9-2020

Non-Accidental Trauma: Nature of Subsequent Encounters and Related Outcomes

Marina Bassili

LOMA LINDA UNIVERSITY
School of Behavioral Health
in conjunction with the
Department of Psychology

_____

Non-Accidental Trauma: Nature of Subsequent Encounters and Related Outcomes

by

Marina Bassili

_____

A Project submitted in partial satisfaction of
the requirements for the degree
Doctor of Psychology

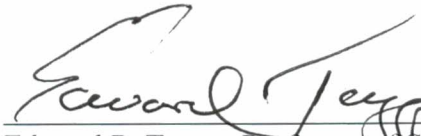
_____

September 2020

Each person whose signature appears below certifies that this project in his/her opinion is adequate, in scope and quality, as a project for the degree Doctor of Psychology.

, Chairperson

Cameron L. Neece, Associate Professor of Psychology



Edward P. Tagge, Professor of Surgery, School of Medicine

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude first and foremost to God for providing me with so many blessings, including the gift and privilege of receiving higher education in a field dedicated to the service of others. It is an honor to be a worker with Him and to use my gifts to continue to serve Him. To Him be all the glory.

I want to thank Dr. Cameron Neece for her guidance and unwavering support, both inside and outside of the lab. Camie, I would not have made it through this journey without you as my chair and advisor. To Dr. Tagge, thank you for your confidence in my vision for this project and your support throughout this process.

To my parents and to the rest of my family, words are not enough to express my gratitude. Your love is beyond measure. Thank you, Mom and Dad, for the sacrifices you made so that Veronica and I could pursue opportunities you did not have access to in this country. I know that I will never be able to repay you, but I hope your pride in my accomplishments confirms the worth of those sacrifices. Veronica, my sister and best friend, you have kept me grounded from day one. Thank you for being there without fail.

Lastly, to my friends and community, I am forever indebted to you. Thank you for believing in me, encouraging me, and for always being a source of comfort in times of struggle or uncertainty. You all mean so much to me and I truly would not be where I am today without each and every one of you.

CONTENT

FIGURES

Figures Page

TABLES

Tables Page

ABBREVIATIONS

ACE	Adverse Childhood Experience
AHT	Abusive Head Trauma
CDC	Centers for Disease Control and Prevention
CT	Computed Tomography (i.e., CT scan)
DSM	Diagnostic and Statistical Manual of Mental Disorders
EEG	Electroencephalogram
EHR	Electronic Health Record
EMR	Electronic Medical Record
ICD	International Statistical Classification of Diseases and Related Health Problems
LLEAP	Loma Linda Electronic Access Program
LLUCH	Loma Linda University Children's Hospital
LLUMC	Loma Linda University Medical Center
MDT	Multidisciplinary Team
MRN	Medical Record Number
NAT	Non-accidental Trauma
PHI	Protected Health Information

ABSTRACT OF THE DOCTORAL PROJECT

Non-Accidental Trauma: Nature of Subsequent Encounters and Related Outcomes

by

Marina Bassili

Doctor of Psychology, Graduate Program in Psychology
Loma Linda University, September 2020
Dr. Cameron Neece, Chairperson

Physical abuse results in a wide array of adverse outcomes, and victims of child abuse often require long-term, intensive care depending on the scope and severity of their trauma. The present study is an extension of a study which examined the services provided in the hospital to children with physical abuse that resulted in hospitalization (Kazandjian, et. al., 2016). It will examine the nature of subsequent hospital encounters in pediatric victims of Non-Accidental Trauma (NAT) at the Loma Linda University Children's Hospital (LLUCH). Researchers will investigate the short-term and long-term physical, neurological, cognitive/developmental, behavioral, and social emotional effects experienced by pediatric NAT victims. Researchers will examine a random subset (n = 38) of the original 151 cases from the LLUCH trauma registry using an in-depth chart review of medical records to determine: the duration between initial discharge and first return to the hospital; the frequency with which children are returning to the hospital; and the nature of subsequent encounters, as well as the problems for which they are seeking care. Results will help identify more specific effects of severe child physical abuse following hospitalization compared to those currently outlined in the literature, and aid researchers in recognizing the health-related needs of these children with regard to their long-term trajectory. It is anticipated that the vast majority of survivors require long-term

routine care, rather than short-term care, and that most children will present with an array of physical, psychological, neurological, cognitive/developmental, and behavioral or socio-emotional needs requiring intensive treatment post-discharge.

CHAPTER ONE

INTRODUCTION

Non-accidental trauma (NAT) is a significant cause of morbidity and mortality in children in our society. NAT is the medical term for suspected or confirmed physical abuse. It is characterized by the presence of at least one ICD-10 injury or poisoning code, based on physician examination, and is typically detected upon hospital admission.

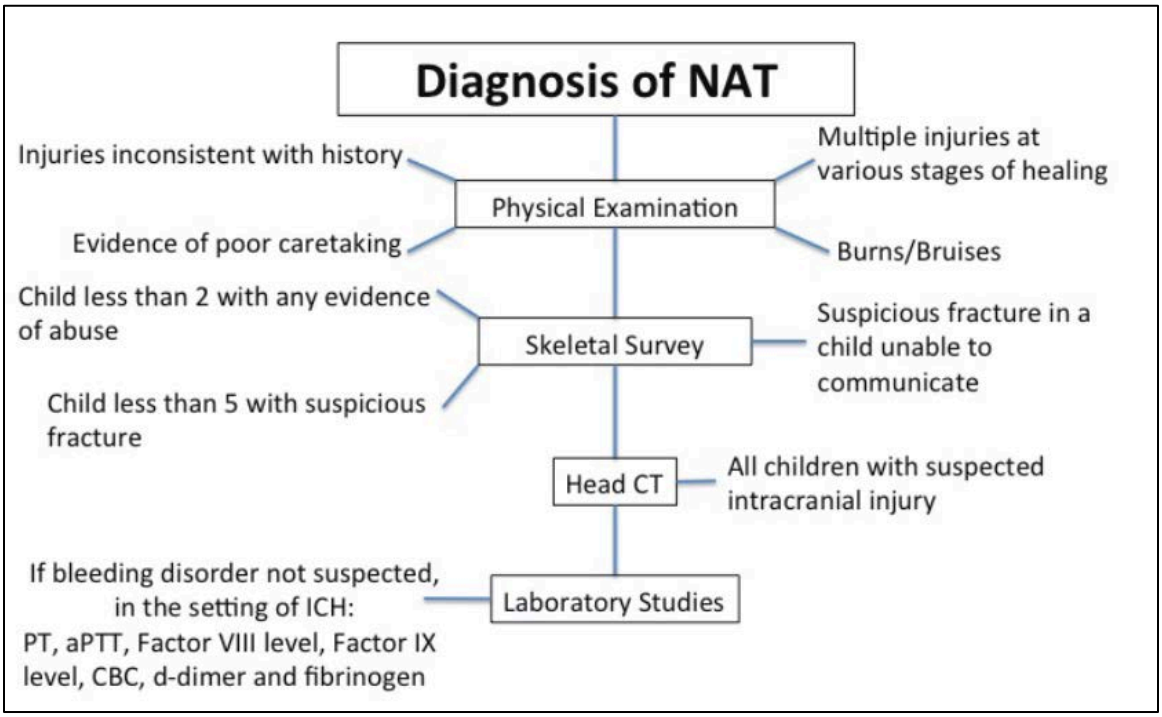


Figure 1. Workup for NAT from *Translational Pediatrics*, Vol. 3.

The most common physical indicators of abuse are bruising, burns, and skeletal fractures. Oftentimes however, abuse is not readily or visibly apparent. This is because

most cases of NAT fall under the category of abusive head trauma (AHT), which is generally marked by internal brain hemorrhaging, contusions, and sub-cortical damage. High cervical spine injury and unexplained seizures are also significant indicators of AHT (Choudhary, Ishak, Zacharia, & Dias, 2014; Joyce & Huecker, 2019).

Major concerns associated with child abuse are children's recovery and both the short- and long-term effects associated with abuse, including but not limited to psychological and physiological consequences. Children who survive abuse often face lifelong impairments across several domains of functioning, not simply limited to physiological functioning, but social, cognitive, academic, and emotional functioning as well. While NAT-related injuries can lead to various physical and developmental outcomes, the most common and most detrimental consequences are often associated with brain damage secondary to AHT. In cases of AHT, victims are often left with permanent disabilities, neurodevelopmental delays, cognitive deficits, paralysis, seizures or epilepsy, ocular damage (often resulting in cortical blindness), hearing loss, and in some cases, cerebral palsy (Paul & Adamo, 2014; Keenan, 2006).

Given that thousands of children are identified as victims of NAT in hospitals each year, and sadly, many of these are recurrent patients (MacMillan, et. al., 2005), prevention is an obvious goal and early intervention is crucial for at-risk families. In addition, the severity of both short- and long-term consequences and the high incidence of NAT point to the dire need for effective early intervention (both medical and otherwise), to first and foremost prevent death in children who have already been victimized, to help them achieve optimal recoveries, and to lessen risk for recurrence. One recognized avenue in protecting children from sustaining NAT is to establish

methods for early detection and preventative programs for at-risk families. Early interventions such as early childhood home visitation programs for at-risk families, parenting skill and family relationship building approaches that teach behavior management and positive parenting skills to parents, have a strong evidence-base for lessening risk for abuse (Fortson, Klevens, Merrick, Gilbert, & Alexander, 2016). Another avenue for protection is focusing on care after a child has sustained injury or physical abuse in order to lessen harm and prevent further future risk. Intervening with families in which abuse has already occurred has especially important implications for preventing death in this population, given that recurrence is associated with higher mortality rates as compared to "single episode" abuse (Paul & Adamo, 2014; Deans, et. al., 2013). Therapeutic services for both parents and children, and enhanced identification of risk factors to prevent subsequent abuse are examples of such interventions.

A study by Kazandjian and colleagues (2016) at Loma Linda University examined the implementation of psychosocial interventions in cases of children diagnosed with NAT at LLUCH. Researchers found that, while the vast majority of children received referrals to Child Protective Services (92% of sample) and 86% received an in-hospital social work referral, only 52.6% of referred children were actually seen by a social worker. Moreover, only 4.4% of children received Pediatric Psychology consultations over the course of their hospital stay, and only 1.8% were referred to an outpatient psychological service at discharge. What may be alarming about these statistics is that referral rates for outpatient psychological services at discharge were so low; given that most interventions for children who have encountered abuse include long-term programs with parents, lack of intervention post-discharge may lead to unnecessary

adverse impact which could be ameliorated with appropriate care.

The current study focuses on the current state of follow-up care for NAT patients at LLUCH. There is a scarcity of research following children who have been victims of NAT, especially regarding holistic care following discharge from the hospital. By determining the proportion of children who are re-admitted into the hospital or require certain specific care following their discharge, researchers may be able to provide information to inform early interventions at discharge or immediately following discharge, in order to help prevent future returns and ensure the best outcomes for children who have been victimized.

CHAPTER TWO

LITERATURE REVIEW

Child Abuse and Maltreatment

Child abuse and maltreatment are significant, persistent issues in our society that lead to detrimental outcomes for victimized children, the most serious and tragic of which is fatality. Child maltreatment is an umbrella term used in the literature and colloquially to refer to any kind of child abuse or neglect. The four forms of abuse most commonly discussed in the literature are physical, sexual, emotional, and psychological abuse. While there is some disagreement with regards to what constitutes child abuse in both research and in legislature, The Child Abuse Prevention and Treatment Act (CAPTA), (42 U.S.C. §5101), retained the following as a comprehensive definition of child abuse and neglect:

> Any recent act or failure to act on the part of a parent or caretaker which results in death, serious physical or emotional harm, sexual abuse or exploitation; or an act or failure to act, which presents an imminent risk of serious harm.

Recent estimates indicate that the number of children in the United States who are possible victims of abuse or neglect is approximately 3.9 million children; of these, approximately 679,000 of these cases were substantiated (Jaffee, 2013). Children who experience abuse are left to face physical and psychological consequences of varying degrees in the aftermath of their recovery, depending on the type, degree, and severity of the abuse.

Physical Abuse and Non-Accidental Trauma

Child physical abuse is one of the leading causes of injury and death in children across the nation (Deans, Thackeray, Groner, Cooper, & Minneci, 2014; Paul & Adamo, 2014). Physical abuse has historically resulted in death in at least 22% of child patients identified as victims of physical abuse alone, while mortality rates increase to as high as 45% when physical abuse co-occurs with other forms of abuse, such as neglect (US Department of Health and Human Services Child Maltreatment Report, 2010).

Non-accidental Trauma (NAT) is the synonymous, medical term for physical abuse. NAT is identified based on physician's examination and is characterized by the presence of at least one ICD-10 code indicating injury or poisoning and "certain other consequences of external causes" (World Health Organization, 2015). As previously stated, many NAT cases each year lead to death. Most of these deaths are results of AHT, most commonly recognized as "Shaken Baby Syndrome." In fact, AHT is so saliently represented in the NAT population that the term "NAT" has traditionally been used synonymously with "Shaken Baby Syndrome" in the literature. According to the Centers for Disease Control and Prevention (CDC) of the United States, AHT is defined as an injury to the skull or intracranial contents of a baby or child younger than 5 years due to intentional abrupt impact and/or violent shaking. Of note, an important distinction between AHT and Shaken Baby Syndrome is that, classification as Shaken Baby Syndrome mandates the presence of a co-occurring triad of subdural hematoma, retinal hemorrhage, and encephalopathy; AHT does not. Currently, the term NAT more broadly encompasses all suspected or confirmed intentional injury or physical trauma, in addition to conventional cases of AHT.

Compared to children who experience accidental injury or trauma, children who are victims of non-accidental trauma have worse outcomes on multiple measures of functioning, are greater consumers of ancillary medical resources, and experience delays in recovery overall compared to their counterparts (CDC, 2008; Paul & Adamo, 2014).

Psychological and Physiological Outcomes of Abuse

As previously indicated, research on injury type and severity has shown that, of all injuries accounted for in NAT cases, head injuries are the most common (Roaten, et. al., 2005). These include skull fractures and other specified traumatic brain injuries, or TBIs. Most victims are children between 0 and 3 years old (Paul & Adamo, 2014). Additionally, AHT accounts for at least one third of all child maltreatment deaths (Paluski & Covington, 2014), with estimates in some years rising to 80% of deaths (Paul & Adamo, 2014).

Injuries include subdural hematomas, subarachnoid hemorrhaging, cerebral edema, cortical contusions, lacerations, diffuse axonal injury/shearing injuries, and hypoxic ischemic encephalopathy (Carty & Pierce, 2002; Sato, Chang, Igarashi, & Noble, 2001). Documented cases of children who sustain brain injury, as evidenced by CT scans, show that these children have worse outcomes than those who only present with skull fractures and who have no evidence of brain injury. In cases that do not result in mortality, AHT is often associated with permanent disability, including mild to severe neurodevelopmental delays, seizures or epilepsy, ocular damage (often resulting in cortical blindness), and in some cases, cerebral palsy (Paul & Adamo, 2014). A large portion of children who are NAT victims sustain these kinds of permanent cognitive

deficits, especially those who experience abusive head trauma; in all, only a minority of NAT victims make a full physical recovery and continue on a trajectory of normal development, with estimates approximating only 15-30% of these children (Paul & Adamo, 2014).

Furthermore, child abuse often results in a wide array of other physical health problems. Physical abuse can lead to significant adverse health outcomes ranging from permanent disability to vision or hearing loss to endocrinologic complications which can result in diabetes (Scavarda, et. al, 2010; Paul & Adamo, 2014); these conditions often require management over the life course. There is research that indicating that harsh corporal punishment, a form of physical abuse, has been linked to arteriosclerosis, hypertension, hepatic disease, arthritis, and obesity and that the probability of developing these problems were higher for those exposed to harsh physical punishment than others who were not (Afifi, 2013). Children exposed to chronic and prolonged maltreatment also show differences in gray matter in the brain, specifically in the orbitofrontal and temporal regions (De Brito, S. A., Viding, E., et al., 2013). Such structural differences are associated with cognitive dysfunction and are often inculpated in the development of various forms of psychopathology over the lifespan, especially major depressive disorder (Vasic, Walter, Hose, & Wolf, 2008; Mak, Wong, Han, & Lee, 2013).

Experiencing abuse can lead to dysregulated emotional and behavioral systems in children, which has negative implications for functioning in a number of areas. Many children who experience physical abuse and other forms of abuse develop poorer self-esteem; engage in risky behaviors; have increased risk for death by suicide; develop substance abuse disorders; and exhibit attachment and relational issues (Felitti, et. al.,

1998; Mullen, Martin, Anderson, Romans, & Herbison, 1996; Litrownik, et. al., 2005; Pears, Kim, & Fisher, 2008; Zeanah, et. al., 2004; Silverman, Reinherz, & Giaconia, 1996).

Many studies have examined the effects of maltreatment and abuse on development and psychological health. Of particular note are the results of the Adverse Childhood Experiences study conducted by the CDC in collaboration with Kaiser Permanente. Results of this landmark study indicated that stressors, namely adverse childhood experiences (ACEs, for short), like physical or sexual abuse, place individuals at elevated risk for developing adverse health outcomes in adulthood. The study also suggests a dose-response relationship when these adverse childhood experiences are compounded; the more adverse experiences a child is exposed to, as is often the case in children who experience abuse (experiencing chronic abuse or multiple forms of abuse concurrently), the worse the trajectory over the life-span with regard to health outcomes. Relationships found between the experience of an ACE, especially child maltreatment, include 2-5x increased likelihood of reporting suicide attempts as adults, risky sexual behavior starting in adolescence, risk for alcoholism/drug use/addiction, future family dysfunction, depression, and anxiety. Among other negative outcomes, individuals are also at risk of experiencing additional ACEs, have an overall increased likelihood of developing one or more psychiatric disorders (Felitti, et. al., 1998; CDC, 2008; Silverman, et. al., 1996). Another study conducted in a community sample of women corroborates these results, indicating that a history of abuse, physical or otherwise, increases risk for development of psychopathology, sexual difficulties, poorer self-esteem, and relational problems (Mullen, et. al., 1996).

As outlined above, child maltreatment and abuse can result in negative health outcomes for children who are victimized especially with regard to psychological functioning. These children often have difficulty behaviorally emotionally and regulating themselves, and, as such, go on to develop both externalizing problems (i.e., aggression or disruptive disorders) and internalizing problems (i.e., depressive or anxious disorders) (Litrownik, et. al., 2005; Pears, et. al., 2008; Zeanah, et. al., 2004). Exposure to abuse has been found to be particularly harmful when perpetrated by a caregiver, which is oftentimes the case in NAT. Furthermore, repeated exposure inflicted by a caregiver adversely impacts children's ability to recognize cues to danger, which can put them at risk for other potential exposures to harm.

When physical traumatic injury occurs, whether intentional or accidental, it also results in an elevated risk for the development of psychiatric disorders. One study examining the association between traumatic injury and psychiatric disorder indicated that children (ages 10-19 in this particular study) were more likely to receive a psychiatric diagnosis, ranging from anxiety, post-traumatic stress disorder, or acute stress disorder, to depressive or substance use disorders after a single episode of traumatic injury (Zatzick & Grossman, 2011; De-Vries, et. al., 1999; Aaron, Zaglul, & Emery, 1999; Zatzick, et. al., 2006; Kassam-Adams & Winston, 2004; Daviss, et. al., 2000; Shemesh, et. al., 2003; Langeland & Olff, 2008; Max, et al., 1998). They were also more likely to exhibit behavioral problems in general. Similar to the dose-response relationship described about, researchers also found that risk for the development of psychiatric disorder increased with increased frequency of sustaining injury (Zatzick & Grossman, 2011).

Economic Impact Associated with NAT

Another area of significant concern is the economic burden that NAT has on society, from the immediate needs of victimized children (hospitalization, mental health care, child welfare systems, and law enforcement) to the longer-term, less direct costs of services secondary to NAT (special education, juvenile delinquency, mental health and health care, adult criminal justice system, and lost productivity to society). The annual societal cost of child abuse and neglect is estimated conservatively to be over $103 billion (Sola, Valerie, Waddell, St. Peter, Aguayo, & Juang, 2018). Research aimed at estimating overall cost over a lifetime indicates for a single surviving AHT victim in the United States, the average expenditure in 2010 was $2.6 million, including $224,500 for medical care and related direct costs; for a child who died, the average was $5.7 million. Collectively, all incidences in 2010 (4,824 cases of AHT) amounted to an estimated lifetime cost of $13.5 billion, including $257 million for medical care, $552 million for special education, $322 million for child protective services/criminal justice, $2.0 billion for lost work, and $10.3 billion for lost quality of life (Miller, et. al., 2017); government sources alone were estimated to pay about $1.3 billion.

CHAPTER THREE

CURRENT STUDY

The purpose of this study was to determine the nature of consequent encounters of children admitted for NAT in the Loma Linda Health System. Nature of encounters following initial discharge date will be used to determine risk and prognoses associated with NAT by identifying which services were utilized most following discharge as well as the types of issues addressed in subsequent hospital encounters. Problems associated with NAT were grouped into the following categories based on the nature of the issues addressed in a hospital visit: psychological, behavioral, social/emotional, or other mental health related; cognitive or developmental; neurological; other physical problems. The goal was to first determine the proportion of children with NAT who returned to the hospital following discharge; how soon following discharge they returned; the reasons for their returns; and lastly, adverse health outcomes that are associated with NAT in both the short- and long-term trajectory.

Specific Aims

Aim 1. Determine proportion of cases from study sample with subsequent encounters, both routine follow-ups versus unexpected encounters, and time frame within which patients return to hospital after discharge (based on dates obtained from Trauma Registry).

Hypothesis 1. Victims of NAT would be found to have a significant pattern of re-admittance to the hospital for repeat NAT following initial discharge within a time frame of 3 years, based on estimates in the literature of suspected recurrent NAT events

between and 3% of 39% (with some estimates up to 50%) of NAT cases, with most happening between 1 and 2 years after first occurrence.

Aim 2. Document frequency with which patients return to the hospital to receive care.

Hypothesis 2. This aim was exploratory; therefore, no hypothesis was provided.

Aim 3. Determine the nature of subsequent encounters, or reason for visits by examining presenting issues, and whether or not encounters are related to initial NAT admission or not.

Hypothesis 3. This aim was exploratory; therefore, no hypothesis was provided.

Methods

Participants

Participants (n = 38) in this study are pediatric patients with a prior admission to LLUCH, who received at least one NAT injury or poisoning code (ICD-9-CM: 800-959.9) during their hospital admission from 1995-2012. Their charts were taken from a sample of 151 archival charts from the LLUCH Trauma Registry Database that were part used in the initial study described above (Kazandjian, et. al., 2016). In the original sample, patients ranged in age from 0-14 years, with 66.2% under 1 year old, 17.2% aged 1 year old, 11.9% aged 2 years old, 0.7% aged 3 years old, 1.3% aged 4 years old, 1.3% aged 5 years old, and 0.7% aged 9 years old. The ethnic spread within the original sample is as follows: Latino/a, 46.4%; Caucasian, 34.4%; African American, 16.6%; American Indian, 2.0%; Asian 0.7%. Approximately half of the patients were female, and half were

male (51% and 49%, respectively).

Table 1 depicts the demographic characteristics of the current sample. Of the 38 patients selected, 71.1% were less than 1 year old. The highest age within sample was 4 years old. Many were 1 month old or younger (18.42%). The mean age was 10.97 months. Females accounted for 60.53% of the patient sample while males accounted for 39.47%. Dispersion of race/ethnicity was as follows: White/Caucasian: 31.58% (n = 12); Hispanic/Latino: 34.21% (n = 13); Black/African American: 18.42% (n = 7); Native American: 2.63% (n = 1); Asian/Pacific Islander: 2.63% (n = 1); Other/Unknown/multi-racial: 10.53% (n = 4).

Table 1. Sample demographics

Variable	N (Percent)
Gender	
Male	15 (39.47%)
Female	23 (60.53%)
Age	
0-1 years	27 (71.05%)
1-2 years	4 (10.53%)
2-3 years	5 (13.16%)
3-4 years	2 (5.26%)
Ethnicity	
White/Caucasian	12 (31.58%)
Hispanic/Latino	7 (34.21%)
Black/African American	13 (18.42%)
Native American	1 (2.63%)
Asian/Pacific Islander	1 (2.63%)
Other/Unknown	4 (10.53%)

Measures and Procedures

The Trauma Registry Service utilized by the LLUCH follows all pediatric trauma cases that are admitted into the hospital. Trauma Registry staff review all admissions (including transferred cases) in order to determine whether patients meet registry database inclusion criteria, specifically, a traumatic injury diagnosis (ICD-9-CM: 800-959.9) When a case has met inclusion criteria, staff completes a chart review of the patients file upon discharge, and patient data is saved to the database. The Trauma Registry Service is an American College of Surgeons-verified trauma program; therefore, patient information is also submitted to the National Trauma Data Bank®, a data bank managed by the American College of Surgeons.

The sample from which we analyzed data was collected from a random sample of 25% (n = 38) of the original 151 archival charts from the LLUCH Trauma Registry Database that were selected from the previous study. For the purposes of the current study, researchers reviewed the electronic health records (EHRs) of the randomly selected subset of patient charts from the original 151 reviewed in the previous study, specifically, notes documenting encounters or medical visits which occurred within 5 years following initial NAT admission. Patient records were accessible via LLEAP (Loma Linda Electronic Access Program), Loma Linda's electronic medical record system.

Each case was examined and information contained in the EHR was documented in two chart review forms (see Appendix 2 for example) in order to determine the nature of encounters following initial discharge, as well as the range of problems patients presented with. The first chart review form (Appendix A) included a de-identified case

ID; demographics at admission; primary injuries; subsequent encounters post- discharge (#); whether or not visit is related to initial NAT (on a scale of 1-4, where 1 = No, 2 = Possibly, 3 = Probably, 4 = Yes); time elapsed since discharge; and nature of subsequent encounters (NAT episode, routine care, follow-up, consultation, etc.). The second chart review form (Appendix B) included concerns reported in the EHR, including physical, neurological, cognitive/ developmental, psychiatric (DSM diagnoses, self-harm, risky behavior, etc.), behavioral, and other social/emotional concerns. A new data set, which included the above information, was then created in Microsoft Excel using data from the tracking forms. Statistical frequencies for the following variables were obtained: duration between initial discharge and first return to the hospital; proportion of children who seek continued medical care; proportion of cases with recurrent NAT; frequency with which children are returning to the hospital; the nature and range of subsequent encounters; and frequencies associated with specific presenting problems.

Data Analysis

Descriptive data analyses were run once information from chart review was entered into the Excel database by category. Researchers utilized univariate analyses to examine the distributions, central tendency, and dispersions of the variables being examined, namely time frame within which patients return to hospital since discharge, whether encounters were related to initial NAT (i.e., related, possibly related, or not related), and nature of presenting problems of other issues encountered.

CHAPTER FOUR

RESULTS

Sample Characteristics

Demographics

For this study, a random sample of 38 participants, or 25% of the original 151 archival charts from the LLUCH Trauma Registry Database (Kazandjian, et. al., 2016), were selected.

Injuries Documented at Time of Initial NAT Admission

Consistent with the literature on NAT, most injuries accounted for in this sample were AHT-type injuries. Injuries classified within this category included traumatic brain injuries of the following natures: subdural/subarachnoid hemorrhage; subdural/subarachnoid hematoma; diffuse axonal injury or shearing injury; and/or retinal hemorrhaging. Of the 38 patients in this sample, 30 children sustained these types of injuries (78.9%). Skeletal injuries were found in almost half of the children in the sample (n=18; 47.4%), making these injuries the second most common. Half of the children had documented bruising to their bodies (n=19), and 26.3% (n=10) had abrasions or lacerations to their bodies as well. Three children were documented as having burn marks on their bodies (7.9%); 1 child was admitted with bite marks (2.6%). Many also had trauma specifically to the face. Injuries classified as facial trauma included bruising or other injury to the face (i.e., black eyes or abrasions), as well as oral injuries; 12 children

(31.6%) sustained these types of injuries. Injuries classified as organ injury or abdominal trauma included but were not limited to blunt trauma to the abdomen, internal lacerations (i.e., to the liver), etc.; 9 children (23.7%) sustained these types of injuries. Injuries classified as pelvic area trauma included any injuries to the genital area or buttocks; 2 children presented with these kinds of injuries (5.3%). Other injuries were documented in another 15.8% of the cases. Several children had infections or viruses of some nature (15.8%). Lastly, some children were dehydrated or malnourished upon admission, or were diagnosed with failure to thrive (7.9%).

Of note, the vast majority of children had multiple kinds of injuries, with many sustaining both head trauma and other injuries (92.1%). Furthermore, of those with any type of fracture (i.e., cranial and/or skeletal; n=25), 15 children had 2 or more fractures.

It is important to note that 4 of the 38 children who were randomly selected for this study passed away during their admission.

Follow-Up and Outcomes Post- Discharge

Overview

Of the initial sample (n = 38), 4 children were deceased; 3 died during their hospital and one died 3 months after discharge. Of the 34 remaining cases, information regarding care following discharge from LLUCH was available for 82.35% (28 children); the remaining children (17.65%; n = 6) had no notes in their EHRs post-discharge and no additional information available in their charts. Therefore, it is unclear whether they were followed elsewhere, if they received no follow up care at all, or if there were no sequelae

directly related to their NAT. Of those who did return for care, 92.86% received follow-up care for a concern related to their NAT (n = 26).

Encounters Post-Discharge by Service or Department

Most children within the sample were seen by a provider within one month after discharge following admission at LLUCH for NAT (78.86%); 17.86% were seen within six months. One child (3.67%) was seen at a time that could not be determined from the EHR. Encounters were rated as being "Related to Initial NAT;" "Likely Related to Initial NAT;" "Likely Unrelated to Initial NAT;" and "Unrelated to Initial NAT" based on problems reported. Subsequent encounters that were determined to be unrelated or likely to be unrelated to the initial NAT admission were reviewed but were not included in the results below; however, all Emergency Department and Urgent Care visits were included as it was difficult to clearly delineate whether or not Emergency Department or Urgent Care visits may have been related, either proximally or distally, to these children's experience of NAT, and whether their abuse made them more likely to require emergent care at any point after their discharge.

Types of service or department documented in patients' notes in the EHR were grouped together based on similarity. See Table 2 below for category breakdown.

While most children were seen by multiple departments and specialties over the span of five years following initial discharge from the hospital, many children were only seen a few times following discharge while others were seen much more frequently for follow up or other care. For example, those who required rehabilitation services were

Table 2. Department/Service Categories of Encounters Post-Discharge.

Department/Specialty Category
Pediatrics or Primary Care
Loma Linda University Children's Hospital (general)
Loma Linda University Children's Hospital Outpatient Clinic
Loma Linda University Medical Center (general)
Internal Medicine
Pediatrics
Pediatrics Teaching Clinic
LLUCH Child Protection Center
Other Primary Care Physician
Radiology
Loma Linda University Medical Center Radiology Medical Group
Loma Linda University Medical Center Diagnostic Radiology
Radiology (general)
Neurology & Neurosurgery
Neurology (general)
Pediatric Neurology
Neurosurgery
Neurodiagnostic Lab
Ophthalmology & Optometry
Ophthalmology (general)
Family Medical Offices Ophthalmology
Outpatient Optometry
Orthopedics & Orthopedic Surgery
Orthopedic Surgery
Orthopedics
Urgent Care or Emergency Department
Urgent Care
Emergency Department
Emergency Room
Rehabilitation
Physical Medicine & Rehabilitation
Inpatient or outpatient occupational therapy

Table 2. (continued)

Inpatient or outpatient physical therapy
Inpatient or outpatient speech therapy
Rehabilitation evaluations or assessments
Other rehabilitation services*
Center for Pain Management
Center for Pain Management
Children's Assessment Center (CAC)
Children's Assessment Center
Dentistry or Orthodontics
Dentistry
Dental Surgery
Orthodontics
Social Work
Social Work
Endocrinology
Endocrinology
Regional Center
Inland Regional Center
Sleep Disorders Center
Sleep Disorders Center
Psychology or Neuropsychology
Psychology
Neuropsychology
Spiritual Care
Chaplain Services
Other
"Nurse visit," "Therapeutic Home/Community Visit," etc.
Unknown/Unspecified
Visits not clearly documented as belonging to any service, department, or group

*Included Botox injections for muscle tone, as well as casting to help with spasticity.

being seen up to multiple times per week, as opposed to children who were only seen once or twice following discharge for routine follow up. Consequent encounters were arranged first based on the proportion of individual patients in the sample (of the 28 for which information was available) who were seen by a particular service or department at any point following discharge (percent of cases). Additionally, the proportion of all visits that a particular service or department accounted for out of all subsequent encounters between all patients (percent total utilization) was calculated in order to provide more representative and comprehensive dispersion of overall service utilization. Encounters were also presented these ways in order to provide information regarding which services appeared to be more critical to care based on severity of injuries, and which were more ancillary. Results of this dispersion are summarized below in Table 3.

Table 3. Descriptive Statistics of Services Utilized in Subsequent Encounters.

Department/Service	% Cases (N)	% Total Encounters
Pediatrics or Primary Care	64.29% (18)	9.38%
Radiology	64.29% (18)	6.59%
Unknown/Unspecified	50% (14)	13.55%
Neurology & Neurosurgery	42.86% (12)	17.58%
Ophthalmology & Optometry	21.43% (6)	9.16%
Orthopedics & Orthopedic Surgery	21.43% (6)	6.23%
Urgent Care or Emergency Department	17.86% (5)	4.40%
Rehabilitation	14.29% (4)	19.05%
Center for Pain Management	10.71% (3)	4.40%
Children's Assessment Center (CAC)	10.71% (3)	1.10%
Dentistry or Orthodontics	7.14% (2)	0.73%
Social Work	7.14% (2)	0.73%
Other	7.14% (2)	0.73%
Endocrinology	3.57% (1)	1.10%
Regional Center	3.57% (1)	0.73%
Sleep Disorders Center	3.57% (1)	0.37%
Psychology or Neuropsychology	3.57% (1)	0.37%
Spiritual Care (Chaplain Services)	3.57% (1)	0.37%

Results demonstrated that, following discharge from the LLUCH, most children were seen at one point or another by Pediatrics or Primary Care and/or Radiology, but the service with the most utilization (that which accounted for the majority of all visits total, between all cases), were Rehabilitation services, despite these services only being provided to four patients of the 28. Many children also required care from Ophthalmology or Optometry to treat retinal injuries and brain injuries affecting vision, though these services were utilized less than Pediatrics/Primary Care, Radiology, and

Neurology services. Given that almost half of the children in the sample presented with skeletal injuries, many also required care from Orthopedics and Orthopedic surgery. Of note, Orthopedic services were provided to as many children as Ophthalmology or Optometry services. Endocrinology services were required for just one child in the sample. It was equally rare for a child to require dental care, likely due to the age range of the sample. Several children required Urgent Care or Emergency Department visits at some point following discharge, however.

Notably, only 3 patients had any documentation of being seen at the Children's Assessment Center for evaluation. Only one child was seen at a Regional Center, despite the frequency with which children were left with developmental delays and disabilities. Furthermore, with regard to mental health services or developmental services, only a few children received services; two were seen by Social Work, and only one child was seen by Psychology or Neuropsychology. It was also rare for a child to be seen at the Center for Pain Management or the Sleep Disorders Center.

"Other services," those which did not fall into one of the above categories, were rarely provided (i.e., only two children received additional services, such as a "Therapeutic Home/Community Visit). Lastly, for a very large proportion of notes, the providing service was unable to be identified. Half of the patients' charts had at least one visit where the providing service was unidentifiable due to not being clearly denoted in the EHR under a particular department or service or possibly due to poor documentation.

Qualitative Summary of Problems Associated with NAT in First Five Years Post-discharge

For the most part, types of services provided and the extent of their utilization was clearly identifiable. However, researchers frequently encountered cases in which the initial injuries associated with the NAT were described, but resulting sequelae were not thoroughly documented in subsequent notes. Those cases for which some problems associated with their NAT were described in the EHR, the reason for the visit was oftentimes simply documented as "follow up." For these cases, additional problems may have been present, but because they were not the specified reason for the visit, they were not documented at all.

Furthermore, it was often quite difficult to ascertain the actual problems for which patients were seeking care from what was documented in the EHR, let alone additional problems they may have been presenting with which were not the *identified* presenting problem for a particular visit. Oftentimes, additional problems (such as "school problems" or aggression) were only arbitrarily mentioned in notes as asides. For several children, no difficulties were described at all despite these children's experience of abuse and the severity of their injuries.

This posed an obstacle for researchers, as it became almost impossible to accurately identify the short- and long-term consequences of NAT besides physical problems for which they were seeking follow-up medical care, let alone to comprehensively speak to the range of these children's problems and how they might be addressed with additional services. While some cases did have more detailed notes regarding problems that resulted from the NAT, these were very few cases and were not

comprehensive or representative of the whole sample. As such, in order to provide some insight into the problems patients may have been experiencing, the few cases that included additional documentation of problems are described qualitatively below.

Given that the most common injuries within this sample were AHT injuries (78.9% of the sample), related neurological and cognitive problems are described first, though physical injuries were typically documented in more detail. Overall, the most common challenges faced were developmental delays, especially motor delays (both fine and gross motor delays). Visual problems were also very common, given the frequency with which victims of NAT in this sample presented with retinal hemorrhaging or hematoma, hemorrhaging in the brain, and/or brain damage on a broader spectrum.

Aside from developmental delays (motor; speech and language), many children developed seizure disorders, some of which resolved with time but many of which did not. Additional problems described included the development of cerebral palsy (n=2); extensive encephalomalacia; probable macrocephaly; neuronal loss or dysfunction; cerebral volume loss; cerebral atrophy; axonal injury; learning disabilities; persistent vegetative state (one case); and brain death. Abnormal EEGs were also documented in multiple cases.

Many children also went on to develop quadriplegia, hemiplegia or hemiparesis, and/or generalized weakness or muscle tone issues which led to loss of or limited mobility, abnormality of gait, muscle contractures, abnormal reflexes, spasticity and decreased muscle tone, resulting in the long-term need for physical therapy and occupational therapy for many children. Visual problems included but were not limited to complete loss of vision (cortical blindness), esotropia, hyperopia, myopia, amblyopia, eye

deviations, and astigmatism.

Documented physical problems included: kyphosis; failure to thrive; sensory deficits; dental disease; feeding disorder/g-tube dependence; constipation (multiple cases); premature adrenarche (precocious puberty secondary to endocrine problems); short stature; scoliosis; hemi-body neglect; tremors; gastroesophageal reflux; anemia; hearing problems; enlarged tonsils; decreased head circumference (<50th percentile), apneic spells, hypoxia, and cardiac arrest.

With regard to documented psychiatric, psychological, and social-emotional or behavioral concerns, associated problems were only described for three cases. The most severe is described first; this child was admitted to the hospital with the following injuries: bilateral scleral conjuctival hemorrhages, diffuse axonal injury, right humerus fracture, multiple rib fractures, fractures of varying ages on skull, arm, rib, and hand, bruises, lacerations, liver injury, and failure to thrive. This child was described as being "emotionally detached" and "frightened of men" as an infant. This child was ultimately diagnosed with autism spectrum disorder, likely associated with documented "repetitive behaviors," and possible sensory integration issues (e.g. "loud noises are bothersome", "very picky eater"). Attention-deficit hyperactivity disorder; trichotillomania, depression, and separation anxiety were also mentioned in this child's chart. Self-injurious behavior was also noted (e.g., "bangs head, hits himself;" "self-abusing with hair pulling, ear twisting;" "pounds his head with fists or against wall;" "tried to scratch face"), along with agitation, sleep disturbance (e.g., "restless sleep"; "crying for an hour non-stop 4x at night"), "staring episodes," temper tantrums, excessive anger, and "explosiveness." Lastly, this child was described as "violent and mean;" aggressive ("aggressive toward

others;" "hitting, biting, kicking;" "destruct[ive] of property"). This child was also noted not to do well in preschool, and to have "learning problems" and "school problems," which were not described in detail.

For another case, the only concern explicitly noted was "flat affect with no verbalizations," during hospitalization. Lastly, for the last case for which concerns were documented, the only behavioral concern reported was that the child had "hit another child."

CHAPTER FIVE

DISCUSSION

This in-depth chart review demonstrated that the most utilized services critical to the recovery of pediatric victims of NAT include follow up with Pediatrics or Primary Care, neurology and neurosurgery, and rehabilitation services. However, the proportion of children who visited these types of providers varied widely on a case-by-case basis.

With regard to the developmental complications documented in the medical records, physical problems resulting from the NAT were described in most detail. Meanwhile, information regarding non-physical problems related to the abuse was quite limited. Given that the vast majority of children presented with AHT, cognitive or neurological difficulties frequently resulting from AHT were also described in some detail, although only for a few cases.

Additionally, while psychiatric, behavioral and social-emotional issues likely existed as well, they were rarely documented; these effects were only documented in 3 of the 28 charts reviewed, and Psychology services or other mental health related services, such as Social Work, were only documented in two patients' charts. As such, is likely that many additional issues, both behavioral or psychological, as well as developmental or physical, were not documented though they likely existed based on the trauma and scope of injuries that NAT victims experienced. Given that most children were seen by Primary Care or Pediatrics at least once following discharge for follow up, one option to address this problem is to develop comprehensive checklists which would be made available to patient families at each primary care visit. Such a checklist might provide the opportunity for families to report on difficulties that may not be the specified reason for a

visit—a “catch-all.” For children with a history of NAT, this would be especially important, as they may be switching providers more frequently that their non-NAT counterparts due to changes in custody and potential involvement in the foster care system. Additionally, physicians might verbally screen for difficulties that patients present with to identify additional issues that families may fail to bring up themselves during visits, as services cannot be provided for problems which are never identified. If physicians can do this on a regular basis when working with patients in this population, then problems that might normally fly under the radar can be sufficiently screened for and addressed. We want to ensure that problems are being caught in order to provide the early intervention that most of these children need given the severity of their injuries.

Regarding conclusions about overall long-term trajectory, given the age range of the children who were followed for this study, being under one year old on average at the time of admission for NAT and on average, no older than five years old at the latest encounters that were reviewed, it is difficult to make definitive conclusions. Simply as a function of their age, young children (such as those in this sample) are less likely than their older counterparts to have experienced the full range of the effects of abuse that are well-documented in the literature (i.e., development of psychiatric disorders, substance abuse, suicidality, etc.). While many of these effects are evident in early childhood, they often extend into adulthood and compound over time if not addressed with treatment early on (The National Child Traumatic Stress Network). However, given the severity of most injuries accounted for, it is reasonable to assume that neurological functioning for the majority of these children would not return to baseline, and that most would continue to require long-term care from Neurology and other rehabilitation services, such as

occupational, physical, and speech therapy.

Additionally, for the smaller subset of children who either had no documented sequelae as a result of their injuries (i.e., children who were admitted for single skeletal fractures, etc.), long-term effects which are associated with physical abuse and the experience of trauma, such as long-term health problems associated with Adverse Childhood Experiences, are likely to manifest as these children reached adolescence and adulthood (Hunter, 2014; Felitti, 1998). However, given the age range of our sample, conclusions regarding long-term problems and trajectory could not be drawn.

Implications

This study provided insight into the nature of follow-up care for pediatric victims of severe physical abuse, or NAT, and demonstrated the needs that these children have after experiencing abuse (both physical and psychologically) based on their injuries and the breadth of services they frequently seek following discharge. By determining the nature of encounters following initial discharge date, researchers were able to identify some of the short- and long-term risks, in various domains, that are associated with NAT. This kind of information is critical to informing future directions for ensuring adequate long-term care, as well as continuity of care for pediatric victims of NAT.

It is important to note that the amount of information in patients' charts which was missing or unavailable for review demonstrated that what happens to these children after their discharge is frequently unclear or altogether unknown. While researchers cannot assume that the children who had no information in their charts post-discharge, or who had limited information in their charts, did not receive adequate follow-up care

following their discharge from the hospital, it is unclear if discharge recommendations provided by LLUCH were followed or not.

Furthermore, for those children no longer served by the Loma Linda Health system following discharge from the hospital (whether due to foster placement in another county or for other reasons), it is unclear the extent to which information contained in the Loma Linda EHR system may have been shared with new providers. Naturally, this could lead to a multitude of problems for these children. Unless previous medical records are specifically requested by the family or by new providers, it is likely that information shared with new providers is lacking detail as to the particular needs of these patients. Information could be incomplete for several possible reasons: one such reason is relying on second-hand reporting of a medical history from guardians which may not be well-versed in or familiar with the child's medical history. This problem was evident in some of the self-report measures completed by foster parents for a few children who received follow-up care within the Loma Linda Health System; their reported lacked significant information regarding the scope and severity of the injuries which some of the children experienced. For example, when asked about a history of trauma in one questionnaire, a foster parent indicated "No history of trauma." This is concerning because it indicates that practitioners assuming the care of these children outside of the Loma Linda University Heath system may never be fully informed of the comprehensive medical history of these patients, as they may be relying on reports from caregivers rather than objective records. This could result in inappropriate care for patients because of a lack of information or misinformation, resulting in compromised care at worst or failure to receive potentially beneficial services at best.

All of this highlights the necessity for clearer and more consistent follow-through between providers for these families, especially in light of the fact that a majority of these children were places with foster families in surrounding counties (n=23), resulting in transfer of care. One possibility for ensuring continuity of care between providers after discharge would be to create a new electronic health system specifically for pediatric NAT patients at a state-wide or national level. All patients included in this system's database would be assigned an MRN number and all physicians involved in their care, as well as those previously involved, would be able to contribute to the care that these patients receive. This would limit the need for third party releases for PHI while ensuring patient confidentiality; additionally, it would make available the full medical history to new providers who may not be familiar with a patient's history, so that physicians would not have to rely on second-hand report from guardians (e.g., foster parents or county social workers). Inherent in this medical record system could be various protocols for caring for specific to patients who have experienced NAT, especially for patients with AHT, including but not limited to screening measures developed particularly for pediatric NAT patients and comprehensive recommendations and resources. This way, services that should be provided to these patients but which are often not provided, such as psychological services and developmental services, would be recommended to all patients, in addition to those services which have been proven most critical to care in this study (i.e., Neurology, Radiology, and Rehabilitation services; see recommendation below regarding potential clinical pathway). Additionally, specific steps for follow up care could be established and a more standardized approach to follow up care could be developed, as one currently does not exist universally (O'Bannon, 2017).

In addition to creating an electronic health system with a NAT-specific database, a specific clinical pathway for best practices with suspected or confirmed victims of NAT could be created to cater to these children's needs from the time they are admitted to the hospital to well-beyond discharge. As the current study suggests, follow-up by Neurology appears to be the most critical to the well-being of these patients. For many of the children described in this study, Neurology was only consulted when a clinical concern arose for these children. However, the literature continues to highlight that most pediatric victims of NAT do present with neurological concerns related to AHT. Thus, it may be in the best interest of both patients and the medical settings that serve them to seek immediate contribution from Neurology, rather than awaiting complications before intervening. Ensuring that all children with NAT are seen by Neurology as a routine part of NAT diagnosis/follow-up/clinical pathway can lead to early intervention when necessary, thereby leading to better clinical outcomes and limiting unnecessary utilization of healthcare (and other societal) resources in the long run (e.g., more invasive procedures later on, etc.).

As previously indicated, most children in this study also required routine follow-up by primary care or general pediatrics, as well as ongoing rehabilitation services. Thus, it is recommended that pediatric victims of NAT also receive comprehensive rehabilitation services in conjunction with consistent follow-up by a primary care physician as part of the suggested clinical pathway. Comprehensive evaluations by physical therapy, speech therapy, and occupational therapy (as developmentally appropriate), would serve a similar purpose in identifying potential areas of need as early and as efficiently as possible. Early intervention may even prevent the need for further

intervention down the line altogether in some cases.

A rudimentary clinical pathway that includes mandatory follow up by Neurology, various rehabilitation services, and Pediatrics (at minimum) can have a number of other benefits on both patient health outcomes and quality of life, as well as on the healthcare system and society at large. By providing comprehensive evaluations as part of routine care, practitioners can ensure targeted utilization of resources for those problems which appear most common for this population. They will have also done their due diligence in identifying patient needs before potential problems are exacerbated and become more difficult to treat. Implementing a clinical pathway such as the one suggested here will also ultimately lessen the economic burden of NAT on society by effectively addressing the immediate medical needs of victimized children, while minimizing future cost utilization associated with the more distal, long-term effects of NAT, such as special education resources, mental health and health care services, lost productivity to society, and so on.

Another recommendation is the implementation of a multidisciplinary team (MDT) approach involving Neurology, Pediatrics, Rehabilitation services, Psychology, and Social Work. This may be one option for streamlining a clinical pathway such as the one suggested above, while making other appropriate services (i.e., Social Work and Psychology) readily available for follow up. Such a multidisciplinary team, either as a stand-alone clinic or as a team within a larger hospital setting, may lead to improved outcomes by reducing time to treatment for patients while lessening economic costs associated with inefficient care. If implemented on-site within the hospital setting, a MDT approach may also reduce average hospital stay (as some research suggests in use

with other patient populations), in turn reducing the financial burden on the hospital for inpatient hospitalization (Ke, et. al., 2013; Pinninti, et. al., 2015).

Limitations

Several limitations to this study exist and should be taken into consideration when interpreting findings. The most concerning of these is the proportion of missing or unknown data encountered during the course of the chart review. Several children had no notes available for review post-discharge (n=6); for these cases, it was unclear whether or not these children were receiving any care following discharge. This may have been due to a majority of these children being placed in care in surrounding counties (n=23), where they were no longer served by the Loma Linda University Health system, or due to being placed with other family members (though this was more rare). Additionally, many patients in the sample who may not have typically been served by LLUCH appeared only to be transferred to LLU due to the severity of their injuries, given Loma Linda's standing as a trauma hospital; therefore, they would no longer have been patients in the LLU system after their discharge.

There were many cases for which some information was available but much of the data was missing; such cases included visits for which an encounter date was available in the EHR but no corresponding notes for the visit were found. The fact that there exists missing data at such a high rate is problematic in that it cannot be assumed that those children for which no information was available actually received any type of care following discharge. If providers cannot access information regarding the care these patients had received to date, and if it is unclear what kind of care was provided in visits

for which a department was specified but no corresponding notes existed, then how can providers ensure that they are delivering continuous, ethical care to patients in a coherent manner?

While this issue highlights what could simply have been a problem in the transfer of paper charts to an electronic system, difficulty tracking children following transfer of care to providers outside of the Loma Linda Health System, or a larger problem indicating a lack of follow-up care altogether. Regardless of the reason, only limited information was available for many of the cases in the sample, and it is extremely concerning that there is no certainty with which researchers can identify whether or not patients did receive follow up care.

Next, with regard to the sequelae associated with NAT in the pediatric population, most of the notes which were reviewed did not provide much information beyond the identified reason for the visit, usually documented simply as "follow up." In other words, while other problems may have been present, because most of these visits were specialty visits, guardians may not have been asked about additional problems they were encountering, such as behavioral or other issues. Additionally, due to the structured format for documentation in patients' charts at a system-wide level, there were not appropriate spaces within most visit notes to document additional concerns, or to even screen for them and make appropriate referrals.

For several children, no additional problems or NAT-related sequelae were documented at all throughout their EHR, outside of the identified reasons for each medical visit. While there were cases for which some problems were noted, such as in parent/guardian questionnaires, this was only true for a small number of cases. Problems

documented for these cases are therefore not comprehensive or representative of the whole sample, significantly limiting generalizability of results.

Additionally, given the age range of the children who were followed for this study, being under one year old on average at the time of admission for NAT and on average, no older than five years old at the latest encounters that were reviewed within the parameters of this study, namely within the first five years post-discharge, conclusions regarding long-term trajectory could not definitively be made. Given the severity of most injuries accounted for, the literature suggests that neurological functioning for the majority of these children will not return to baseline, and that most would continue to require long-term rehabilitation, including care from Neurology (Lind, 2016; Chevignard & Lind, 2014; Lopes, Eisenstein, & Williams, 2013). However, a longitudinal study in which data for patients across health providers would be necessary to comprehensively document long-term trajectories of these patients. For this study, only information contained in the Loma Linda University EHR system was available.

Another issue that arose as a threat to internal validity is reliability from the medical records themselves, since this study was a chart review of archival data. Electronic notes were reviewed as well as hand-written or printed documents that had been scanned into patients' charts when Loma Linda University Health switched to an electronic system; however, due to having a mixture of paper charts and electronic charts, as well as differences in nomenclature and differences between documentations styles between physicians, it was difficult to ensure access to all records and to accurately record all of the information that was readily available in the electronic charts. Furthermore, it appeared that some information may have been lost in the transfer from

paper charts to electronic charts, as several cases included encounter dates for which no corresponding notes were available nor had been scanned in.

Lastly, we do not know the extent to which the findings of this study are representative of what occurs following NAT in this population across the country or even the state, or if these results are only generalizable to LLUCH and the greater San Bernardino area, given the demographics of the area and Loma Linda University Medical Center's standing as a trauma hospital in the area where cases of this kind of severity are frequently transferred.

Conclusion

This study focused on the current state of follow-up care for NAT patients at LLUCH through an in-depth chart review which aimed first to determine proportion of cases from study sample with subsequent encounters and time frame within which patients first return to hospital after discharge date obtained from Trauma Registry; to document frequency with which patients return to the hospital to receive care; and lastly, to determine the nature of subsequent encounters, or reason for visits by examining presenting issues, and whether or not encounters are related to initial NAT admission or not. Results provided insight into the nature of follow-up care for pediatric victims of severe physical abuse, or NAT, and demonstrated the needs that these children have after experiencing abuse (both physical and psychologically) based on their injuries and the breadth of services they frequently seek following discharge. Follow-up care varied widely from case to case, however, results indicated that most children are seen for follow up care within one month after discharge and that the majority were seen at one

point or another by Pediatrics or Primary Care and/or Radiology, while Rehabilitation services were provided most frequently.

By determining the nature of encounters following initial discharge date, researchers were able to identify some of the short- and long-term risks, in various domains, that are associated with NAT. This kind of information is critical to informing future directions for ensuring adequate long-term care, as well as continuity of care for pediatric victims of NAT.

Lastly, several children had no documentation in their chart post-discharge, and in many cases for which some information was available, much of the data was missing; such cases included visits for which an encounter date was available in the EHR but no corresponding notes were found. This highlighted the need for consistent and reliable follow-through between providers for families of NAT victims, as many of these children were discharged to foster families in surrounding counties resulting in transfer of care. By determining the nature of encounters following discharge, researchers can identify risks in various domains that are associated with NAT, and thereby inform future directions for ensuring adequate long-term care as well as continuity of care.

REFERENCES

Aaron, J., Zaglul, H., & Emery, R. E. (1999). Posttraumatic stress in children following acute physical injury. Journal of Pediatric Psychology, 24(4), 335-343. doi:10.1093/jpepsy/24.4.335

Adamo, M. A., Drazin, D., Smith, C., & Waldman, J. B. (2009). Comparison of accidental and nonaccidental traumatic brain injuries in infants and toddlers: demographics, neurosurgical interventions, and outcomes. Journal of Neurosurgery: Pediatrics, 4(5), 414,419. Doi:10.3171/2009.6.peds0939

Afifi, T. O., Mota, N., Macmillan, H. L., & Sareen, J. (2013). Harsh Physical Punishment in Childhood and Adult Physical Health. Pediatrics, 132(2). doi:10.1542/peds.2012-4021

Brito, S. A., Viding, E., Sebastian, C. L., Kelly, P. A., Mechelli, A., Maris, H., & McCrory, E. J. (2012). Reduced orbitofrontal and temporal grey matter in a community sample of maltreated children. Journal of Child Psychology and Psychiatry, 54(1), 105-112. doi:10.1111/j.1469-7610.2012.02597.x

Brown, E. J. (2003). Child physical abuse: Risk for psychopathology and efficacy of interventions. Current Psychiatry Reports, 5(2), 87-94. doi:10.1007/s11920-003-0024-2

Carty, H., & Pierce, A. (2002). Non-accidental injury: a retrospective analysis of a large cohort. Pediatric European Radiology, 12(12), 2919-2925. doi:10.1007/s00330-002-1436-9

Centers for Disease Control and Prevention. (2008). The Effects of Childhood Stress on Health Across the Lifespan. CDC, 1–18. Retrieved from papers2://publication/uuid/6077FB60-B088-4DB5-B9C1-AF9DFDE3EA2F

Centers for Disease Control and Prevention. (2007). Child Maltreatment: Fact-sheet. Atlanta: National Center for Injury Prevention & Control. CDC. Retrieved from: http://www.cdc.gov/ncipc/factsheets/cmfacts.htm

Chevignard, M. P., & Lind, K. (2014). Long-term outcome of abusive head trauma. Pediatric Radiology, 44(S4), 548-558. doi:10.1007/s00247-014-3169-8

Choudhary, A., Ishak, R., Zacharia, T, & Dias, M. (2014). Imaging of spinal injury in abusive head trauma: a retrospective study. Pediatric Radiology, 44(9), 1130-1140. doi: 10.1007/s00247-014-2959-3.

Cicchetti, D., & Toth, S. (1995). A Developmental psychopathology. American Academy of Child Adolescent Psychiatry.

Cox, C. M., Kenardy, J. A., & Hendrikz, J. K. (2008). A Meta-Analysis of Risk Factors That Predict Psychopathology Following Accidental Trauma. Journal for Specialists in Pediatric Nursing, 13(2), 98-110. doi:10.1111/j.1744-6155.2008.00141.x

Daviss, W. B., Mooney, D., Racusin, R., Ford, J. D., Fleischer, A., & McHugo, G. J. (2000). Predicting Posttraumatic Stress After Hospitalization for Pediatric Injury. Journal of the American Academy of Child & Adolescent Psychiatry, 39(5), 576-583. doi:10.1097/00004583-200005000-00011

Depanfilis, D., & Zuravin, S. J. (1998). Rates, Patterns, and Frequency of Child Maltreatment Recurrences among Families known to CPS. Child Maltreatment, 3(1), 27–42. doi: 10.1177/1077559598003001003

Depanfilis, D., & Zuravin, S. J. (2002). The effect of services on the recurrence of child maltreatment. Child Abuse & Neglect, 26(2), 187–205. doi: 10.1016/s0145-2134(01)00316-7

De-Vries, A. P., Kassam-Adams, N., Cnaan, A., Sherman-Slate, E., Gallagher, P. R., & Winston, F. K. (1999). Looking Beyond the Physical Injury: Posttraumatic Stress Disorder in Children and Parents After Pediatric Traffic Injury. Pediatrics, 104(6), 1293-1299. doi:10.1542/peds.104.6.1293

Deans, K. J., Thackeray, J., Askegard-Giesmann, J. R., Earley, E., Groner, J. I., & Minneci, P. C. (2013). Mortality increases with recurrent episodes of nonaccidental trauma in children. Journal of Trauma and Acute Care Surgery, 75(1), 161–165. doi: 10.1097/ta.0b013e3182984831

Deans, K. J., Thackeray, J., Groner, J. I., Cooper, J. N., & Minneci, P. C. (2014). Risk factors for recurrent injuries in victims of suspected non-accidental trauma: a retrospective cohort study. BMC Pediatrics, 14(1), 217. http://doi.org/10.1186/1471-2431-14-217

Ehlers, A., Mayou, R., & Bryant, B. (2003). Cognitive predictors of posttraumatic stress disorder in children: results of a prospective longitudinal study. Behaviour Research and Therapy, 41(1), 1-10. doi:10.1016/s0005-7967(01)00126-7

Finckbone, R., Neece, C., Moores, D., & Tagge, E. (2013). The role of psychology in pediatric non accidental trauma. Unpublished manuscript, Loma Linda University, Loma Linda, CA.

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) study. American Journal of Preventive Medicine, 14(4), 245-258.

Ferleger, N., Glenwick, D. S., Gaines, R. R., & Green, A. H. (1988). Identifying correlates of reabuse in maltreating parents. Child Abuse & Neglect, 12(1), 41–49. doi: 10.1016/0145-2134(88)90006-3

Fortson, B. L., Klevens, J., Merrick, M. T., Gilbert, L. K., & Alexander, S. P. (2016). Preventing child abuse and neglect: A technical package for policy, norm, and programmatic activities. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.

Fryer, G. E., & Miyoshi, T. J. (1994). A survival analysis of the revictimization of children: The case of Colorado. Child Abuse & Neglect, 18(12), 1063–1071. doi: 10.1016/0145-2134(94)90132-5

Herrenkohl, R. C., Herrenkohl, E. C., Egolf, B., & Seech, M. (1979). The repetition of child abuse: How frequently does it occur? Child Abuse & Neglect, 3(1), 67–72. doi: 10.1016/0145-2134(79)90013-9

Hunter, C. (2014, January 21). Effects of child abuse and neglect for adult survivors. Retrieved from https://aifs.gov.au/cfca/publications/effects-child-abuse-and-neglect-adult-survivors

Jaffee, S.R. & Maikovich-Fong, A. K. (2013). Child Maltreatment and Risk for Psychopathology. In T. P. Beauchaine & S. P. Hinshaw (Eds.), Child and Adolescent Psychopathology. (2nd ed., pp. 144-177). Hoboken, NJ: John Wiley & Sons.

Joyce, T., & Hucker, M. (2019). Pediatric Abusive Head Trauma (Shaken Baby Syndrome). StatPearls. Treasure Island (FL): StatPearls Publishing. Retrieved from: https://www.ncbi.nlm.nih.gov/books/NBK499836/

Kassam-Adams, N., & Winston, F. K. (2004). Predicting Child PTSD: The Relationship Between Acute Stress Disorder and PTSD in Injured Children. Journal of the American Academy of Child & Adolescent Psychiatry, 43(4), 403-411. doi:10.1097/00004583-200404000-00006

Kazandjian, D., Young, S., O'Bannon, S., Bassili, M., Pickwith, K., Neece, C., & Tagge, E. (2016). Examining the need for inpatient psychological interventions and referrals for pediatric victims of non-accidental trauma. Unpublished manuscript. Loma Linda University, Loma Linda, CA.

Ke, K. M., Blazeby, J. M., Strong, S., Carroll, F. E., Ness, A. R., & Hollingworth, W. (2013). Are multidisciplinary teams in secondary care cost-effective? A systematic review of the literature. Cost effectiveness and resource allocation: C/E, 11(1), 7. https://doi.org/10.1186/1478-7547-11-7

Keenan, H. T. (2006). Child Outcomes and Family Characteristics 1 Year After Severe Inflicted or Noninflicted Traumatic Brain Injury. Pediatrics, 117(2), 317-324. doi:10.1542/peds.2005-0979

Kenardy, J. A., Spence, S. H., & Macleod, A. C. (2006). Screening for Posttraumatic Stress Disorder in Children After Accidental Injury. Pediatrics, 118(3), 1002-1009. doi:10.1542/peds.2006-0406

Langeland, W., & Olff, M. (2008). Psychobiology of posttraumatic stress disorder in pediatric injury patients: A review of the literature. Neuroscience & Biobehavioral Reviews, 32(1), 161-174. doi:10.1016/j.neubiorev.2007.07.002

Lanier, P., Jonson-Reid, M., Stahlschmidt, M. J., Drake, B., & Constantino, J. (2010). Child maltreatment and pediatric health outcomes: A longitudinal study of low-income children. Journal of Pediatric Psychology, 35, 511-522.

Levy, H. B., Markovic, J., Chaudhry, U., Ahart, S., & Torres, H. (1995). Reabuse rates in a sample of children followed for 5 years after discharge from a child abuse inpatient assessment program. Child Abuse & Neglect, 19(11), 1363–1377. doi: 10.1016/0145-2134(95)00095-p

Lind, K., Toure, H., Brugel, D., Meyer, P., Laurent-Vannier, A., & Chevignard, M. (2016). Extended follow-up of neurological, cognitive, behavioral and academic outcomes after severe abusive head trauma. Child Abuse & Neglect, 51, 358-367. doi:10.1016/j.chiabu.2015.08.001

Litrownik, A. J., Lau, A., English, D., Briggs, E., Newton, R., Romney, S., & Dubowitz, H. (2005). Measuring the severity of child maltreatment. Child Abuse & Neglect, 29, 553–573. doi:10.1016/j.chiabu.2003.08.010 Lyneham

Lopes, N. R., Eisenstein, E., & Williams, L. C. (2013). Abusive Head Trauma in Children: A Literature Review. Jornal De Pediatria (Versão Em Português), 89(5), 426-433. doi:10.1016/j.jpedp.2013.01.012

MacMillan, H. L., Thomas, B. H., Jamieson, E., Walsh, C. A., Boyle, M. H., Shannon, H. S., & Gafni, A. (2005). Effectiveness of home visitation by public-health nurses in prevention of the recurrence of child physical abuse and neglect: a randomised controlled trial. The Lancet, 365(9473), 1786–1793. doi: 10.1016/s0140-6736(05)66388-x

Mak, A.K., Wong, M.M., Han, S.H., & Lee, T.M. (2009). Gray matter reduction associated with emotion regulation in female outpatients with major depressive disorder: a voxel-based morphometry study. Progress in Neuro-Psychopharmacology and Biological Psychiatry. 33(7):1184–90. doi: 10.1016/j.pnpbp.2009.06.025.

Marshall, D. B., & English, D. J. (1999). Survival Analysis of Risk Factors for Recidivism in Child Abuse and Neglect. Child Maltreatment, 4(4), 287–296. doi: 10.1177/1077559599004004002

Max, J. E., Castillo, C. S., Robin, D. A., Lindgren, S. D., Smith, W. L., Sato, Y., & Arndt, S. (1998). Posttraumatic Stress Symptomatology after Childhood Traumatic Brain Injury. The Journal of Nervous & Mental Disease, 186(10), 589-596. doi:10.1097/00005053-199810000-00001

Middlebrooks, J.S., Audage, N.C. (2008). The Effects of Childhood Stress on Health Across the Lifespan. Atlanta (GA): Centers for Disease Control and Prevention, National Center for Injury Prevention and Control.

Miller, T. R., Steinbeigle, R., Lawrence, B. A., Peterson, C., Florence, C., Barr, M., & Barr, R. G. (2017). Lifetime Cost of Abusive Head Trauma at Ages 0–4, USA. Prevention Science, 19(6), 695–704. doi: 10.1007/s11121-017-0815-z

Mirza, K. A., Bhadrinath, B. R., Goodyer, I. M., & Gilmour, C. (1998). Post-traumatic stress disorder in children and adolescents following road traffic accidents. The British Journal of Psychiatry, 172(5), 443-447. doi:10.1192/bjp.172.5.443

Mullen, P., Martin, J., Anderson, J., Romans, S., & Herbison, G. (1996). The long-term impact of the physical, emotional and sexual abuse of children: A community study. European Psychiatry, 11. doi:10.1016/0924-9338(96)89276-5.

Murphy, J. M., Bishop, S. J., Jellinek, M. S., Quinn, S. D., & Poitrast, J. F. G. (1992). What happens after the care and protection petition?: Reabuse in a court sample. Child Abuse & Neglect, 16(4), 485–493. doi: 10.1016/0145-2134(92)90065-y

Palusci V.J., Covington, T.M. (2014). Child Maltreatment Deaths in the U.S. National Child Death Review Case Reporting System. Child Abuse & Neglect, 38, 25-36.

Paul, A. R., & Adamo, M. A. (2014). Non-accidental trauma in pediatric patients: a review of epidemiology, pathophysiology, diagnosis and treatment. Translational Pediatrics, 3(3), 195–207. http://doi.org/10.3978/j.issn.2224-4336.2014.06.01

Pears, K. C., Kim, H. K., & Fisher, P. A. (2008). Psychosocial and cognitive functioning of children with specific profiles of maltreatment. Child Abuse & Neglect, 32, 958–971. doi:10.1016/j.chiabu.2007.12.009

Petersen, A. C., Joseph, J., & Feit, M. (Eds.). (2013). New directions in child abuse and neglect research. Washington, DC: The National Academies Press. Retrieved from http://www.nap.edu/read/ 18331/chapter/1.

Pinninti, M., Cho, C., Thohan, V., Cheema, O., Hastings, T., Crouch, J., Downey III, F.X., Sulemanjee, N.Z. (2015). Multi-Disciplinary Team Management Is Cost Effective in Patients During the Index Hospitalization of Left Ventricular Assist

Device Implantation. The Journal of Heart and Lung Transplantation, 34(4). doi: 10.1016/j.healun.2015.01.449

Roaten, J. B., Partrick, D. A., Nydam, T. L., Bensard, D. D., Hendrickson, R. J., Sirotnak, A. P., & Karrer, F. M. (2006). Nonaccidental trauma is a major cause of morbidity and mortality among patients at a regional level 1 pediatric trauma center. Journal of Pediatric Surgery, 41(12), 2013-2015. doi:10.1016/j.jpedsurg.2006.08.028

Sar, V. (2011). Developmental trauma, complex PTSD, and the current proposal of DSM-5. European Journal of Psychotraumatology, 2. doi: 10.3402/ejpt.v2i0.5622 Silverman

Sato, M., Chang, E., Igarashi, T., & Noble, L. (2001). Neuronal injury and loss after traumatic brain injury: time course and regional variability. Brain Research, 917(1), 45-54. doi:10.1016/s0006-8993(01)02905-5

Saxe, G. N., Stoddard, F., Hall, E., Chawla, N., Lopez, C., Sheridan, R., & Yehuda, R. (2005). Pathways to PTSD, Part I: Children with Burns. American Journal of Psychiatry, 162(7), 1299-1304. doi:10.1176/appi.ajp.162.7.1299

Scavarda, D., Gabaudan, C., Ughetto, F., Lamy, F., Imada, V., Lena, G., & Paut, O. (2010). Initial predictive factors of outcome in severe non-accidental head trauma in children. Childs Nervous System, 26(11), 1555-1561. doi:10.1007/s00381-010-1150-x

Shemesh, E., Keshavarz, R., Leichtling, N. K., Weinberg, E., Mousavi, A., Sadow, K., & Yehuda, R. (2003). Pediatric Emergency Department Assessment of Psychological Trauma and Posttraumatic Stress. Psychiatric Services, 54(9), 1277-1281. doi:10.1176/appi.ps.54.9.1277

Shonkoff, J., Garner, A., & Committee on Psychosocial Aspects of Child and Family Health, Committee on Early Childhood, Adoption, and Dependent Care, and Section on Developmental and Behavioral Pediatrics. (2012). The lifelong effects of early childhood adversity and toxic stress. Pediatrics, 129(1), e232-e246.

Silverman, A. B., Reinherz, H. Z., & Giaconia, R. M. (1996). The long-term sequelae of child and adolescent abuse: A longitudinal community study. Child Abuse & Neglect, 20(8), 709-723. doi:10.1016/0145-2134(96)00059-2

Sola, R., Waddell, V. A., St. Peter, S. D., Aguayo, P., & Juang, D. (2018). Non-accidental trauma: A national survey on management. Injury, 49(5), 921–926. doi: 10.1016/j.injury.2018.03.006

Stallard, P., Velleman, R., & Baldwin, S. (1998). Prospective study of post-traumatic stress disorder in children involved in road traffic accidents. British Medical Journal, 317(7173), 1619-1623. doi:10.1136/bmj.317.7173.1619

Stoddard, F. J., Saxe, G., Ronfeldt, H., Drake, J. E., Burns, J., Edgren, C., & Sheridan, R. (2006). Acute Stress Symptoms in Young Children with Burns. Journal of the American Academy of Child & Adolescent Psychiatry, 45(1), 87-93. doi:10.1097/01.chi.0000184934.71917.3a

Sturms L.M., van der Sluis C.K., Stewart R.E., et al. (2005). A prospective study on paediatric traffic injuries: health-related quality of life and post-traumatic stress. Clinical Rehabilitation, 19(3),312–322. doi: 10.1191/0269215505cr867oa

Tepas J.J., Schinco, M.A. (2004) Pediatric trauma. In: Moore EE, Feliciano DV, Mattox KL. (Eds), Trauma, 5th ed. (1021-1037). New York: McGraw-Hill.

The National Child Traumatic Stress Network. Effects. Retrieved February 14, 2020 from https://www.nctsn.org/what-is-child-trauma/trauma-types/early-childhood-trauma/effects.

Trokel, M., Discala, C., Terrin, N. C., & Sege, R. D. (2004). Blunt Abdominal Injury in the Young Pediatric Patient: Child Abuse and Patient Outcomes. Child Maltreatment, 9(1), 111-117. doi:10.1177/1077559503260310

U.S. Department of Health and Human Services, Administration for Children and Families, Administration on Children, Youth and Families, Children's Bureau. (2010). Child Maltreatment, 2010.

Vasic, N., Walter, H., Hose, A., & Wolf, R.C. (2008). Gray matter reduction associated with psychopathology and cognitive dysfunction in unipolar depression: a voxel-based morphometry study. J Affect Disord. 109(1–2):107–16. doi: 10.1016/j.jad.2007.11.011.

Winston, F. K., Kassam-Adams, N., Vivarelli-Oneill, C., Ford, J., Newman, E., Baxt, C., Cnaan, A. (2002). Acute Stress Disorder Symptoms in Children and Their Parents After Pediatric Traffic Injury. Pediatrics, 109(6). doi:10.1542/peds.109.6.e90

World Health Organization (1992). International classification of diseases and related health problems (10th rev., ICD-10). Geneva, Switzerland: Author.

Zatzick, D. F., & Grossman, D. C. (2011). Association Between Traumatic Injury and Psychiatric Disorders and Medication Prescription to Youths Aged 10–19. Psychiatric Services, 62(3), 264–271. doi: 10.1176/ps.62.3.pss6203_0264

Zatzick, D. F., Grossman, D. C., Russo, J., Pynoos, R., Berliner, L., Jurkovich, G., Rivara, F. P. (2006). Predicting Posttraumatic Stress Symptoms Longitudinally in a Representative Sample of Hospitalized Injured Adolescents. Journal of the American Academy of Child & Adolescent Psychiatry, 45(10), 1188-1195. doi:10.1097/01.chi.0000231975.21096.45

Zeanah, C. H., Scheeringa, M., Boris, N. W., Hellers, S. S., Smyke, A. T., & Trapani, J. (2004). Reactive attachment disorder in maltreated toddlers. Child Abuse and Neglect, 28, 877–888. doi:10.1016/j.chiabu.2004. 01.010

Zink, K. A., & Mccain, G. C. (2003). Post-Traumatic Stress Disorder in Children and Adolescents with Motor Vehicle-Related Injuries. Journal for Specialists in Pediatric Nursing, 8(3), 99-106. doi:10.1111/j.1088-145x.2003.00099.x

APPENDIX A

CHART REVIEW TRACKING FORM 1 (SAMPLE)

ID	Length of Admission	Encounter Date	#	Service/ Department	Presenting Problem/ Nature of Encounter	Related to NAT?
23	1/27/99 – 2/13/99	3/2/99	1	LLUMC ED	Episodes of spastic eye movement	1
		3/6/99	2	LLUMC ED	High pitched crying, eyelid fluttering, decreased appetite	1
		3/6/99	3	Pediatrics	WCC	3
		3/10/99	4	LLUCH Acute Inpatient Rehabilitation	Inpatient Rehabilitation	1
		3/10/99	5	LLUCH PECS/Neuropsychology/ Psychology	Assessment	1
		3/15/99	6	LLUCH Social Work	Psychosocial Evaluation	1
		4/21/99	7	Pediatrics	WCC	3
		6/14/99	8	99	99	99
		6/16/99	9	Rehabilitation Institute Outpatient Rehabilitation Center	Pediatric Occupational Therapy Evaluation	1
		7/16/99	10	Rehabilitation Institute Outpatient Rehabilitation Center	Feeding/Dysphagia Evaluation	1
		9/27/99	11	Pediatric Neurology	Evaluation	1
		10/1/99	12	99	99	99
		10/15/99	13	99	99	99
		10/19/99	14	Inland Valley Retina	F/U	1
		10/20/99	15	Physical Medicine and Rehabilitation	F/U	1
		10/28/99	16	Center for Pain Management	99	2
		12/20/99	17	99	99	99
		12/29/99	18	Rehabilitation Institute Outpatient Rehabilitation Center	Rehabilitation	1
		1/10/00	19	99	99	99
		2/10/00	20	Pediatrics	WCC	3
		2/28/00	21	Physical Medicine and Rehabilitation	F/U	1
		5/15/00	22	99	99	99
		5/31/00	23	Pediatric Rehabilitation Clinic	F/U	1

		7/25/00	24	99	99	99
		7/26/00	25	LLU Surgery Center for Dentistry	Dental Treatment	3
		8/30/00	26	Pediatric Rehabilitation Clinic	F/U	1
		9/6/00	27	Pediatric Neurology	F/U	1
		11/6/00	28	Pediatrics	Sick Visit	4
		11/27/00	29	Pediatric Rehabilitation Clinic	Routine Care	1
		11/30/00	30	Pediatrics	Sick Visit	4
		12/6/00	31	99	99	99
		1/4/01	32	99	99	99
		2/26/01	33	Pediatric Neurology	F/U	1
		2/26/01	34	Pediatric Rehabilitation Clinic	Routine Care	1
		5/23/01	35	Pediatric Rehabilitation Clinic	F/U	1
		7/31/01	36	99	99	99
		8/20/01	37	Pediatric Neurology	F/U	1
		10/4/01	38	99	99	99
		10/16/01	39	99	99	99
		12/3/01	40	99	99	99
		1/8/02	41	Pediatric Rehabilitation Clinic	F/U	1
		1/14/02	42	99	99	99
		2/4/02	43	Pediatric Neurology	F/U	1
		4/16/02	44	Pediatric Rehabilitation Clinic	F/U	1
		6/8/02	45	Inland Valley Retina	Routine Care	1
		7/10/02	46	Pediatric Neurology	F/U	1
		10/16/02	47	99	99	99
		11/6/03	48	Pediatrics	Sick visit	1
		11/26/03	49	99	99	99
		1/19/04	50	LLUCH PICU (admission)	Failure to Thrive	1
		1/20/04	51	LLUCH Chaplain Services	Initial Visit/Spiritual Support	1
		99	52	Therapeutic Home/Community Visit	Therapeutic Home/Community Visit	1

APPENDIX B

CHART REVIEW TRACKING FORM 2 (SAMPLE)

ID	Physical Concerns	Cognitive/ Developmental/ Neurological Concerns	Psychiatric Concerns	Behavioral Concerns
11	Head circumference <50th %ile; hyper-reflexivity/increased tone in legs; enlarged tonsils	Mild delays in gross motor, fine motor, cognitive, and language (nonverbal at 17 months); apraxia, ataxia, "mild ataxia, diskinetic cerebral palsy"	Diagnosis of autism, trichotillomania, depression, self-harm, separation anxiety, "restless sleep"; possible sensory integration issues ("loud noises are bothersome"); sleep disturbance ("crying for an hour non-stop 4x at night"; repetitive behavior; ADHD; depressed; anxious	Violent and mean; aggressive toward others; self-injury - bangs head, hits himself; "hitting, biting, kicking"; "temper tantrums"; "self-abusing with hair pulling, ear twisting; increased anger and "explosiveness"; aggression/destruction of property; self-harm ("pounds his head with fists or against wall" "tried to scratch face"); "very picky eater"; "staring episodes", "emotionally detached"; "frightened of men" as an infant; increased agitation, feelings of guilt; past SI; "school problems"; "did not do well [in preschool]"; learning problems