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Pediatric Consultations to Child Protective Services:

The Role of Expert Opinions

Lindsay Kellogg McGuire

YALE UNIVERSITY

2008

**Pediatric Consultations to Child Protective Services:
The Role of Expert Opinions**

A Thesis Submitted to the
Yale University School of Medicine
in Partial Fulfillment of the Requirements for the
Degree of Doctor of Medicine

By
Lindsay Kellogg McGuire
2008

PEDIATRIC CONSULTATIONS TO CHILD PROTECTIVE SERVICES: THE ROLE OF EXPERT OPINIONS. Lindsay McGuire, Kimberly Martin, and John M. Leventhal. Department of Pediatrics, Yale University, School of Medicine, New Haven, CT.

The purpose of this study was to provide a description of the types of child abuse consultations done by experts at Yale-New Haven Children's Hospital (YNHCH) to Child Protective Services (CPS) in Connecticut, and compare the opinions of the likelihood of child maltreatment of the initial treating physician, CPS, and the child abuse expert.

Eligible cases were referred by CPS for expert child abuse consultations at YNHCH between March, 1998 and June, 2005. Abstracted information included demographics, information about the type of injury, and the assessments of the case by the initial treating physician, CPS, and the child abuse expert.

Of 187 cases, 49% were males; 30% were African American, 28% white, 23% Hispanic, 1% Asian, and 17% were of unknown ethnicity. The types of cases, defined by the most serious overall injury to the child varied: 46% involved fractures; 22% bruises, scars, or abrasions; 13% burns; 4% brain hemorrhages; 2% death; 1% retinal hemorrhage; and 7% other injuries; in 5% of cases no physical injury to the child was found by any of the assessors.

In 57% (N=68) of the 119 cases that had opinions by all three assessors, the expert agreed with the opinion of the original physician on the case; of these 68 cases, 44 were abuse, 6 were uncertain, and 18 were accidental. In 65% (N=77) of cases the expert agreed with CPS on the case; of these cases, 50 were abuse, 2 were uncertain and 25 were accidental. The expert was more likely to determine the case to be accidental (49% of cases) compared to CPS (25% of cases), and the original physician (18% of cases).

When CPS believed the case to be abuse (69 cases), the expert most often agreed it was abuse (72%), but in 22% of cases disagreed and determined the case to be accidental.

Overall, the expert thought 48% of the cases were abuse. When no explanation was given by the caretaker to account for the child's injury (N= 18), the expert was very likely to find the case one of abuse (72%); in contrast, when an explanation was provided by the caretaker for a fall (N=45) or an accident by the child (N=16), the expert was less likely to find the case one of abuse (35% and 31%, respectively).

Factors that increased the probability of the expert determining the case to be one of abuse included: the child had a medical or psychological problem, the child was on record with CPS for a previous concern of maltreatment, CPS removed the child from the home or provided parental services/education, and the child had 3 or more injuries.

Although there was agreement in a substantial proportion of cases, in a significant number of cases the child abuse expert had opinions that differed from CPS and the treating physician. Therefore, second opinions by child abuse experts have important value in selected child abuse cases both to confirm previous assessments by the treating physician and CPS, and to change the opinion of the case.

Acknowledgments

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TABLE OF CONTENTS

I. INTRODUCTION.....	1
Background	
Child Protective Services	
Review of Literature	
Purpose of Study	
II. METHODS.....	11
Setting	
Selection of Sample	
Review of Records	
Variables	
Analysis	
Researchers	
III. RESULTS.....	20
Social and Demographic Characteristics	
Clinical Characteristics	
CPS Involvement	
Expert's Role in the Case	
Past Medical History of the Child	
Social History of the Family	
Opinions of the Cases	
Suggestions Made by Expert	
IV. DISCUSSION.....	38
Strengths and Limitations of This Study	
Conclusions	
V. REFERENCES.....	44
VI. APPENDIX.....	46
Abstraction form	

INTRODUCTION

Background

Health care providers are often the first to recognize and report a case of child maltreatment. When physicians suspect child maltreatment, they have a legal responsibility, as mandated reporters, to report the case to Child Protective Services (CPS). In 2003, in the United States, 2.9 million cases of suspected child maltreatment were referred to a CPS agency (1). Of the cases referred, 906,000 children were substantiated as victims of child maltreatment (including physical abuse, neglect, and sexual abuse). Health care providers account for 8.2% of all reports of suspected child abuse to CPS; educators and law enforcement are the two most common sources of reports to CPS.

The largest proportion of child maltreatment victims are under 3 years of age, and the fewest number of victims are over 16 years of age. African-American children were abused at a higher rate (20.4 per 1,000 children) than were white children (11 per 1,000 children). Unfortunately, the most frequent perpetrators of maltreatment are the parents (80%), which makes sense given that parents tend to spend the most time around their children. Unmarried partners of parents accounted for 4% of perpetrators. When maltreatment is substantiated, CPS decides what actions to take with the child and family: 15% of child abuse victims are placed in foster care (1).

In 2003 the child protective service (CPS) agency (the Department of Children and Families (DCF)) of the State of Connecticut investigated a total of 32,802 cases. Of those cases, CPS substantiated maltreatment in 9,267 cases (28%), and the remaining 23,535 cases were unsubstantiated. Since a single referral to CPS can include more than

one child, the 9,267 cases of substantiated maltreatment included 12,256 children. Of the substantiated cases of child maltreatment in Connecticut, 11.5% were physical abuse, 71.2% were neglect, and 4.5% were sexual abuse (1). Similar to national trends, in Connecticut the highest proportion of maltreated children were less than three years of age.

When a case is reported to CPS in Connecticut, the agency investigates the case to determine whether child maltreatment has occurred. In cases that are particularly difficult to make a determination about whether child maltreatment has occurred, the DCF investigation may include a consultation from a pediatrician who is an expert in the evaluation of child abuse. The child abuse expert provides an opinion about whether or not child maltreatment occurred or if the injury has another reasonable explanation, such as an accident or birth injury. At the time of the study, there were three physicians in the state of Connecticut, Dr. Leventhal, Dr. Bechtel, and Dr. Berrien, who performed these medical consultations for DCF. Dr. Berrien is at St. Francis Hospital and Connecticut Children's Medical Center, and Drs. Leventhal and Bechtel are at Yale-New Haven Children's Hospital. With the additional information from the pediatric child abuse consultation, DCF makes a decision about whether to substantiate child maltreatment and whether protective measures are needed to ensure the child's safety. Although similar consultation services exist in other states, there is no literature about the kinds of cases referred, the kinds of evaluations conducted, and the opinions of the child abuse experts. As of now, no report has analyzed what sorts of cases are referred to these physicians by DCF and what the child abuse experts generally find after reviewing these cases.

Child Protective Services

The Department of Children and Families (DCF), the Child Protective Service Agency of Connecticut, is funded through federal and state governments, governed by federal and state laws, and works in coordination with state courts, police departments, and social service providers (2). The goal of DCF is to protect children and strengthen their families. In 1974, a federal law called the Child Abuse Prevention and Treatment Act (CAPTA) encouraged states to require professionals who work with children to report suspected cases of child abuse to social service departments (2). Most of the national data on child maltreatment reported in this thesis come from the National Child Abuse and Neglect Data System (NCANDS), which is a federally funded effort to collect national data on child abuse. The data are submitted by each state to The Children's Bureau in the Administration on Children, Youth, and Families, and are analyzed and published in an annual national report (1).

Child Protective Services (CPS) is a division of DCF. The role of CPS is to investigate all reports of suspected child maltreatment and determine if they are cases of maltreatment. The CPS worker determines what needs to be done to keep the child safe, which may include removing the child from the home to prevent future episodes of maltreatment. After criticism that CPS was too quick to remove children from their original home, the Family Preservation and Support Initiative law was passed in 1993. This law provided federal funds to states to be used to preserve and support families in hopes of avoiding family disruptions and abusive situations for children. In cases of abuse, DCF does not always remove the child from the home. When possible, DCF tries to support the family so that it is safe for the child to remain in or return to the home.

CPS workers can recommend resources to families in need, such as domestic violence shelters, substance-abuse treatment centers, mental health evaluations, child care arrangements, and counseling. In 1997, the Adoption and Safe Families Act law provided additional funds to preserve and support families and encouraged the foster care system to transition children in foster care into permanent homes faster. All these services are aimed at helping the family provide a safe environment to the developing child (2).

Review of Literature

There is no literature specifically related to expert second opinions to CPS on child maltreatment. This study is the first of its kind and hopes to bring understanding on the usefulness of expert second opinions and how they can help advance the field of diagnosing child abuse. Due to the fact there is no literature pertaining to expert consultations to CPS, this literature review focuses on common characteristics associated with child maltreatment and collaborations amongst physicians to detect child maltreatment. The literature review highlights issues of importance, such as the difficulty physicians have in determining if a case should be reported to CPS, and current systems, such as the DART committee and telemedicine aimed at helping this problem. In addition, we examine common types of physically abusive injuries as well as family characteristics associated with abuse.

Physician's Dilemma

Being accused of child maltreatment is a serious allegation. It can tear families apart and cause children to be removed from the home. Medical practitioners tend to be

cautious when referring cases of maltreatment for fear of harming the patient and his or her family if he or she is wrong in the diagnoses of maltreatment. A recent court ruling in England ruled that children could sue physicians who make a wrongful diagnosis of abuse (3). In this case, the court in England felt that a wrongful diagnosis of maltreatment could be so harmful for a child that the child should be able to take legal recourse if the allegation is false. The court did, however, deny parents the same right to sue for wrongful accusations. This ruling holds physicians more responsible for claims of child maltreatment they report, and would thus serve to make them more cautious in reporting claims in which there is a high degree of uncertainty.

This fear of making a false allegation against a family is part of the reason why physicians may underreport cases of child maltreatment. Underreporting child maltreatment can lead to potentially life-threatening situations for the maltreated child. There are many explanations for why physicians underreport child maltreatment cases; perhaps, they do not recognize the case as maltreatment, or if they are unsure, they do not want to falsely accuse a family. Resolving this issue requires education of physicians about the role of CPS and the process of what happens once a case is referred (4). A study by Cerezo showed that an abuse detection training program tripled the child abuse detection rates amongst a group of physicians in Spain (5).

Physicians may feel more comfortable reporting questionable cases of abuse if they knew that CPS had the option to consult a pediatric expert in difficult cases. This option could provide physicians with the assurance that CPS does indeed investigate each case thoroughly. The results of the study on expert second opinions could be used as part of a training program for physicians to educate them about the kinds of cases reported by

physicians that are substantiated as maltreatment, or shown to be non-maltreatment cases. This information may help physicians know what to look for when reporting child maltreatment and feel more comfortable making a report to CPS when they suspect child maltreatment.

It is sometimes difficult for physicians to make the judgment of whether the child in their office with an extremity fracture is a victim of child abuse or simply a child who sustained this injury from a fall. Connecticut's law states that physicians are required to report all reasonable suspicions of child abuse, so a physician is expected to report a case when they have a reasonable suspicion, not proof, that child maltreatment occurred (6).

DART and Telemedicine

Yale-New Haven Children's Hospital has a program in place to review cases of suspected child maltreatment that are evaluated at the hospital, known as DART committee. DART stands for Detection, Assessment, Reporting, and Treatment. Cases in which the treating clinician suspects abuse or neglect are brought to the committee for review. One goal of the committee is to identify children at risk of maltreatment, and provide the child and his or her family with supportive services. Another goal is to discuss cases of possible abuse and provide clinicians with expert opinions as to the next course of management. The DART committee raises awareness about child maltreatment among clinicians, and offers consultations and support to clinicians who need help in determining whether a case qualifies as abuse (7).

Programs such as the DART committee are useful because they provide clinicians with an easily accessible method of obtaining a second opinion about a case they are

concerned may be one of child maltreatment. However, not all hospitals or clinics have the resources to provide a program similar to DART for their clinicians. For these other institutions, telemedicine is a good alternative to provide an on-site child abuse review committee. Telemedicine involves a child abuse expert at a remote location who reviews a case or examines a potential victim of child abuse over the internet. Telemedicine allows for rapid expert opinions in cases of questionable child abuse, and expert consultations to rural areas that do not have local child abuse experts. Often times, the second opinion helps the initial physician determine what to do with a case and whether to refer the case to CPS.

The Children's Hospital Medical Center of Cincinnati offers a telemedicine program to physicians who want expert second opinions. Physicians and law enforcement officials who want a second opinion can post images and information about the case on a secure website and emergency medicine physicians specializing in child abuse at Cincinnati Children's Hospital review the case and provide an opinion. A benefit of this program is that already traumatized children do not have to travel to a foreign town and be seen by another set of doctors. In addition, the program saves children and families from false allegations of child abuse and referrals to CPS for unwarranted reasons (8). A study on telemedicine conducted in Florida in 2005 showed that the nurses who performed the consultations over the internet became comfortable with the digital format and style of performing examinations on a child electronically (9).

The DART committee and telemedicine are examples in which experts gather together to review cases and help each other make a determination of whether the case is child abuse and how to protect the child. Despite the use of telemedicine and the DART

committee to obtain second opinions, no studies to date have examined the effect of second opinions of a child abuse expert in cases referred to a CPS agency.

Family and Social Characteristics Associated With Cases of Substantiated Abuse

When CPS or a clinician is reviewing a case, many factors such as family characteristics, age of the child, and the circumstances surrounding the injury are taken into account when forming an opinion about whether or not child maltreatment has occurred. When assessing whether an injury is likely due to abuse, characteristics of the family, such as race, social history, substance abuse, and family violence are strong predictors of the decision to substantiate the case as one of abuse (10). Benbenishty's study found that traits of the child, such as gender, were less predictive of substantiated child abuse by CPS, than were characteristics of the family. The strongest predictor of whether a case is substantiated as one of child abuse is whether there is a previous report of child abuse in that family to CPS.

Studies have shown that minority children have higher rates of substantiated child abuse than do white children. In addition, in one study, skeletal radiographic surveys (X-rays of all the child's bones) were ordered more often for minority children with fractures than for white children with the same types of fractures (11). The authors of this study found that while minority children did indeed have higher rates of substantiated abusive fractures, they were also more likely to be falsely reported for suspected abuse than were their white counterparts. Thus, racial bias does exist in reporting of fractures suspected from child abuse, and this is an important point to consider in the evaluation of such cases.

The gender of caregivers is an important factor in the evaluation of child maltreatment. Leventhal (2000) noted that males in the household are responsible for the majority of serious cases of child abuse. In addition, he noted that it is always important to consider an underlying medical problem, such as a clotting disorder or osteogenesis imperfecta, when considering injuries to children (12).

Age of the mother or primary caretaker is another important factor to consider when analyzing cases of child maltreatment. Stier et al. found that maltreatment was more common in children born to young mothers (18 years or younger at time of child's birth). Having a teenage mother puts children at increased risk of child maltreatment and for having a change in their primary caretakers, as compared to children of older mothers (13).

Purpose of Study

Studies on decision-making concerning child maltreatment have focused on the decision of mandated reporters to report to Child Protective Services (CPS) or clinicians to diagnose child maltreatment. Over the last several years, CPS has increasingly relied on child abuse pediatricians to provide advice about cases of suspected maltreatment. Despite these expert consultations, no previous study has reviewed consultations to child abuse pediatricians by CPS.

In this study, we examined child abuse expert consultations by Drs. Leventhal and Bechtel for DCF in the state of Connecticut between March 1, 1998 and June 30, 2005. We sought to determine the types of child abuse cases that were referred to child abuse experts for second opinions and the assessment of the cases by the initial treating

physician, DCF, and the child abuse expert. In addition, we examined the types of cases where the initial physician, DCF, and the expert either agreed or disagreed about the likelihood of abuse.

There were several specific aims of this study:

1. To describe the types of cases referred by CPS to the child abuse expert
2. To describe the types of evaluations performed by the child abuse expert.
3. To describe the conclusions and recommendations of the expert
4. To quantify the cases in which the initial treating physician/CPS/and the expert agree and disagree.
5. To determine if expert second opinions are useful to CPS in their evaluation of a case of suspected child maltreatment.

METHODS

Setting

In the state of Connecticut, mandated reporters, such as physicians, nurses, dentists, therapists, teachers, clergy, and social workers, are required by law to report suspected child maltreatment to the Department of Children and Families (DCF), the state's child protective service agency. DCF then investigates these cases and comes to a conclusion about whether or not to substantiate child maltreatment. As part of the investigation, DCF can ask a child abuse expert to consult on the case and offer a second opinion as to how the injuries may have occurred. In the state of Connecticut, DCF seeks second opinions for cases from the Northern half of the state from Dr. Frederick Berrien at St. Francis Hospital in Hartford and from the Southern half of the state from Drs. John M. Leventhal and Kirsten Bechtel at Yale-New Haven Children's Hospital. The second opinions add information that helps DCF make its final assessment of the case.

Selection of Sample

All cases of suspected child maltreatment referred by DCF to a child abuse expert at Yale-New Haven Children's Hospital between 3/1/1998 and 6/30/2005 were reviewed. Cases from the DART committee (the child abuse committee) at Yale-New Haven Hospital were not eligible for the study.

Cases were excluded for the following reasons:

- 1) Cases of sexual abuse were excluded because they were few in number and of a different nature than cases of abuse or neglect .

- 2) Cases without information on the assessment of the case by the child abuse expert were excluded.
- 3) Some cases were missing a substantial amount of information from the file (e.g. no information from DCF or the initial treating physician) and were therefore excluded.

Review of Records

Lindsay McGuire and three undergraduate research assistants reviewed the records for each case. The record included notes by the child abuse expert and this/her letter to DCF, DCF notes written by the DCF social worker, hospital records, and any other information in the file such as police records, interview transcripts, or photos of the child. An abstraction form was developed to record this information (See Appendix for Abstraction Form). Information recorded included demographics, information about the type of injury, the primary complaint of the caretaker about the child's injury, the explanation of the injury by the caretaker, the social history of the family, the medical history of the child, and the assessments of the case by the physician who initially evaluated the child, by DCF, and by the child abuse expert. Information also was recorded regarding tests reviewed and ordered by the expert, as well as if the expert examined the child or interviewed family members of the child. This study was approved by the Yale Human Investigations Committee (HIC # 27668).

Five procedures were developed to ensure consistency and accuracy in abstractions:

1. Coding criteria were developed so that information on the evaluation of the initial physician, DCF, and the expert could be coded in a systematic way.
2. All three abstractors discussed each case where there was a question concerning how to code any of the items in the abstraction form.
3. 15% of cases were checked at random by Lindsay McGuire and/or by John M Leventhal, MD to check for accuracy in abstractions.
4. Sixty cases were randomly selected by a computer program to be separately abstracted by two abstractors and were then checked for consistency. In instances where there was a disagreement between the two abstractors, Lindsay McGuire or John M. Leventhal, MD reviewed the case with the original two abstractors and made a decision.
5. During data entry, several cases were entered by each abstractor to ensure accuracy in all data entry.

Variables

Listed below are the major variables abstracted from the records

Demographic Information

- 1) Birth date of child
- 2) Gender of child
- 3) Race of child
- 4) Town where the child lived
- 5) Who the primary caretaker of the child was
- 6) Who was caring for the child at the time of event

- 7) Ages of the caretakers

Problem with Child

- 1) Information on the primary complaint of the caretaker at the time of event was recorded, (i.e. what made them realize there was a problem with their child).
- 2) The date of the event
- 3) Whether the caretaker sought medical care for the child
- 4) Where the caretaker sought medical care for the child
- 5) If the child was hospitalized and the dates of hospitalization
- 6) The injuries the child sustained
- 7) How the caretaker explained the cause of those injuries

Initial Medical Care

- 1) What medical tests/evaluations were done to the child when the child first sought medical care and the results (normal or abnormal) of those tests.

Tests/evaluations included X-rays, MRIs, CT scans, photos, eye exams, skeletal surveys, and bleeding studies.
- 2) Evidence of old injuries
- 3) Any disagreements between physicians treating the child about the likelihood of child abuse was recorded

DCF

- 1) Who contacted DCF

- 2) The identity of the suspected perpetrator
- 3) Interventions by DCF, such as taking a 96-hour hold on the child, placing the child in temporary or permanent foster care, or providing parental education, were recorded.

Child Abuse Expert Evaluation

- 1) The type of evaluation performed by the child abuse expert, (e.g., did the expert interview or examine the child and/or interview other family members).
- 2) What types of medical tests ordered by the initial examining physician were reviewed by the expert.
- 3) What types of new medical tests the expert ordered, and if those new tests revealed any new findings.
- 4) If the child abuse expert consulted with any other medical specialists. Any time the child abuse expert reviewed X-rays, he/she always reviewed them with a pediatric radiologist, and so we did not code the pediatric radiologist in this variable.

Injuries to Child

All injuries to the child found by either the initial physician or the expert were recorded under the overall medical results of concern section of the abstraction form.

Past Medical History

- 1) Any significant medical/psychological problems of the child (e.g., autism, ADHD, or cerebral palsy).
- 2) Past visits to the emergency department (including the date of visit and the reason for the visit).
- 3) Past history of concerning injuries to the child.

Social History

- 1) History of substance abuse by a member in the home, including who was the offender of the substance of abuse.
- 2) Violence in the home, including who committed the violence .
- 3) History of arrests of someone in the family was recorded, and it was noted if a violent crime was committed.
- 4) Previous concerns or confirmations by DCF of abuse to this child or the child's siblings.

Child Abuse Expert Suggestions

- 1) What kinds of medical tests were ordered by the expert.
- 2) Suggestions of the child abuse expert (e.g. send child home, place child in foster care, parental education, further DCF investigation, etc).

Assessment of Case

The assessments of the case by the physician, DCF, and the expert were recorded. The assessment of the case means whether the physician, DCF, or the expert believed the case to be one of child maltreatment (including neglect or abuse or both), or of benign cause (including accidental injury, having a medical explanation, or resulting from a birth injury). A 5-point scale was created to rate each assessment. The 5-point scale ranged from 1=definite child maltreatment, 2=probable child maltreatment 3=uncertain 4=probable benign cause and 5=definite benign cause. After a preliminary review of records, we realized that the choices for child maltreatment were either abuse, neglect, or both abuse and neglect and the choices for benign cause were either accidental injury, medical explanation, or a birth injury. In order to account for these possibilities, we used three possible anchors on one side of the scale (abuse, neglect, or both) and one of three possible anchors on the other side of the scale (accident, medical problem, or birth injury). The abstractor first had to choose one anchor from the abuse set of anchors and one anchor from the benign set of anchors. The abstractor then used the 5-point scale as described above (1=definite left anchor, 2=probable left anchor, 3=uncertain, 4=probable right anchor, and 5=definite right anchor) to rate the each opinion. There were three identical scales, one was used for the initial treating physician, one for DCF, and one for the expert. The same two anchors were used for all three opinions for an individual case.

In several of our analyses of the data we grouped the five point opinion scale into a three point scale (maltreatment, uncertain, or accident), in order to make the tables easier to interpret. Definite and probable maltreatment were grouped into maltreatment, uncertain was left alone, and definite and probable accident were grouped into accidental.

We also grouped the anchors together for the final analysis. Accident, medical problem, and birth injury were grouped as accidental, and abuse and neglect were grouped as abuse.

The opinions of the physicians, DCF, and the expert obtained by reading and interpreting their notes in the record. To translate the written opinion into the 5-point scale, we created coding criteria to rate in a systematic manner the opinions and ensure consistency in ratings between abstractors. The following are a list of words or phrases from the written opinions that were used by the three abstractors to code the opinions. The abstractors looked for the following words or phrases in the written notes of the physicians, DCF, or the expert to make a decision about how to classify the opinion according to our 5-point scale.

1= Definite Abuse/Neglect: Most likely, most consistent with, consistent with, indicative of, highly concerned, very concerned, in all likelihood, appears to be, fairly sure.

2=Probable Abuse/Neglect: Likely, suspected, worried about, plausible.

3=Uncertain: Cannot be ruled out, I am not sure.

4=Probable Accident/Benign cause: Likely, suspected, worried about, plausible.

5=Definite Accident/Benign cause: No concern, benign cause, most likely, most consistent with, consistent with, indicative of, highly concerned, very concerned, in all likelihood, appears to be, fairly sure.

When an abstractor had a question about an opinion, the abstractors reviewed the case together and reached consensus.

Analysis

Kimberly Martin and Katherine Ellingson analyzed the demographic variables, type of injuries variables, and outcome data. SAS Version 9.1 was used for the analyses. We calculated frequencies for the main variables and examined associations between variables using chi square tests. We also evaluated the percent agreement among the three assessors.

Researchers

Study Design – John M. Leventhal, Lindsay McGuire, Kimberly Martin, Katherine Ellingson, Kirsten Bechtel.

Medical Record Review/Data Entry – Lindsay McGuire, Maura Kennedy, Charon Smalls, Julie Monteagudo

Data Analysis – Kimberly Martin (primary statistician), Katherine Ellingson (statistician), John M. Leventhal, Lindsay McGuire

RESULTS

Social and Demographic Characteristics

Of 225 cases referred from CPS to an expert for a second opinion, 17% were excluded for the following reasons: sexual abuse (7 cases) and not enough information in the file (31). Table 1 shows the demographic characteristics of the final sample.

Table 1: Demographic characteristics of sample

Characteristics	% of 187 total cases
Gender	
Male	49%
Ethnicity	
African-American	30%
White	28%
Hispanic	23%
Asian	1%
Unknown	17%
Age	
<6 months	26%
6 months -11 months	24%
1 to 4 years	29%
> 4 years	21%
CPS Regional Office	
Southwestern Region	33%
South Central Region	33%
Eastern Region	13%
North Central Region	7%
Northwestern Region	10%
Unable to be determined	4%

Twenty-four cases involved children with teenage mothers between the ages of 16 and 19, 6 cases involved children with teenage fathers. The mean age of the mothers was 27 years old, and the mean age of the fathers was 30 years old. Age of parent was missing for 59 mothers (32%) and 96 fathers (51%).

Clinical Characteristics of Cases

Table 2 shows some of the clinical characteristics of the cases including who the primary caretaker of the child was at the time of the incident that caused harm to the child.

Table 2: Clinical characteristics of cases

Characteristics	% of 187 total cases
Primary caretaker of child at time of event	
Mother	31%
Mother and Father	16%
Father	13%
Teacher	8%
Another relative/family friend	8%
Mother's boyfriend	6%
Foster Care Parent	4%
Unknown	14%
Primary complaint upon presentation to health care facility	
Injury to extremity (swelling or pain)	35%
Skin problem (bruising or abrasion)	14%
Burn	14%
Injury to head or face	10%
Neurological problem	3%
Fracture	2%
Death	.5%
Other symptoms (fever, vomiting, diarrhea, crying)	17%
Complaint not clearly specified in chart	4%
Caretaker's explanation of mechanism of injury to child	
Child fell	24%
Caretaker did not know how child got hurt	23%
Caretaker accidentally injured child (e.g. dropped child, fell on child)	19%
Accidental burn	11%
No explanation given by caretaker	10%
Child accidentally injured him/herself	9%
Other explanation given by caretaker	5%

Seventy-five percent of the children were first taken to a hospital at the time of the injury/event. The two most common hospitals children in this study were taken to were Bridgeport Hospital (21 cases) and Yale-New Haven Children's Hospital (20 cases) (The cases included in this study from Yale-New Haven Children's Hospital were not

reviewed by the DART Committee). Twenty-four percent of children were taken to a clinic or pediatrician's office. In two cases, we could not determine which health care facility the child was taken to. Of all the cases, 38% eventually were hospitalized for their injuries.

Table 3 shows which tests were obtained to evaluate the children when they presented to the initial treating physician and the results of those tests; approximately half the children received an X-ray showing an abnormal result. The table also shows which of those tests obtained were reviewed by the expert, and in what percentage of cases reviewed the expert believed the test results were consistent with maltreatment. The expert reviewed 94% of the X-rays obtained of the children, and 40% of the time found those X-rays to be consistent with maltreatment to the child.

Table 3: Tests Performed on Children

What was done to evaluate child by initial treating physician	% cases receiving test N=187	% receiving test that showed abnormal result	% of tests obtained that were reviewed by expert	% of tests reviewed by expert thought to be consistent with maltreatment per expert
X-Ray	52%	92%	94%	40%
Skeletal Survey	48%	35%	90%	29%
Photos taken of child/location of injury	29%	--	93%	--
Head CT Scan	25%	61%	92%	40%
Eye Exam*	16%	34%	75%	23%
Bleeding Studies	13%	21%	77%	17%
MRI	5%	67%	80%	50%
Other test **	11%	--	64%	21%

*Eye exam was done by an ophthalmologist and report was reviewed by pediatrician

** Other tests include ultrasound, EEG, thyroid test, or upper GI series.

In 17% of cases, the tests revealed evidence of old injuries in the child. Of the old injuries identified, 91% were fractures, 6% were bruises, and 3% were subdural hematomas.

CPS Involvement

Table 4 shows three aspects of CPS involvement in the case, including who contacted CPS about the case, who CPS thought responsible, and CPS' intervention in the case. The table shows that 84% of the reports to CPS came from mandated reporters. CPS thought one or both of the parents was responsible in 69% of cases. CPS removed the child from the home in less than half of cases (44%). If CPS did more than one intervention on a family, we chose to show the most important intervention in Table 4. We used the following scale (from most important to least): removed child from home, further investigation, provided services to the family, no further action, and, unknown.

Table 4: Characteristics of CPS involvement

Characteristics	% of cases (N=187)
Who contacted CPS about the case	
Health care provider	71%
Teacher	10%
Family friend	3%
Social worker	3%
Mother	2%
Relative	2%
Foster parent	1%
Unknown who contacted CPS	8%
Who CPS thought was responsible for suspected maltreatment	
Mother	36%
Mother and father	26%
Father	7%
Mother's boyfriend	5%
Foster care parent	3%
Another relative	2%
Teacher	2%
Family friend	1%
CPS could not determine who was the suspected perpetrator	17%
Interventions taken by CPS in the case	
Removed child from home	44%
Further investigation conducted	27%
No further action taken	6%
Provided family with support/education	5%
Unclear what CPS did to intervene	17%

Expert's role in the case

Dr. Kirsten Bechtel reviewed 18% of the cases, and Dr. John Leventhal reviewed 82%.

In 43 of the 187 cases (23%), the expert saw the child in person. When the expert saw the child, the following were performed: physical exam (70%), physical exam and interview (28%), interview without physical exam (2%). In the 77% of cases when the experts did not see the child directly, they reviewed the information provided by DCF.

In 32 of the 187 cases (17%), the expert also interviewed the caretaker of the child about the events related to the child's injury. The following caretakers were interviewed: mother (52%), mother and father (35%), father (3%), maternal grandmother (3%), foster care parent (3%), and residential facility worker (3%).

In 32 of the 187 cases (17%) the expert ordered new tests to be obtained on the child. Table 5 shows the new tests that were ordered by the expert, and if the expert believed the test results were consistent with maltreatment.

Table 5: New Tests Ordered by Expert

Test ordered by expert	Percentage of cases receiving test N=187	Percentage of cases receiving test that showed result consistent with maltreatment
X-Ray	2%	100%
Skeletal Survey	10%	40%
Photos taken of child/location of injury	3%	67%
Head CT Scan	2%	0%
Eye Exam	0.5%	0%
Bleeding Studies	0.5%	0%

In 2% of cases the expert ordered new X-rays on a child, and in all three of those cases found the results of the X-ray to be consistent with maltreatment. Of the 32 cases in which new tests were ordered by the expert, in 9 cases the new tests revealed new findings pertinent to the case, and in the remaining 23 cases the new tests did not reveal

new findings. In 2 of the 9 cases in which the new tests revealed new findings, the additional tests/photos ruled out initial findings of injury in the child, and in the other 7 cases, the additional tests/photos ordered by the expert found a new injury in the child. Of the 7 new injuries found, 3 were fractures, 1 was an abrasion, 1 was a rash, 1 was a marking on the skin, and 1 was blue sclera.

In 20 cases (11% of 187) the expert discussed the case with another health professional such as: another pediatrician (9 cases), an emergency department doctor (4 cases), a dermatologist (2 cases), a psychiatrist (1 case), a burn specialist (1 case), a pulmonary specialist (1 case), a dentist (1 case), or an ophthalmologist (1 case).

Table 6 shows the overall injuries for the 187 cases, including those found by the initial doctors who saw the child and those found by the expert. The most common injury was a fracture or dislocation (46%) followed by a skin finding that included bruises, abrasions, scars, or rashes. In Table 6, we have prioritized the injuries and only recorded the most serious injury on each child, so the overall number of injuries adds to 100%. The severity of the injuries in order was: death, brain hemorrhage, retinal hemorrhage, burn, fracture/dislocation, skin problem, other, and no injury.

Table 6: Overall Injuries to Child (by the most severe injury per child)

Most severe Injury	Percentage of cases in which this injury was found N=187
Fracture, dislocation*	46%
Skin problem (e.g., bruise, abrasion)	22%
Burn	13%
No Injury Found	5%
Brain Hemorrhage	4%
Death	2%
Retinal Hemorrhage	1%
Other (swelling, insect bites, blue sclera)	7%

*In this category most were fractures and there were only 3 cases of a dislocation

Past Medical History of the Child

Fifteen percent of the children had a past medical history of concerning injuries to the child. Concerning injuries were noted in the chart by CPS or a physician as possible maltreatment. Twenty percent of the children had previous ED visits noted in their records.

Twenty percent of the children had a history of a significant medical or psychiatric problem. Eleven children had a mental health or psychiatric problem, including autism, PTSD, mental retardation, bipolar disorder, or depression. The other 26 had a physical or medical problem, including asthma, epilepsy, cerebral palsy, hypothyroidism, anemia, AIDS, or blindness.

Social History of the Family

Table 7 shows the social characteristics of the families; 23% of families had a history documented in the record of substance abuse in the past or at the time of the event. When substance abuse was present, in 44% of cases it was the father, in 33% of cases it was the mother, in 12% of cases it was both parents, in 5% of cases it was the mother's boyfriend, in 2% of cases it was another family member, and in 5% of cases it was unknown who the substance abuser was. Twenty six percent of families had a history of violence in the home in the past or at the time of the event that was documented in the record. In the cases of violence, 61% of cases had the father as the violent offender, in 12% of cases both parents were violent, in 10% of cases the mother was the violent offender, in 6% of cases the mother's boyfriend was the violent offender,

in 2% of cases an uncle was the violent offender, and in 8% of cases it was unable to be determined.

Table 7: Social History of Family

Social Characteristic	% of cases N=187
History of Substance Abuse	
Not mentioned in chart	40%
No history	37%
Past history	18%
At time of event	5%
History of Violence in the home	
Not mentioned in chart	42%
No history	32%
Past history	23%
At time of event	3%
History of arrests of members of home	
Not mentioned in chart	46%
No history	32%
Yes	22%

Twenty-two percent of families had a history of an arrest of a family member documented in the record. In 67% of these cases a violent crime was committed that warranted the arrest. When an arrest was made it was the: father (48%), mother (17%), both parents (12%), mother's boyfriend (12%), uncle (2%), and unknown (10%).

In 46 cases (25% of 187) the children were already on record with CPS for a concern of maltreatment. Of these 46 cases, 27 of them had been confirmed by CPS to be maltreatment. Of the 187 cases, in 23 cases (12%) CPS had confirmed maltreatment of another child in the household in the past.

Opinions of the Cases

Table 8 highlights the opinions of the cases by the initial physician, CPS, and the expert for all 187 cases. In 41% of cases the expert thought the injury was definite maltreatment, whereas CPS thought definite maltreatment in only 33% of cases, and the physicians in 21% of cases.

Table 8. Opinion of cases. N=187

Opinion	Physician	CPS	Expert
Definite Maltreatment	21%	33%	41%
Probable Maltreatment	22%	16%	7%
Uncertain	21%	12%	9%
Probable Accident	2%	7%	13%
Definite Accident	11%	12%	30%
*Unable to determine	23%	20%	0%

*Unable to determine means that based on the data available the researchers were unable to determine the opinion of the physician, CPS, or the expert.

In Tables 10, 11, and 12 we excluded cases in which either the expert, CPS, or the initial physician had an “unable to be determined” opinion, and we were left with 119 cases. “Unable to be determined” means that based on the information in the child’s record, the researchers could not determine what the opinion of one of the assessors was, either because the information was missing from the file or the assessor did not give a clear opinion. In order to simplify these tables, we collapsed the five-point scale into a three-point scale of abuse (definite and probable), uncertain, and accident (definite and probable). We also collapsed the anchors into maltreatment (including abuse and neglect), and accidental (including medical causes and birth injuries). Table 9 shows a comparison of the 119 cases with opinions for all three assessors compared to the 68 remaining cases that were missing an opinion for one of the assessors. We can see there are no statistically significant differences between the two groups in terms of gender, race, age, or most serious overall injury to the child.

Table 9: Comparing characteristics of 119 cases with opinions for all 3 assessors vs. the remaining 68 cases

Characteristics	Cases with 3 opinions N=119	Cases lacking an opinion N=68
Gender		
Male	56 (47%)	36 (53%)
Race		
African American	36 (30%)	21 (31%)
Hispanic	25 (21%)	18 (26%)
Caucasian	41 (34%)	11 (16%)
Unknown	15 (13%)	16 (24%)
Other	2 (2%)	2 (3%)
Age		
0-12 months	64 (54%)	30 (44%)
1 to 4 years	37 (31%)	17 (25%)
Over 4 years	18 (15%)	21 (31%)
Most serious overall injury		
No Injury	4 (3%)	6 (9%)
Fracture/Dislocation	62 (52%)	24 (35%)
Burn	18 (15%)	6 (9%)
Skin Problem (bruise, abrasion)	20 (17%)	22 (32%)
Death	2 (2%)	1 (2%)
Retinal Hemorrhage	2 (2%)	0
Brain hemorrhage	5 (4%)	2 (3%)
Other	6 (5%)	7 (10%)

Table 10 compares the opinion of the expert and the physician for the 119 cases. In 57% of cases the expert agreed with the physician on whether the case was abuse, uncertain, or accidental. Table 10 also shows that the physician was uncertain in 30 cases (25%), but the expert was only uncertain in 9 cases (8%). Uncertain means that the physician or the expert could not decide whether the case was due to abuse or accident. In 21 of the 68 cases (31%) in which the treating physician thought abuse, the expert determined the case to be accidental. When the treating physician was uncertain about the case, the expert found the case to be accidental roughly two thirds of the time, and determined it to be abusive 17% of the time. When the physician thought the case was accidental, the expert rarely found it to be one of abuse (14%). The physician is more

sensitive (94%) at detecting abuse cases than specific (46%) at detecting non-abuse cases¹.

Table 10: Physician's opinion of case vs. Expert's opinion for 119 cases

Physician's Opinion		Expert's Opinion			Total
		Abuse	Uncertain	Accidental	
Physician's Opinion	Abuse	44	3	21	68 (57%)
	Uncertain	5	6	19	30 (25%)
	Accidental	3	0	18	21 (18%)
	Total	52 (44%)	9 (7%)	58 (49%)	119 (100%)

Table 11 demonstrates the relationship of the expert's opinion to CPS' opinion of the case. In 65% of cases the expert agreed with CPS on whether the case was abuse, uncertain, or accidental. Again, the expert was less often uncertain (9 uncertain cases for the expert vs. 20 cases for CPS). The expert was also more likely to determine the case to be accidental (58 cases) compared to CPS (30 cases). When CPS thought abuse, the expert most often agreed it was abuse (72% of cases), and in 22% of cases disagreed and determined the case to be accidental. When CPS was uncertain about a case, the expert determined it to be accidental 90% of the time. The expert determined that 2 out of 30 cases that CPS thought to be accidental were abusive in nature. CPS is more sensitive (96%), at detecting abuse cases than specific (63%) at detecting non-abuse cases².

Table 11: Expert's opinion of case vs. CPS' opinion for 119 cases

CPS' Opinion		Expert's Opinion			Total
		Abuse	Uncertain	Accidental	
CPS' Opinion	Abuse	50	4	15	69 (58%)
	Uncertain	0	2	18	20 (17%)
	Accidental	2	3	25	30 (25%)
	Total	52 (44%)	9 (7%)	58 (49%)	119 (100%)

¹ Sensitivity of the physician detecting abuse is calculated as $44/(44+3)=94\%$, and specificity is calculated as $18/(21+18)=46\%$.

² Sensitivity of CPS detecting abuse is calculated as $TP/(TP+FN)$, or $50/(50+2)=96\%$. Specificity is calculated as $TN/(FP+TN)$. In this example $Specificity = 25/(15+25)=63\%$.

Table 12 shows CPS' opinion compared to the physician's opinion of the cases. In 62%, of cases CPS agreed with the physician on whether the case was abuse, uncertain, or accidental.

Table 12: CPS' opinion of case vs. Physician's opinion for 119 cases

		Physician's Opinion			Total
		Abuse	Uncertain	Accidental	
CPS' Opinion	Abuse	55	8	6	69 (58%)
	Uncertain	8	8	4	20 (17%)
	Accidental	5	14	11	30 (25%)
Total		68 (57%)	30 (25%)	21 (18%)	119 (100%)

Of the 187 total cases, 150 cases had opinions for CPS and the expert. For these 150 cases we divided them into two groups: children less than a year old and children one year and older. Table 13 shows the relationship between the expert's opinion and CPS' opinion for all cases involving children less than one year of age. Of the 75 cases involving children under a year of age, the expert and CPS agreed on the case being either abuse, uncertain, or accidental 71% of the time. In addition, in this age group, CPS and the expert agreed that it was abuse in 42 cases (56%).

Table 13: Expert's vs. CPS' opinion for cases involving children <1years (N=75)

		Expert's Opinion			Total
		Abuse	Uncertain	Accidental	
CPS' Opinion	Abuse	42	3	8	53 (71%)
	Uncertain	1	2	9	12 (16%)
	Accidental	0	1	9	10 (13%)
Total		43 (57%)	6 (8%)	26 (35%)	75 (100%)

Table 14 shows the 75 cases involving children one year of age or older. The expert agreed with CPS on the case being either abuse, uncertain, or accidental 68% of the time (51 cases), compared to 71% agreement in cases of children under one year of

age. The expert found 41% of cases in children one year and older to be the result of abuse, compared to 57% of cases the result of abuse in children under one year of age.

Table 14: Expert’s vs. CPS’ opinion for cases involving children one year old older (N=75)

		Expert’s Opinion			Total
		Abuse	Uncertain	Accidental	
CPS’ Opinion	Abuse	29	2	8	39 (52%)
	Uncertain	0	1	10	11 (15%)
	Accidental	2	2	21	25 (33%)
	Total	31 (41%)	5 (7%)	39 (52%)	75 (100%)

Table 15 shows how the expert’s opinion relates to the caretaker’s account of how the injury occurred. Overall, the expert thought 48% of the cases were abuse. When no account was given by the caretaker (18 cases), meaning the caretaker did not provide the physicians or CPS with an explanation for how the injury occurred, the expert found the case one of abuse 72% of the time and accidental 22% of the time. When the caretaker explained the injury as a fall by the child or an accidental injury by the child, the expert was less likely to determine the case to be abuse (35% and 31%), and more likely to determine the case to be accidental (58% and 56%).

We used a chi square test to evaluate the relationship between the expert’s opinion and whether or not an explanation was given. We grouped falls, accidental injuries reported by adults, accidental burns, child’s accidents, and others into the category of explanation given. The other two categories were: no explanation given and no information about the history in the record (“unknown”). We examined these three categories for abuse vs. accidental injury for the expert’s opinion. Within these constraints, 51% of the cases with a history were rated as abuse vs. 76% with no history, and 45% with unknown history (P=0.08).

Table 15: Expert's opinion of the case compared to caretaker's account of how the injury occurred

Caretaker's Account of Injury	Expert's Opinion of case			Total N (% of row)
	Abuse N (% of row)	Uncertain N (% of row)	Accidental N (% of row)	
Fall	16 (35%)	3 (7%)	26 (58%)	45 (24%)
Unknown	17 (40%)	5 (11%)	21 (49%)	43 (23%)
Accidental Injury by Adult*	19 (53%)	4 (11%)	13 (36%)	36 (19%)
Accidental Burn	11 (55%)	1 (5%)	8 (40%)	20 (11%)
None Given	13 (72%)	1 (6%)	4 (22%)	18 (10%)
Child's Accident**	5 (31%)	2 (13%)	9 (56%)	16 (8%)
Other	8 (89%)	0	1 (11%)	9 (5%)
Total	89 (48%)	16 (8%)	82 (44%)	187

* e.g. adult accidentally dropped child, fell on child. ** i.e. child did something to him/herself to injure him/herself

Table 16 shows the expert's opinion as it relates to the most severe overall injury of the child (this includes injuries found by the initial treating physician as well as injuries identified at a later time by the expert). The injury most associated with abuse was brain hemorrhage: 86% of the time the expert believed it was inflicted, and in no cases did the expert find brain hemorrhage to be accidental. In contrast, fractures/dislocations were the injury least often associated with abuse (37% of fractures were found to be the result of abuse). We used a chi square test to examine if there was a statistically significant association between the expert's opinion compared to the type of injury. In order to construct a two by two table for the analysis, we grouped the injuries into serious injuries (including burns, brain hemorrhage, death, and retinal hemorrhage) and less serious injuries (including fracture/dislocation, Bruise/abrasion, and other), and we took out the uncertain category. Statistical significance was almost reached (P=0.064), with the expert more likely to find a not serious injury linked to abuse (62% vs. 47%).

Table 16: Experts opinion of the case compared to the overall injuries to the child

Injuries to the Child	Expert's Opinion of case			Total
	Abuse	Uncertain	Accidental	
Fracture/dislocation	32 (37%)	8 (9%)	46 (53%)	86
Bruise, abrasion, scar	26 (62%)	3 (7%)	13 (31%)	42
Burns	12 (50%)	2 (8%)	10 (42%)	24
Brain Hemorrhage	6 (86%)	1 (14%)	0	7
Death	1 (33%)	0	2 (67%)	3
Retinal Hemorrhage	1 (50%)	0	1 (50%)	2
Other	6 (46%)	1 (8%)	6 (46%)	13
No Injury	5 (50%)	1 (10%)	4 (40%)	10
Total	89	16	82	187

Table 17 shows the relation between the mother's age at the time of the event and the expert's opinion. In cases where the mother was 18 years or younger at the time of the event, the expert believed the incident to be abuse 79% of the time, as compared to only 49% of the time when the mother was over age 18. To examine the association between the mother's age and opinion of the expert, we removed cases where the mother's age was unknown and the uncertain category. A borderline statistically significant association was found between the mother's age being 18 years or younger and the expert finding the case to be the result of abuse ($P=0.068$).

Table 17: Experts opinion of the case compared to age of mother at time of event

Age of Mother	Expert's Opinion of case			Total
	Inflicted	Uncertain	Accidental	
≤18 years	11 (79%)	0	3 (21%)	14
>18 years	56 (49%)	8 (7%)	50 (44%)	114
Unknown age	22 (37%)	8 (14%)	29 (49%)	59
Total	89	16	82	187

Table 18 compares the expert's opinion of the case with the race of the child. The percentage of the cases believed to be abuse by the expert the expert was similar across races of African-American, Hispanic, and Caucasian (53%, 40%, and 54%), which was not statistically different.

Table 18: Experts opinion of the case compared to the race of the child

Race of the Child	Expert's Opinion of case			Total
	Inflicted	Uncertain	Accidental	
African-American	30 (53%)	2 (4%)	25 (44%)	57 (30%)
Hispanic	17 (40%)	6 (14%)	20 (46%)	43 (23%)
Caucasian	28 (54%)	4 (8%)	20 (38%)	52 (28%)
Unknown	12 (39%)	4 (13%)	15 (48%)	31 (17%)
Other	2 (50%)	0	2 (50%)	4 (2%)
Total	89 (48%)	16 (8%)	82 (44%)	187

Twenty percent of children in the study had a history of a significant medical or psychological problem. Table 19 demonstrates that in cases where the child has a significant medical or psychological problem the expert was more likely to determine the case to be abuse (57%) and less likely to determine the case to be accidental (38%) compared to cases where the child had no significant medical or psychological problem (48% abuse and 45% accidental). This difference was not statistically significant.

Table 19: Expert's opinion of the case compared to child's history of past medical or psychological problem

Past medical or psychiatric problem?	Expert's Opinion of case			Total
	Abuse	Uncertain	Accidental	
Yes	21 (57%)	2 (5%)	14 (38%)	37 (20%)
No	41 (48%)	7 (8%)	37 (45%)	85 (45%)
No Mention	27 (42%)	7 (11%)	31 (48%)	65 (35%)
Total	89 (48%)	16 (8%)	82 (44%)	187 (100%)

Twenty-five percent of children in the study had a concern of maltreatment in the past on record with CPS. Table 20 demonstrates that in cases where the child had a concern for maltreatment in the past, the expert was more likely to determine the case to be abuse (59%) and less likely to determine the case to be accidental (35%) compared to cases where the child had no concern for maltreatment in the past (48% abuse and 46% accidental). To examine the association between the expert's opinion and a concern of

maltreatment in the past, we combined the no and no mention categories and removed the uncertain category. Within these limitations, no significant association was found (P=0.10).

Table 20: Expert’s opinion of the case compared to a concern about maltreatment of the child in the past on record with CPS

Concern of maltreatment in past?	Expert’s Opinion of case			Total
	Abuse	Uncertain	Accidental	
Yes	27 (59%)	3 (7%)	16 (35%)	46
No	39 (48%)	5 (6%)	37 (46%)	81
No Mention	23 (38%)	8 (13%)	29 (48%)	60
Total	89	16	82	187

Table 21 demonstrates the relationship between the expert’s opinion of the case and the intervention taken by CPS with the family before the expert reviewed the case. When CPS removed the child from the home, the expert was more likely to find the case one of abuse (67% of time), compared to uncertain, or accidental. Another way to look at the same data is when the expert found the case to be one of abuse, CPS was most likely to have removed the child from the home (56 of 89 cases, or 63% of the time). When CPS decided no further action was needed with the family, the expert was most likely to find the case to be accidental (92% of cases). In 20 cases where the child was removed from the home, the expert found the case to be accidental. We can only assume that after CPS read the expert’s evaluation of the case the child was returned home.

Table 21: Experts opinion of the case compared to CPS intervention in case

Intervention taken by CPS	Expert’s Opinion of case			Total
	Abuse	Uncertain	Accidental	
Removed child from home	56 (67%)	7 (8%)	20 (24%)	83
Provide services, education	7 (70%)	1 (10%)	2 (20%)	10
Further investigation	14 (28%)	6 (12%)	30 (60%)	50
No further action	1 (8%)	0 (0%)	11 (92%)	12
Unknown	11 (34%)	2 (6%)	19 (59%)	32
Total	89	16	82	187

Table 22 compares the opinion of the expert to the number of overall injuries to the child. In some instances a child had one injury (e.g., a fracture), but in some cases a child had two or three injuries (e.g., a fracture, bruise, and burn). Table 22 demonstrates that if a child had zero to two injuries the expert found the case to be abusive 45% of the time, compared to 88% of the time if the child had 4 to 6 injuries. The expert found none of the cases to be accidental if the child had over 3 injuries. These differences were statistically significant, with the uncertain category removed ($P=0.01$).

Table 22: Experts opinion of the case compared to number of different overall injuries to child

Number of different Injuries to Child	Expert's Opinion of case.0			Total
	Abuse	Uncertain	Accidental	
0-2	75 (45%)	14 (8%)	79 (47%)	168
3	7 (64%)	1 (9%)	3 (27%)	11
4-6	7 (88%)	1 (12%)	0 (0%)	8
Total	89	16	82	187

Suggestions Made By Expert

The expert made the following suggestions for the cases: continue investigation (24%), obtain more medical tests (14%), remove child from home (9%), provide family with supportive and educational services (6%), send child home and close the case (6%), and no suggestions made (56%)

In 14% of cases the expert suggested that further medical tests be ordered on the child before closing the investigation. The further medical tests were not reviewed as part of the case, but rather were a recommendation by the expert for CPS to do in the future. The medical tests most often suggested were a skeletal survey (52%), an X-ray (7.5%), a genetic test (7.5%), a skin biopsy (7.5%), a physical exam (7.5%), an eye exam (4%), an evaluation for osteogenesis imperfecta (4%), a behavioral evaluation (4%), and an evaluation by an orthopaedic specialist (4%).

DISCUSSION

In this study, which is the first to examine expert second opinions to CPS on cases of suspected child abuse, we found that the expert's opinion differed from the physician's opinion in 43% of cases, and from CPS' opinion in 35% of cases. These differences demonstrate the usefulness of an expert's second opinions because there are a substantial number of cases where the expert changed the opinion of the case.

By the time the expert reviewed the case, many imaging studies had already been performed on the children. However, we highlight the importance of the expert in ordering new imaging studies, since in 9 cases these additional imaging studies were essential in either finding a new injury or ruling out what was previously thought to be an injury based on a previous test. Thus, after reviewing the case, the expert can be useful in suggesting further studies that can find other occult injuries.

The expert is useful in providing a definitive opinion for the case when the other assessors are uncertain. The physician and CPS were more likely to be uncertain about the case (30 cases for the physician and 20 for CPS), compared to only 9 uncertain cases for the expert. Reasons for the expert being uncertain less often could include that the expert has more experience in evaluating cases of suspected child abuse, the expert has more data to review on the case, and the expert can dedicate more time to review each case in depth.

An extremely useful role for the expert is in the cases in which the physician or CPS believed the case to be abuse and the expert determined the case was accidental. This occurred in 21 cases when the physician thought it was abuse and in 15 cases when CPS thought it was abuse but the expert determined the injury to be accidental. This

decision has important repercussions for both the family and the child. An equally important role for the expert is when the physician or CPS believed the case to be accidental and the expert determined the case to be abuse; these cases may have been missed were it not for the expert highlighting them as cases of abuse. This occurred in only 3 cases where the physician believed the child to be accidentally injured and in 2 cases where CPS thought the case was an accident but the expert determined the case to be abuse. It is reassuring that this occurred in a very small number of cases, suggesting that few cases of abuse are being missed.

Not surprisingly, our results also demonstrate that when a plausible explanation is given by the caretaker to explain the injury the expert is more likely to determine the case to be accidental; when no explanation is given by the caretaker the expert is more likely to find the case to be abuse. Although statistical significance was not attained ($P=0.08$), our results suggest that with a larger sample size, significance may have been attained. This can be useful to clinicians in practice when they encounter a child with a suspicious injury: if the caretaker is unable to provide an explanation for how the injury occurred, it is more likely to be a case of abuse compared to when the caretaker provides an explanation for the injury. Support for this comes from a review of 253 fractures in children younger than 3 years of age by Leventhal (1993). These authors found that when a caretaker did not report an accidental event that caused the fracture, or when the fracture was not consistent with the explanation of how the injury occurred, the fracture was more likely to be due to abuse (14).

The likelihood of the expert determining the case to be one of abuse also depends on the child's type of injury. Brain hemorrhages were found to be abusive in 86% of

cases, compared to fractures, which were found to be abusive in 37% of cases. Statistical significance was almost attained for serious vs. non-serious findings ($P=0.06$), with the association between non-serious injuries and the expert being more likely to find the case the result of abuse. This finding suggests that the injury severity may not be a strong predictor of the opinion of the expert due to our small sample size, or the fact that our sample was entirely referral cases, and thus may not be representative of all child maltreatment cases referred to CPS.

Our study also highlights that children with mothers under 18 years of age are more likely to have their injuries be classified as abuse by the expert compared to children with older mothers. This finding is similar to the findings of other studies and highlights the need for extra services and support for young mothers (13). Although our study did not show statistical significance ($P=0.06$), perhaps with a larger sample size and fewer unknown responses for the mother's age, statistical significance would have been attained.

Our study did not find a statistically significant difference in the expert's opinion of the case based on the race of the child. This is reassuring and suggests that racial bias was not a factor in the opinion rendered by the expert.

Our study did find statistical significance when examining the association between the child's number of injuries and the expert's opinion of the case. Thus, the greater the number of injuries to the child, the more likely the expert found that the injuries were abusive. In cases where the child had four or more separate types of injuries (e.g., a fracture, a bruise, a burn, and a brain hemorrhage), the expert found it to be abusive in 88% of cases. The fewer the number of separate injuries the child

sustained, the more likely the expert was to find the case accidental. This finding is useful in a clinical setting: the more injuries the child has sustained, the more likely it is that they were abusive injuries.

We have demonstrated that there are certain characteristics that make a child at higher risk of having their injury determined to be one of abuse by the expert. These characteristics included having a mother less than 18 years of age, having a significant medical or psychological problem, having a previous report of suspected maltreatment to CPS, and having more than three injuries to the child. These are all risk factors for a child to be a victim of abuse and should be noted by physicians when they are evaluating a suspicious injury in a child. These characteristics combined with ideas mentioned earlier of the parent not providing an explanation of the injury and the child having a serious injury should raise the clinician's suspicion that the child may be a victim of abuse.

Our study has demonstrated that there was an association between the expert's opinion of the case and the nature of CPS' intervention in the case. In cases where CPS removed the child from the home (the most serious intervention), the expert found 67% of those cases to be due to abuse and only 24% to be accidental. In contrast, when CPS did not pursue further action with the family, the expert found the case to be accidental 92% of the time. For the 24% of cases in which the child was removed from the home, and later the injury was determined to be accidental, one can only imagine the ramifications this has on the child and the family. We assume that after CPS obtained the expert opinion, the child was returned home.

Strengths and Limitations of This Study

A strength of the study is the amount of information abstracted from the file of each case. Detailed information was available from the child's hospital records, lab and imaging results, social workers' interviews, CPS' interviews, and the expert's investigation. The sample size was large enough that we were able to exclude cases where information from one of the assessors was incomplete. We had three researchers reviewing the files and completing a detailed abstraction form. The abstraction form was systematic and straightforward, allowing little room for error or entering the wrong information. In instances where a piece of information was unclear, all three reviewers discussed the case and came to a decision.

This study has the obvious limitation of being done at a single institution with two child abuse expert experts in Connecticut. Thus, the findings may not be generalizable to other programs where second opinions are provided to CPS. We feel our sample of 187 cases over several years provides a significant variety of cases; however, additional cases from other institutions would also provide valuable information.

Another limitation of our study is that our records on each child do not include follow-up information on what happened to the child after the experts made their determination on the case. We assume CPS followed the expert's suggestions; however, it would be useful to know if these children were seen by CPS in the future and if they were victims of abuse at a later date.

Another important limitation is we do not know why CPS sought second opinions on these specific cases and not others. The failure to know why cases got selected for second opinions limits the generalizability of our results.

Conclusion

This study demonstrates the importance of second opinions in cases of suspected child abuse. In some instances the expert confirmed what was previously thought by CPS or the physician, and in certain key cases, the expert provided a differing opinion. Given the number of cases in which the expert disagreed with CPS, it is clear how crucial these second opinions are in the investigation of these children and their families.

Our study also highlights key features of a case that make it more likely for the expert to find the case abusive. These features include: an inadequate explanation of the injury by the caretaker, a young mother, a child with medical or psychological problems, a child already on record with CPS for a concern of maltreatment, and a child who has sustained three or more separate injuries. These findings may be helpful in guiding clinicians in their initial assessment of a child whom they suspect may be a victim of abuse.

In the future, it would be of great value to examine expert consultations to child abuse services at other institutions and in other areas of the country to determine if the findings support the conclusions of this study.

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APPENDIX

I. Case Consultation Study Abstraction Form

Subject # (Index case) ___ ___ ___

Number of siblings (other than the subject) evaluated: ___

Abstractor: ___ ___

Date of abstraction: ___ ___ / ___ ___ / ___ ___

Expert: ___ ___

Date of referral to expert: ___ ___ / ___ ___ / ___ ___

There was a letter from expert to DCF.

1=No 2=Yes

This case is excluded from the study

1=No 2=Yes If Yes, why: ___ ___

DEMOGRAPHICS

Date of Birth: ___ ___ / ___ ___ / ___ ___

Gender of the child:

1=Male 2=Female

Race/Ethnicity of the child (according to DCF):

1=African American 2=Hispanic 3=Caucasian 4=Asian

5=Native American 6=Unknown 7=Other

Town/City: ___ ___

Primary Caretaker: 1) ___ ___ 2) ___ ___

Primary Caretaker at time of event: 1) ___ ___ 2) ___ ___ (If no event, leave blank)

Age of Mother (relative to event): ___ ___

Age of Father (relative to event): ___ ___

Age of Primary Caretaker if not above (relative to event): ___ ___

PROBLEM

Primary complaint by caretaker at time of the event: ___ ___

Approximate date of most recent event: ___ ___ / ___ ___ / ___ ___

Sought medical care.

1=No 2=Yes

Facility: ___ ___

Date of facility visit: ___ ___ / ___ ___ / ___ ___

The child was transferred/referred to another facility.

1=No 2=Yes

If yes, child was transferred/referred to: ___ ___

Hospitalization occurred.

1=No 2=Yes

Date of admission: ___ ___ / ___ ___ / ___ ___

Date of discharge: ___ ___ / ___ ___ / ___ ___

Initial Injuries relating to primary complaint:

Primary (descriptor/injury): ___ / ___

Location of injury: ___

Secondary (descriptor/injury): ___ / ___

Location of injury: ___

Tertiary (descriptor/injury): ___ / ___

Location of injury: ___

Caretaker's primary account of event and/or explanation of cause of injury: ___

The following were done:

Photos were taken.

1=No 2=Yes

If yes: 1=Photos of Child 2=Photos of Location or object 3=Both (6/30/5)

X-ray of area of concern

1=No 2=Yes

If yes, the results were: 1=Normal 2=Abnormal

CT scan of head

1=No 2=Yes

If yes, the results were: 1=Normal 2=Abnormal

Eye exam

1=No 2=Yes

If yes, the results were: 1=Normal 2=Abnormal

Skeletal survey

1=No 2=Yes, complete 3=Yes, partial

If yes, results were: 1=Normal 2=Abnormal

Bleeding studies (platelets, PT, or PTT)

1=No 2=Yes

If yes, the results were: 1=Normal 2=Abnormal

MRI of head

1=No 2=Yes

If yes, the results were: 1=Normal 2=Abnormal

Other tests that were conducted:

___ Results were: 1=Normal 2=Abnormal

___ Results were: 1=Normal 2=Abnormal

Tests/studies revealed evidence of old injuries.

0=No tests were done 1=No 2=Yes

If yes, specify the type of injury: 1)___ 2)___ 3)___

Was there any disagreement among medical examiners about the cause of injury?

1=No Disagreement (includes no mention) 2=Disagreement 3=N/A (only 1 medical examiner).

DCF

Who contacted DCF about the present injury or event? ___

Who did the DCF suspect as the perpetrator of this abuse and/or neglect?

1) ___ 2) ___

What was done to intervene? 1)___ 2)___ 3)___

SECOND OPINION

The expert saw the child.

1=No 2=Yes

If yes, what method of assessment was done?

1=Physical Examination 2=Interview 3=Both

The expert interviewed the caretaker:

1=No 2=Yes

If yes, who was interviewed: ___

The expert also interviewed: 1)___ 2)___ 3)___

The following were reviewed:

Photos

1=No 2=Yes

If yes: 1=Photos of Child 2=Photos of Location or object 3=Both

X-ray of area of concern

1=No 2=Yes

If yes, the results were:

1=Normal 2=Abnormal, abuse suspected 3=Abnormal, non-abuse

CT scan of head

1=No 2=Yes

If yes, the results were:

1=Normal 2=Abnormal, abuse suspected 3=Abnormal, non-abuse

Eye exam

1=No 2=Yes

If yes, the results were:

1=Normal 2=Abnormal, abuse suspected 3=Abnormal, non-abuse

Skeletal survey

1=No 2=Yes, complete 3=Yes, partial

If yes, the results were:

1=Normal 2=Abnormal, abuse suspected 3=Abnormal, non-abuse

Bleeding studies (platelets, PT, or PTT)

1=No 2=Yes

If yes, the results were:

1=Normal 2=Abnormal, abuse suspected 3=Abnormal, non-abuse

MRI of head

1=No 2=Yes

If yes, the results were:

1=Normal 2=Abnormal, abuse suspected 3=Abnormal, non-abuse

Other tests:

___ Results were: 1=Normal 2=Abnormal, abuse suspected
3=Abnormal, non-abuse

___ Results were: 1=Normal 2=Abnormal, abuse suspected
3=Abnormal, non-abuse

Video records

1=No 2=Yes

If yes, then of what: ___ ___

The following tests were ordered by the expert:

X-ray of area of concern

1=No 2=Yes

If yes, the results were:

1=Normal 2=Abnormal, abuse suspected 3=Abnormal, non-abuse

CT scan

1=No 2=Yes

If yes, the results were:

1=Normal 2=Abnormal, abuse suspected 3=Abnormal, non-abuse

Eye exam

1=No 2=Yes

If yes, the results were:

1=Normal 2=Abnormal, abuse suspected 3=Abnormal, non-abuse

Skeletal survey

1=No 2=Yes, complete 3=Yes, partial

If yes, the results were:

1=Normal 2=Abnormal, abuse suspected 3=Abnormal, non-abuse

Bleeding studies (platelets, PT, or PTT)

1=No 2=Yes

If yes, the results were:

1=Normal 2=Abnormal, abuse suspected 3=Abnormal, non-abuse

MRI

1=No 2=Yes

If yes, the results were:

1=Normal 2=Abnormal, abuse suspected 3=Abnormal, non-abuse

Other tests that were ordered:

___ ___ Results were: 1=Normal 2=Abnormal, abuse suspected
3=Abnormal, non-abuse

___ ___ Results were: 1=Normal 2=Abnormal, abuse suspected
3=Abnormal, non-abuse

Consulted other specialists.

1=No 2=Yes

If yes, then who: ___ ___

Did tests ordered or exams by expert reveal any additional findings:

0=No tests ordered 1=No 2=Yes

If yes: 1= Ruled out initial findings 2=Found additional injury

If found additional injury what type was it?: ___ ___

Overall Medical Results of Concern (from all tests and evaluations):

1)___ 2)___ 3)___ 4)___ 5)___ 6)___

PAST MEDICAL HISTORY

Does this child have a significant medical/psychological problem?

0=No Mention 1=No 2=Yes

If yes, the medical/psychological problem was: 1)___ 2)___ 3)___

Was this child seen in E.R. prior to this event?

0=No Mention 1=No 2=Yes

If yes, the complaint was: ___ (Code from Primary complaint list)

Date of visit: ___/___/___

Did this child have any past history of concerning injuries?

0=No Mention 1=No 2=Yes

SOCIAL HISTORY

Is there a history of substance abuse in the home?

0=No Mention 1=No 2=Yes, in the past 3=Yes, at time of the event 4=Yes, past and at time of the event

If yes, then with whom? ___

Is there a history of violence in the home (Including domestic violence)?

0=No Mention 1=No 2=Yes, in the past 3=Yes, at time of the event 4=Yes, past and at time of the event

If yes, then who was the offender? ___

Is there a history of arrests of members of the home?

0=No Mention 1=No 2=Yes

If yes, was there a violent crime committed?

0=No Mention 1=No 2=Yes

If yes, then who was the offender? ___

Was there a previous concern of maltreatment with this child noted by DCF?

0=No Mention 1=No 2=Yes

If yes, then who was the perpetrator? ___

If yes, was medical care sought?

0=No Mention 1=No 2=Yes 9=Not Applicable

Date of admission: ___/___/___

Has DCF confirmed maltreatment of this child in the past?

0=No Mention 1=No 2=Yes 9=Not Applicable

Has DCF confirmed maltreatment of other children in the home?

0=No Mention 1=No 2=Yes 9=Not Applicable

OPINIONS (Use only one anchor for all three opinions)

Physicians believed injury/ies to be caused by:

1=Definite 2=Probable 3=Uncertain 4=Probable 5=Definite

1=Abuse
2=Neglect
3=Abuse and/or Neglect

4=Accident
5=Medical
6=Birth
7=Other: ___

99-No information from physician available

-If there is disagreement amongst doctors without a majority of physicians strongly in favor of one, then code as uncertain.

DCF believed injury/ies to be caused by:

1=Definite 2=Probable 3=Uncertain 4=Probable 5=Definite

1=Abuse

2=Neglect

3=Abuse
and/or
Neglect

4=Accident

5=Medical

6=Birth

7=Other:
— —

99- No information from DCF available

The Expert believed injury/ies to be caused by:

1=Definite 2=Probable 3=Uncertain 4=Probable 5=Definite

1=Abuse

2=Neglect

3=Abuse
and/or
Neglect

4=Accident

5=Medical

6=Birth

7=Other:
— —

If 3 (Abuse and/or Neglect) was coded for anchor 1,

Opinion of Physician: 1=Abuse 2=Neglect 3=Both 4=NA

Opinion of DCF: 1=Abuse 2=Neglect 3=Both 4=NA

Opinion of Expert: 1=Abuse 2=Neglect 3=Both 4=NA

(Code NA when person is using right anchor and has no concerns of abuse or neglect)

Notes: _____

The expert suggested the following action to be taken: 1)___ 2)___ 3)___

If Medical Tests were ordered by Expert, they were: 1)___ 2)___ 3)___

Comment Code 1)___ 2)___