

Preventing abusive head trauma

RACP Chapter of Community Child Health Satellite Day
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Disclosure

- I have no relevant financial relationships with the manufacturer(s) of any commercial product(s) and/or provider(s) of commercial services discussed in this CME activity.
- I do not intend to discuss an unapproved/investigative use of a commercial product/device in my presentation





Learning objectives

- The epidemiology of abusive head trauma
- Shaken baby prevention programmes
- Perinatal risk assessment for abusive head trauma
- Home visiting and head injury prevention
- Where to from here



Epidemiology





Definition

“Pediatric abusive head trauma is defined as an **inflicted** injury to the skull or intracranial contents of an infant or young child (< 5 years of age)”

Parks SE, Annest JL, Hill HA, Karch DL. Pediatric Abusive Head Trauma: Recommended Definitions for Public Health Surveillance and Research. Atlanta (GA): Centers for Disease Control and Prevention; 2012



Population incidence (per 100,000)

Population	< 1 year	Age (months)	< 2 year ‡	Lead Author	Year
Alaska	55.9		34.4	Parrish	2013
Canada ¹	14.1	5 (median)		Bennett	2011
Canada	15.5			Fujiwara	2012
Estonia	28.7	3.9 (mean)	¶	Talvik	2006
New Zealand	22 - 31	7.8 (median)	14.7–19.6	Kelly	2008
North Carolina	29.7	4 (median)	17	Keenan	2003
North Carolina	36.0			Zolotor	2015
Pennsylvania ²	26	4.1 (median)	14.7	Kesler	2008
Pennsylvania	45.2		26.6	Dias	2017
Queensland	12.4		6.7	Kaltner	2013
Scotland	24.6	2.2 (median)	¶	Barlow	2000
Switzerland ³	14 [†]	4 (median)		Fanconi	2010
United Kingdom	18 [§]	3 (median)	10.1 [§]	Jayawant	1998
United Kingdom	12.1–17.8		6.4–9.3	Hobbs	2005
USA (non-fatal) ⁴	32.3	Peak hospitalisation 2 months	18.7	Parks	2012
USA (KID data)	39.8			Niederkrötenenthaler	2013
USA (military)	34-39.2 [†]			Gumbs	2013

¹Age < 15 yr ²Age < 3 yr ³Age < 6 yr ⁴Age <5 yr [†] denominator is per 100,000 live births
[§] 82% of the figure for total SDH [‡] The rate for 1-2 year olds varies from 2.8-12 (Bennett, Kesler, Parks cite rates for older children) [¶] No cases over 12 months old

Te Puaruruhau “Sheltering the bud”
 Puawaitahi “Blossoming in unity”



Notes on incidence

1. The community incidence of potentially injurious practices
 - 26/1000 parents in the Carolinas shook a child <2 years old¹⁹
 - 5.6% of Dutch parents smothered, slapped, or shook a baby <6/12 old²⁰
 - 1-4% of mothers in Hawaii Healthy Start assaulted a child < 3 years old²¹

2. “Lesser degrees” of head injury



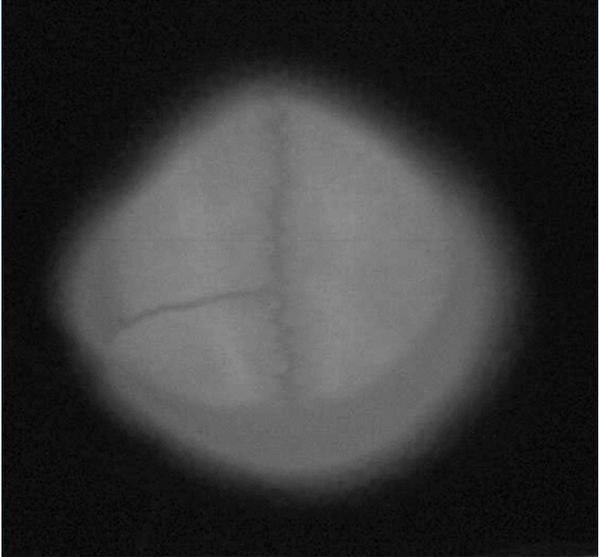
- Bruising to the head is common in abuse²²⁻²⁶
- Serious rotational injury can occur from force applied to the ear²⁷



3. Missed cases of head injury²⁸⁻³³

The probability of recognising AHT in an infant with no bruises, no seizures, normal breathing and an intact family, may be as low as 1 in 5²⁸





Te Puaruruhau "Sheltering the bud"
Puawaitahi "Blossoming in unity"





Infantile subdural haematoma in Auckland, New Zealand: 1988–1998

Patrick Kelly, Ian Hayes

Abstract

Aim To review the Auckland experience of traumatic subdural haematoma (SDH) in infants under 2 years of age, with particular regard to features which might help to differentiate accidental from non-accidental injury (NAI).

Methods Retrospective review of the medical records of children under 2 years of age, coded for subdural haematoma (SDH) and retinal haemorrhage (RH) over a 10-year period.

Results Sixty-four cases of SDH were identified. Forty-one of these were due to non-accidental trauma, and 23 cases were accidental. Differences between these two groups related to the age of presentation, ethnicity, the type of explanation for the injury, and differences in aspects of the clinical presentation (apnoea, seizures, fractures, retinal haemorrhage). Mortality in the non-accidental group was far higher.

Conclusions Subdural haemorrhage is a significant cause of death and disability in infants presenting to hospital in Auckland. In the majority of cases, it is caused by child abuse, and there are certain features that are helpful in establishing this diagnosis. The long-term outcome in this group is unknown, but there is reason to believe that, in many cases, it is poor. There is considerable scope for further research.

In the 40 years since Henry Kempe¹ first reminded the medical community of the fact of child abuse, subdural haematoma (SDH) in young infants has become increasingly recognised as a warning sign. There is now an extensive literature on the clinical presentation (often known as 'shaken baby syndrome'), although debate continues as to the exact mechanisms of injury required.^{2–6}

Auckland and Starship Children's Hospitals provide general medical and surgical services to central Auckland. They also provide neurosurgery and intensive care for children from metropolitan Auckland (1996 population: 1,081,776) and elsewhere in New Zealand (1996 population: 3,618,300). This study was undertaken to characterise the infants we were seeing with SDH, and to identify features that might be helpful in diagnosis and management.

Methods

A retrospective study of those children under 2 years of age admitted to Auckland or Starship hospitals with subdural or retinal haemorrhage, from 1 January 1988 to 31 December 1998. We did not include infants that may have presented to National Women's Hospital—the principal tertiary neonatal facility for metropolitan Auckland during that period. Nor did we include infants who may have presented in South Auckland, but were not transferred to Starship Children's Hospital.

Cases were identified by ICD9 codes for SDH (8523, 8522, 8007, 8002, 8012, 8017) and retinal haemorrhage (RH) (3628.1). All six coding fields were included, so codes for child abuse were identified. However, these codes were not our primary search strategy. A trial run demonstrated clearly that the broader strategy identified more infants with SDH.

ORIGINAL ARTICLE

Shaken baby syndrome in New Zealand, 2000–2002

Patrick Kelly¹ and Bridget Farrant²

¹Te Puaruruhau (Child Abuse Assessment Unit), Starship Children's Hospital, and ²Department of Paediatrics, University of Auckland, Auckland, New Zealand

Aim: To describe the epidemiology of subdural haemorrhage (SDH) in New Zealand infants.

Methods: Prospective enrolment of all cases of infantile SDH from 2000 to 2002. Retrospective analysis of national discharge and death data for the same period.

Results: Seventy-seven cases of infantile SDH were identified prospectively, and a further 49 cases retrospectively. Of these 126 cases, 92 resulted from non-birth-related trauma. Forty-eight of these were attributed to abuse and 28 to accidental injury. Sixteen cases were undetermined. The 'minimum' annual incidence of inflicted infantile SDH in New Zealand is 14.7 per 100 000 (95% confidence interval(CI) 10.8–19.4), and the 'maximum' 19.6 per 100 000 (95% CI 15.1–25.0). Among Maori, the 'minimum' is 32.5 per 100 000 (95% CI 21.4–47.3), and the 'maximum' 38.5 per 100 000 (95% CI 26.3–54.4).

Conclusions: The epidemiology of infantile subdural haemorrhage in New Zealand is similar to that described elsewhere. Non-accidental head injury is a significant child health issue in New Zealand, and the incidence is particularly high among Maori.

Key words: child abuse; shaken baby syndrome; subdural hematoma; traumatic brain injury.

While subdural haemorrhage (SDH) can result from non-traumatic or accidental causes, many cases result from abuse.^{1–3} The term 'shaken baby syndrome' (SBS) is often applied to such cases, although controversial, because it implies one particular mechanism of injury.^{4–8} Many infants show signs of impact to the head, and for these shaken impact syndrome may be a better term.^{9,10} Other terms such as non-accidental head injury (NAHI) or inflicted traumatic brain injury do not imply any specific mechanism. However, the older term remains widely known, and there is good evidence that violent shaking (with or without impact) is often involved.^{11–13} We use the term SBS because it is widely recognised, not because we regard it as a precise description of the mechanisms of NAIH.

There is population-based data on the incidence of NAIH in the UK^{14–16}, North Carolina¹⁷ and Canada,¹⁸ but none from New Zealand (2001 population 3 820 749) (<http://www.stats.govt.nz/census/2001-census-statistics/2001-national-summary/default.htm>, Accessed 18 June 2006).

Key Points

- 1 In New Zealand, there is a high rate of non-accidental head injury among Maori infants.
- 2 In most cases of both abusive and accidental infantile head trauma, the injuries are restricted to the head alone.
- 3 A significant number of cases of serious head trauma in infancy may not receive an adequate assessment for child abuse.

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We aimed to describe the New Zealand incidence of infantile SDH, medical investigations, diagnoses, short-term neurological outcome and demographic characteristics, in order to guide further local research in prevention, diagnosis and treatment.

Materials and Methods

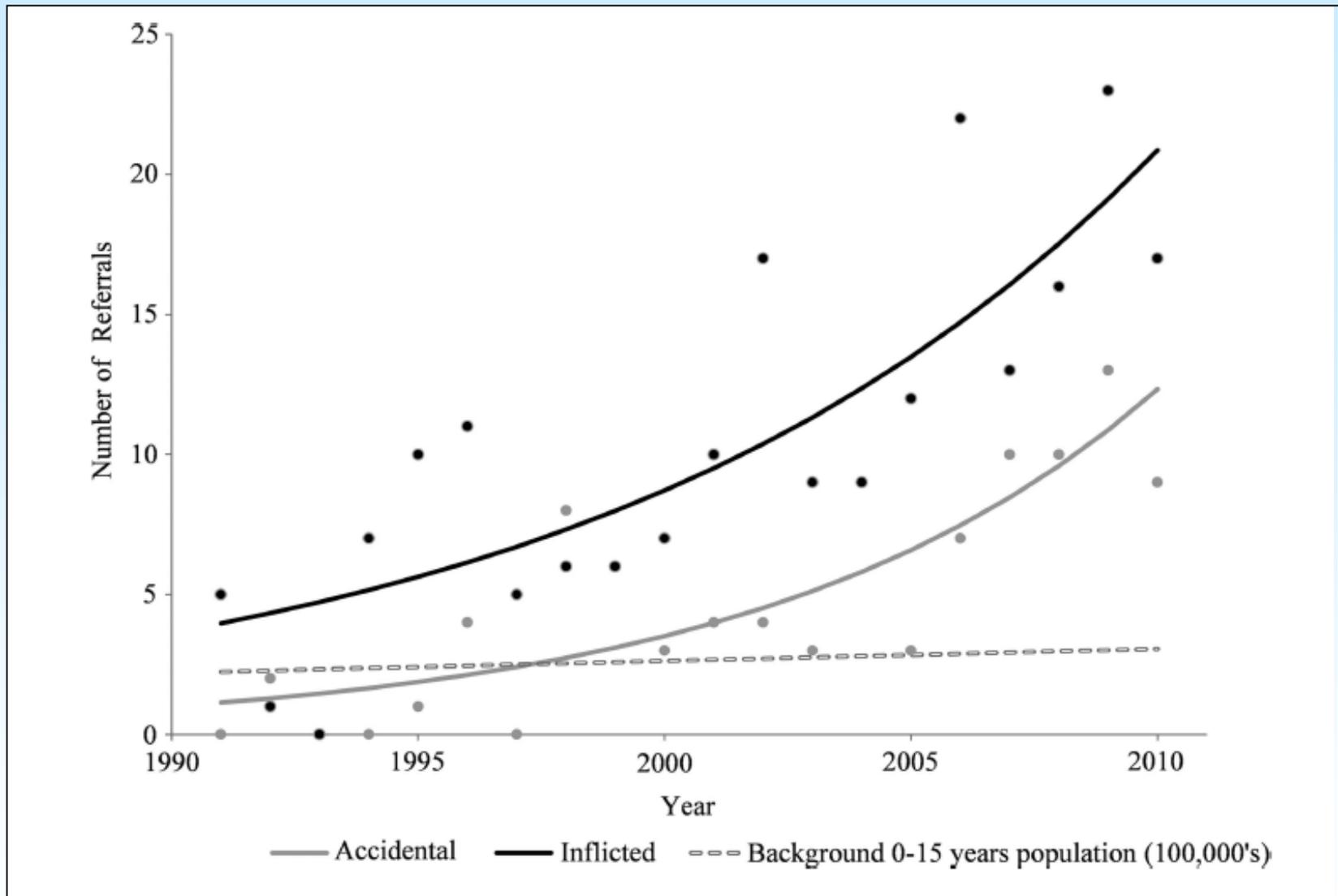
The New Zealand Paediatric Surveillance Unit (NZPSU) was established in 1997 'to operate a system for monitoring acute flaccid paralysis, as part of the global certification of eradication of poliomyelitis, required by the World Health Organisation' (WHO) (<http://www.nzpsu.com/index.html>, Accessed 18 June 2006). Other conditions can be placed under surveillance for a specified period at the request of researchers (<http://www.paediatrics.org.nz/PSNZold/nzpsu/nzpsu1.html#1>, Accessed 18 June 2006).

Every New Zealand paediatrician receives a monthly card or email asking them to tick a box if they have seen any of the conditions under surveillance. Replies go to the NZPSU, which notifies the relevant investigator. The investigator then sends a questionnaire to the notifier.

Our study was approved by the Northern Regional Ethics Committee and the NZPSU Scientific Review Panel. From 1 January 2000 to 31 December 2002, SDH in infants under 2 years was on the list of conditions under surveillance. We included all neurosurgeons in 2002. The study protocol was clear that we wished to be informed of all cases of infantile SDH, regardless of cause.

The two-page questionnaire details definitions used and data requested (Fig. 1). At the time, there was little information on risk factors particular to NAIH, so we sought information identified as relevant for infant homicide.²¹ Each infant was identified by a code entered by the notifier, and date of birth. Age at





1 million dollars

12 million dollars

240 million dollars

5.4 billion dollars



Research article

Extended follow-up of neurological, cognitive, behavioral and academic outcomes after severe abusive head trauma



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Cognitive impairment
Behavior
School

ABSTRACT

Studies about long-term outcome following abusive head trauma (AHT) are scarce. The aims of this study were to report long-term neurological, cognitive, behavioral and academic outcomes, ongoing treatments and/or rehabilitation, several years after AHT diagnosis, and factors associated with outcome. In this retrospective study, all patients admitted to a single rehabilitation unit following AHT between 1996 and 2005, with subsequent follow-up exceeding 3 years, were included. Medical files were reviewed and a medical interview was performed with parents on the phone when possible. The primary outcome measure was the Glasgow Outcome Scale (GOS). Forty-seven children (out of 66) met the inclusion criteria (mean age at injury 5.7 months; SD = 3.2). After a median length of follow-up of 8 years (range 3.7–12), only seven children (15%) had “good outcome” (normal life – GOS I) and 19 children (40%) presented with severe neurological impairment (GOS III and IV). Children sustained epilepsy (38%), motor deficits (45%), visual deficit (45%), sleep disorders (17%), language abnormalities (49%), attention deficits (79%) and behavioral disorders (53%). Most children (83%) had ongoing rehabilitation. Only 30% followed a normal curriculum, whereas 30% required special education services. Children with better overall outcome (GOS I and II) had significantly higher educated mothers than those with worse outcomes (GOS III and IV); graduation from high school 59% and 21% respectively ($p = 0.006$). This study highlights the high rate of severe sequelae and health care needs several years post-AHT, and emphasizes the need for extended follow-up of medical, cognitive and academic outcomes.

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Introduction

Abusive head trauma (AHT), also labeled various ways in the literature, such as *shaken baby syndrome*, *shaken impact syndrome*, *whiplash-shaking injury*, *inflicted head trauma*, *non-accidental head injury*, is an inflicted brain injury defined by an acute brain injury (often associated with subdural or subarachnoid hemorrhage) where no history or no compatible history

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Caregivers' voices: The experiences of caregivers of children who sustained serious accidental and non-accidental head injury in early childhood

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Abstract

Head injury is a leading cause of mortality and acquired neurological impairment in children. Head-injured children may have neurobehavioural deficits that persist for years following injury. Head injury can result in significant and persistent caregiver burden, including mental health issues, family stress and disorganisation, and unmet social and healthcare service needs. Few studies have examined the healthcare and social service needs of children and their families following head injury sustained at an early age. This qualitative study aims to describe the experiences of caregivers of children who sustained a serious head injury (particularly non-accidental head injury) before the age of 2 years. Caregivers were interviewed up to 15 years following the initial injury. Semi-structured interviews with 21 caregivers of 15 children (aged 3–15 years at the time of interview) were completed. Thematic analysis of interview data generated three key themes: impact, support and information. The study's findings reveal the broad impact of serious childhood head injury on caregivers, specifically the significant distress and burden brought about through lack of information, challenges in accessing support and inconsistent care. Recommendations for developing a quality 'model of care' and improving ease of access to supports for caregivers are provided.

Keywords

Caregivers, children, head injury, non-accidental head injury, thematic analysis, whānau/families

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Non-accidental head injury in New Zealand: The outcome of referral to statutory authorities[☆]

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Recurrence

Legal system

ABSTRACT

Objectives: To describe the outcome of referral to the statutory authorities for infants under 2 years with non-accidental head injury (NAHI), and to establish whether the authorities held sufficient information to develop a risk profile for these cases.

Methods: Retrospective review of cases admitted to hospital in Auckland, New Zealand from 1988 to 1998. Records from the hospital admission, child protective services and Police were reviewed, up to 19 years from diagnosis.

Results: Of 39 infants, 33 survived to leave hospital. Documentation of risk factors was erratic, and sometimes incongruent between agencies. Inter-agency case conferences took place in 17/39 (44%). The Department of Child, Youth and Family Services (CYF) used an informal family agreement to secure safety in 15/33 survivors (45%). Family Group Conferences occurred in 17/33 (52%). Nine of 33 were placed permanently outside the home (27%), two (6%) with unrelated caregivers. Charges were laid in 18/39 cases (46%). Fifteen cases came to trial, with 14 convictions (36%). Of the survivors, 44% were later renotified to CYF. There was no obvious relationship between type of intervention and re-notification.

Conclusions: Ensuring the safety of an infant with NAHI, and identifying and taking appropriate action with regard to the offender, are complex tasks. In New Zealand, data collection is often incomplete and inter-agency practice and collaboration is variable. Although the rate of prosecution was relatively high by international standards, many children were later notified again for further concerns of abuse or neglect, suggesting that our interventions have been only partially successful.

Practice implications: This paper suggests that all infants admitted to hospital with non-accidental head injury should become part of a prospective inter-agency research study, using a standardised data collection instrument. This should include the systematic collection of all data known or suspected to be associated with risk of child abuse, and incorporate long-term prospective follow-up, regardless of child protective or legal outcomes. Without large numbers followed prospectively and according to sound methodology, it is difficult to prove which forms of intervention are better than others at reducing the risk of further abuse.

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[☆] This data was first presented at the 10th Australasian Conference on Child Abuse and Neglect, Wellington, February 2006.

* Corresponding author at: Starship Children's Hospital, Park Road, Private Bag 92024, Auckland 1, New Zealand.





Shaken Baby Prevention

PREVENTION IS BETTER THAN CURE

We all need help throughout our lives, and benefit from 'right first time' support, sometimes at early stages, sometimes at moments of crisis or difficulty. We also need strong communities that build readiness, resilience and resourcefulness, and national systems and policies which help people to thrive, not undermine them.



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Parent Education by Maternity Nurses and Prevention of Abusive Head Trauma
Robin L. Altman, Jennifer Canter, Patricia A. Patrick, Nancy Daley, Neelofar K. Butt
and Donald A. Brand
Pediatrics 2011;128:e1164; originally published online October 24, 2011;
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The online version of this article, along with updated information and services, is
located on the World Wide Web at:
<http://pediatrics.aappublications.org/content/128/5/e1164.full.html>

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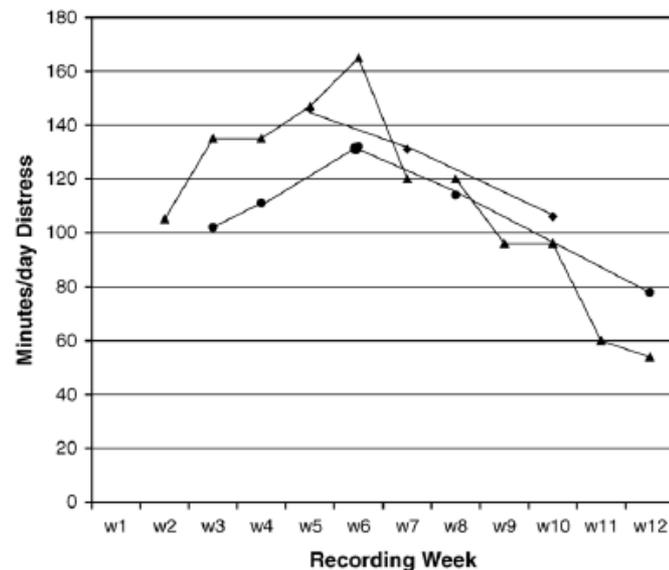
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R.G. Barr et al. / *Child Abuse & Neglect* 30 (2006) 7–16



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Abusive Head Trauma: Judicial Admissions Highlight Violent and Repetitive Shaking

Catherine Adamsbaum, Sophie Grabar, Nathalie Mejean and Caroline Rey-Salmon
Pediatrics published online Aug 9, 2010;
DOI: 10.1542/peds.2009-3647

Te Puaruruhau “Sheltering the bud”
Puawaitahi “Blossoming in unity”

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Co-delivery

The screenshot shows the TexasChildcareTraining website. The header includes the logo for 'Prevention Vermont' and the site title 'TexasChildcareTraining' with the tagline 'practical training for busy childcare professionals'. Navigation links for Home, About, Online Courses, Live Workshops, Blog, and Contact are present, along with a search icon and a 'Sign In' button. A left sidebar lists various topics like Family Support, Child Sexuality, Shaken Baby Syndrome, Head Trauma, Education, Health, Childcare, Parenting, Resources, and VT Parents. The main content area features a course card for 'Recognizing and Preventing Shaken Baby Syndrome and SIDS' with a 'COMING SOON!' banner and a star rating. To the right is a 'Description' section with a text box stating the course is coming soon and a 'SUBSCRIBE!' button. Below this is a 'Related Courses' section with four course cards, each priced at \$15.00: 'Developmental Milestones 6', 'Positive Guidance: The Key to...', and 'HOW SAFE IS YOUR DAYCARE?'. A footer text reads: 'parents, grandparents, childcare providers, healthcare workers, and any Vermonter interested in keeping our children safe.'



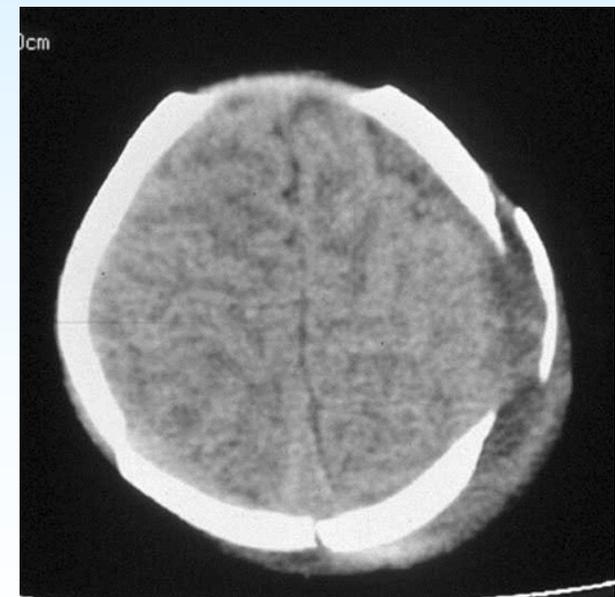
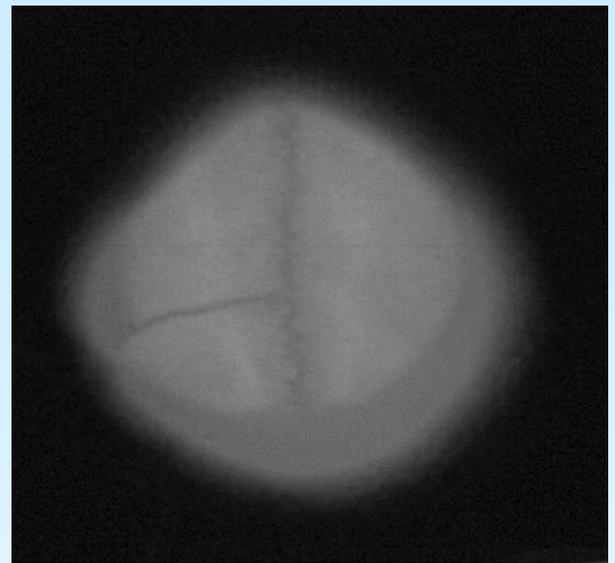


Risk and protective factors

- Age
- Infant crying



- 
- Multiple doses
 - Teaching parents mindfulness and reflective parenting
 - Combining education with increased support
 - Population-level approaches that include home visiting
 - All approaches need to reach males





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Patrick Kelly, Ian Hayes

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Conclusions Subdural haemorrhage is a significant cause of death and disability in infants presenting to hospital in Auckland. In the majority of cases, it is caused by child abuse, and there are certain features that are helpful in establishing this diagnosis. The long-term outcome in this group is unknown, but there is reason to believe that, in many cases, it is poor. There is considerable scope for further research.

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Non-accidental head injury in New Zealand: The outcome of referral to statutory authorities^{*}

Patrick Kelly^{a,*}, Judith MacCormick^a, Rebecca Strange^b

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^b Auckland District Health Board and Child Youth and Family Liaison Social Worker, Auckland, New Zealand

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Results: Of 39 infants, 33 survived to leave hospital. Documentation of risk factors was erratic, and sometimes incongruent between agencies. Inter-agency case conferences took place in 17/39 (44%). The Department of Child, Youth and Family Services (CYF) used an informal family agreement to secure safety in 15/33 survivors (45%). Family Group Conferences occurred in 17/33 (52%). Nine of 33 were placed permanently outside the home (27%), two (6%) with unrelated caregivers. Charges were laid in 18/39 cases (46%). Fifteen cases came to trial, with 14 convictions (36%). Of the survivors, 44% were later re-notified to CYF. There was no obvious relationship between type of intervention and re-notification.

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Practice implications: This paper suggests that all infants admitted to hospital with non-accidental head injury should become part of a prospective inter-agency research study, using a standardised data collection instrument. This should include the systematic collection of all data known or suspected to be associated with risk of child abuse, and incorporate long-term prospective follow-up, regardless of child protective or legal outcomes. Without large numbers followed prospectively and according to sound methodology, it is difficult to prove which forms of intervention are better than others at reducing the risk of further abuse.

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^{*} This data was first presented at the 10th Australasian Conference on Child Abuse and Neglect, Wellington, February 2006.

^{*} Corresponding author at: Starship Children's Hospital, Park Road, Private Bag 92024, Auckland 1, New Zealand.





“This study also found that the data collected by the key agencies involved in cases of NAHI, was inconsistent and often incomplete. In the absence of a systematic, prospective and collaborative approach to these cases, it could be suggested that the child protection system in New Zealand is conducting a form of poorly controlled experiment. Children and families are subjected to a wide variety of interventions, and re-notification is taken as the measure of success or failure - a measure for whose validity little good evidence exists”

Kelly 2009

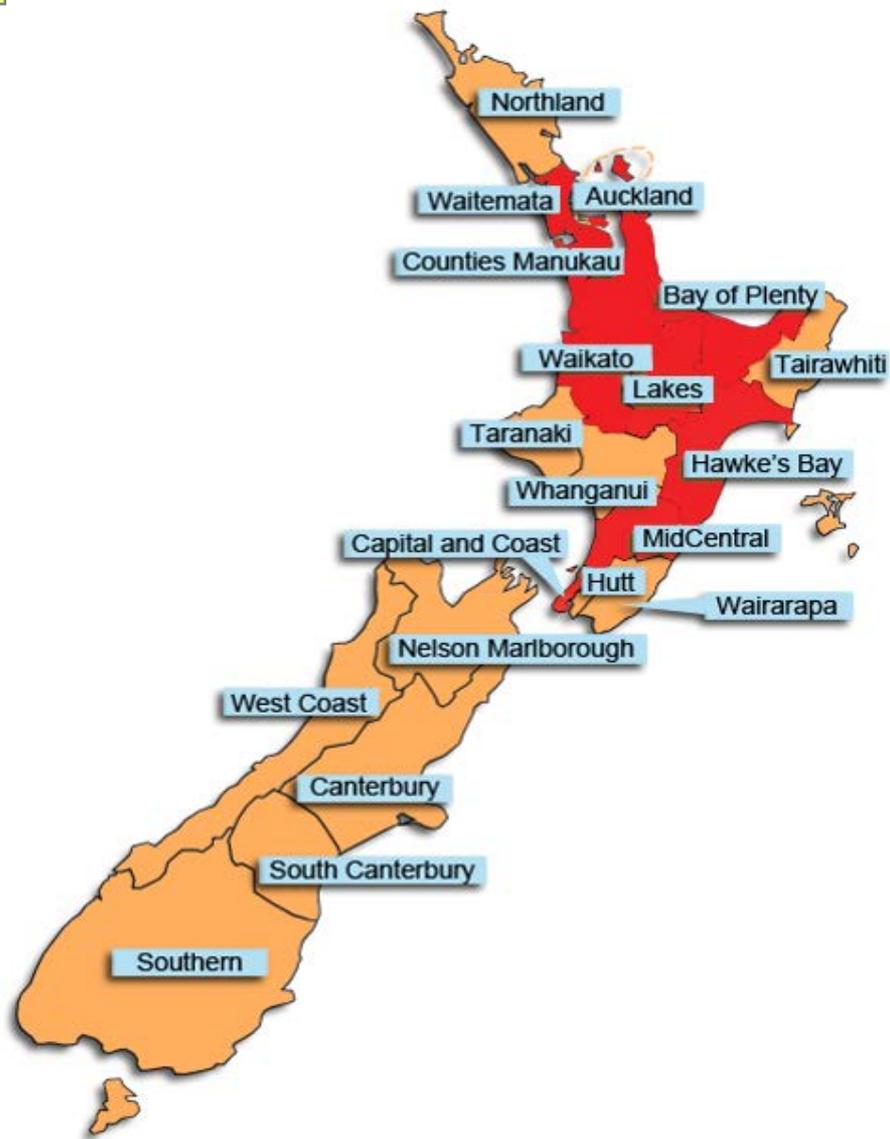


- Cases admitted to Starship 1991 to 2010
 - Age <2 years
 - Intracranial injury and/or skull fracture
 - AHT diagnosed and reported to statutory authorities

- Birthplace was identified.
 - Nine DHB where ≥ 5 cases were born included

- Four controls randomly selected for each case
 - born on the same day in the same hospital
 - who did not sustain AHT by the age of 5 years





	District Health Board	Included	Excluded
1	Counties	46	4
2	Auckland	34	
3	Waitemata	21	2
4	Waikato	9	4
5	Lakes	8	
6	Bay of Plenty	7	
7	MidCentral	7	
8	Hawkes Bay	6	
9	Capital Coast	4	
10	Northland		4
11	Taranaki		2
12	Nelson		2
13	Canterbury		2
14	Southland		2
15	Hutt Valley		1
16	Whanganui		1



Data collection and analysis

- 142 cases (86%), 550 controls (97%)
- Maternal and child perinatal records
- 75 variables arranged in related groups
- Frequency analysis: $p < 0.1$
- Univariable analysis: $p < 0.1$
- Multivariable analysis: $p < 0.05$



Table III. Variables remaining in the final multivariable model

Variables	Categories	Cases No. (%)	Controls No. (%)	Conditional multivariable OR (95% CI)	Unconditional multivariable OR (95% CI)
Maternal age (per y)				0.91 (0.85, 0.97)	0.92 (0.88, 0.96)
Ethnicity	European	31 (21.8)	255 (46.4)	1.00	1.00
	Pacific	25 (17.6)	115 (20.9)	2.17 (0.92, 5.14)	1.92 (0.93, 3.98)
	Asian	5 (3.5)	50 (9.1)	2.13 (0.62, 7.38)	2.06 (0.64, 6.63)
	Other	3 (2.1)	23 (4.2)	1.47 (0.18, 12.00)	2.33 (0.39, 13.74)
	Maori	78 (54.9)	107 (19.5)	4.61 (1.98, 10.78)	3.97 (2.12, 7.44)
Other social history†	No	67 (47.2)	444 (80.7)	1.00	1.00
	Unknown	57 (40.1)	89 (16.2)	2.29 (0.49, 10.72)	1.27 (0.37, 4.35)
	Yes	18 (12.7)	17 (3.1)	4.29 (1.32, 13.91)	4.62 (1.81, 11.80)
Partner status	Married	27 (19.0)	309 (56.2)	1.00	1.00
	Unknown	24 (16.9)	46 (8.4)	1.90 (0.65, 5.56)	2.04 (0.91, 4.60)
	De facto‡	45 (31.7)	111 (20.2)	3.10 (1.23, 7.83)	3.27 (1.59, 6.74)
	Single	46 (32.4)	84 (15.3)	5.10 (1.83, 14.23)	3.7 (1.71, 8.03)
Unknowns§	0	47 (33.1)	372 (67.6)	1.00	1.00
	1 vs 0	40 (28.2)	95 (17.3)	5.75 (2.27, 14.59)	3.89 (2.02, 7.50)
	2+ vs 0	55 (38.7)	83 (15.1)	13.53 (2.39, 76.47)	7.96 (2.06, 30.71)
Supplements¶	Yes	19 (13.4)	130 (23.6)	1.00	1.00
	Unknown	69 (48.6)	222 (40.4)	2.44 (0.94, 6.33)	1.06 (0.51, 2.20)
	No	54 (38.0)	188 (34.2)	3.53 (1.30, 9.54)	2.73 (1.29, 5.79)
Prolonged rupture of membranes**	No	108 (76.1)	503 (91.5)	1.00	1.00
	Unknown	22 (15.5)	36 (6.5)	0.99 (0.34, 2.87)	0.99 (0.43, 2.28)
	Yes	12 (8.5)	11 (2.0)	13.01 (2.84, 59.68)	6.53 (2.10, 20.30)
Gestation (per wk) Feeding††	Breastmilk	65 (45.8)	432 (78.5)	0.79 (0.69, 0.91)	0.77 (0.69, 0.86)
	Unknown	10 (7.0)	10 (1.8)	1.00	1.00
	Formula	36 (25.4)	49 (8.9)	5.82 (1.31, 25.81)	3.93 (1.17, 13.18)
	Both	31 (21.8)	59 (10.7)	4.53 (1.67, 12.28)	4.25 (2.18, 8.29)
				6.06 (2.39, 15.36)	4.74 (2.42, 9.28)

*Ethnicity. Participant-defined. If multiple, prioritized as Maori, Pacific, Asian, Other, European.

†Other social history. Any social concern documented in clinical notes. Examples: attempted suicide, child in care, child protective services involved, partner in jail, prostitution, single parent, social worker involved.

‡De facto. Living together as a couple but not married.

§Unknowns in substance abuse history, other social history, partner status, and booking.

¶Supplements. Any medication not usually prescribed (eg, folate, vitamins, iron [if not prescribed for anemia]).

**Membrane rupture more than 48 hours before delivery.

††Pattern of feeding in 24 hours before discharge. Breast includes expressing.

Kelly P, Thompson JMD, Koh J, Ameratunga S, Jelleyman T, Percival TM, Elder H, Mitchell EA. Perinatal risk and protective factors for pediatric abusive head trauma: a multicenter case-control study. *J Pediatr.* 2017;187:240-246.

Inter-pregnancy interval

- The interval between deliveries was not included in the final model because it eliminated 265 primiparous women.
- It was significant in group analysis (31 months for cases, 38.8 for controls, $p=0.026$) so we performed an additional analysis of the effect for 422/427 multiparous women.
- Shorter inter-pregnancy intervals were significantly associated with AHT ($p=0.029$), OR 0.76 (95% CI, 0.59-0.98) per year.
- The risk for a second baby born after three years was less than half that for one born after one year.

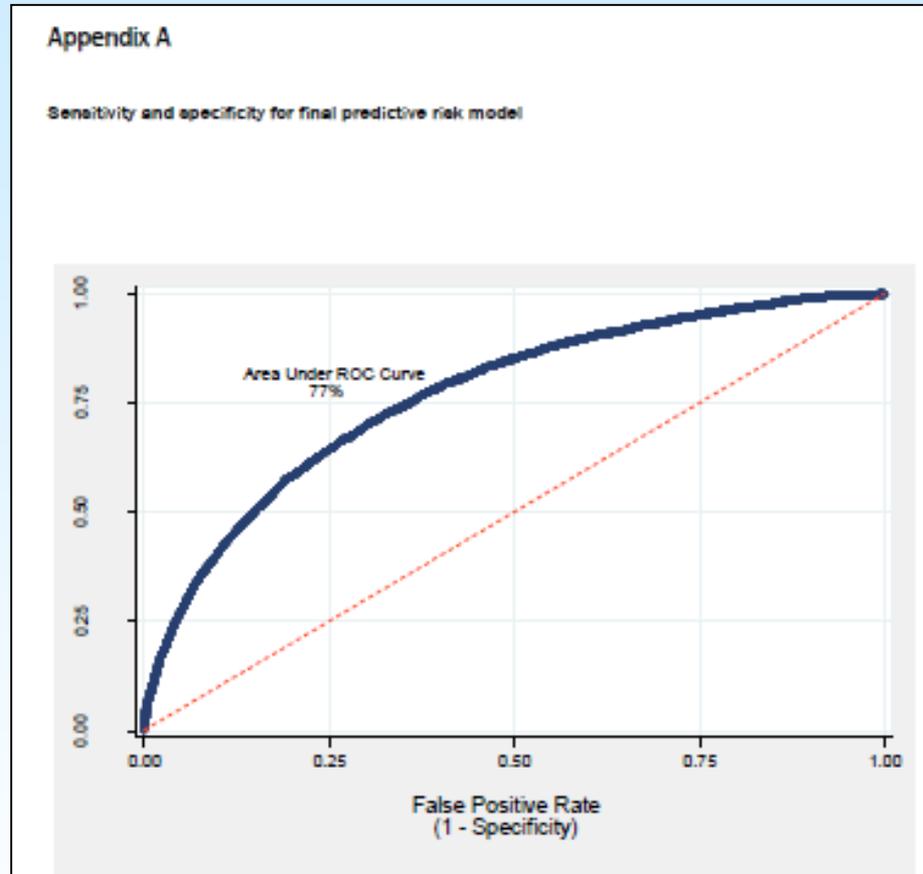
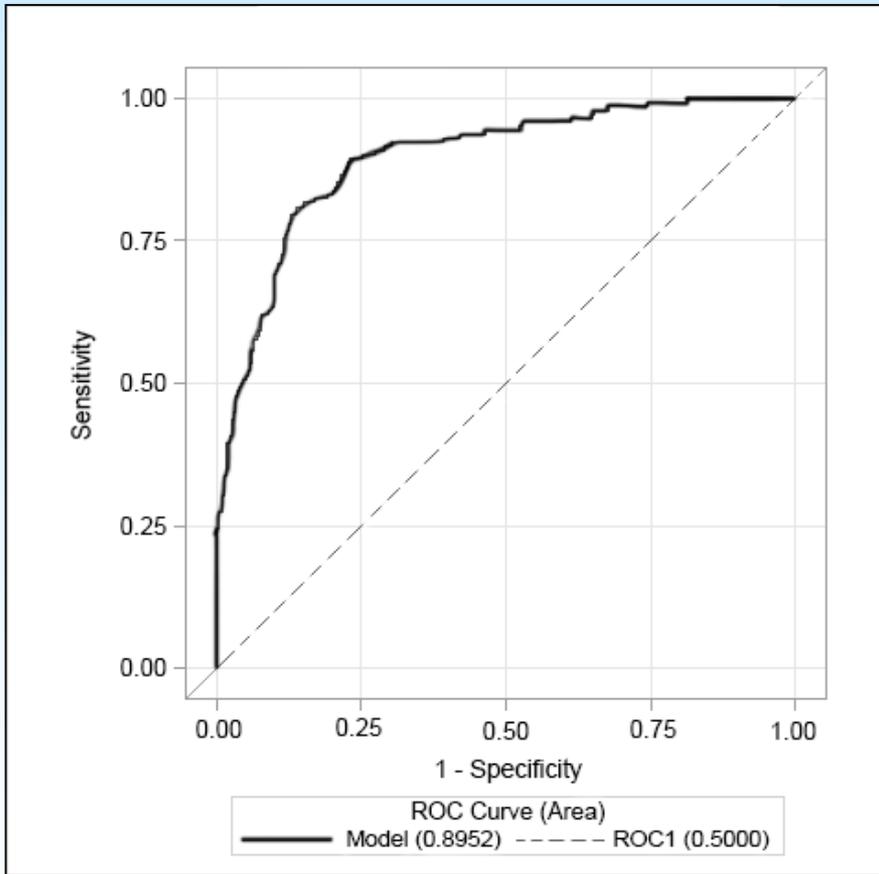


Not...

- Alcohol or drug use
- Medical or psychiatric history
- Smoking
- NZ deprivation index
- Parity
- Antenatal care provider
- Admission to SCBU
- Birth type (singleton or twin)
- Birthweight
- Gender
- Referral for social support or statutory intervention



Model performance



Vaithianathan R, Maloney T, Putnam-Hornstein E, Jiang N. Children in the public benefit system at risk of maltreatment: identification via predictive modeling. *Am J Prev Med.* 2013;45:354-9.





Limitations

- Retrospective study
- Missing data
 - Father and/or mother's partner
 - Education
 - Intimate partner violence
 - Psychosocial factors
- Possibility of residual confounding
 - measured or unmeasured factors
- Cannot be used to predict individual risk







Aims

- To investigate whether there is a relationship between a family being known to Oranga Tamariki or the police at the time of birth and the risk of subsequent abusive head trauma.
- To investigate whether data from child protective services or the police improve an existing risk model derived from perinatal health records



Data collection

- Name and date of birth of the father obtained from the Birth Certificate
- Names and date of birth of father, mother and baby provided to OT
- OT database searched for data concerning the parents, parents' partner(s), siblings and step-siblings (16 variables)
 - Notification, investigation, substantiation, type of abuse, response
 - Youth Justice
- Names and dates of birth provided to the police
- Police database searched for data related to intimate partner violence (IPV) or offences for “other violence”, alcohol or drugs (5 variables)
- Data included a count

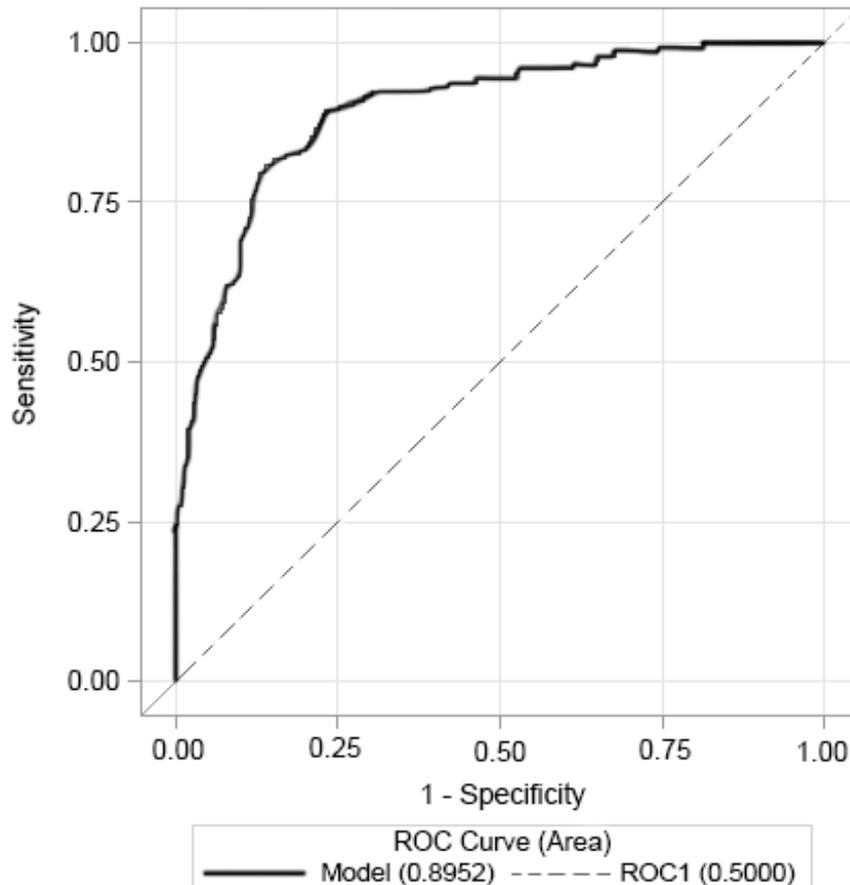


Is there a relationship between these variables and the risk of AHT?

Risk factor	Cases N (%)	Controls N (%)	P value
Mean age of the father	27.3	32.5	<.0001
Father not on the Birth Certificate	26/142 (18%)	52/550 (9%)	0.004
Notification	64/142 (45%)	56/550 (10%)	<.001
Substantiation	53/142 (37%)	36/550 (7%)	<.001
Custody obtained by Oranga Tamariki	24/142 (17%)	16/550 (3%)	<.001
Parent involved in Youth Justice	30/142 (21%)	16/550 (3%)	<.001
Police call-out for IPV	50/142 (35%)	86/550 (12%)	<.001
Partner violence offence	26/142 (18%)	55/550 (10%)	<.001
Other violence offence	33/142 (23%)	55/550 (10%)	<.001
Drug offence	24/142 (17%)	37/550 (7%)	<.001
Alcohol offence	28/142 (20%)	68/550 (12%)	0.03



Receiver Operator Characteristic Curve



Model based on perinatal health records alone

AUC = **89.5%** (95% CI 86.6 - 92.5)

Nagelkerke's pseudo R^2 = 33.1%

Model incorporating notifications to CPS

AUC = **90.9%** (95% CI 88.0 - 93.7)

Nagelkerke's pseudo R^2 = 35.5%



Limitations

- Data from notifications and the police may not be sensitive indicators of risk
 - most child abuse and neglect is not reported
 - most intimate partner violence is not reported
- Association does not mean predictive value
 - Model cannot be used for individual risk prediction



Conclusions

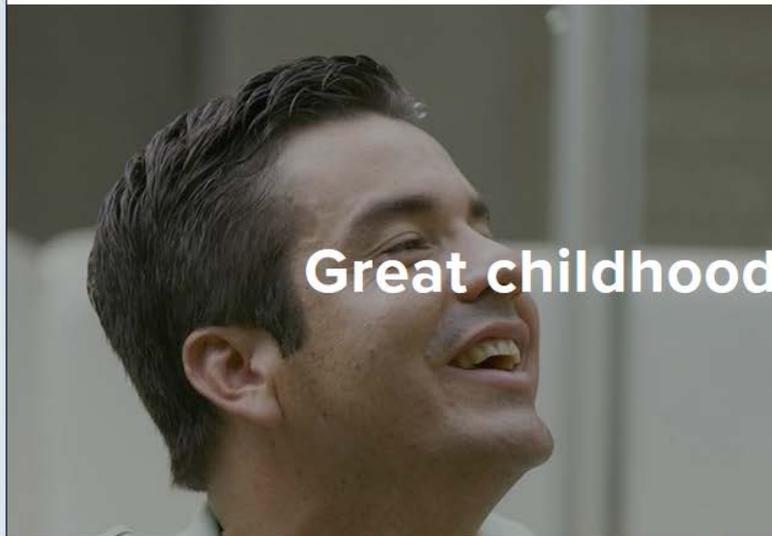
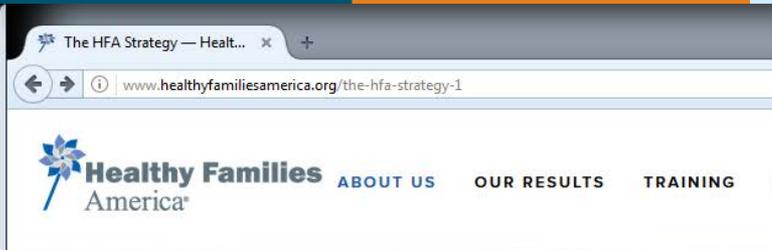
- There is a relationship between data known to statutory authorities at the time of birth, and the risk of subsequent abusive head trauma
- These data do not help to explain risk identified from perinatal records:
 - preterm delivery
 - missing data in particular domains of perinatal records
 - discontinuance of breastfeeding in the first week of life
 - prolonged rupture of membranes
- Accessing these data would be unlikely to assist perinatal healthcare providers in predicting the risk of subsequent AHT
- Information gathered by healthcare providers as part of routine care may be more useful in predicting risk and guiding interventions than information available to the statutory authorities





Home visiting





The Healthy Families America Strategy

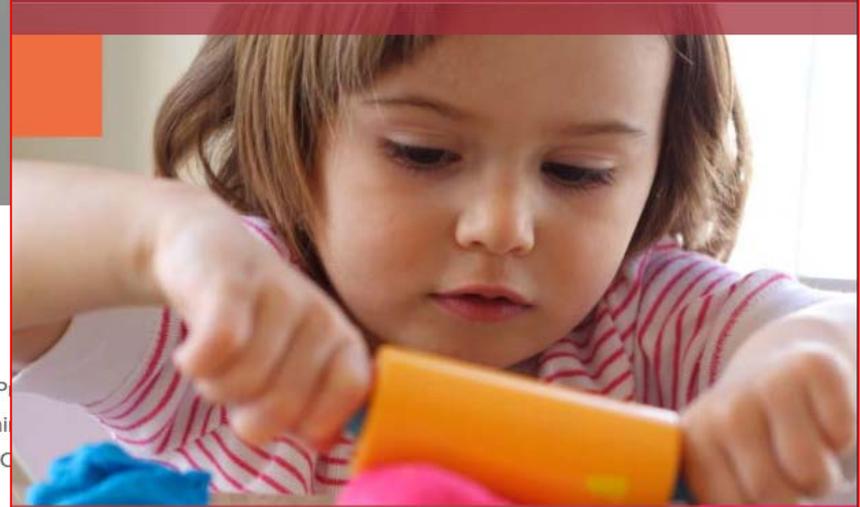
Healthy Families America (HFA) is the signature program of P... Chicago, Illinois, provides support, technical assistance, traini... across 38 states, the District of Columbia, American Samoa, C... Puerto Rico and in Canada.

WHAT



Early Start

Evaluation Report



Nine year follow-up



TABLE 1. Early Identification Screening for Referral to Healthy Start

Medical Record Screen	Family Stress Checklist Interview
<ol style="list-style-type: none"> 1. Unmarried 2. Partner unemployed 3. Inadequate income 4. Unstable housing 5. No phone 6. Education under 12 years 7. Inadequate emergency contacts 8. History of substance abuse 9. Inadequate prenatal care 10. History of abortions 11. History of psychiatric care 12. Abortion unsuccessfully sought or attempted 13. Adoption sought or attempted 14. Marital or family problems 15. History of depression 	<ol style="list-style-type: none"> 1. Childhood history of being abused 2. Substance abuse, mental illness or criminal history 3. Previous or current Child Protective Services involvement 4. Low self-esteem, poor coping ability 5. Multiple life stressors 6. Potential for violent temper outbursts 7. Unrealistic expectations for child's development 8. Harsh punishment of child 9. Perceives child as being difficult or provocative 10. Child unwanted or risk of poor bonding
<p>Item scoring: True, false, unknown Positive screen: True score on either item number 1, 9, or 12 Two or more true scores Seven or more unknowns</p>	<p>Item scoring for each parent: 0 = No problem 5 = Mild problem 10 = Severe problem Positive assessment: A total score of 25 for either parent triggers referral to Healthy Start.</p>

Duggan A et al. Hawaii's healthy start program of home visiting for at-risk families: evaluation of family identification, family engagement, and service delivery. *Pediatrics*. 2000;105(1 Pt 3):250-9.



The Impact of the Family Start Home Visiting Programme on Outcomes for Mothers and Children

A Quasi-Experimental Study

February 2016

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Home visiting since 1907

Paraprofessional programs since 1998

30 of 74 districts

No routine screening

Ad hoc referral



Families experiencing at least one of these high needs criteria:



- young parents (under 18 years of age) who are experiencing an additional challenge or need
 - those with mental health issues
-
- those experiencing difficulties with drugs, alcohol or gambling
 - parents with a childhood history of abuse
 - a care or protection history for other children
 - relationship problems
 - concerning child health and developmental issues.

OR

A referral can also be made, as an exception, when the criteria above are not met. Referrers are asked to explain why an exception should be made by indicating what needs there are based on a combination of the additional indicators as listed below:

Families experiencing more than one of the following indicators:



- a lack of positive support networks
- a lack of financial and material resources
- frequent change of address
- low parental education
- sudden unexplained death in infancy (SUDI) factors
- criminal justice involvement

Maternal age, partner status, unknowns (booking, social history, partner status, substance abuse), preterm delivery, not breast-feeding, inter-pregnancy interval



Where to from here?

- Take responsibility for the issue
- Reframe the question
 - “intentional” and “unintentional” injury
- Collect good data, systematically
 - “unknown” matters
 - we don’t know what doesn’t matter
 - unashamed
 - health providers can’t afford to avoid the difficult conversations
- Analyse and respond to that data



Perinatal healthcare providers are a natural home for prevention

There are already lessons for AHT prevention

- Possible effect of programs which address teen pregnancy, increase the spacing of pregnancies and promote breastfeeding
- The importance of comprehensive data collection
 - Planned or unplanned pregnancy
 - Partner status
 - Substance use, untreated mental health issues
 - Intimate partner violence
 - Other social circumstances
- The criteria used for referral into home visiting programs
- “No child left behind” – prioritising the missing



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