

Shaken Baby Syndrome, Wrongful Convictions, and the Dangers of Aversion to Changing Science in Criminal Law

By CASSANDRA ANN JENECKE*

IF ACTORS IN THE AMERICAN CRIMINAL JUSTICE SYSTEM FAIL to enact systemic reforms that adequately address the collapse of “shaken baby syndrome” (“SBS”) as a definitive medical diagnosis of criminal child abuse, then they will continue to contribute to the substantial, if not certain, risk that innocent caregivers and parents will be wrongfully convicted and imprisoned for child abuse related crimes where no actual crime may have been committed. The risk of wrongful convictions is particularly certain because experts estimate that every year in the United States approximately 1500 babies are diagnosed with SBS and approximately 200 defendants are convicted of child abuse crimes related to SBS.¹

Part I of this Comment explores the medical and legal history of SBS, by highlighting important medical studies and legal adaptations that have shaped the current state of SBS diagnoses and prosecutions. It finds that the basis forming the medicolegal² diagnosis of criminal

* J.D., University of San Francisco School of Law, 2013; Political Science B.A. with honors and History B.A. with honors, Boston University, 2010. The author would like to thank Professor Richard Leo for his guidance and encouragement, not only in the development of this paper, but throughout law school. Also, many thanks to the U.S.F. Law Review Board of Editors, especially Tanner Jacobs, for all their hard work in preparing this piece for publication. Last, but certainly not least, the author thanks her mother and family for their unending encouragement and support.

1. Deborah Tuerkheimer, *The Next Innocence Project: Shaken Baby Syndrome and the Criminal Courts*, 87 WASH. U. L. REV. 1, 9–10 (2009) [hereinafter Tuerkheimer, *The Next Innocence Project*]. Both proponents and critics of the syndrome have disapproved of the term “shaken baby syndrome,” advocating instead for the use of terms like abusive head trauma (“AHT”) or non-accidental head injury (“NAHI”). *Id.* at 11 n.68. See *infra* Part I for a detailed discussion of this shift in nomenclature.

2. Keith A. Findley et al., *Shaken Baby Syndrome, Abusive Head Trauma, and Actual Innocence: Getting It Right*, 12 HOUS. J. HEALTH L. & POL’Y 209, 212 (2012). Findley utilizes the term “medicolegal” to describe the interconnectedness of the medical diagnosis of SBS and the implied legal inference of criminal child abuse. *Id.* Used here, “medicolegal” re-

child abuse was deeply flawed from its inception. This discredited basis created, and continues to support, the perfect storm for the wrongful conviction of caregivers and parents based on flawed science.

Part II surveys international recognition of, and reforms related to, the changing debate over SBS. Both the United Kingdom and Canada enacted systemic reforms after their investigations into pediatric forensic science revealed that changes in the science of SBS jeopardized the integrity of old SBS convictions and guilty pleas. Australia's highest criminal courts recognized and integrated the debate over SBS into their common law. These countries are models for recognition of, and reforms related to, the shifting SBS debate and serve as exemplars of timely and appropriate reactions to scientific evolution.

Part III examines the current state of SBS medical diagnoses and criminal prosecutions in the United States. While the medical debate over the shifting science of SBS rages on, American legal recognition of the shift has been slow and haphazard. As a result, the substantial likelihood of parent and caretaker wrongful accusations and convictions of child abuse based on the theory of SBS continues to run unabated and unchecked.

Part IV recognizes that systemic, national reform of SBS investigations and prosecutions in the United States is unlikely and impractical. In the alternative, individual actors in the criminal justice system that contribute to the problem of SBS wrongful convictions can address their contributions by changing their actions to recognize the evolution of SBS science.

The conclusion emphasizes the substantial risk of SBS-related wrongful convictions absent recognition of, and reform related to, the evolution of scientific understanding by the American criminal justice system. However, it concludes that where systemic and nationwide reform is unlikely or impractical, each individual actor in the criminal justice system can adjust his or her actions to combat his or her contributions to wrongful convictions.

I. The Scientific, Medical, and Legal History of Shaken Baby Syndrome

The importance of the history of SBS to understanding the current state of the debate cannot be overstated. However, it is important

fers to the medical diagnosis of a legal conclusion; namely, that children presenting with SBS must have been criminally abused. *Id.*

to first establish a basic understanding of the medical and legal diagnosis of SBS.

A. Shaken Baby Syndrome: What it is Medically and Legally

Children under the age of four are particularly susceptible to head trauma and brain injuries because they have large and heavy heads, undeveloped and weak neck muscles, and thin, pliable skulls.³ Historically, in the absence of other signs of trauma, babies who exhibited a triad of symptoms, including subdural hemorrhages,⁴ retinal hemorrhages,⁵ and cerebral edema,⁶ were believed to be the victims of violent shaking or abusive head trauma because these symptoms were thought to be “traumatic in origin.”⁷ The presence of the triad was thought to be “distinctly characteristic—in scientific terms, pathognomonic—of violent shaking.”⁸

Because of the allegedly traumatic origin of the triad of symptoms, the medical diagnosis of SBS became a “medical diagnosis for murder,” when each element of the crime was scientifically proven by expert testimony regarding the syndrome and the child’s condition.⁹ Invariably, prosecution experts would testify that the force necessary to cause the triad of injuries established the *actus reus* and *mens rea*¹⁰ because the force was comparable to that of a car accident or a multiple-story fall.¹¹ Moreover, the last person alone with the child was the guilty party because the triad of symptoms and a change in the baby’s general wellbeing and appearance would have been immediately present after infliction of the injury.¹² SBS cases became the *res ipsa loquitur* of criminal cases and eliminated the need for additional

3. Mary E. Case, *Position Paper on Fatal Abusive Head Injuries in Infants and Young Children*, 22 AM. J. FORENSIC MED. & PATHOLOGY 112, 113 (2001).

4. *Id.* at 114–15. Subdural hemorrhaging is bleeding in the brain “between the hard outer-layer and spongy membranes that surround the brain.” Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 4.

5. Case, *supra* note 3, at 116–17. Retinal hemorrhaging is “bleeding of the inside surface of the back of they eye.” Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 4.

6. Case, *supra* note 3, at 118. Cerebral edema is brain swelling that results in increased pressure in the skull and brain. *Brain Swelling*, WEBMD, <http://www.webmd.com/brain/brain-swelling-brain-edema-intracranial-pressure> (last updated July 7, 2012).

7. Findley, *supra* note 2, at 224.

8. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 11.

9. Deborah Tuerkheimer, *Science-Dependent Prosecution and the Problem of Epistemic Contingency: A Study of Shaken Baby Syndrome*, 62 ALA. L. REV. 513, 516 (2011) [hereinafter Tuerkheimer, *Science-Dependent Prosecution*].

10. *Id.* at 515–16.

11. Findley, *supra* note 2, at 224–25.

12. *Id.*

evidence of motive or a history of abuse normally present in child abuse cases.

B. The Beginnings of SBS: The 1960s and 1970s

The diagnosis of SBS finds its fundamental basis in 1960s medical research of child abuse¹³ and adult whiplash injuries.¹⁴ In 1962, German pediatrician C. Henry Kempe developed the “battered child syndrome,” which hypothesized that child abuse had been historically under-diagnosed, and that the symptoms of bruising, fractures, and subdural hemorrhages in children were more likely caused by abuse than by accident.¹⁵ In 1968, American neurosurgeon A.K. Ommaya, ensuring that they met with minimal direct head impact, subjected adult monkeys to mimicked rear-end car accidents,¹⁶ Ommaya found that adult monkeys could sustain whiplash injuries, including subdural hemorrhages, in rear-end car accidents without direct head impacts and without suffering from an immediate loss of consciousness.¹⁷

In 1972, because of questions left unanswered in Kempe’s battered child syndrome, British neurosurgeon A.N. Guthkelch researched why some “battered” children exhibited subdural hemorrhages without any external evidence of abuse on their heads.¹⁸ Basing his theory on the confessions of a caregiver and three assailants who admitted to violently shaking children in their care and on the Ommaya adult whiplash study, Guthkelch hypothesized that children subjected to rapid and repeated acceleration and deceleration would sustain subdural hemorrhages without direct evidence of violence to their heads.¹⁹ Guthkelch found that with their “relatively large head[s] and puny neck muscles,” infants and young children were “particularly vulnerable” to sheering forces produced by violent shaking which caused whiplash injuries, like subdural hemorrhages.²⁰

13. See generally C.H. Kempe et al., *The Battered Child Syndrome*, 181 JAMA 17 (1962). Kempe’s article on battered child syndrome and Ommaya’s article on whiplash injuries in adults formed part of the basis for A.N. Guthkelch’s 1971 article on whiplash injuries in children and for John Caffey’s article on whiplash shaken infant syndrome.

14. A. K. Ommaya et al., *Whiplash Injury and Brain Damage: An Experimental Study*, 204 JAMA 285 (1968).

15. Kempe, *supra* note 13, at 17.

16. Ommaya, *supra* note 14, at 286.

17. See *id.* at 285.

18. A.N. Guthkelch, *Infantile Subdural Haematoma and Its Relationship to Whiplash Injuries*, 2 BRIT. MED. J. 430, 430 (1971).

19. *Id.*

20. *Id.*

Guthkelch opined that infant shaking was a likely explanation for these types of injuries, particularly in Great Britain, where there was an impression that “a good shaking” was “socially more acceptable and physically less dangerous” than direct violence.²¹ After reviewing two cases of infants displaying subdural hemorrhages without evidence of direct violence to their heads, Guthkelch opined that children who presented this type of case could be victims of violent shaking and that physicians should “inquire, however guardedly or tactfully, whether . . . the [baby] could have been shaken.”²² As such, Guthkelch recommended that all cases of infantile subdural hemorrhages were best assumed to be traumatic in origin unless proved otherwise.²³

American pediatric radiologist John Caffey is responsible for the American version of a study similar to the Guthkelch study.²⁴ In 1974, Caffey hypothesized that many babies were incorrectly diagnosed as *battered* when they were actually *shaken*.²⁵ Caffey identified the whiplash injuries of subdural hemorrhages, retinal hemorrhages, and brain damage or swelling as the clinical manifestations of babies suffering from “whiplash shaken infant syndrome.”²⁶ Caffey also noted that the “most characteristic pattern of physical findings” on the whiplashed infant was an “extraordinary diagnostic contradiction”—the absence of external signs of trauma.²⁷ Moreover, Caffey deduced that based on the “preponderance of the [medical] evidence,” the particularly pathogenic symptom of retinal hemorrhages could not be caused by a natural occurrence, but rather must have been “caused by postnatal manual shaking.”²⁸ Caffey concluded that the frequency and accuracy of shaken baby cases depended largely on the intensity of the

21. *Id.* at 431.

22. *Id.*

23. *Id.*

24. See Findley, *supra* note 2, at 223.

25. John Caffey, *The Whiplash Shaken Infant Syndrome: Manual Shaking by the Extremities with Whiplash-Induced Intracranial and Intraocular Bleedings, Linked with Residual Permanent Brain Damage and Mental Retardation*, 54 *PEDIATRICS* 396, 396 (1974). Dr. Caffey focused his study on cases where caregivers admitted to shaking the babies, which then becomes an issue of circular reasoning and selection bias identified by critics of SBS. See *infra* Part I.D.2. “Battered Child Syndrome,” as first described by C. Henry Kempe, is “a clinical condition in young children who have received serious physical abuse” and exhibit evidence of direct violence to their persons. Kempe, *supra* note 13, at 17. Contrarily, “shaken baby syndrome” is a clinical condition in infants and children that does not necessarily present with evidence of direct violence. See *supra* Part I.A.

26. See Caffey, *supra* note 25.

27. *Id.* at 399.

28. *Id.* at 400.

medical examination and that the “concept of whiplash shaken infant syndrome warrant[ed] careful diagnostic consideration in all infants with unexplained convulsions, hyperirritability, bulging fontanel, paralysis, and forceful vomiting.”²⁹ Caffey further suggested, in the form of a poem, a “nationwide educational campaign against the shaking, slapping, jerking, and jolting of infants’ heads.”³⁰

Caffey’s and Guthkelch’s hypotheses regarding whiplash injuries in infants developed “into the medicolegal hypothesis of ‘shaken baby syndrome.’”³¹

C. The Problems of Shaken Baby Syndrome Arise: The 1980s and 1990s

The pathognomonic nature of Caffey’s whiplash shaken infant syndrome and the triad of symptoms was generally accepted and went largely unchecked by both medical and legal professionals until the late 1980s and 1990s.

The first major medical and scientific challenge to SBS came in 1987, when American neurosurgeon Ann-Christine Duhaime attempted to validate the SBS hypothesis by conducting a combined neurological and biomedical engineering study.³² Duhaime’s study measured the force of shaking a baby and compared it to accepted head impact force thresholds for infants.³³ Duhaime found that the force caused by vigorous shaking was not likely to cause fatal injuries in babies.³⁴ In fact, the force caused by shaking measured well below the established head injury thresholds and was only approximately one-fiftieth the force generated by impact.³⁵ Duhaime further expanded on her study in a 1992 article where she hypothesized that the triad of symptoms associated with SBS were likely caused by shaking *and* impact, rather than just by shaking alone.³⁶

29. *Id.* at 403.

30. *Id.*

31. Findley, *supra* note 2, at 223.

32. Ann-Christine Duhaime et al., *The Shaken Baby Syndrome: A Clinical, Pathological, and Biomechanical Study*, 66 J. NEUROSURGERY 409 (1987) [hereinafter Duhaime, *The Shaken Baby Syndrome*].

33. *Id.*

34. *Id.* at 414.

35. *Id.* at 413.

36. Ann-Christine Duhaime et al., *Head Injury in Very Young Children: Mechanisms, Injury Types, and Ophthalmologic Findings in 100 Hospitalized Patients Younger Than 2 Years of Age*, 90 PEDIATRICS 179, 183 (1992) [hereinafter Duhaime, *Head Injury in Very Young Children*].

Though the first appeal of an SBS-triad prosecution came in 1984,³⁷ the first legal challenge to SBS that gained national and international recognition was the case of British nanny Louise Woodward and the death of baby Matthew Eappen.³⁸ Matthew died five days after being admitted to the hospital with a fractured skull.³⁹ He presented with a subdural hematoma and hemorrhages upon admittance to the hospital.⁴⁰ Woodward admitted to being “a little rough” with Matthew when putting him on the bed, and said she was “not . . . as gentle as [she] might have been” with him.⁴¹ The prosecution presented expert witnesses, “including several of the treating physicians,”⁴² who testified that Matthew’s injuries were caused by violent shaking and head impact on a hard surface.⁴³ The defense relied on Woodward’s testimony and experts who ascribed Matthew’s hemorrhages to the spontaneous re-bleeding of a clot formed three weeks earlier.⁴⁴ The jury convicted Woodward of second-degree murder, and Woodward was sentenced to the statutorily mandated term of life in prison.⁴⁵ However, at a post-conviction hearing, Woodward’s conviction was reduced to involuntary manslaughter, and she was sentenced to time served and released.⁴⁶ Though unsuccessful at achieving an acquittal, Woodward’s case was the first use of defense experts to challenge the finality of the SBS diagnosis.⁴⁷ Her case also widened the already developed schism between proponents and critics of SBS.⁴⁸ However, by 2000 SBS was once again widely and generally accepted as both a medical diagnosis and a prosecutorial theory.

D. The Debate of and Consensus on Shaken Baby Syndrome Shifts: the 2000s

Following the Duhaime studies and Woodward case, the debate amongst supporters and critics of SBS increased and the consensus of support for the theory shifted.

37. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 9.

38. *See id.* at 15.

39. Commonwealth v. Woodward (*Woodward II*), 694 N.E.2d 1277, 1281 (1998).

40. *Id.* at 1292–93.

41. Commonwealth v. Woodward (*Woodward I*), No. 97-0433, 1997 Mass. Super. LEXIS 213, at *2–3 (Mass. Super. Ct. Nov. 10, 1997).

42. *Woodward II*, 694 N.E. 2d at 1293.

43. *Id.* at 1282 n.4.

44. *Id.*

45. *Id.* at 1281.

46. *Id.*

47. Findley, *supra* note 2, at 228.

48. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 15.

1. Advent of Evidence-Based Medicine and SBS Critics

Due in large part to the advent of evidence-based medicine, the weaknesses of SBS were acknowledged by proponents and investigated by its critics.⁴⁹ Evidence-based medicine is “the conscientious, explicit, and judicious use of scientific evidence in making medical decisions and cautions against unsystematic, untested reasoning and intuition based clinical assessments. It integrates scientific principles and clinical experience with valid, current research.”⁵⁰ Evidence-based medicine involves “a review of the quality of evidence that is available in various diseases and fields of inquiry within medicine.”⁵¹ These new evidence-based medicine standards required doctors to derive their research from methodically rigorous science and statistics, which prompted both critics and proponents to review the science underlying SBS.⁵²

Mark Donohoe, a critic of SBS, evaluated and ranked by internationally accepted standards the SBS literature written from 1966 to 1998 to determine the degree of confidence that could be attributed to the SBS theory.⁵³ Donohoe’s conclusion was disconcerting—he found that there was “inadequate scientific evidence to come to a firm conclusion on most aspects of causation, diagnosis, treatment, and any other matter pertaining to SBS.”⁵⁴ These studies suffered from self-selection bias; the cases evaluated in these studies were chosen because they each presented with the triad of symptoms they sought to confirm as diagnostic.⁵⁵ As a result, the studies found the criteria they used to choose their cases as pathognomonic of SBS.⁵⁶ Moreover, these studies lacked control groups, were poorly defined, and lacked blind assessment.⁵⁷ Donohoe recognized the difficulty in relying on indirect or disputed evidence because it was “clearly unethical to intentionally shake infants to induce trauma,”⁵⁸ but as fellow SBS critic Patrick Lantz noted in support of Donohoe, the difficulty did not “jus-

49. *Id.* at 14–16.

50. Patrick E. Lantz, Letter to the Editor, *The Evidence Base for Shaken Baby Syndrome: Response to Reece et al from 41 Physicians and Scientists*, 329 BRIT. MED. J. 741, 741 (2004).

51. Mark Donohoe, *Evidence-Based Medicine and Shaken Baby Syndrome Part I: Literature Review, 1966–1998*, 24 AM. J. FORENSIC MED. & PATHOLOGY 239, 239 (2003).

52. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 12.

53. *Id.*; Donohoe, *supra* note 51.

54. Donohoe, *supra* note 51, at 241.

55. *Id.* at 239.

56. *Id.*

57. *Id.* at 241.

58. *Id.* at 239.

tify circular reasoning, selection bias, imprecise case definition, unsystematic review publications, or conclusions that overstep the data.”⁵⁹

2. Admissions of Weakness in the Early 2000s

Despite the critics, support of SBS was still strong. Indeed, the National Center on SBS had started training police, social workers, and prosecutors to identify SBS cases and having the Center’s members produce position papers on SBS for major medical journals.⁶⁰ For example, forensic pathologist Mary Case wrote one such position paper for the National Association of Medical Examiners (“NAME”).⁶¹ Case’s position paper made it clear that the debate regarding the mechanism of shaking in the SBS theory was controversial.⁶² Because of that controversy, the more appropriate name was Abusive Head Trauma (“AHT”).⁶³ This position paper was the first recognition of SBS’s weakness;⁶⁴ however, the admissions did not end there.

In 2002, the National Institutes of Health held a conference to address the disputed issues of SBS.⁶⁵ While the conference only allowed SBS supporters to attend, the attendees generally agreed that a nomenclature shift was warranted given the biomedical engineering developments.⁶⁶ Additionally, the conference speakers repeatedly acknowledged that there was a lack of evidentiary support for SBS.⁶⁷ Even Conference Director Dr. Carol Nicholson said that “[b]ecause there is very little scientific, experimental, or descriptive work” regarding the pathology and mechanics of SBS, what was needed was scientific research that was subject to and could survive evidence-based scrutiny.⁶⁸ The attendees generally agreed that the literature suffered from serious gaps, particularly “the problem of circularity of reason-

59. Lantz, *supra* note 50, at 741.

60. See *About the Center*, NATIONAL CENTER ON SHAKEN BABY SYNDROME, <http://dontshake.org/sbs.php?topNavID=2&subNavID=10> (last visited Apr. 24, 2013).

61. See Case, *supra* note 3. Due to its controversial nature, the article did not pass NAME peer review and was not endorsed by the NAME reviewers; however, it was published in the NAME journal. *Id.* at 112 (Editor’s note); Findley, *supra* note 2, at 232–33.

62. Case, *supra* note 3, at 112–13.

63. Findley, *supra* note 2, at 212.

64. See *id.* at 232–33.

65. *Id.* at 233.

66. *Id.* at 233–34.

67. *Id.* at 234–35.

68. AM. ACAD. OF PEDIATRICS, *INFLECTED CHILDHOOD NEUROTRAUMA: PROCEEDINGS OF A CONFERENCE SPONSORED BY DEP’T OF HEALTH AND HUMAN SERVS., NAT’L INST. OF HEALTH, NAT’L INST. OF CHILD HEALTH & HUMAN DEV., OFFICE OF RARE DISEASE & NAT’L CTR. FOR MED. REHAB. RESEARCH* at IX (Robert M. Reece & Carol E. Nicholson eds., 2003).

ing.”⁶⁹ This problem with circularity was summarized best by conference attendee and SBS-supporter, Dr. Jenny, who stated, “[if] we use pre-determined, generally accepted criteria to determine if a child’s injuries are inflicted or unintentional . . . then . . . those criteria are found to occur most frequently in abused children.”⁷⁰

3. Medical and Scientific Challenges to SBS

Given the weaknesses in early SBS research, medical and scientific professionals began investigating the origin and cause of the triad of symptoms. Though individually different, the critical research of SBS all generally concluded that the classic triad—subdural hemorrhages, retinal hemorrhages, and brain damage—were *not* pathognomonic of child abuse and that there were a variety of non-traumatic causes of the triad.

British clinical neuropathologist J.F. Geddes conducted two studies in 2001 because of the dearth of neuropathological study of SBS cases.⁷¹ Geddes reviewed the nervous system tissue of fifty-three infants who reportedly died from abuse.⁷² She found that 77% of the children experienced severe hypoxic brain damage.⁷³ From this, she raised the possibility that the subdural hemorrhages found in allegedly abused children could have been caused by a lack of oxygen, rather than by trauma.⁷⁴

In her second study, Geddes reviewed thirty-seven cases of non-accidental head injury and found that the brain damage and swelling seen in 75% of these children were caused by hypoxia.⁷⁵ Hypoxia can develop from a variety of non-traumatic origins, including many medical conditions that affect the flow of oxygen to the brain.⁷⁶ Moreover, the brain damage caused by hypoxia greatly depends on how long the

69. *Id.* at 51–52.

70. *Id.*

71. J.F. Geddes et al., *Neuropathology of Inflicted Head Injury in Children, I. Patterns of Brain Damage*, 124 *BRAIN* 1290 (2001) [hereinafter Geddes, *Patterns of Brain Damage*]; J.F. Geddes et al., *Neuropathology of Inflicted Head Injury in Children, II. Microscopic Brain Injury in Infants*, 124 *BRAIN* 1299 (2001) [hereinafter Geddes, *Microscopic Brain Injury in Infants*].

72. Geddes, *Patterns of Brain Damage*, *supra* note 71, at 1290.

73. *Id.* Hypoxic brain damage is caused by a decrease in the supply of oxygen to the brain, which can cause coma, seizures, and even brain death, especially if the hypoxia lasts longer than five minutes. *Hypoxia and Brain Injury*, BRAIN INJURY INSTITUTE, <http://www.braininjuryinstitute.org/Brain-Injury-Types/Hypoxia.html> (last visited Sept. 30, 2013).

74. Geddes, *Microscopic Brain Injury in Infants*, *supra* note 71, at 1304–05.

75. *Id.* at 1299.

76. *Hypoxia and Brain Injury*, *supra* note 73.

brain is deprived of oxygen; brain cells start to die after as few as five minutes.⁷⁷

These findings invalidated several legal propositions that were based on the premise that subdural hemorrhages and brain damage were necessarily traumatic.⁷⁸ If the brain damage was caused by hypoxia rather than trauma, then the triad-based theories of actus reus, mens rea, and identity would be voided.⁷⁹ Geddes' studies stand for two propositions: first, that the triad of symptoms, particularly subdural hemorrhages and brain damage, could not necessarily be attributed to trauma in the absence of external evidence; and second, that the trauma caused by shaking was survivable and did not cause the symptoms generally attributed to shaking deaths.⁸⁰

Similarly, forensic pathologist John Plunkett began investigating the mechanism of short-distance falls to determine: (1) if they could cause the triad of symptoms; (2) if children sustained lucid intervals immediately after short-distance falls causing the triad of symptoms; and (3) if, or at what rate, short-distance falls could be fatal.⁸¹ Plunkett reviewed eighteen cases of fatal, short-distance falls from playground equipment as reported by the Consumer Product Safety Commission.⁸² The children ranged in age from twelve months to thirteen years and fell from two to ten feet.⁸³ Twelve of the children's falls were witnessed or videotaped by a non-caretaker, which independently confirmed the distance of the fall.⁸⁴ Nine of the twelve children, whose falls were witnessed by a non-caretaker, experienced lucid intervals ranging from five minutes to two days.⁸⁵ Though only six of the eighteen children had their eyes examined by their doctors, four of those children had retinal hemorrhaging.⁸⁶ Based on these findings, Plunkett concluded that children could accidentally take a short-distance fall, experience a lucid interval after that fall, present with both subdural and retinal hemorrhages, and die from their injuries.⁸⁷ As such, Plunkett's study suggests that a history of falls given by

77. *Id.*

78. Geddes, *Microscopic Brain Injury in Infants*, *supra* note 71, at 1304.

79. *Id.* at 1305.

80. *See id.*; Geddes, *Patterns of Brain Damage*, *supra* note 71.

81. John Plunkett, *Fatal Pediatric Head Injuries Caused by Short-Distance Falls*, 22 AM. J. FORENSIC MED. & PATHOLOGY 1, 1 (2001).

82. *Id.*

83. *Id.*

84. *Id.*

85. *Id.* at 8–9.

86. *Id.* at 9.

87. *Id.* at 10.

caregivers could not be automatically dismissed or discounted as an alternative mechanism or cause of the triad of symptoms.

Lastly, child-abuse pediatrician Kent Hymel addressed the issue of subdural hemorrhages and the possible re-bleeding of old subdural hemorrhages.⁸⁸ Hymel investigated two cases of indoor, accidental, pediatric, closed-head trauma that resulted in subdural hemorrhages.⁸⁹ Medical personnel witnessed both impacts in medical settings.⁹⁰ Hymel emphasized that subdural hemorrhages were etiologically linked to “accidental trauma; inflicted trauma; medical or surgical interventions; prenatal, perinatal, and pregnancy-related conditions; birth trauma; metabolic diseases; congenital malformations; genetic diseases; oncologic-diseases; autoimmune disorders; clotting disorders; infectious diseases; [and] the effects of poisons, toxins, or drugs”⁹¹ Moreover, Hymel determined that old, non-acute hemorrhages that were difficult, if not impossible, to find could spontaneously re-bleed with little to no application of trauma.⁹² These re-bleeds could create acute subdural hemorrhages that could result in unconsciousness, brain damage, or death.⁹³ Hymel found that there needed to be an extensive differential diagnosis of the subdural hemorrhage’s origins before abuse or traumatic injury could be assumed.⁹⁴

As shown by the evidence-based medical studies of SBS science, the syndrome has been plagued by weaknesses since its inception. The earlier studies conducted by Guthkelch and Caffey promulgated circular reasoning by using populations limited to cases with the presence of the triad of symptoms, which obviously confirmed the presence of the triad of symptoms as pathognomonic of violent shaking and child abuse. This circularity was highlighted by Donohoe’s evidence-based study and then exacerbated by the discovery of causes for the triad other than trauma. The Geddes, Plunkett, and Hymel studies are only a few examples of the scientific and medical research challenging the premise that the symptoms forming the classic SBS triad were distinctly traumatic in origin. These studies seriously call into question

88. Kent Hymel et al., *Intracranial Hemorrhage and Rebleeding in Suspected Victims of Abusive Head Trauma: Addressing the Forensic Controversies*, 7 *CHILD MALTREATMENT* 329, 329 (2002).

89. *Id.*

90. *Id.*

91. *Id.* at 332.

92. *Id.* at 342.

93. *Id.* at 340.

94. *Id.* at 344.

SBS prosecutions solely based on evidence of the allegedly “traumatic” symptoms of child abuse. However, even at present in the United States, triad-based investigations, prosecutions, and convictions still occur in great number.

II. International Recognition, Reconsideration, and Reforms of SBS Evolution

The international criminal law community has recognized and tried to combat the issues raised by the shifting medical consensus on the validity of the SBS triad of symptoms and its theory of per se abuse. Australia, the United Kingdom, and Canada are models of the integration of changing opinions on SBS.

A. Australia

Australia’s solution to the SBS shift was strikingly simple—prosecutions based solely on the presence of one or more of the triad of symptoms could not prove a case of criminal abuse beyond a reasonable doubt absent some other corroborating evidence. Australia’s integration was done on the basis of a regular criminal appeal and has since changed the investigation and prosecution of alleged SBS cases.

In May 2001, a Western Australian father was accused of murdering his son. The father was the only adult at home with the baby when he noticed that his son appeared unwell and was having difficulty breathing and then “flopped.”⁹⁵ After being rushed to the hospital via ambulance, the baby was found to be suffering from severe brain swelling and died three days later.⁹⁶ The baby’s autopsy revealed a complete absence of traumatic injuries but did show that the child had suffered from the classic triad of SBS symptoms—subdural and retinal hemorrhaging accompanied by severe brain damage.⁹⁷

At a bench trial, the father stated that he believed something was obstructing his son’s airway and that he administered sharp blows against his son’s back to dislodge that obstruction, but the defense conceded that it may have caused trauma.⁹⁸ The father proffered the eminent and highly qualified forensic pathologist John Hilton, who stated that it was “not tenable” to conclude that the only possible cause of the baby’s death was violent shaking.⁹⁹ Hilton further opined

95. R v. Court, [2003] WASCA 308, ¶ 7 (Austl.).

96. *Id.* ¶ 7–8.

97. *Id.* ¶ 15–16.

98. *Id.* ¶¶ 3(7)(a), 12.

99. *Id.* ¶¶ 5, 55.

that absent corroborating evidence or a witness, it is “highly suspect” to conclude that the child died from being shaken in a prolonged or violent way because he suffered from the triad of symptoms.¹⁰⁰ Contrarily, the government’s expert believed that sustained shaking for thirty seconds or about forty to fifty shakes was the only reasonable cause of the baby’s injuries, despite his complete lack of bruising.¹⁰¹ The government’s expert also acknowledged that there was scientific dissent about the force required to cause the triad of symptoms and some experts believed that shaking could not meet the force threshold required to cause such injuries.¹⁰² The father was acquitted of all charges and the government appealed.¹⁰³

The Supreme Court of Western Australia, reasoning that there was not enough evidence to establish proof beyond a reasonable doubt that the father had so intentionally injured his son that the baby died from such injuries, upheld the father’s acquittal.¹⁰⁴ The Court opined that the government over-relied on the medical testimony in their appeal of the trial judge’s decision. The trial judge and Supreme Court both found that the background evidence presented at trial,¹⁰⁵ specifically that the father was loving and that his three-year-old daughter was at home at the time of the baby’s collapse, did not directly correlate with expert testimony at trial¹⁰⁶ and justified the trial judge’s finding that he was “unable to conclude beyond a reasonable doubt that the death . . . was caused by . . . shak[ing].”¹⁰⁷

The Australian Supreme Court’s opinion highlights the court system’s absorption of new scientific understanding.¹⁰⁸ Particularly, both the trial and Supreme Court accepted the premise that the triad of symptoms, absent a witness, corroborating evidence, or confession, could not prove beyond a reasonable doubt that a baby died from being shaken in a prolonged or violent manner.¹⁰⁹ Though not a solution for past cases, Australia’s integration of the conversation on, and development of, SBS in 2003 was a solution to preserve the integrity of SBS cases prosecuted in the future.

100. *Id.* ¶ 55.

101. *Id.* ¶¶ 3(7)(c), 29.

102. *Id.* ¶ 29.

103. *Id.* ¶ 3.

104. *See id.*

105. *Id.*

106. *Id.* ¶¶ 102, 177, 181–82.

107. *Id.* ¶ 185.

108. *Id.* ¶ 5.

109. *Id.* ¶ 44.

B. United Kingdom

Similar to the Australian recognition, the British recognition and integration of the change in SBS science came in the appellate courts. However, the British investigation into SBS was initiated by a greater problem—the issues surrounding pediatric forensic pathology.¹¹⁰

In 2004, the British Attorney General ordered a review of infant homicide cases after the Court of Appeals overturned the cases of Sally Clark and Angela Cannings for deficiencies in the pediatric forensic evidence admitted at their trials.¹¹¹ The Attorney General reviewed 297 cases and found twenty-eight general infant homicide cases that created concerns about the integrity of their convictions.¹¹² Defendants were welcomed to appeal directly to the court of appeals or with assistance of the Criminal Cases Review Commission.¹¹³ Amongst that group of 297 cases, eighty-nine were cases of SBS.¹¹⁴

On July 21, 2005, the court of appeals issued an opinion in the consolidated appeal of four defendants convicted of killing or greatly injuring a child by shaking them.¹¹⁵ The four cases shared five common traits: (1) the convictions were the result of contested trials; (2) the defendant denied using unlawful force against the child; (3) the defendant argued and offered evidence of a possible alternative explanation for the cause of the child's injuries; (4) the defendant attacked the conventional theory of SBS; and (5) the children each exhibited one or more of the triad symptoms.¹¹⁶

On appeal, the court heard from twenty-five medical and scientific experts—eleven proffered by the defense and fourteen proffered by the government.¹¹⁷ The appeals court premised its decision in recognition that there was no expert unanimity regarding the amount of force necessary to cause the triad, but that serious or even fatal inju-

110. This Comment does not attempt to investigate the weaknesses that plague the field of pediatric forensic pathology and evidence—that is a topic in and of itself. However, it is important to note that both the British and Canadian SBS reformations developed out of concerns over the integrity of pediatric forensic pathology.

111. THE RT. HON. THE LORD GOLDSMITH QC, REVIEW OF INFANT DEATH CASES ADDENDUM TO REPORT: SHAKEN BABY SYNDROME (2006), *available at* http://www.childrenscourt.lawlink.nsw.gov.au/agdbasev7wf/_assets/childrenscourt/m41005111/reviewofinfantdeathcasespaper.doc.

112. *Id.* ¶ 1.

113. *Id.*

114. *Id.* ¶ 2.

115. *R v. Harris*, [2005] EWCA 1980, ¶ 1 (Ct. App. Crim. Div.) (Austl.).

116. Goldsmith, *supra* note 111, ¶¶ 5–6.

117. *Id.* ¶ 8.

ries could be caused by little force or by short-distance falls.¹¹⁸ Moreover, the court believed that the more severe the injuries the more likely they were to stem from more than just rough handling or play because if that amount of force was enough, then “hospitals would be full of such cases.”¹¹⁹

The court concluded that while the triad of symptoms traditionally associated with SBS was consistent with the unlawful application of force, the triad was not diagnostic of SBS in all cases where the triad was present.¹²⁰ As a result, in cases where the triad of injuries alone was present and where there was no supporting evidence of abuse, “the triad on its own . . . [could not] automatically or necessarily” lead to a conclusion that the infant had been violently shaken and could not prove a defendant’s guilt beyond a reasonable doubt.¹²¹ Lastly, the court reasoned that the force necessary to create the triad required more than rough handling, but also acknowledged that there were rare cases where the triad could be caused by little force.¹²² As such, all SBS cases were fact-specific and required individualized investigations and prosecutions.¹²³

While the triad remained “a strong pointer” to SBS in the United Kingdom,¹²⁴ the British Attorney General felt it prudent to further review the eighty-eight SBS cases identified during the Infant Homicide Review of 2004 because it recognized that “[t]he most difficult cases are those where there is no [external] evidence of abuse” and only the triad indicated abuse and SBS.¹²⁵ A majority of the eighty-eight cases had additional evidence beyond the triad, including evidence of impact with a wall, admissions to shaking and punching, old fractures, other head injuries, or violent squeezing fractures.¹²⁶ Ten of the remaining cases merited additional investigation, and three of those raised such high concerns over the integrity of the convictions

118. *Harris*, [2005] EWCA 1980, ¶ 79.

119. *Id.* ¶ 78–80.

120. *Id.* ¶ 152.

121. *Id.*

122. *Id.* ¶¶ 147, 267.

123. *Id.*

124. *Id.* ¶ 70.

125. Goldsmith, *supra* note 111, ¶¶ 13, 15. Those eighty-eight cases were chosen because either the only evidence of abuse was one or more of the triad symptoms or because the defense proposed an alternative to shaking that could be supported by new research accepted by the Court of Appeals. *Id.* ¶ 16.

126. *Id.* ¶ 18.

that the Attorney General sent letters to the defendant and defense counsel recommending appeal.¹²⁷

The British court of appeals decision in the consolidated SBS case and the result of the Addendum Review have “appreciably altered the course of SBS prosecutions” in the United Kingdom.¹²⁸ Rather than the weakness-riddled, formulaic investigation and prosecution based on SBS, suspected SBS investigations and prosecutions “demand . . . each case be assessed individually, based on the evidence available.”¹²⁹

The United Kingdom’s integration of the changes in SBS science highlights the possibility of systemic reform, not only protecting future prosecutions, but also attempting to rectify previous wrongful convictions.

C. Canada

Similarly to the United Kingdom, the Canadian province of Ontario’s 2005 to 2007 investigation into SBS prosecutions was spurred by concerns over pediatric forensic pathology and the quality of work done by Dr. Charles Smith, the province’s leading pediatric forensic pathologist.¹³⁰ Smith, who had “no formal training or certification in forensic pathology,” had worked as a pediatric pathologist from 1981 to 2005 at “Toronto’s world-renowned Hospital for Sick Children.”¹³¹ Concerns over Smith’s professional competence, methodology, and conclusions had been building since the early 1990s, but it was not until 2005 that Ontario’s Chief Coroner Dr. Barry McLellan reviewed cases of suspicious child deaths in which Smith was either the forensic pathologist or had provided expert testimony.¹³² McLellan found that Smith had made factual conclusions based on his autopsies that were not reasonably supported by the material available to him.¹³³ Moreover, a five-person panel of independent forensic pathologists reviewed forty-five of Smith’s cases and found that there were thirty questionable cases where Smith either did not conduct the indicated examina-

127. *Id.* ¶ 19–20.

128. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 24 n.149.

129. Sam Lister, *Q&A: Shaken Baby Syndrome*, *TIMES ONLINE* (Feb. 14, 2006, 12:00 AM), <http://www.thetimes.co.uk/tto/news/uk/article1935788.ece>.

130. See STEPHEN T. GOUDGE, *INQUIRY INTO PEDIATRIC FORENSIC PATHOLOGY IN ONTARIO, VOLUME 1: EXECUTIVE SUMMARY* (2008), *available at* <http://www.attorneygeneral.jus.gov.on.ca/inquiries/goudge/report/index.html>.

131. *Id.* at 6.

132. *Id.* at 6–7.

133. *Id.* at 7.

tion, or his opinion omitted significant facts or was not supported by the facts presented by the case.¹³⁴

As a result of these preliminary findings, the Attorney General of Ontario convened a committee to conduct a systemic review and assessment of pediatric forensic pathology in Ontario to be headed by former Canadian Supreme Court Justice Stephen T. Goudge.¹³⁵ After seventeen months and more than \$8.3 million, the Goudge Committee produced a more than one-thousand-page report that reviewed the use of pediatric forensic pathology in Ontario from 1981 to 2001.¹³⁶ The Goudge Report found that the forensic pathology system in Ontario was severely flawed and populated by woefully inadequate so-called experts.¹³⁷ The Goudge Report recommended sweeping reforms of the forensic pathology system, including increased education, training, and certification in Canada for forensic pathology.¹³⁸

The Goudge Report also called into question SBS triad-based prosecutions.¹³⁹ Citing the changes in SBS pathology research and knowledge, the Goudge Report recommended review of pleas or prosecutions based solely on evidence of the SBS-triad in order to preserve their certitude.¹⁴⁰ The committee noted that the triad was no longer pathognomonic of abuse and that short-distance falls by infants can be fatal.¹⁴¹ They argued the more controversy surrounding an area of forensic evidence, the more scrutiny that should be applied to its prosecution.¹⁴²

As a result of the Goudge Report, the Ontario Attorney General's Office identified 220 cases where a determination was made that the baby had died after being shaken.¹⁴³ Of the 220 cases identified, 142 were marked for review by a team comprised of Goudge, the chief forensic pathologist, a regional supervising coroner, a senior defense attorney, and a senior prosecutor.¹⁴⁴ To date, at least four defendants

134. *Id.*

135. News Release, Ministry of the Attorney General of Ontario (Apr. 25, 2007), available at <http://www.attorneygeneral.jus.gov.on.ca/english/news/2007/20070425-pi-tr.asp> [hereinafter Ontario AG News Release].

136. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 25 n.150.

137. GOUDGE, *supra* note 130, at 528.

138. *See id.*

139. *Id.* at 531.

140. *Id.* at 528–29.

141. *Id.*

142. *Id.*

143. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 25 n.150.

144. *Id.*

convicted of SBS-related crimes have been exonerated and released.¹⁴⁵

Australia, the United Kingdom, and Canada stand as exemplars of integration of the scientific evolution of SBS. Through legal precedents and policies, each country was able to protect the integrity of future SBS prosecutions by identifying the weakness of triad-only prosecutions and addressing them accordingly. Having set legal precedence against future triad-only SBS prosecutions and conducting voluntary reviews of previous SBS convictions, the United Kingdom and Canada stand as ideal models of SBS systemic reaction.¹⁴⁶

The value that the United Kingdom and Canada have placed on the integrity of previous SBS pleas and convictions shows recognition of, and concern over, the substantial risk, possible certainty of wrongful convictions, and false guilty pleas associated with SBS cases. Their actions highlight this Comment's main concern—specifically, that absent systemic or actor-driven reform and review of SBS cases, wrongful convictions can and will continue.

III. American Recognition and Reconsideration of the 2000s SBS Debate

In comparison to the global changes and international recognition of the weaknesses in SBS, a review of the current state of SBS medical and legal debates in the United States highlights the American criminal justice system's slow, halting, and inconsistent response to the evolution of SBS science. Unlike the Australian and United Kingdom Supreme Courts, who heard appeals on the contravening theories of SBS in 2003 and 2005 respectively, our Supreme Court's consideration of the issues did not come until 2012.¹⁴⁷ Moreover, our trial courts have admitted and excluded SBS evidence in a myriad of ways, few of which were consistent with other jurisdictions. Lastly, our

145. See, e.g., Kirk Makin, *Mother Wrongly Convicted in Infant's Death Acquitted*, GLOBE AND MAIL (Dec. 7, 2009, 11:26 AM), <http://www.theglobeandmail.com/news/national/mother-wrongly-convicted-in-infants-death-acquitted/article1391307/>; Tracey Tyler, *A Father's 20-year Battle for Exoneration*, TORONTO STAR (Jan. 20, 2011), http://www.thestar.com/news/gta/2011/01/20/a_fathers_20year_battle_for_exoneration.html; Mike Crawley, *Ontario Mother's Murder Conviction Quashed*, CBC NEWS TORONTO (Feb. 10, 2011, 11:39 AM), <http://www.cbc.ca/news/canada/toronto/story/2011/02/10/tammy-marquardt-court546.html>; *Pathologist Played Key Role in Several Cases*, THE SPEC (Nov. 12, 2007), <http://www.thespec.com/news/canada/article/192541—pathologist-played-key-role-in-several-cases>.

146. Canada is also to be praised for including guilty pleas in its systemic review of previous cases in recognition of an SBS defendant's cost benefit analysis. See GOUDGE, *supra* note 129, at 532.

147. *Cavazos v. Smith*, 132 S. Ct. 2, 4 (2012).

appellate courts have overturned or upheld SBS convictions based on a variety of justifications. This halting and inconsistent adjustment to the SBS revolution perpetuates the risk, and practically guarantees, that caregivers and parents are still being wrongfully convicted where no actual crime occurred.

A. Admission of SBS Experts and Evidence

Physical or scientific evidence is admitted in trial through the testimony of expert witnesses. Admissibility of expert testimony is governed by the *Daubert*¹⁴⁸ standard in federal courts, while some state jurisdictions, including California, retain the *Frye*¹⁴⁹ standard of general acceptance.¹⁵⁰

Under the *Daubert* standard, the judge is the gatekeeper of the trial and is required to assure that scientific expert testimony is relevant, reliable, and based on real scientific knowledge.¹⁵¹ To determine if the scientific knowledge is based on reliable science, courts will engage in a multi-factor analysis to determine if the scientific testimony is valid. These relevant factors include: (1) whether the theory is falsifiable, refutable, or testable, (2) whether the theory has been subjected to peer review and publication, (3) whether there is a known or potential error rate and what that rate is, and (4) to what degree the theory or technique is generally accepted by a relevant scientific community.¹⁵² Contrarily, the *Frye* standard provides that expert testimony based on science is admissible only where the scientific method is generally accepted as reliable in the relevant scientific community.¹⁵³ Moreover, the *Frye* standard is applied only to novel areas of scientific experimentation, which means that *Frye* hearings will not be held to evaluate evidence that has been generally accepted for years, like SBS.¹⁵⁴

Despite the rabid debate amongst experts during the 2000s, challenges by defense attorneys to the admission of SBS-supporter expert testimony were generally unsuccessful in both *Frye* and *Daubert* jurisdictions.¹⁵⁵ For example, in the 2003 Nebraska¹⁵⁶ case of *State v.*

148. *Daubert v. Merrell Dow Pharms. Inc.*, 509 U.S. 579 (1993).

149. *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923).

150. *See People v. Kelly*, 549 P.2d 1240 (Cal. 1976).

151. *Daubert*, 509 U.S. at 597.

152. *See id.* at 592–95.

153. *Frye* 293 F. at 1014.

154. *See id.*

155. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 32–33.

Leibhart,¹⁵⁷ the defendant argued that reliable scientific authority, data, or research did not support the theory of SBS; but the trial court found that SBS had been clinically tested and was generally accepted within the scientific medical community of pediatricians.¹⁵⁸ After noting that despite issues associated with selection bias of the cited relevant community pediatricians, issues with the methodological quality associated with the clinical studies cited by the state's expert, and issues with the unknown error rates of those studies, the theory of SBS was and had been generally accepted for years and as such was not subject to exclusion, the Nebraska appellate court upheld the trial court's decision.¹⁵⁹

Contrarily, in the 2007 Missouri¹⁶⁰ case of *State v. Hyatt*,¹⁶¹ the court excluded an SBS proponent's expert testimony.¹⁶² The court held that testimony opining that SBS was the cause of death based only on the presence of subdural hemorrhaging and retinal bleeding in the absence of traumatic cranial trauma was not generally accepted because there was

substantial, persistent and continuing criticism of this [SBS] diagnosis among many in the medical and scientific research communities . . . that subdural hematoma and retinal bleeding can have many other causes and that the diagnosis of shaken baby syndrome is merely a "default" diagnosis . . . [that] pediatricians use when they have no other explanation for the cause of the child's injuries.¹⁶³

However, the majority of trial courts did not agree with the *Hyatt* court and have been almost uniform in justifying their admission of disputed SBS evidence.¹⁶⁴ Courts emphasize that "the standard of admissibility is relevance and reliability, not certainty."¹⁶⁵ As such, it is not the court's purpose in excluding scientific evidence to exclude evidence that is uncertain, but rather in excluding scientific evidence

156. Nebraska has adopted the federal *Daubert* standard. See *Schafersman v. Agland Coop.*, 631 N.W.2d 862 (Neb. 2001).

157. *State v. Leibhart*, 662 N.W.2d 618, 623 (Neb. 2003).

158. *Id.* at 623.

159. *Id.* at 628.

160. Missouri is controlled by a state statute that is similar, but not identical, to the *Daubert* standard. However, the Missouri statute requires more than the general acceptance standard of *Frye*. *State Bd. of Registration for the Healing Arts v. McDonagh*, 123 S.W.3d 146, 155 (Mo. 2003) (en banc).

161. *Order, State v. Hyatt*, No. 06M7-CR00016-02 (Mo. Cir. Ct. Nov. 6, 2007).

162. *Id.*

163. *Id.*

164. See Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 32-38.

165. *People v. Martinez*, 74 P.3d 316, 322 (Colo. 2003).

that is based on unreliable or untestable methods. This is a reflection of the court's gatekeeping function.¹⁶⁶ Moreover, disputes as to the strength of an expert's credentials, faults in his methodology, or lack of textual authority for his opinion, go to the weight, not the admissibility of that expert's testimony, such that vigorous cross-examination of a study's inadequacies allows the jury to weigh the alleged defects and reduce the possibility of prejudice.¹⁶⁷

Despite this continued admission, there was also hope for SBS defendants because, while courts continued to admit expert testimony supporting SBS, courts were not excluding defense expert testimony critiquing and challenging the basis of SBS on the basis of *Daubert* or *Frye*.¹⁶⁸ Admission of SBS critics is the beginning of the road to fully integrating the SBS revolution into current investigations and prosecutions and to combating the wrongful conviction of SBS defendants.

B. SBS Issues at Trial During the 2000s

Over the past decade, the medical debate surrounding the validity of SBS and AHT has been heated and extensive, but now there are several points that are generally accepted by the medical community.¹⁶⁹ Most importantly, it is generally accepted that the triad of symptoms traditionally associated with SBS—subdural hemorrhages, retinal hemorrhages, and brain damage—are no longer pathognomonic of abuse or shaking.¹⁷⁰ These symptoms, once attributed solely to trauma, can be caused by a range of natural and non-traumatic alternative mechanisms, including birth trauma, disease, infection, genetics, and childhood stroke.¹⁷¹ These previously unaccepted principles have finally called into question the once simple prosecution of SBS cases and have upset investigatory and prosecutorial complacency by creating reasonable doubt. This doubt requires trial courts to evaluate the validity of SBS.

1. Issues with Intent and Causation

Prior to the 2000s, intent and causation in SBS prosecutions was proven by the traumatic nature of the SBS-triad because it was believed that the shaking required to cause those injuries was so violent

166. *Commonwealth v. Martin*, 290 S.W.3d 59, 68 (Ky. Ct. App. 2008).

167. *Id.*

168. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 32 n.194.

169. Findley, *supra* note 2, at 297–98.

170. *Id.*

171. *Id.*

as to be per se evidence of causation and the wrongdoer's intent to cause great bodily harm or death.¹⁷² However, alternative theories of causation and the mechanism of death have eliminated the per se traumatic nature of the SBS-triad.

We now know two things. First, subdural and retinal hemorrhages are not caused exclusively by trauma from shaking or impact,¹⁷³ in fact, nearly half of newborns that present with no symptoms—medically known as asymptomatic—actually have subdural hemorrhages without brain damage.¹⁷⁴ It is also now readily accepted that chronic subdural hemorrhages can spontaneously re-bleed with little to no trauma.¹⁷⁵ Moreover, while it was once thought that short-distance falls could not be fatal, it is now well accepted, that though rare, such falls can be life threatening.¹⁷⁶

Second, we now know that the force necessary to cause the SBS-triad is so great that the infant neck cannot sustain those symptoms without also suffering spine and brain stem injuries.¹⁷⁷ As such, the per se trauma premise that once proved intent and causation have been seriously called into question and virtually debunked by evidence-based research.

2. Issues with Time of Injury and Identity

Prior to the 2000s, it was believed that the last person alone with the child was the guilty party because the triad of symptoms and a change in the baby's general wellbeing and appearance would have been immediately present after infliction of the baby's injury.¹⁷⁸ However, now it is also generally accepted that while lucid intervals are not characteristic in cases where the triad results from natural causes, lucid intervals are possible in trauma cases.¹⁷⁹ This finding completely contradicts the previous belief held by SBS proponents that children who developed the triad of symptoms from trauma would fall completely unconscious immediately following infliction of the injury. The possibility of lucid intervals in alleged trauma cases raises doubt as to

172. See *supra* Part I.A.

173. P.E. Lantz, *Perimacular Retinal Folds from Childhood Head Trauma*, 328 BRIT. MED. J. 754, 754 (2004).

174. See Hymel, *supra* note 88.

175. *Id.*

176. See Plunkett, *supra* note 81.

177. Faris Bandak, *Shaken Baby Syndrome: A Biomechanics Analysis of Injury Mechanisms*, 151 FORENSIC SCI. INT'L 71, 78 (2005).

178. Tuerkheimer, *Science-Dependent Prosecution*, *supra* note 9, at 516.

179. Findley, *supra* note 2, at 297.

when the injury was caused. As such, the per se trauma premise that once proved time of injury and identity has been seriously questioned.

3. Issues with Confessions

Prior to the 2000s, the finality of a triad-based SBS diagnosis created a confession, rather than a truth-seeking investigation style by both police and prosecutors.¹⁸⁰ Police and prosecutors argued that histories given by caretakers denying any trauma were false, and that alleged short-distance falls or mild shaking in search of a response from a non-responsive child were attempts to minimize guilt.¹⁸¹ As a result, when caregivers would explain that the baby's severe symptoms were either unprovoked or without explanation (e.g., the result of a short-distance fall or from playful or revival shaking) prosecutors and police interpreted those stories as confirming the SBS diagnosis.¹⁸² Moreover, accused individuals were well known for fabricating information and augmenting their actions in hindsight in order to say what the interrogator wanted to hear and omitting facts to give a better impression of their story.¹⁸³ These confessions formed the basis for case selection in many of the SBS studies highly critiqued during the 1990s.¹⁸⁴

However, with the advent of DNA exonerations and recognition of the puzzling occurrence of accused individuals confessing to things they did not do, the relevance of confessions in SBS cases has diminished because their reliability and accuracy are questionable at best.¹⁸⁵ It is now well recognized that in cases where perpetrators have confessed to shaking the child, confessions cannot be used as a scientific correlation between the injuries suffered because confessions are not scientific and are subject to a variety of contamination issues.¹⁸⁶ More-

180. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 30.

181. *See id.* at 30–31; Brian Holmgren, *Prosecuting the Shaken Infant Case*, in *THE SHAKEN SYNDROME: A MULTIDISCIPLINARY APPROACH* 275, 307 (Stephen Lazoritz & Vincent J. Pausci eds. 2001). Holmgren argued for early intervention in SBS investigations by prosecutors because “a false, discrepant, evolving or absent history is also an important diagnostic component for a medical opinion that the child is a victim of abuse.” *Id.* at 277. Early intervention by prosecutors can preserve the integrity of investigations and ensure that caregivers did not “shut down discussion with professionals or seek out immediate legal representation.” *Id.*

182. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 30–31.

183. Jan E. Leestma, “Shaken Baby Syndrome”: *Do Confessions by Alleged Perpetrators Validate the Concept?*, 11 J. AM. PHYSICIANS & SURGEONS 14, 14 (2006).

184. *Id.*

185. *See* Findley, *supra* note 2, at 256–61.

186. *Id.* at 256–57; *see also* Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 30 (noting that possible contamination issues include the use of real or fabricated evidence as

over, there may be false positives included in a number of shaking confessions because caretakers who committed acts that were more egregious than shaking will confess to shaking in order to minimize their guilt.¹⁸⁷

Because of the perceived finality of an SBS diagnosis, police officers and prosecutors were plagued by confirmation bias because “whatever contradict[ed] the scientific ‘givens’ [was] deemed ‘discrepant’ and a confession” of wrongdoing.¹⁸⁸ As a result, they would use interrogation techniques that are particularly prone to producing false confessions and plea-bargains.¹⁸⁹ For example, police officers would assert that medical evidence proved the child was shaken and that the accused caretaker was the only possible abuser.¹⁹⁰ As a result, guilt-ridden caretakers will search their minds to find an explanation, recalling minor incidents like the mild “shaking” of an unresponsive child.¹⁹¹ This type of incontrovertible assertion made any alternative explanations appear incriminating.¹⁹²

Moreover, the slam-dunk nature of SBS prosecutions would often force accused caretakers to engage in a cost-benefit analysis that favored confessing as a part of a plea bargain with a reduced and assured sentence rather than running the risk of conviction at trial and a high sentence.¹⁹³ This particular proclivity to false confessions further decreases the reliability and credibility of SBS confessions.

Issues surrounding intent, causation, identity, and the reliability of confessions in SBS cases were issues raised during the 2000s’ raging debate over the validity of SBS, and they are still pertinent to any and all future SBS investigations and prosecutions. Each of these issues also emphasizes the substantial risk and likelihood that there were indeed wrongful convictions and false guilty pleas resulting from questionable evidence of *actus reus*, *mens rea*, identity, and false confessions in previous SBS cases.

proof of guilt and the investigator’s seeking of a confession rather than information and explaining how both of these issues contaminate the interrogations and the confessions and facts they illicit).

187. See Findley, *supra* note 2, at 256–58.

188. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 31.

189. Findley, *supra* note 2, at 259.

190. *Id.* at 256–61.

191. *Id.*

192. *Id.*

193. *Id.* at 260.

C. SBS Issues on Appeal During the 2000s

In addition to the issues raised at SBS trials during the 2000s, the SBS revolution also resulted in a variety of new appeals from cases predating the early 2000s, including appeals based on newly discovered evidence, insufficiency of evidence at trial, and ineffective assistance of counsel. Although not all appeals were successful, those that were showcase the beginning of the American recognition of changing SBS science and its effects on the integrity of previous SBS convictions.

1. Newly Discovered Evidence and *State v. Edmunds*¹⁹⁴

Though they vary slightly by jurisdiction and the evidentiary standard applied,¹⁹⁵ post-conviction appeals based on newly discovered evidence must show that the evidence was discovered after trial and could not have been discovered earlier through the exercise of counsel's due diligence.¹⁹⁶ The appellee must also show that the new evidence is material and not simply cumulative to the evidence presented at trial.¹⁹⁷ However, the biggest hurdle in newly discovered evidence appeals is that the appellee must show the evidence would most likely have resulted in a different verdict at trial.¹⁹⁸

The model case for a successful newly discovered evidence appeal in an SBS case is *State v. Edmunds*.¹⁹⁹ On October 16, 1995, baby Natalie was "crying very hard" and was unwilling to eat when her parents dropped her off with her babysitter, Audrey Edmunds.²⁰⁰ Edmunds placed Natalie in a car seat propped up on a bed with her bottle and went to check on the other children in her care.²⁰¹ Edmunds returned to find Natalie unresponsive with liquid leaking out of her mouth and nose.²⁰² Natalie was taken by ambulance to the hospital where she died later that night, and Edmunds was charged with first-degree reckless homicide.²⁰³

At trial, the State presented numerous experts who said that the cause of Natalie's death was violent shaking and that Edmunds was the

194. *Edmunds II*, 746 N.W.2d 590 (Wis. 2008).

195. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 51.

196. *Id.* at 51–52.

197. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 53.

198. *Id.*

199. *See id.*

200. *Edmunds II*, 746 N.W.2d 590, 592 (Wis. 2008).

201. *Id.* at 592.

202. *Id.*

203. *Id.*

only possible culprit because Natalie would have had an immediate and obvious response to the violent shaking and would not have appeared normal.²⁰⁴ They also stated that a lucid interval after infliction of the injury was not possible in Natalie's case.²⁰⁵ Contrarily, the defense's expert opined that the shaking that caused Natalie's injuries happened before she was dropped off with Edmunds and that she experienced a lucid interval before having a seizure and falling unconscious.²⁰⁶ Edmunds was convicted in 1997 and filed her first post-conviction motion arguing insufficiency of evidence; however, the Court of Appeals denied her motion and the Wisconsin Supreme Court denied Edmunds's petition.²⁰⁷

Edmunds re-filed a motion for a new trial in 2006, citing newly discovered evidence.²⁰⁸ At the evidentiary hearing before the circuit court, Edmunds presented six experts "who explained that there [was] now a significant debate in the medical community as to whether Natalie's symptoms were necessarily indicative of shaking or shaking combined with head trauma in infants."²⁰⁹ In opposition, the State presented four experts who said the 1996 science was still "valid despite the emergence of a debate."²¹⁰ The circuit court denied Edmunds's motion, and she once again appealed.²¹¹ The circuit court stated that Edmunds had presented newly discovered evidence but still denied her motion by reasoning that she had not established a reasonable probability of a different result.²¹²

This time, the court of appeals, concluding that Edmunds had successfully shown by clear and convincing evidence the requisite elements of a newly discovered evidence appeal, overturned the lower court's denial of a new trial based on the newly discovered evidence.²¹³ First, the evidence regarding the validity of SBS and the triad of symptoms was not and could not have been known to her in 1995 because the evidence developed over the decade after her first appeal and was therefore not a result of counsel's negligence or lack of due diligence.²¹⁴ Second, the evidence was material because it

204. *Id.* at 592–93.

205. *Id.*

206. *Id.* at 592.

207. *State v. Edmunds (Edmunds I)*, 602 N.W.2d 760 (Wis. 1999).

208. *Edmunds II*, 746 N.W.2d at 593.

209. *Id.*

210. *Id.*

211. *Id.* at 593–94.

212. *Id.*

213. *Id.* at 595–96.

214. *Id.* at 596.

presented an alternative theory for the source of Natalie's injuries and was not merely cumulative because it differed from the substance and quality of the defense's evidence at trial.²¹⁵ As a result, the court found that the evidence could have created reasonable doubt in the minds of the jurors, despite the State's argument that its case was still stronger than that of the defense.²¹⁶ The court opined that it was the jury's job to evaluate and decide between the competing medical opinions about Natalie's cause of death and the evidence presented could have most certainly raised reasonable doubt as to Edmunds's guilt.²¹⁷ Edmunds was granted a new trial, but months following her successful appeal all charges against her were dismissed.²¹⁸ Review of the court of appeals decision in *Edmunds* was once again denied by the Wisconsin Supreme Court.²¹⁹

Although Edmunds' appeal was successful, its precedential value is limited to those cases that predate the 2000s' debate over SBS.²²⁰ Those cases tried after the early 2000s will not have available to them an appeal based on newly discovered evidence because evidence of the debate and the weakness of SBS could and should have been known and explored by defense counsel at trial. However, Edmunds' appeal is an example of the beginnings of American integration of the changing science of SBS into the criminal justice system and shows that wrongful SBS convictions predating the SBS debate can be rectified on appeal.

2. Insufficiency of Evidence at Trial and *Cavazos v. Smith*²²¹

The next type of appeal explored by many critics of SBS was for insufficiency of evidence.²²² In order to set aside a jury's verdict on the grounds of insufficient evidence, a reviewing court must find that the evidence was so insufficient that no rational trier of fact could have agreed with the jury.²²³ Additionally, federal courts hearing insufficiency of evidence claims in habeas petitions may only overturn a

215. *Id.*

216. *Id.* at 597.

217. *Id.*

218. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 51.

219. *State v. Edmunds (Edmunds III)*, 749 N.W.2d 663, 663 (Wis. 2008).

220. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 55–56.

221. 132 S. Ct. 2 (2011).

222. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 42.

223. *Jackson v. Virginia*, 443 U.S. 307, 318–19 (1979).

state court decision for insufficient evidence if the state court decision was “objectively unreasonable.”²²⁴

Unfortunately, insufficiency of evidence appeals have been wholly unsuccessful in the realm of SBS cases, particularly when considering that the “deference [paid] to the fact-finding functions of juries translates into a legal regime generally hostile to insufficiency arguments.”²²⁵ Indeed, the United States Supreme Court has recognized that this standard may lead to “the inevitable consequence . . . that judges will sometimes encounter convictions that they believe to be mistaken, but that they must nonetheless uphold.”²²⁶

The model case for the unsuccessful nature of insufficiency of evidence claims is the case of Shirley Smith.²²⁷ On November 29, 1996, seven-week-old Etzel was put to sleep on a sofa, and his grandmother Shirley Smith fell asleep on the floor next to the couch.²²⁸ She awoke to find the baby limp, claiming that “[s]omething [was] wrong with Etzel.”²²⁹ She believed he might have fallen off the couch.²³⁰ An ambulance was called, but by the time the paramedics arrived, Etzel was not breathing, had no heartbeat, and resuscitation efforts failed.²³¹ Though initially believed to be death by Sudden Infant Death Syndrome (SIDS), Etzel’s autopsy revealed subdural hemorrhaging and a bruise on the back of his head.²³² When questioned, Smith stated that she had given him “a little shake, a jostle” to wake him after she awoke and found him to be unresponsive.²³³ Smith was charged with assault on a child resulting in death.²³⁴

At trial, the State proffered three experts who testified that Etzel’s subdural hemorrhages and bruising could not have been caused by a fall from the couch or resuscitation efforts.²³⁵ In fact, the hemorrhage and bruise proved that Etzel had been violently shaken even in spite of the absence of retinal hemorrhages.²³⁶ In opposition, the defense offered two experts, one of whom concluded that Etzel died from

224. *Renico v. Lett*, 559 U.S. 766, 773 (2010).

225. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 42.

226. *Cavazos*, 132 S. Ct. at 4.

227. *See id.*

228. *Id.* at 4.

229. *Id.*

230. *Id.*

231. *Id.*

232. *Id.* at 4–5.

233. *Id.* at 4.

234. *Id.*

235. *Id.* at 4–5.

236. *Id.* at 5.

brain trauma not caused by shaking because he lacked the traditional shaking symptom of retinal hemorrhages.²³⁷ Both defense experts admitted, however, that retinal hemorrhages did not occur in every SBS case.²³⁸ Moreover, the defense experts disagreed as to whether Etzel died from SIDS.²³⁹ Smith was found guilty and sentenced to an indeterminate sentence of fifteen years to life in prison.²⁴⁰

Smith appealed citing that there was no sufficient evidence upon which a reasonable jury could convict her; however, the court of appeals denied her motion and the California Supreme Court denied review of the lower court's decision.²⁴¹ Smith, claiming again there was insufficient evidence to convict her, filed a habeas writ in federal district court.²⁴² The court denied Smith's motion, and she appealed to the Ninth Circuit which reversed with instructions to grant Smith's writ.²⁴³ The court reasoned that there was "no evidence to permit an expert conclusion one way or the other" on the question of whether Etzel died from SBS because there was "no physical evidence of . . . tearing or shearing, and no other evidence supporting death by violent shaking."²⁴⁴ The Ninth Circuit concluded that because an "[a]bsence of evidence cannot constitute proof beyond a reasonable doubt," the California Court of Appeal had unreasonably applied the insufficiency of evidence standard.²⁴⁵ Smith was released in 2006—ten years after her incarceration.²⁴⁶

On the State's appeal, the Supreme Court found in a per curiam decision that the Ninth Circuit had erred in its decision because the extremely deferential standard of review for insufficiency of a state court's decision by a federal court demanded that the jury's decision be upheld.²⁴⁷ The jury was presented with competing views of Etzel's cause of death and the affirmative indications of trauma such that it could make a reasonable and rational decision to convict Smith.²⁴⁸

237. *Id.*

238. *Id.*

239. *Id.*

240. *Id.*

241. *Id.* at 5–6.

242. *Id.* at 6.

243. *Id.*

244. *Id.*

245. *Id.*

246. See Carol J. Wilson, *Jerry Brown Commutes Grandmother's Murder Sentence*, L.A. TIMES (Apr. 6, 2012, 11:27 AM), <http://latimesblogs.latimes.com/lanow/2012/04/shaken-baby-clemency.html>.

247. *Cavazos*, 132 S. Ct. at 6.

248. *Id.* at 6–7.

The Supreme Court held that the evidence presented at trial was sufficient despite the fact that “doubts about whether Smith [was] in fact guilty are understandable.”²⁴⁹

Justices Ginsburg, Breyer, and Sotomayor, taking aim at the lack of corroborating evidence of abuse²⁵⁰ and the poor quality of Smith’s counsel and the experts called in her defense, dissented.²⁵¹ Moreover, Justice Ginsburg wrote that, given the change in scientific consensus on the validity of SBS, it was “unlikely that the prosecution’s experts would today testify as adamantly as they did in 1997,” and as such the Supreme Court should not have granted writ of certiorari in Smith’s case.²⁵² Justice Ginsburg also chastised the State for relying on Smith’s distraught and equivocal confession to having given Etzel “a little shake, a jostle to wake him” as an admission of guilt.²⁵³

The Supreme Court’s majority decision stated that clemency may be appropriate but that it was not done through judicial intervention.²⁵⁴ On April 6, 2012, after serving ten years in prison, Governor Jerry Brown commuted Smith’s sentence, citing “significant doubts” as to her guilt.²⁵⁵

Smith’s ten-year insufficiency of evidence battle and eventual Supreme Court decision highlights the unlikelihood of success in SBS appeals, as well as the unlikelihood of rectifying the undoubtedly numerous wrongful convictions resulting from evidence now known to be insufficient. However, filtered throughout all the appellate opinions is the recognition, ineffectual though it is, that the changing consensus on the science of SBS could affect the integrity of past and future SBS convictions.

3. Ineffective Assistance of Counsel and *State v. Schoonmaker*²⁵⁶

The last type of appeal brought forth by SBS-convicted defendants was ineffective assistance of counsel.²⁵⁷ The right to reasonably effective assistance of counsel is a fundamental right guaranteed by the Sixth Amendment of the United States Constitution.²⁵⁸ To estab-

249. *Id.* at 7.

250. *Id.* at 9–10.

251. *Id.* at 11–12.

252. *Id.* at 10–11.

253. *Id.* at 11.

254. *Id.* at 7.

255. Wilson, *supra* note 246.

256. 176 P.3d 1105 (N.M. 2008).

257. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 41.

258. U.S. CONST. amend. VI.

lish a claim of ineffective assistance of counsel, a defendant must show deficient performance by counsel resulting in prejudice against the defendant that, but for counsel's deficient performance, would have resulted in a different outcome in the proceeding.²⁵⁹ Generally brought in writs of habeas, ineffective assistance of counsel appeals have a high appellate standard.²⁶⁰

The model case for a successful ineffective assistance of counsel appeal is *State v. Schoonmaker*.²⁶¹ On July 24, 2000, Schoonmaker was an eighteen-year-old taking care of his girlfriend's one-month-old son who had been born five weeks premature and was suffering from bronchitis.²⁶² Schoonmaker brought the baby to the baby's grandmother and told her that the baby had rolled off the couch when Schoonmaker had been prepping the baby's bronchitis medication in another room.²⁶³ The baby "had vomited and was pale, limp, and 'just staring.'"²⁶⁴ Medical tests at the hospital revealed that the baby suffered from severe subdural and retinal hemorrhages and a brain injury resulting in total blindness.²⁶⁵

Schoonmaker was charged with intentional child abuse resulting in great bodily harm. He qualified for a public defender but instead decided to pay for private counsel.²⁶⁶ Unfortunately, Schoonmaker could not also afford to pay for the time necessary to interview the state's medical experts, nor could he afford to hire his own experts.²⁶⁷ Defense counsel motioned for the state to fund Schoonmaker's experts, but the trial court denied that motion.²⁶⁸ As a result, his private attorney tried to withdraw as counsel so that he could be represented by a public defender and could have his experts paid for by the state.²⁶⁹ However, the trial court once again denied defense counsel's motion, despite both the court's and the prosecutor's acknowledging that the defendant's inability to hire experts was purely a result of a lack of funds and not a trial tactic or strategy.²⁷⁰ While the first trial

259. *Strickland v. Washington*, 466 U.S. 668, 687 (1984).

260. *Id.*

261. 176 P.3d 1105.

262. *Id.* at 1108.

263. *Id.*

264. *Id.*

265. *Id.*

266. *Id.*

267. *Id.* at 1109.

268. *Id.* at 1109–10.

269. *Id.*

270. *Id.* at 1110.

resulted in a mistrial, his second trial ended with convictions for both child abuse with great bodily harm and negligent child abuse.²⁷¹

Schoonmaker appealed on the basis of ineffective assistance of counsel arguing that the trial court's denial of defense counsel's request to withdraw from the case forcibly made the counsel ineffective.²⁷² The New Mexico Supreme Court agreed and granted defendant's appeal on the basis of ineffective assistance of counsel and ordered he be given a new trial.²⁷³ The court reasoned that because the defendant's case hinged on whether the jury believed the baby's injuries could be caused by the alleged fall off the couch, an effective case necessarily required expert testimony as to the effects of short falls and a discounting of the State's SBS triad-based prosecution.²⁷⁴ The court held that the trial court's denial of defense counsel's motion to withdraw made his performance unjustifiably deficient by placing defense counsel in the "untenable" position of either refusing to proceed with trial and risking contempt charges or proceeding without the necessary experts and lodging an ineffective defense.²⁷⁵ The court went on to opine that a presumption of prejudice lays where the ineffective nature of counsel was brought about and "occasioned by the rulings of the court itself."²⁷⁶ As a result, the trial court's actions unduly prejudiced Defendant by denying him access to a public defender that could have performed a proper and effective defense.²⁷⁷

Though a difficult standard to meet, the ineffective assistance of counsel appeal in SBS cases has been successful in more than one case.²⁷⁸ Each successful appeal has been very fact specific, but each one gives hope to others seeking appeals on the same grounds in SBS cases. The success of ineffective assistance of counsel appeals also shows the system's reliance on the trial phase preventing wrongful convictions—absent effective counsel, more courts are inclined to review the integrity of an SBS conviction.

271. *Id.* at 1110–11.

272. *Id.* at 1111–12.

273. *Id.* at 1116.

274. *Id.* at 1114.

275. *Id.* at 1115.

276. *Id.*

277. *Id.* at 1114–16.

278. *See, e.g.,* State v. Hales, 152 P.2d 321 (Utah 2007) (granting ineffective assistance of counsel appeal where defense counsel failed to retain an expert with the necessary qualifications to combat the prosecution's evidence).

In comparison to the global changes and international recognition of the weaknesses in SBS, the American criminal justice system's integration of the changes in SBS science has been slow, halting, and inconsistent. This is concerning because the weaknesses identified in the theory of SBS are the very things that lead to the wrongful conviction of SBS defendants every year.

IV. Suggested Reforms for the United States

“As a general proposition, the tighter the nexus between scientific expertise and criminal prosecution, the more acute the problems for justice if or when scientific paradigms decisively shift.”²⁷⁹ In the case of SBS, there is a substantial risk that many SBS triad-based convictions were crimeless prosecutions where a non-abusive explanation for the triad of symptoms may have existed but went undiscovered.²⁸⁰

Because of the current debate amongst the expert community, jurors are being asked to resolve an outstanding dispute between two scientific camps. This is arguably their job as jurors—to judge the evidence and make a decision on its credibility and weight. However, to ensure that juries are able to carry out their task in such a way as to avoid or minimize the possibility of wrongful convictions in SBS-related prosecutions, the system has to protect the case's integrity. This is particularly important because “‘shaken baby syndrome’ . . . is embedded in the collective minds of the public, law enforcement, prosecuting attorneys, child-protection personnel, and physicians.”²⁸¹

Other countries, like the United Kingdom and Canada, have enacted systemic, wide-sweeping reforms in response to the change in SBS science.²⁸² However, similar reforms are unlikely to occur in the United States for several reasons. First, the number of SBS prosecutions in the United States is much higher than in the United Kingdom or Canada.²⁸³ Some estimate the rates of SBS in the United States, which is estimated at over 1500 diagnosis per year,²⁸⁴ is approximately double those in Canada, the United Kingdom, and New Zealand combined.²⁸⁵ The rate and lack of data of SBS cases in the United States

279. Tuerkheimer, *Science-Dependent Prosecution*, *supra* note 9, at 554.

280. *See id.* at 551, 563.

281. Leestma, *supra* note 183, at 1.

282. *See supra* Part II.

283. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 25–26 n.150–51.

284. *See id.* at 9–10.

285. A.N. Guthkelch, *Problems of Infant Retino-Dural Hemorrhage with Minimal External Injury*, 12 HOUS. J. HEALTH L. & POL'Y 201, 206–07 (2006) [hereinafter Guthkelch, *Problems of Infant Retino-Dural Hemorrhage*].

further compounds any reform that would take place.²⁸⁶ Moreover, the multitude of jurisdictions makes it difficult to identify a single systemic reform plan where each jurisdiction possibly suffers from different issues.²⁸⁷

However, if each actor within the system takes responsibility for his or her contribution to wrongful convictions, then he or she can help preserve the integrity of SBS and AHT related investigations, prosecutions, and convictions. Below are the actors, their contributions to the problem of SBS wrongful convictions, and suggested reforms within each actor's control that would help to minimize the problems.

A. Doctors, Scientists, and the Expert Community

Perhaps the most important actors in the system of SBS investigations and prosecutions are the experts who flag cases for police and who testify to the allegedly scientific proof of abuse. They almost single-handedly open and close every single SBS case.²⁸⁸ As such, it is incredibly important that their contributions to wrongful convictions be identified and rectified.

The schism between proponents and critics of SBS is growing and has a bitter and hateful tinge. Those who question the science behind SBS are still consistently accused of "incompetence, greed, indifference to child abuse, and . . . having histrionic/borderline personality disorders."²⁸⁹ This contempt has made the scientific debate difficult and places the integrity of SBS investigations and prosecutions at risk by creating self-interested and biased identifiers and experts of abuse. To address this problem, the father of SBS, A.N. Guthkelch, has issued a "Serious Call" for civility in scientific discourse.²⁹⁰ In his call, Guthkelch asks for a dialogue that is respectful of dissenters and a return to a "commitment to pursu[ing] the truth."²⁹¹

Moreover, Guthkelch calls for experts to distinguish between hypotheses and knowledge—particularly because Guthkelch characterizes SBS as a hypothesis for symptoms that are not yet fully understood or explainable—because it is wrong not to inform courts and juries of

286. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 25–26 n.148–51.

287. *See id.*

288. *See supra* Part I.A.; Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 27–28.

289. Findley, *supra* note 2, at 226 n.53.

290. *See* Guthkelch, *Problems of Infant Retino-Dural Hemorrhage*, *supra* note 285, at 201.

291. *Id.*

that distinction.²⁹² He states that “[o]ften ‘getting it right’ simply means saying, clearly and unequivocally [that] ‘we don’t know.’”²⁹³ Guthkelch ends with calling for a review of the reliable science evidence by “individuals who have no personal stake in the matter, and who have a firm grounding in basic scientific principles”²⁹⁴ Similarly, Geddes wrote in 2004 that “[i]f the concept of [SBS] is scientifically uncertain, we have a duty to re-examine the validity of other beliefs in the field of infant injury.”²⁹⁵

Beyond a respectful dialogue, this author recommends that major medical associations propagate standardized differential diagnostic approaches—like the one proposed by American pediatrician Stephen Boos—for their members to use in cases of infants or children presenting with the SBS-triad.²⁹⁶ These standardized approaches should *not* presume abuse but instead investigate to rule out or confirm the multitude of alternative diagnoses that can cause the triad of symptoms. In his “Educational Papers on Abusive Head Trauma,” Boos calls for “all medical conditions [to] be ruled out before consider[ation of] trauma [as] the cause of signs and symptoms.”²⁹⁷ Indeed, only after accidental trauma is excluded can SBS be the “only remaining diagnosis.”²⁹⁸ This type of standardized approach to formerly SBS-presumed symptoms might encourage even those doctors inclined to see child abuse everywhere to follow standards or face potential criticism for their deviation from the standards or for their inability to look past their predilections for diagnosing SBS.

These types of reforms to the initial medical examination and to the study of SBS would combat the problem of wrongful convictions first by properly filtering cases and preventing non-abuse cases from ever reaching the investigation stage. It is generally at the investigation stage by law enforcement that the snowball of a wrongful conviction

292. *See id.* at 207.

293. *Id.*

294. *Id.* at 208.

295. J.F. Geddes, *The Evidence Base for Shaken Baby Syndrome*, 328 *BRIT. MED. J.* 719, 719 (2004).

296. *See* Stephen Boos et al., *Educational Papers: Abusive Head Trauma Part I. Clinical Aspects*, 171 *EUR. J. PEDIATRIC* 415, 418–421 (2012). Boos’s standardized diagnostic approach calls for taking a detailed chronological and medical history of both the child and the child’s siblings, assessing the child’s growth curve, and assessment of risk factors while conducting a differential diagnosis meant to rule out “all medical conditions, both congenital and acquired, [to] be ruled out before trauma can be considered” as a cause. *Id.* at 419.

297. *Id.* at 422.

298. *Id.*

tion gains momentum and become virtually unstoppable.²⁹⁹ Additionally, reforms that work towards addressing the deficiencies in the theory of SBS would ensure that expert testimony at trials preserves the integrity of the trial by fully representing the facts. The importance of reforms in the scientific and expert field of SBS cannot be overstated; they are the beginning and the end.

B. Police and Social Workers

Once doctors make an SBS diagnosis, police officers or social workers are alerted and then charged with investigating the circumstances surrounding the child's injuries.³⁰⁰ After completing their investigation, officers are able to recommend pursuit of a prosecution.³⁰¹ It is at this stage that the snowball of wrongful convictions truly gains momentum. Once charged, few things can be done to combat the risk of wrongful convictions.³⁰² As such, police officer and social worker contributions to wrongful convictions have far reaching consequences that could easily be rectified if caught early.

Investigators are often plagued with confirmation bias, particularly once they are given an indication from medical personnel that abuse is likely. As such, they will seek only the evidence they need to confirm that answer. They interview the caretakers and investigate their stories to determine if there was wrongdoing. Moreover, police officers and social workers have long accepted and believed in the definitive nature of SBS.

In order to combat their confirmation bias, police officers and social workers should be educated about the possible alternatives to abuse in alleged SBS cases. This type of re-education would be the first step towards eliminating the investigatory inclination to seek confirmatory evidence of a foregone conclusion and would encourage them rather to seek the truth. Their bias is not purposeful or vindictive; in fact, it is based purely on the alleged infallibility of an SBS diagnosis. However, the infallibility of SBS has been seriously questioned and re-education of our investigators is necessary to prevent the perpetuation of a debunked theory.

299. See BRANDON L. GARRET, *CONVICING THE INNOCENT: WHERE CRIMINAL PROSECUTIONS GO WRONG* 270 (2011).

300. See, e.g., A.C. Thompson et. al., *The Child Cases: Guilty Until Proven Innocent*, NPR (June 28, 2011, 12:30 AM), <http://www.npr.org/2011/06/28/137454415/the-child-cases-guilty-until-proven-innocent>.

301. See, e.g., *id.*

302. See GARRET, *supra* note 299.

Moreover, police and social workers must look past their beliefs and recognize the possibility of false confessions. Not all caretakers minimize or lie when speaking about the history immediately preceding the onset of symptoms.³⁰³ In fact, recent studies show that the stories of short-distance falls and trauma days before the death of a child have been confirmed as possible causes.³⁰⁴ Yet, police and social workers clinging to the belief that SBS is infallible, will illicit false confessions by asserting that medical evidence proves the child was shaken and that the accused caretaker is the only possible culprit. This tactic of confronting a defendant with allegedly irrefutable evidence forces SBS suspects to search their memory for some explanation, recalling minor incidents like the mild shaking of an unresponsive child.³⁰⁵ Once a confession is elicited, officers will cease investigating and recommend charging.

The confirmation bias that plagues SBS investigation increases the substantial risk of wrongful convictions.³⁰⁶ As such, the far-reaching consequences of police officer and social worker contributions to wrongful convictions must be addressed by re-educating them as to the weaknesses of SBS diagnosis and the possibility of confirmation bias and false confessions.

C. Prosecutors

In general, prosecutors are an important factor in wrongful convictions, but they are even more important in SBS wrongful convictions. They hold the power to charge or not to charge, to go to trial or not go to trial, to offer a plea deal or not to offer a plea deal, or to dismiss a case. However, there are reforms that could be made at each stage of the prosecutor's influence in an SBS case that would work towards preventing and rectifying SBS wrongful convictions.

First, prosecutors are guilty of confirmation bias when they choose to charge a case based on an SBS diagnosis from doctors and investigators.³⁰⁷ They will accept at face value the strength of the med-

303. See, e.g., Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 30–31; Plunkett, *supra* note 81, at 8; Findley, *supra* note 2, at 256.

304. See Plunkett, *supra* note 81, at 8.

305. Findley, *supra* note 2, at 256.

306. See GARRET, *supra* note 299, at 266. Investigators and prosecutors can all suffer from cognitive confirmation bias by believing that a suspect is guilty before reviewing all the pertinent facts and then seeking only those facts that will confirm their suspicions. *Id.* “Once people form a belief, they tend to adhere to it and look for evidence that fits or confirms their preconceived idea.” *Id.*

307. See Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 27–28.

ical diagnosis provided by the experts closest to the case.³⁰⁸ Like police officers, prosecutors rely heavily on diagnoses and thus will stop investigating alternative mechanisms of death when an SBS abuse diagnosis occurs.³⁰⁹ As a result, a similar type of re-education campaign needs to occur in order to educate prosecutors about weaknesses of an SBS diagnosis based solely on the presence of the triad of symptoms.³¹⁰

Second, prosecutors' offices should require that officers provide them with corroborating circumstantial or direct evidence³¹¹ above and beyond the triad before charging crimes in relation to an alleged SBS case. By requiring corroborating evidence, prosecutors will ensure that only those cases with sufficiently reliable evidence of abuse are being charged, which would prevent a greater number of caregivers from being wrongfully charged. This would increase the likelihood that their prosecutions would not result in wrongful convictions by preventing cases from moving forward absent adequate evidence.

Third, when making plea bargains, prosecutors should recognize that the cost-benefit analysis in an SBS case truly lends itself to producing false guilty pleas where SBS prosecutions are virtual slam-dunk convictions.³¹² The nature of SBS prosecutions would often force accused caretakers to engage in a cost-benefit analysis that favored confessing as a part of a plea bargain with a reduced and assured sentence.³¹³ As a result, prosecutors may take advantage and elicit guilty pleas from defendants who may be guilty of nothing.³¹⁴ As such, prosecutors should not offer exceedingly reduced plea bargains in triad-only or scientifically unreliable cases. The reality is that those cases that are so weak as to warrant significantly reduced sentences should never make it to a courtroom but instead should be dismissed. The prosecutor's job is to be a truth seeker and an administer of justice. As such, prosecutors should protect the integrity of the court and the case by freely admitting to the case's weaknesses and dismissing cases that lack corroborating evidence instead of taking advantage of

308. *Id.*

309. *Id.* at 29–30.

310. *Id.* at 28–29.

311. For example, such evidence might include a history of child abuse or evidence of physical violence in order to validate the doctor's diagnosis of child abuse.

312. Findley, *supra* note 2, at 260.

313. *Id.*

314. *Id.*

the now-debunked definitive nature of SBS diagnoses and prosecutions.

Lastly, prosecutors should embrace the concept of conviction and plea integrity units.³¹⁵ Conviction and plea integrity units are inter-office boards that review plea-bargains taken by and the convictions of defendants to ensure the integrity of the prosecutor's actions and prosecutorial decisions made in the case. Particularly in SBS related cases that are plagued with scientific doubt and questionable confessions, plea integrity units would assure an additional level of protection against wrongful convictions.

It is important that prosecutors be re-educated about the weakness of their SBS prosecutorial theory and that they recognize the possibility of false SBS confessions and enact change to ensure that confessions are as reliable as possible. Like medical personnel and police officers, prosecutors hold a great deal of power in SBS cases. They are the ones who choose which SBS cases get charged and which SBS cases get tried. They have virtually sole discretion in what a defendant is charged with and in whether a charge is dismissed.

D. Defense Attorneys

Once an SBS case makes it to the courtroom, it is really in the hands of defense counsel to properly challenge the state's case. However, if a defense attorney does not understand the weaknesses of SBS, they may fail to challenge effectively or adequately what many still assume to be a slam-dunk case of scientific proof. To combat that risk, defense attorneys must be educated about the scientific weaknesses of SBS.

Systemic education of defense attorneys would ensure that they are fully versed and capable of effectively cross-examining the state's experts. In order to accomplish this, public defenders might consider sending members of their offices to SBS conferences or by holding training sessions with SBS critics and experts. It would also ensure that they are capable of properly identifying the experts their clients need to launch the most effective defense possible. This is particularly relevant where examination of a particular type of evidence requires spe-

315. See DAVID A. HARRIS, FAILED EVIDENCE: WHY LAW ENFORCEMENT RESISTS SCIENCE 157 (2012).

cific medical training, certification, or a specialty is required for an expert to issue a reliable opinion.³¹⁶

E. Judges

Judges have almost unilaterally justified their admission of SBS evidence in spite of the debate because it is not their job to judge the weight or credibility of the evidence, but rather to ensure that the scientific evidence admitted is scientifically reliable. This seems like a fair point. However, where an expert's opinion is based on research that has been seriously questioned or debunked, courts should pause before automatically accepting SBS expert testimony as generally accepted or scientifically reliable. Moreover, courts should consider the inherent bias in the communities from which those studies see general acceptance. Pediatricians are much more likely to be pro-SBS and therefore continue to accept or fail to question research that forensic pathologist and biomedical engineers have debunked. The community of acceptance is incredibly important to credibility and reliability of an expert's knowledge.

Contrarily, if courts are going to allow expert testimony on behalf of the state, then it should also most assuredly allow it on behalf of the defendant. This has not yet become an issue in SBS trials;³¹⁷ however, courts should continue to ensure that defendants are able to capably launch a proper defense by eliminating any prejudicial roadblocks standing in the way. This would include disallowing experts from offering definitive opinions as to cause of death where they are not sufficiently supported by research or evidence.

Conclusion

If actors in the American criminal justice system fail to enact systemic reforms that adequately address the collapse of SBS as a definitive medical diagnosis of criminal child abuse, then they will continue to contribute to the substantial, if not certain, risk that innocent caregivers and parents will be wrongfully convicted and imprisoned where no actual crime was committed. The risk of wrongful convictions is particularly certain because experts estimate that every year in the United States approximately 1500 babies are diagnosed with SBS

316. See, e.g., *State v. Hales* 152 P.2d 321 (Utah 2007) (granting ineffective assistance of counsel appeal where defense counsel failed to retain an expert with the necessary qualifications to combat the prosecution's evidence).

317. Tuerkheimer, *The Next Innocence Project*, *supra* note 1, at 32 n.194.

and approximately 200 defendants are convicted of child abuse crimes related to SBS.³¹⁸

The scientific evolution and indeed revolution of the theory of SBS from the 1970s to present highlights the substantial and virtually certain risk that there are caretakers and parents who were wrongfully convicted of severely injuring or killing children. Between issues with the certainty of proving intent, action, and identity, prosecutions that move forward based solely on the triad of symptoms cannot sustain a conviction of proof beyond a reasonable doubt. However, these triad-based cases are still successfully prosecuted even today in spite of the weaknesses in the theory of SBS. Moreover, appeals in faulty prosecutions go denied and wrongful convictions go un-rectified. This is the reality of SBS today.

Keith Findley wrote about the importance of “getting it right” in SBS prosecutions,³¹⁹ as did A.N. Guthkelch³²⁰ and Deborah Tuerkheimer.³²¹ The importance of getting it right in SBS cases cannot be overstated because, in reality, an SBS defendant may be wrongfully convicted and imprisoned where no crime actually occurred. Moreover, SBS cases cause untold trauma and damage to families and the accused. Getting it right requires systemic or actor-driven reforms that ensure the integrity of SBS prosecutions and convictions. If the American criminal justice system continues to ignore, overlook, or minimize the evolution of SBS science, then it will continue to maximize the opportunity for wrongful convictions to occur and leave those wrongfully convicted without recourse.

318. *Id.* at 10.

319. *See* Findley, *supra* note 2.

320. *See* Guthkelch, *Problems of Infant Retino-Dural Hemorrhage*, *supra* note 285.

321. *See* Tuerkheimer, *The Next Innocence Project*, *supra* note 1.