FREQUENTLY ASKED QUESTIONS ABOUT INFLICTED TRAUMATIC BRAIN INJURY

Q1. How many Australian children experience inflicted Traumatic Brain Injury as a result of abuse?

Brain Injury Australia believes that there are no reliable numbers on national incidence - that is, the number of new "cases" in a given year - for inflicted Traumatic Brain Injury in children. There are, however, some guides.

- Information obtained by Brain Injury Australia shows 52 children with inflicted Traumatic Brain Injury have been admitted to New South Wales' two statewide children's hospitals - The Children's Hospital at Westmead and Sydney Children's Hospital - over the last 5 years, and their numbers are increasing. Their average age was 10 months.

- A review of admissions to the pediatric brain surgery unit at The Children's Hospital at Westmead between 1995 and 2002 found 65 cases of inflicted Traumatic Brain Injury.[i]

- The most common cause of what's called subdural haematoma (the collection of blood in the space between the outer and middle layers of the covering of the brain, caused by force applied to the head sufficient to rupture veins) in infants and effusion (the resulting leakage of cerebrospinal fluid) is abuse. From international surveys, a group of Australian paediatricians, paediatric neurosurgeons, and researchers have estimated that 65 cases of subdural haematoma/ effusion occur each year nationwide the result of inflicted Traumatic Brain Injury.[ii]

- A review of admissions to The Royal Alexandra Hospital for Children/ The Children's Hospital at Westmead between 1987 and 1996 found 38 children with subdural haematoma/ effusion, the commonest cause for which (in 55% of cases) was inflicted Traumatic Brain Injury.[iii]

- Evidence from a survey conducted in the United States suggests that, for every child admitted with inflicted Traumatic Brain Injury, as many as 150 other children in the community suffer head trauma from caregivers.[iv]

- The NSW Department of Community Services responded to 327 "reports of baby shaking" between 2004 and 2006. 284 of the cases "required investigation".[v]

- Between 10-18% of cases of Cerebral Palsy in Australia occur after birth - the result of brain infection or haemorrhage (bleeding), poisoning or head trauma. Of these 60-100 new cases each year, around 10% are the result of inflicted Traumatic Brain Injury. Information obtained from the Cerebral Palsy Institute by Brain Injury Australia indicates that their numbers are increasing.

Q2. How common is physical abuse of children in Australia?

- During 2007-08, over 12,000 notifications of physical abuse made to Australia's child protection agencies were substantiated - there was reason to

believe that the child had been, was being, or was likely to be abused.[vi]

- During 2007-08, there were 194 hospital separations[vii] for infants (less than 12 months old) and 218 for children aged 1- 4 years due to assault.[viii]

Q3. Which children are at the greatest risk?

Infants.

- Infants are at the greatest risk of inflicted Traumatic Brain Injury. The New South Wales Child Death Review Team's 10-year survey of 136 fatal assaults found that children less than 1 year old were 16 times more likely to die than those aged between 5 and 15.[ix]

- A review of all admissions over a 2-year period of children with head injuries aged less than 1 year to hospitals in large city in the United States found that 95% of serious Traumatic Brain Injuries were the result of child abuse.[x]

- Part of the reason for the high rates of inflicted Traumatic Brain Injury in infants is due to the unique features of their brain. They have proportionately large heads supported by weak neck muscles. Their brains are soft. Any excessive acceleration, deceleration, or rotation of the head – from being shaken, for example – can result in intracranial bleeding and damage to developing neural pathways. Most intracranial injuries in young children are not associated with skull fractures.

Indigenous children.

- During 2007-08, Indigenous children were more than 6 times as likely to be the subject of a substantiation of a notification of child abuse or neglect than non-Indigenous children.[xi]

- The New South Wales Child Death Review Team's 10-year survey of 136 fatal assaults found the risk of death by assault for Aboriginal children is four times greater than that of non-Aboriginal children.[xii]

Q4. What happens to these children – how many die?

- 25 children were killed by their parents, on average, every year in Australia between 1989 and 2002. Just under half of all victims were killed with the use of “assaultive force”. The most common cause of death would be inflicted Traumatic Brain Injury.[xiii]

- In 2003, the leading cause of death among children aged 0–14 years was injury. Assault was the third most common type of injury causing death.[xiv]

- Fatal child abuse is the most common reason for child homicide, accounting for more than 1 in 3 of the 437 homicides of children aged less than 15 years recorded in NSW between 1991 and 2005. The most common cause of child abuse resulting in death is inflicted Traumatic Brain Injury. [xv]

- In the United States, there were an estimated 1,760 child deaths due to child abuse or neglect in 2006-07. The US’ Advisory Board on Child Abuse and

Neglect argues that this is a significant underestimation and reported that a more realistic estimate of child deaths was around 2,000 per year. This would approximate to five children per day.[xvi]

- The World Health Organization estimates 57,000 children were victims of homicide in the year 2000. The highest rates of fatal child abuse are found among children aged 0-4 years. The most common cause of death was inflicted Traumatic Brain Injury, followed by abdominal injuries and intentional suffocation.[xvii]

Q5. What happens to the children who survive inflicted Traumatic Brain Injury?

- As many as 1 in every 3 children the victims of inflicted Traumatic Brain Injury will die as a result of their injuries. Of those who survive, as many as 2 in every 3 will live with profound and permanent disability.[xviii]

Q6. Is inflicted Traumatic Brain Injury always picked up in hospital?

- As many as 1 in every 3 cases of inflicted Traumatic Brain Injury may be missed even if they reach hospital.[xix]

- Where inflicted Traumatic Brain Injury is detected, more than 2 in 5 of those children will show signs of previous head trauma.[xx]

- Where inflicted Traumatic Brain Injury is undetected, nearly 1 in 3 children will go on to be re-injured, and 1 in 10 die. As many as 4 out of 5 subsequent deaths from inflicted Traumatic Brain Injury could have been prevented with earlier diagnosis.[xxi]

Q7. Who commits this kind of abuse?

- New South Wales' Child Death Review Team found that parents, spouses, domestic partners or other family members were responsible for the "overwhelming majority" (95.8%) of the 136 fatal assaults of children that occurred between 1996 and 2005.[xxii]

- Of the perpetrators identified in 65 cases of inflicted Traumatic Brain Injury admitted to The Children's Hospital at Westmead, 37% were fathers, 31% maternal male partners, 15% mothers, 10% other relatives and 7% were babysitters.[xxiii]

- A study of 52 cases of inflicted Traumatic Brain Injury in infants investigated by the Queensland Police Service found "victims were shaken, thrown, punched, head-butted, and attacked with objects such as lumps of wood."[xxiv]

Q8. Is inflicted Traumatic Brain Injury the same thing as Shaken Baby Syndrome?

- They are different names for same thing but inflicted Traumatic Brain Injury can occur to a child of any age. Other names you might hear are “abusive head trauma” or “non-accidental head injury”.
- The expression "Shaken Baby Syndrome" derives from the work of Dr John Caffey, an American radiologist. His 1974 paper on the “Whiplash Shaken Infant Syndrome” offers this description: “the most characteristic pattern is that of massive traumatic intracranial [within the skull] and intraocular [inside the eye] bleeding in the absence of external signs of trauma to the head and neck. The clinical presentation is often nonspecific with symptoms of irritability, excessive crying, vomiting, drowsiness and seizures. The lack of history of trauma makes the diagnosis of intracranial haemorrhage [bleeding] difficult, and other diagnoses such as systemic infection, or meningitis [infection of the tissues around the brain] may be considered. Subdural hematomas [the collection of blood in the space between the outer and middle layers of the covering of the brain, caused by force applied to the head sufficient to rupture veins] associated with child abuse are often bilateral [on both sides of the brain] and this may aid in the diagnosis of non-accidental injuries.”

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[i] ”Nonaccidental Head Injuries In Children: A Sydney Experience, Ali Ghahreman, M.B.Ch.B., Vishal Bhasin, M.B.Ch.B.,Raymond Chaseling, F.R.A.C.S., Bronwyn Andrews, M.B.B.S. and Erhard W. Lang, M.D., Ph.D. Department of Neurosurgery, The Childrens’ Hospital at Westmead, University of Sydney, New South Wales, *Australian Neurosurgery* (Pediatrics 3) 103:, 2005, p. 217/18.

[ii] Subdural Haematoma and Effusion in Children Aged less than 2 years: a proposed Australian Paediatric Surveillance Unit study, Australian Paediatric Surveillance Unit, The University of Sydney, The Children’s Hospital at Westmead

[iii] "Subdural Hematomas in Children Under 2 Years. Accidental or Inflicted? A 10-Year Experience" Dimitra Tzioumi The Royal Alexandra Hospital for Children, Westmead, Australia, R. Kim Oates, The University of Sydney and The Royal Alexandra Hospital for Children, Westmead, Australia, *Child Abuse and Neglect*, vol. 22, no. 11, pp. 1105–1112, 1998

[iv]“A recent prospective North Carolina study, in which all children with severe abusive head trauma resulting from shaking were enumerated during a 2-year period, determined that the rate of abusive head trauma in the first 2 years of life was 17.0 cases per 100 000 live births.14 The results from that study, combined with our data, suggest that, for every 1 child 2 years of age who sustains a serious or life-threatening injury, another 152 children may be shaken by their caregivers and sustain subclinical brain trauma that goes undetected." Epidemiologic Features of the Physical and Sexual Maltreatment of Children in the Carolinas, I. Bangdiwala and Robert Agans Adrea D. Theodore, Jen Jen Chang, Desmond K. Runyan, Wanda M. Hunter, Shrikant,
Pediatrics 2005;115; p.335

[v] NSW Legislative Council Questions and Answers No. 6, Thursday 31 May 2007.

[vi] Australian Institute of Health and Welfare 2009. *Child protection Australia 2007–08*. Child welfare series no.45 Cat. no. CWS 33. Canberra: AIHW, p.69. Physical abuse refers to “any non-accidental physical act inflicted upon a child by a person having the care of a child.” A “child protection notification…consist of reports made to an authorised department by persons or other bodies making allegations of child abuse or neglect, child maltreatment or harm to a child.” A “substantiation of a notification…refers to child protection notifications made to relevant authorities…which were investigated and the investigation…and it was concluded that there was reasonable cause to believe that the child had been, was being or was likely to be abused or neglected or otherwise harmed.”

[vii] A “separation is the process by which an episode of care for an admitted patient ceases.” One
patient may be “separated” more than once in a given year. Inter-hospital transfers (for the one patient) will also include more than one separation.

[viii] *The International Statistical Classification of Diseases and Related Health Problems, 10th revision* (ICD-10) coding for assault includes: homicide; injuries inflicted by another person with intent to injure or kill, by any means; assault by drugs, medicaments and biological substances, by hanging, strangulation and suffocation, by drowning and submersion, by handgun discharge, by rifle, shotgun and larger firearm discharge, by sharp obj ect, by blunt object, by pushing from high place, by pushing or placing victim before moving object, by crashing of motor vehicle, by bodily force, and by neglect and abandonment.

[ix] “…For those children aged 1 year old death is 6 times more likely; and for those children aged 2 to 4 years old death is 4 times more likely.” *Trends in the fatal assault of children in NSW: 1996-2005*, NSW Child Death Review Team, p.3 “The rate of homicide among infants aged less than 1 year is higher than rates among older children and adults”, Child homicide in New South Wales from 1991 to 2005, Olav B Nielssen, Matthew M Large, Bruce D Westmore and Steven M Lackersteen, *Medical Journal of Australia*, 2009; 190, p.7

[x] “Serious Head Injury in Infants: Accident or Abuse?”, M. Elaine Billmire MD and Patricia A. Myers, Department of Pediatrics, University of Cincinnati College of Medicine, and Department of Social Services, Children's Hospital Medical Center, Cincinnati, *Pediatrics* Vol. 75 No. 2 February 1985, pp. 340-342

[xi] "The reasons for the over-representation of Aboriginal and Torres Strait Islander children in child protection substantiations are complex. The report Bringing them home [National inquiry into the separation of Aboriginal and Torres Strait Islander children from their families, HREOC, 1997] examined the effect of child welfare policies on Indigenous people. It noted that some of the underlying causes of the over-representation of Aboriginal and Torres Strait Islander children in the child welfare system include: the legacy of past policies of the forced removal of some Aboriginal children from their families; intergenerational effects of previous separations from family and culture; poor socioeconomic status; perceptions arising from cultural differences in child-rearing practices.” Australian Institute of Health and Welfare 2009. *Child protection Australia 2007–08*. Child welfare series no.45 Cat. no. CWS 33. Canberra: AIHW, p.31

[xii] *Trends in the fatal assault of children in NSW: 1996-2005*, NSW Child Death Review Team, p.3

[xiii] “Just under half of all filicide victims were killed with the use of assaultive force (46 percent), followed by a knife or other sharp instrument (13 per cent). A further 10 per cent were killed by poison, including carbon monoxide poisoning, through the use of a motor vehicle, with the parent usually attempting or committing suicide in the incident.” Mouzos, J., & Rushforth, C. (2003). *Family homicide in Australia*, Trends & Issues in Crime and Criminal Justice No. 255, Canberra: Australian Institute of Criminology, p.3

[xiv] “According to the most recent national data, in 2003 the leading cause of death among children aged 0–14 years was injury, which is broken down into five subcategories: transport accident, drowning, assault, falls and suicide. In 2003, assault was the third most common type of injury causing death for Australian children aged 0–14 years. It resulted in the deaths of 73 children in 2001–03, compared to 327 deaths of children from transport accidents and 139 drowning deaths. A total of 815 Australian children aged 0–14 years died from injuries in 2001–03”, Australian Institute of Health and Welfare. (2005). *A Picture of Australia’s Children*.

[xv] Child homicide in New South Wales from 1991 to 2005, Olav B Nielssen, Matthew M Large, Bruce D Westmore and Steven M Lackersteen, *Medical Journal of Australia* 2009; 190, p.7

[xvi] US Department of Health and Human Services, Administration on Children, Youth and Families. (2009). Child maltreatment 2007. Washington: US Government Printing Office. US Advisory Board on Child Abuse and Neglect. (1995). A nation’s shame: Fatal child abuse and neglect in the United States. Washington, DC: US Department of Health and Human Services. “Most disturbing is the reality that child maltreatment is a leading cause of death in children in the United States. It is the fourth leading cause of death in children between 1 and 4 years of age, and inflicted Traumatic Brain Injury is the leading cause of death among all children with traumatic injuries.” Inflicted Traumatic Brain Injury: Advances in Evaluation and Collaborative Diagnosis, Jill C. Glick and Kelley Staley Child Protective Services, Department of Pediatrics, The University of Chicago, Chicago, *Pediatric Neurosurgery* 2007;43, p. 437.

[xvii] "Deaths are only the visible tip of the problem. Millions of children are victims of non-fatal abuse and neglect. In some studies, between one-quarter and one-half of children report severe and frequent physical abuse, including being beaten, kicked or tied up by parents." World Health Organization. (2002). *Child abuse and neglect: Facts.*

[xviii] "The morbidity from shaken baby syndrome is serious: 12–30% of victims die, and 60–70% of the survivors suffer from significant neurological handicap." Investigating subdural haemorrhage in infants, A M Kemp, *Archives of Disease in Childhood*, 2002;86, p.99, "...The outcomes of patients presented in the current study compare favorably with the previously published data. In our series, a smaller proportion of patients died or were left with significant neurological disability in comparison with previous studies. Duhaime, et al., reported a mortality rate of 26% in a series of 84 patients with nonaccidental head injury. In the series of Holloway, et al., 14% of the 49 patients died and 39% were severely disabled. In the study of King, et al., of 364 patients, 19% died and 60% survived with moderate-to-severe neurological disability or remained in a vegetative state. In our series, four patients (6%) died and 21 patients (31%) remained severely disabled or in a vegetative state.," Nonaccidental Head Injuries In Children: A Sydney Experience, Ali Ghahreman, M.B.Ch.B., Vishal Bhasin, M.B.Ch.B.,Raymond Chaseling, F.R.A.C.S., Bronwyn Andrews, M.B.B.S. and Erhard W. Lang, M.D., Ph.D. Department of Neurosurgery, The Childrens' Hospital at Westmead, University of Sydney, New South Wales, *Australian Neurosurgery* (Pediatrics 3) 103:, 2005, p. 217/18, "...This study confirms and adds significantly to the literature regarding the high morbidity rate in the survivors of inflicted TBI. Sixty
-eight per cent of the survivors had a significant morbidity. Thirty-six per cent had severe neurological disabilities requiring significant long-term nursing and carer support in the community.", The Neurological Outcome Of Non-Accidental Head Injury, Karen Barlow, Elaine Thompson, David Johnson and Robert A. Minns (196) *Pediatric Rehabilitation*, 2004, vol. 7, no. 3, 195–203, "There is a high rate of morbidity and mortality among infant victims of shaken baby syndrome. Mortality rates range from 15%4 to 38%, with a median of 20% to 25%. In one series, of those infants who were comatose when initially examined, 60% died or had profound mental retardation, spastic quadriplegia, or severe motor dysfunction. Other infants initially had seizures, irritability, or lethargy but had no lacerations or infarctions of brain tissue. These children did not have severely elevated intracranial pressure, subtle neurologic sequelae sequelae, or persistent seizures.", American Academy Of Pediatrics, Committee on Child Abuse and Neglect, "Shaken Baby Syndrome: Rotational Cranial Injuries—Technical Report", *Pediatrics* Vol. 108 No. 1 July 2001.)

[xix] "Fifty-four (31.2%) of 173 abused children with head injuries had been seen by physicians after AHT and the diagnosis was not recognized. The mean time to correct diagnosis among these children was 7 days (range, 0-189 days). Abusive head trauma was more likely to be unrecognized in very young white children from intact families and in children without respiratory compromise or seizures. In 7 of the children with unrecognized AHT, misinterpretation of radiological studies contributed to the delay in diagnosis. Fifteen children (27.8%) were reinjured after the missed diagnosis." , Analysis of Missed Cases of Abusive Head Trauma, Carole Jenny, MD, MBA, Lt Col Kent P. Hymel, MD, USAF, MC Alene Ritzen, MD, JD Steven E. Reinert, MS Thomas C. Hay, *Journal of the American Medical Association*, February 17, 1999—Vol 282, No. 7, p.621.

[xx] "A missed diagnosis can result in repeat injury and/or death. When the diagnosis of inflicted TBI is made, as many as 45% of children have signs of previous brain injury." A Population-Based Comparison of Clinical and Outcome Characteristics of Young Children With Serious Inflicted and Noninflicted Traumatic Brain Injury, Heather T. Keenan et al., *Pediatrics*, Vol. 114 No. 3 September 2004, p.633.

[xxi] "Infants may not present with the classical features of a head injury and instead have more non-specific symptoms such as poor feeding, vomiting and lethargy and, therefore, the diagnosis may be missed or delayed. In one study, 27.8% of children with missed diagnoses were reinjured and perhaps four out of five deaths could have been prevented with earlier diagnosis." The Neurological Outcome of Non-accidental Head Injury Karen Barlow, Elaine Thompson, David Johnson and Robert A. Minns, Pediatric Rehabilitation, 2004, Vol. 7, No. 3, 196, Analysis of Missed Cases of Abusive Head Trauma, Carole Jenny, MD, MBA, Lt Col Kent P. Hymel, MD, USAF, MC Alene Ritzen, MD, JD Steven E. Reinert, MS Thomas C. Hay, DO *Journal of the American Medical Association*, February 17, 1999—Vol 282, No. 7, p.621.

[xxii] "The fatal injuries of the remaining children were inflicted by carers such as acquaintances or friends, or persons unknown to the children." Trends in the fatal assault of children in NSW: 1996-2005 NSW Child Death Review Team, p.3

[xxiii] Nonaccidental Head Injuries In Children: A Sydney Experience, Ali Ghahreman, M.B.Ch.B., Vishal Bhasin, M.B.Ch.B.,Raymond Chaseling, F.R.A.C.S., Bronwyn Andrews, M.B.B.S. and Erhard W. Lang, M.D., Ph.D. Department of Neurosurgery, The Childrens' Hospital at Westmead, University of Sydney, New South Wales, *Australian Neurosurgery* (Pediatrics 3) 103:, 2005, p. 217/18.

[xxiv] "In some instances, the acute head injury was the only evidence of trauma present; other victims presented with both chronic and acute injuries to the head and/or body… In one case, medical staff initially thought an 11-month-old infant with massive trauma had been run over by a motor vehicle. The head injuries recorded included skull fractures, cerebral edema, subarachnoid and subdural hematomas, and ocular trauma including retinal hemorrhages, subhyaloid hemorrhages, detached retinas, retinal folds, subconjunctival hemorrhages, and optic nerve hemorrhages. The mean age of the infant victims was 5.98 months.", Perpetrator accounts in infant abusive head trauma brought about by a shaking event, Dean Biron, Doug Shelton, State
Crime Operations Command, Queensland Police Service, Community Child Health, Gold Coast Health Services, Bundall, Qld, Australia, Child Abuse & Neglect 29 (2005) 1347–1358, p. 1350.