pediatrician, R = radiologist, RH = retinal hemorrhages, SBS = shaken baby syndrome, SDH = subdural hemorrhages, SIDS = sudden infant death syndrome.

Themes	Category	Condensed meaning units
Causality	*Assessing*	Robust research supports the traditional SBS hypothesis. (O)
issues	*robustness*	Knowledge of the mechanism is currently insufficient. (F)
		Lack of evidence means that personal opinions influence causal reasoning. (O)
		In the absence of evidence – draw conclusions as usual! (P)
	Paradoxical	Revival shaking is not enough to cause the triad findings. (P)
	phenomena	If violently shaken, I would expect presence of bruises. (O)
		Violent shaking is needed for SDH and RH to occur. (O)
		Why would the vitreous body move due to shaking and cause bleedings? (O)
		Seen many apneas and near-SIDS infants, without triad findings. (P)

Diagnostic procedure	*Reasons for judgements*	Important to examine search pattern in the medical records. (P)
		Rely on experienced colleagues' judgements. (O)
		If lack of evidence, shaking must still be the main suspicion. (P)
		We must admit that we do not know. (O)
		There is a huge need for more research. (O)
	Emotional impact	Difficult not to be influenced by the radiologist's questioning "*Shaken*?" (P)
		"Gut feelings" from meeting with the caregiver provide a lot of information. (O)
		Career, groupthink and emotions influence the assessment too much. (F)
		In case of uncertainty, the bigger picture is important. (O)
		The judgement is like everything else – personal. (R)
		Strong incentive to lie – underreporting must be suspected. (P)
		Parents always confess even if they lie initially. (P)
		Everybody knows that one should never shake a baby. (O)
		A panicked parent might react inadequately. (O)
Physicians' professional role	*Assessing trustworthiness*	The father admitted having shaken the baby! (P)
		The judgement is like everything else - personal. (R)
		Strong incentive to lie - hence underreporting must be suspected. (P)
		Parents always eventually confess despite they were initially lying. (P)
		A panicked parent might react inadequate. (O)
	Assessing learning and training	My experience of such cases is solely theoretical. (P)
		If it is unknown which theory is correct, then we are walking on thin ice. (O)
		Had not heard about the SBU report. (R)
		EBM is needed in future education. (R)
	Duties and ethical dilemmas	First of all, always protect the infant! (P)
		The aim of the SBU report was to free perpetrators, not to save infants. (O)
		Better falsely accuse than to chicken out. (R)
		Abuse must be suspected in order not to miss cases. EBM is insufficient. (O, P)
		Protect infants with isolated triad findings and always rule out shaking! (P)
		If telling the truth, there is a dilemma considering the infant's best interests! (R)
		As radiologists we have to raise a red flag if SDH are identified. (R)
	Legal	If shaking has not taken place, the consequences will be catastrophic. (P)

consequences	The SBS hypothesis implies that parents prove their innocence. (O)
	I sympathize with innocent fathers who are convicted of made-up crimes! (R)
	Not protecting the infant makes also the physician responsible (of murder). (R)
	There is a culture which protects violent parents more than infants. (R)

4. Discussion

4.1 Causality Issues

Mechanism hypotheses are about mechanism and causality, whereas evidence is usually about associations. Austin Bradford Hill was the one who first discussed how studies of statistical associations could support or call into question a mechanism hypothesis on causality (Hill, 1965). A study also showed that using Hill's criteria for causality, the hypoxia hypothesis was more plausible than the SBS hypothesis regarding SDH and RH (Acres & Morris, 2014). Robustness concerns how evidence-based studies can support a mechanism hypothesis.

4.2 Assessing Robustness

The implication of the claim that the empirical studies supporting the traditional SBS hypothesis are very robust seems to be that the physicians also understood the consequences of this hypothesis; when isolated triad findings have been identified, the infant *must* have been shaken violently, provided that "acceptable" explanations (diseases and accidental trauma) have been ruled out. Hence, the adoption of the traditional SBS hypothesis means that someone must be held responsible for having performed violent shaking and that an infant is protected from future abuse.

Some respondents who found the traditional SBS hypothesis most plausible had perhaps not contemplated all its ethical, legal and societal consequences. Others did identify the ethical dilemmas associated with the SBS hypothesis; prioritizing the infant's safety above all may have negative consequences for the infant and its siblings, will have negative consequences for innocent parents, and can create a moral burden or stress for the involved physicians (Passmore et al., 2020; Lynøe & Eriksson, 2020).

The traditional SBS hypothesis was in 2009 integrated into the AHT diagnostic procedure (Christian & Block, 2009). However, an infant with AHT – as defined before 2009 - will display signs of relevant trauma (e.g., bruises or fractures) and accordingly *not* represent a case of *isolated* triad findings. The current scientific controversy, as illustrated in this study, concerns *isolated* triad cases.

Findings of bilateral and extensive RH are often stated to be highly specific of traumatic shaking (Royal College of Ophthalmologists, 2024). An interesting argument for RH being predictive of violent shaking was the comment of an ophthalmologist that *"if an ophthalmologist says so, the SBS diagnosis is valid."* This is a clear case of an eminence-based - not an evidence-based – argument (Bhandari et al, 2004). Eminence-based arguments usually refer to those of a prominent specialist with long personal

experience, sometimes presented as "consensus statements", and are by some considered equal to or even better than evidence-based medicine (Choudhary et al., 2018).

Generally, however, to prioritize "long personal experience", emphasizing "the infant's best interests", and to contrast this with evidence-based medicine, is problematic. This can be illustrated by the claim that "*if the evidence is insufficient, we must stick to the traditional diagnostic procedure*."

4.3 Paradoxical Phenomena

Several of the presented paradoxical phenomena illustrate the ongoing controversy regarding causality and an association between traumatic shaking and isolated triad findings on the one hand, and hypoxia and isolated triad findings on the other.

The presence of paradoxical phenomena and anomalies also illustrates the necessity for more research within this area – which two pediatricians requested. A few participants indicated that they had never seen SDH or RH in ALTE cases – but the short duration of ALTE was not considered, nor the absence of brain scan and fundoscopy, suggesting a possible focus for future research.

4.4 Diagnostic Procedures

4.4.1 Reasons for Judgments

The identification of triad findings has long been widely accepted to demonstrate that traumatic shaking has taken place. However, after the publication of the SBU report (Elinder et al., 2018), the importance of triad findings was toned down and instead "the whole picture" was highlighted. Several respondents in the present study also referred to "the whole picture" – including the caregiver's narrative, the family's behavior and connection with the infant, and whether the caregiver's narrative was in accordance with the clinical findings (Hettler & Greenes, 2003).

A few respondents accepted that the father had shaken his son as a revival attempt, and that in such a situation a parent might panic and "*react inadequately.*" Even though several participants stated that it was not a physician's task to determine whether a suspected caregiver was telling the truth or not, many participants blamed the father and held him responsible for shaking his baby and causing its collapse. One participant explicitly stated that the father needed a psychiatric evaluation.

Interestingly, it can be noted that, during the 1980s and 1990s in Sweden, a parent of an infant with a sudden and unexpected collapse was considered reliable when he/she arrived at the hospital and informed about what had happened (Wennergren et al., 1987). At that time, such conditions were referred to as near-SIDS, without any suspicion of foul play, and no CT scans and/or fundoscopic examinations were conducted. Currently, revival shaking is by the SBS proponents mostly considered as created by the caregiver to avoid accusations and convictions of child abuse, and concerned pediatricians are encouraged not to believe such explanations (Hettler & Greenes, 2003). Some argue that such a father is not reliable and others that he is reliable and that his motive should be considered as mitigating circumstances (Greenwald, 2020).

4.4.2 Emotional Impact

In 1973, a criticized experiment regarding the difficulties in diagnostic accuracy of psychiatric diagnoses, particularly in distinguishing between being sane and insane, was published (Rosenhan, 1973). The point in the present context is that the author described the "stickiness" of a psychiatric diagnosis. If "*a psychiatric diagnosis*" is replaced by the radiologist's "Shaken?", it can be assumed that if a person has been "tagged" with suspicion of child abuse, this could "*profoundly color others' perception of [the person] and [their] behavior* (Rosenhan, 1973)." Several pediatricians and ophthalmologists made clear that it was difficult to avoid letting a remark like "*Shaking?*" influence the diagnostic procedure. Even within somatic care, "gut feelings," emotions, and intuition associated with *fast thinking* have been described as representing one of three tracks when making diagnoses (Stolper et al., 2010).

4.5 Physicians' Professional Role

4.5.1 Assessing Trustworthiness

Although many respondents from all four specialties stated that they felt it was not a physician's role to evaluate the caregivers' trustworthiness, several comments regarding this issue referred to how to get "the true story."

One hypothetical background for not trusting the caregiver could be that there is a *"very strong incentive to deny"* having shaken a baby violently – and hence to mistrust any caregiver who denies it. Another reaction was that it appeared "*odd*" to revive a collapsed baby by shaking it, as "*everybody knows that one should never shake a baby.*"

Other participants stated that it was comprehensible that a parent in panic might act in this manner – especially if he/she did not know how to deal with such a situation.

Some who found the father trustworthy stated that "neonatal apnea" should be considered, but also that ALTE came *before* the shaking that caused the triad findings, which are factual issues. ALTE was familiar to several respondents and is often associated with revival shaking on the part of a parent (Wennergren et al., 1987; Greenwald, 2024). As one third of all isolated triad cases are associated with an episode of ALTE and revival shaking, it was expected that more physicians would have acknowledged this association. ALTE is now replaced with the term "brief resolved unexplained event" (BRUE), subdivided into BRUE and high-risk BRUE (Lynøe & Eriksson, 2020). The latter can develop under certain conditions and is probably not always "brief" and "resolved", an issue suitable for future research (Lynøe & Eriksson, 2024a).

4.5.2 Assessing Learning and Training

Both pediatricians and radiologists stated that they learned and were trained according to the traditional SBS hypothesis, e.g., that SDH is caused by disrupted bridging veins, in turn caused by traumatic shaking. This is in accordance with experiences from other countries, with participants stating that *"I had it drummed into me that if there is SDH and RH it's abuse"* (Cowley et al., 2018), illustrating how theoretical and practical training have influenced diagnostic reasoning regarding suspected SBS. In the

present study, some participants also stated that they had never heard of the hypoxia hypothesis, nor of the SBU report, indicating that controversies and evidence were never discussed, and that the issue was not analyzed critically. A US study from 2016 also indicated that 88% of concerned physicians agreed that shaking only was likely to produce triad findings (Narang et al., 2016).

4.5.3 Duties and Ethical Dilemmas

Many of the concerned physicians described their main and primary duty to protect the infant's life. This prioritized duty seems reasonable if the situation and/or findings in the infant indicate abuse, negligence, or the risk thereof. However, some of the responding physicians stated that they were sometimes in doubt when diagnosing SBS. Doubt in such cases might create a moral burden or moral stress (Passmore et al., 2020; Lynøe & Eriksson, 2020a), particularly as one pediatrician commented being "*brave and not chicken out.*" This statement might indicate the contrasting point of view that the primary goal for the concerned physician is to adhere to the moral doctrine *"First of all, protect the child!"*

Although many of the respondents seemed aware of the catastrophic social and legal consequences for an innocent parent, for the partner, and not least for the infant and its siblings, they felt that removal of the infant from its family was the least bad course of action. It is understandable that this ethical dilemma might create moral stress and sometimes even burnout (Passmore et al., 2020; Lynøe & Eriksson, 2020a). Seen from outside the pediatric preferences, a scientific approach to both solve the ethical dilemma and resolve the scientific controversy related to isolated triad cases could be to rely more on the caregivers' narratives (Wennergren et al., 1987; Greenwald, 2024) and intensify high-quality research, including different aspects of non-shaking hypotheses.

4.5.4 Legal Consequences

The fact that a large majority found the traditional SBS hypothesis correct (Lynøe et al., 2025) is most likely explained primarily as an effect of learning and training, as no other mechanism theory was presented in a scientific setting until 2001. Furthermore, no broader criticism of the SBS hypothesis appeared until around a decade later. Hence, most (older) respondents can be expected to have learned only about the traditional SBS hypothesis throughout their medical school and clinical training. Adopting the traditional SBS hypothesis has two predictable consequences: the intended good consequence that the infant is (hopefully) not exposed to maltreatment in the future, and the unintended bad consequence that the family is split up and that a potentially innocent parent is held responsible for a crime that never occurred. Following the introduction of non-traumatic hypotheses, preferences, and emotions might influence the choice of hypothesis (Lynøe et al., 2025). As described, some respondents had learned that if bilateral SDH is detected, the suspicion of SBS is supposed to be high, and if the ophthalmologic findings are interpreted as allegedly "highly specific" of shaking (Royal College, 2024), or even certain (HAS, 2017). However, some of those studies (Vinchon et al., 2010; Hymel et al., 2022) have recently been found to exhibit high risks of bias and hence very low levels of scientific evidence (Lynøe & Eriksson, 2024b).

An interesting comment concerned the assertion that if a case of abuse was missed and this later resulted in the infant's death, the clinician who allowed the parents to return home with their baby should be held responsible for "*deliberately having assisted murder*". If this attitude is representative of, e.g., older pediatricians, it can have consequences for younger pediatricians' careers, illustrating the difficulties to question the traditional SBS hypothesis (Leventhal & Edwards, 2017; Strouse, 2016). It can even implicate pressure upon editors and reviewers of scientific journals and result in difficulties to publish relevant critique of the scientific basis for the traditional SBS hypothesis (Leventhal & Edwards, 2017).

4.6 Strengths and Limitations

Strengths are that the participants were selected randomly from three of the four specialties, and that *all* physicians from the fourth specialty were included. Further, the study sample encompassed *all* comments (595 in total), made by 205 of the 391 respondents.

As the study was related to a scientific controversy involving very young infants, the study itself and the questionnaire used were considered controversial by some participants. This might have resulted in a higher drop-out rate than would be expected for a study on a non-controversial issue.

4.7 Conclusions

Several participants commented on the ethical dilemmas they experienced, particularly when they were not confident that the SBS diagnosis was accurate, but concluded that the least bad option was to protect the infant and hence choose the SBS diagnosis. This was the case also when they were aware that a potentially innocent caregiver could be held responsible and convicted. It is understandable that an individual in this situation might be concerned about her role as a physician and feel moral stress.

This qualitative content analysis confirms the different opinions about the causes of isolated triad findings. We suggest that the influence of groupthink, theoretical and practical training and differences in evidence-based requirements represent explaining factors. In order to optimize the diagnostic procedure, to minimize negative societal and legal consequences, and to reduce moral stress and burnout among involved physicians, we suggest improvement of the diagnostic process by raising research quality and by taking the guardian's narrative into greater consideration.

References

Acres, M., & Morris, J. A. (2014). The pathogenesis of retinal and subdural haemorrhage in nonaccidental head injury in infancy: Assessment using Bradford Hill criteria. *Med Hypothes*, *82*, 1-5. https://doi.org/10.1016/j.mehy.2013.09.017

Adamsbaum, C. et al. (2010). Abusive head trauma: Juridical admissions highlight violent and repetitive shaking. *Pediatrics*, *126*, 546-555. https://doi.org/10.1542/peds.2009-3647

Bhandari, M., Zlowodzki, M., & Cole, P. A. (2004). From eminence-based practice to evidence-based practice: A paradigm shift. *Minn Med*, *87*(4), 51-54.

Brook, C., Rossant, C., Squier, W., Eriksson, A., Melinek, J., & Schifrini B., (2025). A critical review of the American Academy of Pediatrics Technical Report on Abusive Head Trauma. *Forensic Sci Intl Synergy*, *11*, 100650. https://doi.org/10.1016/j.fsisyn.2025.100650

Christian, C. W., & Block, R. (2009). Committee on Child Abuse and Neglect; American Academy of Pediatrics. Abusive head trauma in infants and children. *Pediatrics*, *123*(5), 1409-1411. https://doi.org/10.1542/peds.2009-0408

Choudhary, A. K. et al. (2018). Consensus statement on abusive head trauma in infants and young children. *Pediatr Radiol*, *48*(8), 1048-1065. https://doi.org/10.1007/s00247-018-4149-1.

Cowley, L. E. et al. (2018). Factors influencing child protection professionals' decision-making and multidisciplinary collaboration in suspected abuse head trauma cases: A qualitative study. *Child Abuse Neglect.*, *82*, 178-191. https://doi.org/10.1016/j.chiabu.2018.06.009

Edwards, G. A. et al. (2020). What do confessions reveal about Abusive Head Trauma? A systematic review. *Child Abuse Rev.*, *29*(3), 253-268. https://doi.org/10.1002/car.2627

Elinder, G. et al. (2018). Traumatic shaking: The role of the triad in medical investigations of suspected traumatic shaking. *Acta Pædiatrica*, *107*, S472, 3-23. https://doi.org/10.1111/apa.14473

Gertner, N. (2015). *'Why the innocent plead guilty': An exchange*. New York Rev Books. 8: 23.

Geddes, J. F. et al. (2001a). Neuropathology of inflicted head injury in children. I. Patterns of brain damage. *Brain*, *124*, 1290-1298. https://doi.org/10.1093/brain/124.7.1290

Geddes, J. F. et al. (2001b). Neuropathology of inflicted head injury in children. II. Microscopic brain injury in infants. *Brain*, *124*, 1299-1306. https://doi.org/10.1093/brain/124.7.1299

Geddes, J. F. et al. (2003) Dural haemorrhages in non-traumatic infant deaths: Does it explain the bleeding in 'SBS syndrome'? *Neuropathol Appl Neurobiol.*, *29*, 14-23. https://doi-org.proxy.ub.umu.se/10.1046/j.1365-2990.2003.00434.x

Geddes, J. F., & Whitwell, H. L. (2004a) Inflicted head injury in infants. *Forensic Sci Intl*, *146*, 83-88. https://doi.org/10.1016/S0379-0738(03)00283-4

Geddes, J. F. et al. (2004b). Violence is not necessary to produce subdural and retinal haemorrhage: A reply to Punt et al. *Pediatr Rehabil.*, *7*(4), 261-265. https://doi.org/10.1080/13638490412331280435

Graneheim, U. H., & Lundman, B. (2011). Qualitative content analysis in nursing research: Concepts, procedures and measures to achieve trustworthiness. *Nurse Educ Today*, *24*(2), 105-112. https://doi.org/10.1016/j.nedt.2003.10.001

Greenwald, M. J. (2024). Accidental vs. abusive head trauma in infancy: is revival shaking the missing link? *Clin Case Rep.*, *29*(12), e9633. https://doi.org/10.1002/ccr3.9633

Haute Autorité de Santé (HAS). (2017). *Clinical Practice Guideline: Shaken baby syndrome or non-accidental head injury caused by shaking*. Retrieved December 17, 2025, from https://www.has-sante.fr/upload/docs/application/pdf/2018-02/shaken_baby_syndrome.pdf

Hettler, J., & Greenes, D. S. (2003). Can the initial history predict whether a child with a head injury has been abused? *Pediatrics*, *111*(3), 602-607. https://doi.org/10.1542/peds.111.3.602

Hill, A. B. (1965). The environment and disease: Associant or causation? *Proc Royal Soc Med.*, *58*, 295-300. https://doi.org/10.1177/003591576505800503

Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qual Health Res.*, *15*(9), 1277-1288. https://doi.org/10.1177/1049732305276687

Hymel, K. P. et al. (2022). An analysis of physicians' diagnostic reasoning regarding pediatric abusive head trauma. *Child Abuse Neglect.*, *129*, 105666. https://doi.org/10.1016/j.chiabu.2022.105666

Leventhal, J. M., & Edwards, G. A. (2017). Flawed theories to explain child physical abuse: What are the medical-legal consequences? *JAMA.*, *318*(14), 1317-1318. https://doi.org/10.1001/jama.2017.11703

Lynøe, N., Castor, A., Juth, N., & Eriksson, A. (2025). Experimental study of the diagnostic process in suspected Shaken Baby Syndrome. *Ann Child Neurol Soc.*, *3*(3), 158-164. https://doi.org/10.1002/cns3.70031

Lynøe, N., & Eriksson, A. (2020a). Can burnout among child abuse clinicians be caused by doubt that they are doing the right thing? *Perm J.*, *24*, 20.011. https://doi.org/10.7812/TPP/20.011

Lynøe, N., & Eriksson, A. (2020b). Is there a common denominator for Brief Resolved Unexplained Events, Sudden Infant Death Syndrome, and alleged Shaken Baby Syndrome? *Med. Hypothes.*, *144*, 109939. https://doi.org/10.1016/j.mehy.2020.109939

Lynøe, N., & Eriksson, A. (2024a). Prolonged unexplained event might change an "unreliable perpetrator" into a "reliable resuscitator". *Med. Hypothes.*, *189*, 111383. https://doi.org/10.1016/j.mehy.2024.111383

Lynøe, N., & Eriksson, A. (2024b). Disguised incorporation bias and meta-analysis of diagnostic accuracy studies. *Acta Pædiatr.*, *113*(3), 503-505. https://doi.org/10.1111/apa.17076

Malterud, K. (2012). Systematic text condensation: A strategy for qualitative analysis. *Scand J Publ Health*, *40*(8), 795-805. https://doi-org/10.1177/1403494812465030

Morse, J. M. (2008). Confusing categories and themes. *Qual Health Res.*, *18*(6), 727-728. https://doi.org/10.1177/1049732308314930

Narang, S. K., Estrada, C., Greenberg, S., & Lindberg, D. (2016) Acceptance of shaken baby syndrome and abusive head trauma as medical diagnoses. *J Pediatr.*, *177*, 273-278. https://doi.org/10.1016/j.jpeds.2016.06.036

Parks, S. E. et al. (2012a). Characteristics of fatal abusive head trauma among children in the USA: 2003-2007: an application of the CDC operational case definition to national vital statistics data. *Inj Prev.*, *18*(3), 193-199. https://doi.org/10.1136/injuryprev-2011-040128

Parks, S. et al. (2012b). Characteristics of non-fatal abusive head trauma among children in the USA, 2003-2008: Application of the CDC operational case definition to national hospital inpatient data. Inj Prev., 18(6), 392-398. https://doi.org/10.1136/injuryprev-2011-040234

Passmore, S. et al. (2020). The relationship between hope, meaning in work, secondary traumatic stress and burnout among child abuse clinicians. *Perm J.*, *24*, 19.087. https://doi.org/10.7812/TPP/19.087

Punt, J. et al. (2004). The 'unified hypothesis' of Geddes et al. is not supported by the data. *Pediatr Rehabil.*, *7*(3), 173-184. https://doi.org/10.1080/13638490410001711515

Rosenhan, D. L. (1973). On being sane in insane places. *Science*. *179*(4070), 250-258. https://doi.org/10.1126/science.179.4070.250

Royal College of Ophthalmologists. (2024) Clinical guideline, abusive head trauma and the eye. Retrieved from December 17, 2025, from https://www.rcophth.ac.uk/wp-content/uploads/2021/08/Abusive-Head-Trauma-and-the-Eye.pdf

Supreme Court of Judicature Court of Appeal (Criminal Division). Neutral Citation Number: [2005] EWCA Crim. 1980 Case Nos. 200403277. 200406902. 200405573. 200302848. Approved Judgement. *Paragraph*, 68, 69.

Stolper, E. et al. (2010). Gut feelings as a third track in general practitioners' diagnostic reasoning. *J Gen Intern Med.*, *26*(2), 197-203. https://doi.org/10.1007/s11606-010-1524-5

Squier, W. (2011). The "Shaken Baby" syndrome: Pathology and mechanisms. *Acta Neuropathol*, *122*, 519-542. https://doi.org/10.1007/s00401-011-0875-2

Strouse, P. J. (2016). Child Abuse: We have problems. *Pediatr Radiol.*, *46*, 587-590. https://doi.org/10.1007/s00247-016-3551-9

Uscinski, R. H., & McBride, D. K. (2008). The SBS syndrome: An odyssey. II. Origins and further hypothesis. *Neurol Med Chir* (Tokyo), *48*(4), 151-155. https://doi.org/10.2176/nmc.48.151

Vinchon, M. et al. (2010). Confessed abuse versus witnessed accidents in infants: Comparison of clinical, radiological, and ophthalmological data in corroborated cases. *Child's Nerv Syst.*, *26*(5), 637-645. https://doi.org/10.1007/s00381-009-1048-7

Wennergren, G. et al. (1987) The epidemiology of sudden infant death syndrome and attacks of lifelessness in Sweden. Acta Pædiatr Scand, *76*(6), 898-906. https://doi.org/10.1111/j.1651-2227.1987.tb17261.x

Acknowledgement

We thank Anders Castor, MD, for his participation in the early phases of this manuscript.

Data availability: All 595 comments are available in Swedish on request.