

House Committee on Human Services
November 12, 2019

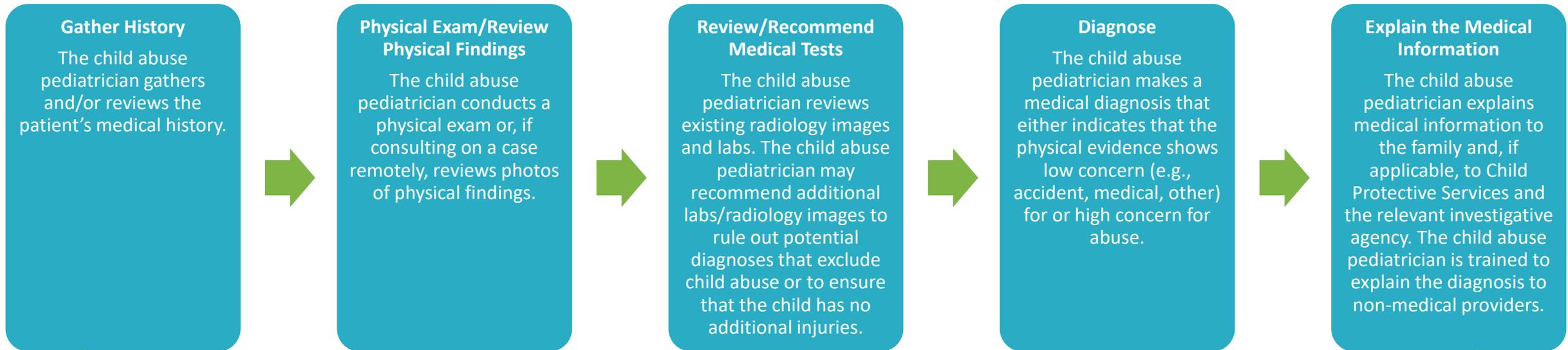
Dr. James Lukefahr, San Antonio

Resource Documents on Child Abuse
Pediatrics

What is a Child Abuse Pediatrician?

Child abuse pediatricians are doctors specially trained to evaluate children who may be victims of abuse and/or neglect. Child abuse pediatricians are board certified and receive three years of specialized training through their fellowship. They further hone their expertise through their experience in child abuse pediatrics and ongoing education of medical literature. Their skills and training make them the doctors most equipped to help determine if and how a child was injured. They are uniquely able to decipher differences between symptoms likely caused by child abuse and those with other explanations. As part of their process, child abuse pediatricians may recommend additional testing to rule out medical problems or diagnoses other than child maltreatment. Child abuse pediatricians sometimes receive a subpoena to testify in court. When this happens, child abuse pediatricians are required to appear. Their role in court is to educate the judge and jury about the medical diagnosis. It is never the child abuse pediatrician's role to decide whether a child should be removed from their caregiver, to determine who is guilty, or to decide whether someone is a good parent.

What Process Does a Child Abuse Pediatrician Follow?



Throughout this process, child abuse pediatricians collaborate with social workers, particularly to gather information and risk factors of the child's family. They also consult and collaborate with other pediatric specialists, including Pediatricians, Critical Care, Geneticists, Endocrinologists, Neurosurgeons, Orthopedic surgeons, Hematologists, and others as appropriate to ensure the child receives the correct diagnosis.

Timeline of Child Abuse/Neglect Developments in Texas

Series of Abuse Cases

Beginning in 2003, a series of child deaths due to abuse/neglect drew media attention and criticism of the Child Protective Services (CPS) system.

On Christmas in 2003, four-year-old Jovonie Ochoa was starved to death by family members, weighing just 16 pounds. Over the next few years, several other child deaths in abuse and neglect cases further intensified the need to respond to child maltreatment in Texas.

Founding of Forensic Assessment Center Network (FACN)

In 2005, Senate Bill 6 established the FACN to provide CPS investigators with consistent, reliable support from medical experts.

The Forensic Assessment Center Network (FACN) is funded by the Department of Family and Protective Services (DFPS) and has been in existence since 2006. The FACN was established by Senate Bill 6 in 2005 because CPS investigators were not receiving consistent or reliable support from medical experts. Particularly in rural areas, physicians who were not specially trained in pediatrics, trauma, or forensics were providing inadequate or conflicting advice during the CPS investigation progress. Therefore, Senate Bill 6 allocated funding to form the FACN as a statewide network of pediatric consultants with expertise in child maltreatment and injury.

American Board of Pediatrics Designates Child Abuse Pediatrics as a Subspecialty

In 2006, child abuse pediatrics was accepted as a subspecialty of the American Board of Pediatrics. The first subspecialists were certified in 2009.

In 2006, the American Board of Pediatrics accepted child abuse pediatrics as a subspecialty. By 2010, 191 pediatricians had become board certified in this subspecialty. As a result of the new specialty designation, three-year child abuse fellowships have been developed at academic medical centers. Most of them are housed within children's hospitals across the country and, similar to other pediatric specialty fellowships, there is both clinical and research training and a requirement for a scholarly project.

Guidelines Issued on Child Abuse Centers at Children's Hospitals

In 2006, the National Association of Children's Hospitals and Related Institutions (NACHRI) characterized the critical role of child abuse teams at children's hospitals.

In 2006, NACHRI defined what a child abuse center at a children's hospital should consist of and issued a call to children's hospitals to develop these centers. Specifically, NACHRI developed a framework for understanding the range of maltreatment services offered at children's hospitals. The framework outlines what a child protection team at a children's hospital should offer in terms of infrastructure, staffing, functions, and systems to be considered basic, advanced, or a center of excellence. The guidelines on centers of excellence informed future legislation in Texas.

Creation of Blue Ribbon Task Force

In 2009, the passage of Senate Bill 2080 created the Blue-Ribbon Task Force to develop a strategic plan to combat child abuse and improve child welfare.

Senator Carlos Uresti authored the bill during the 81st Legislative Session, stating that the task force was born out of Jovonie Ochoa's death. The bill created a nine-member task force to examine specific statutory changes, new programs, and methods to foster cooperation among state agencies and the state and local governments.

Founding of Medical Child Abuse Resources and Education System (MEDCARES)

In 2010, the MEDCARES grant program was created to support child abuse programs at academic medical centers and children's hospitals in their clinical activities.

The Medical Child Abuse Resources and Education System (MEDCARES) was formed in 2010 in response to the passage of Senate Bill 758 in 2007, which recommended the development of the program. The purpose of MEDCARES is to support child abuse programs at academic medical centers and children's hospitals in their clinical activities, since child maltreatment consultations are often particularly time-consuming and inadequately reimbursed by routine medical billing mechanisms. Like FACN centers, all MEDCARES sites have either board-certified CAPs and/or pediatricians with 5 or more years clinical experience in child maltreatment, and all sites have immediate access to other pediatric subspecialists whose expertise can be pertinent to some cases of suspected child abuse. Unlike the FACN, MEDCARES also allows funding to be used for mental health, prevention, education, research, and community outreach activities. Therefore, at sites that are recipients of both grants, medical services and coordination with Child Protective Services (CPS) are often covered with FACN funds and MEDCARES may be used to support social and mental health services for the child and/or parent.

Expansion of MEDCARES

From 2009-2016, the MEDCARES program expanded from eight sites to 11.

Medical Child Abuse Resources and Education System (MEDCARES)

Senate Bill 2080, 81st Legislative Session, amended sections of the applicable code, [Health and Safety Code, Chapter 1001, Subchapter F \(§1001.151 - §1001.157\)](#) to establish MEDCARES. The goal is to improve services related to the assessment, diagnosis, and treatment of child abuse and neglect in hospital or academic health care settings through funding, collaboration, and outcome reporting.

MEDCARES Grant Program

The purpose of the grant program is to provide funds for developing and supporting regional programs to improve the assessment, diagnosis, and treatment of child abuse and neglect. The funds are slated for hospitals or academic health centers with expertise in pediatric health care with a demonstrated commitment to developing basic programs in the same field for the assessment, diagnosis, and treatment of child abuse and neglect.

Child Abuse Specialists:

Child Abuse Pediatricians (CAPs) are highly trained physicians available for consultation to children and adolescents with suspected child abuse and neglect injuries. Child Abuse Pediatrics is a relatively new subspecialty that provides assessment, diagnosis and treatment for children with suspected child maltreatment injuries. In simpler terms, child abuse specialists (CAPs, Forensic Nurse Examiners, Sexual Assault Nurse Examiners, Physician Assistants, Psychologists, etc.) improve timely and accurate diagnoses, provide treatment and give support to investigations.

CAPs and their team of trained specialists provide careful, objective and meticulous evaluations with consideration to alternative diagnoses using evidence-based standards and collaboration from multiple outside sources including law enforcement, the judicial system, advocacy centers, CPS and others.

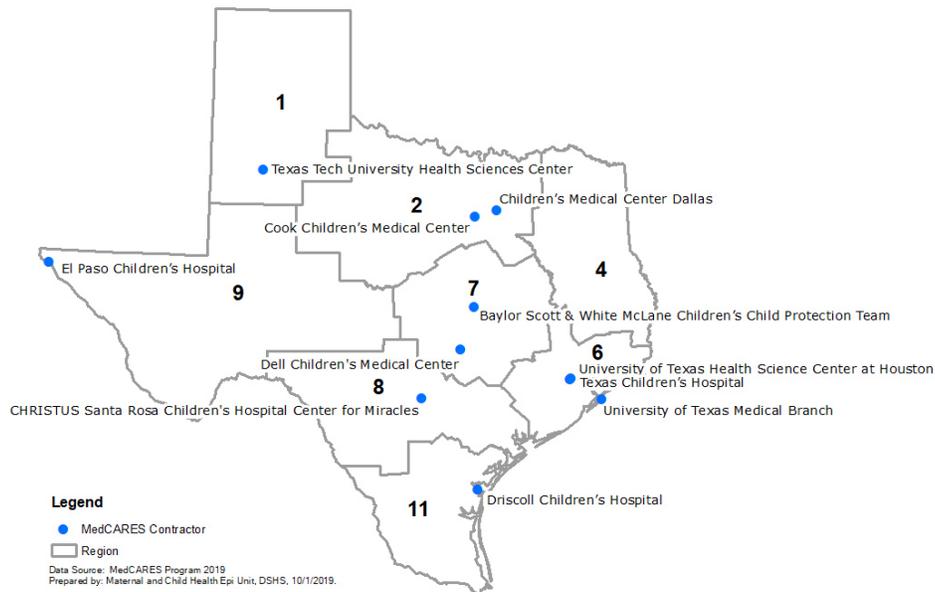
Medical services include:

- Comprehensive medical evaluations in an inpatient or outpatient setting and
- Access to subspecialties like radiology, toxicology, neurology, trauma care, and burn care.

Depending on the type of maltreatment, a child could require access to specialized equipment and/or the care of additional specialized medical professionals. These facilities are equipped to handle such needs or have relationships in place to ensure the child receives the full spectrum of care.

In addition to providing direct services, these highly trained professionals also provide education and training to those who work on the front lines with children at risk (such as law enforcement, case workers, members of the judiciary) as well as other members of the public (parents, teachers, students, medical professionals). Information is regularly provided on topics such as how to identify various types of abuse, reporting requirements, abuse mimickers, abusive head trauma, and photo documentation.

MedCARES Contractors 2019

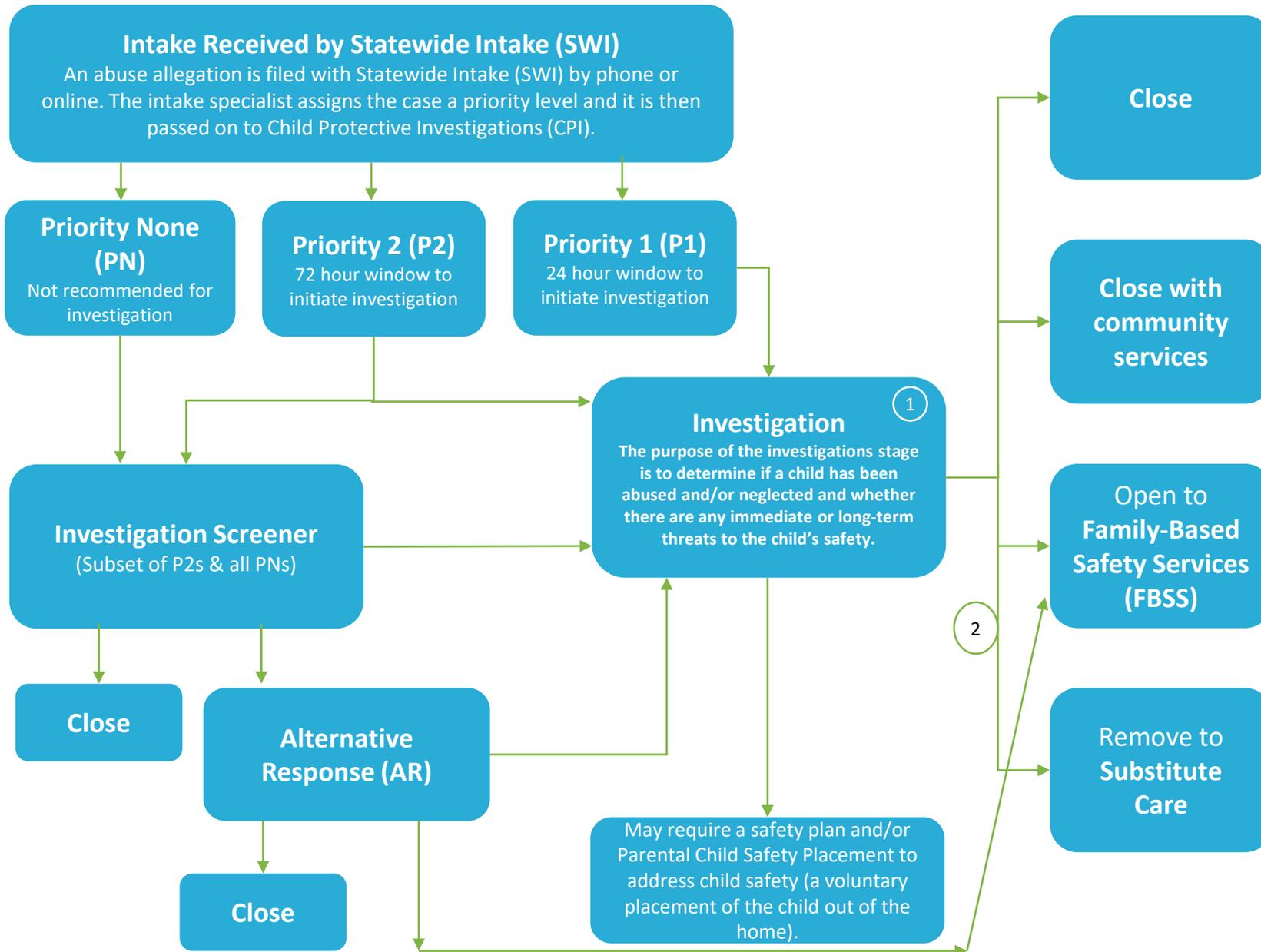


The list below includes the specialists across the state, all of which participate in the MEDCARES grant program in some capacity:

Children's Medical Center Dallas* REACH Program 1935 Medical District Drive Dallas, TX 75235 214-456-6919	Baylor Scott & White McLane Children's Child Protection Team 1901 SW H.K. Dodgen Loop MS-CH 1205 Temple, Texas 76502 254-935-4051
CHRISTUS Santa Rosa Health Care System* Center for Miracles 333 N. Santa Rosa Street San Antonio, TX 78207 210-704-3800	University of Texas Health Science Center Houston*- CARE Center 6410 Fannin Street, Suite 1425 Houston, TX 77030 713-500-6064
Cook Children's Medical Center* CARE Team 801 Seventh Avenue Fort Worth, TX 76104 682-885-3953	Texas Tech University Health Science Center* Pediatrics 3601 4th Street Lubbock, TX 79423 806 743-6629
Dell Children's Medical Center* CARE Team 4900 Mueller Blvd. Austin, TX 78723 512-324-0095	University of Texas Medical Branch 301 University Blvd., Route 0359 Galveston, TX 77555 409 772-1444
Driscoll Children's Hospital* - CARE Team 3533 South Alameda Corpus Christi, TX 78411 361-694-CARE (2273)	Texas Children's Hospital*- CAP Program 6621 Fannin Street Houston, TX 77030 832-822-1843
El Paso Children's Hospital Center for the Prevention of Child Abuse 4845 Alameda El Paso, TX 79905 915-521-7024 or 915-521-7732	

NOTE: Those with an asterisk (*) by their name indicate sites that have at least one CAP.

Child Abuse Pediatricians' Role in the Broad Child Abuse and Neglect Investigation Process



Steps during which a child abuse pediatrician (CAP) may be consulted:

1. During the investigation stage, the CPI team checks the abuse/neglect backgrounds of those involved in the case; assesses patterns of maltreatment, home conditions, and the family's past ability to protect the child from harm; reviews prior interventions with the family; conducts interviews, etc. As part of this process, a small percentage of cases are referred to CAP when a medical opinion is needed to decipher whether abuse or neglect has occurred.
2. To begin the removal process to substitute care, a court hearing is called, during which the judge either confirms or does not confirm the threat to the child's safety. This process is outlined in Ch. 262 of the Texas Family Code. A CAP is involved again if they receive a court subpoena by either the defense or prosecution. In court, the CAP's role is to educate the court about the medical diagnosis. It is outside the scope of the CAP's role to comment on whether the child should be removed from their caregiver.

Child Abuse Pediatricians Are a Vital Resource to Keep Children Safe

The flowchart below shows how child abuse pediatricians (CAPs) receive referrals and what they do with these referrals. This process is one piece of a larger system designed to protect children.

Referral:

Various entities refer patients to CAPs when their medical expertise is needed to decipher if or how a child was injured non-accidentally. Data indicate that a small percentage of reported child abuse and neglect cases are evaluated by a CAP.¹

Diagnosis:

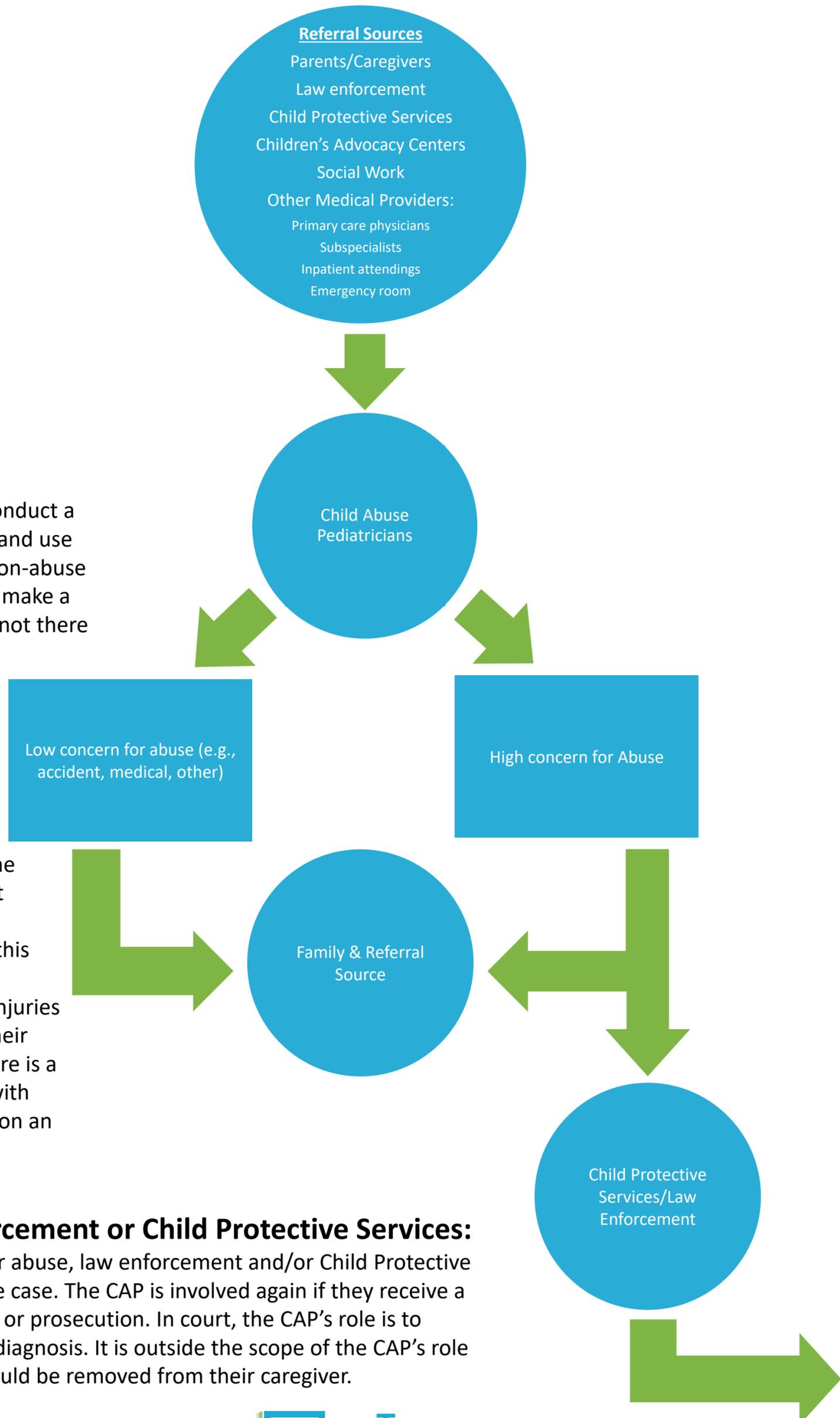
CAPs gather/review patient history, conduct a physical exam, review labs/radiology, and use their specialized training to rule out non-abuse causes of physical findings. They then make a medical assessment as to whether or not there is a concern for abuse and/or neglect.

Explain the Medical Information:

CAPs communicate the diagnosis to the family, referral source, and all relevant investigative agencies, including Child Protective Services. The CAP's role in this step is only to explain the medical information, including what a child's injuries mean and the process of arriving at their diagnosis. If the CAP assesses that there is a concern for abuse, they file a report with Child Protective Services or follow up on an existing report.

Further Action By Law Enforcement or Child Protective Services:

If the diagnosis indicates a concern for abuse, law enforcement and/or Child Protective Services take over management of the case. The CAP is involved again if they receive a court subpoena by either the defense or prosecution. In court, the CAP's role is to educate the court about the medical diagnosis. It is outside the scope of the CAP's role to comment on whether the child should be removed from their caregiver.



¹ Texas Department of State Health Services. 2016. *Medical Child Abuse Resource and Education System Biennial Report 2015-2016*. Texas Department of State Health Services..



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Child Abuse & Neglect



Is the diagnosis of physical abuse changed when Child Protective Services consults a Child Abuse Pediatrics subspecialty group as a second opinion?

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ABSTRACT

Objectives: To characterize the changes regarding the diagnosis of physical abuse provided to Child Protective Services (CPS) when CPS asks a Child Abuse Pediatrics (CAP) specialty group for a second opinion and works in concert with that CAP group.

Methods: Subjects were reported to CPS for suspected physical abuse and were first evaluated by a physician without specialized training in Child Abuse Pediatrics (non-CAP physician). Subjects were then referred to the area's only Child Abuse Pediatrics (CAP physician) group, located in a large metropolitan pediatrics center in the United States, for further evaluation. The diagnoses regarding abuse provided by CAP physicians working in concert with CPS were compared to those provided to CPS by other physicians.

Results: Two hundred consecutive patients were included in the study. In 85 (42.5%) cases, non-CAP physicians did not provide a diagnosis regarding abuse, despite initiating the abuse report to CPS or being asked by CPS to evaluate the child for physical abuse. Of the remaining 115 cases, the diagnosis regarding abuse differed between non-CAP physicians and CAP physicians working in concert with CPS in 49 cases (42.6%; $\kappa = .14$; 95% CI, $-.02, .29$). In 40 of the 49 cases (81.6%), CAP assessments indicated less concern for abuse when compared to non-CAP assessments. Differences in diagnosis were three times more likely in children from a nonurban location (OR 3.24; 95% CI, 1.01, 11.36).

Conclusions: In many cases of possible child physical abuse, non-CAP providers do not provide CPS with a diagnosis regarding abuse despite initiating the abuse investigation or being consulted by CPS for an abuse evaluation. CPS consultation with a CAP specialty group as a second opinion, along with continued information exchange and team collaboration, frequently results in a different diagnosis regarding abuse. Non-CAP providers may not have time, resources, or expertise to provide CPS with appropriate abuse evaluations in all cases.

Practice implications: Though non-CAP providers may appropriately evaluate many cases of physical abuse, the diagnosis regarding abuse provided to CPS may be changed in some cases when CAP physicians are consulted and actively collaborate with CPS investigators. Availability of Child Abuse Pediatrics subspecialty services to investigators is warranted.

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Introduction

Child abuse is a common condition, occurring in approximately 11/1000 children in the United States annually (Department of Health and Human Services, Administration on Children, Youth and Families, 2008). Primary care providers and other physicians without special expertise in child abuse may appropriately evaluate many cases; however, other cases may be more challenging, time consuming, or complex. In these instances, special expertise in and dedication to child abuse may be beneficial. In these cases, a Child Abuse Pediatrician may provide the needed expertise and availability to ensure the best possible outcome for both the child and the family involved in the investigation.

Child Abuse Pediatrics (CAP) is an emerging subspecialty. The American Board of Medical Specialties approved the CAP application for subspecialty status in 2006, and the first subspecialty certification exam will occur in 2009 (American Board of Medical Subspecialties, 2008). Evaluating complicated cases of possible abuse frequently requires an understanding of important and emerging scientific knowledge base of Child Abuse Pediatrics. Studies have addressed the importance of the history provided by caregivers (Hettler & Greenes, 2003), biomechanical analysis of fracture morphology (Pierce, Bertucci, Vogeley, & Moreland, 2004), mechanical and physiological analysis of head injury (Duhaime et al., 1987; Prange, Coats, Duhaime, & Margulies, 2003; Raghupathi, Mehr, Helfaer, & Margulies, 2004) and scientific evidence regarding bruises and burns (Allasio & Fischer, 2005; Committee on Child Abuse and Neglect, American Academy of Pediatrics, 2002; Daria et al., 2004; Drago, 2005; Dunstan, Guildea, Kontos, Kemp, & Sibert, 2002; Feldman, 1992; Maguire, Mann, Sibert, & Kemp, 2005a, 2005b; Maguire, Mann, Sibert, & Kemp, 2005b; Mathew, Ramamohan, & Bennet (1998); Moritz & Henriques, 1947; Spiller et al., 2003; Sugar, Taylor, & Feldman, 1999). These data have increased the ability of physicians to accurately determine the likelihood of abuse in a scientific manner. It is not yet known what, if any, effect Child Abuse Pediatricians with knowledge in these areas may have on investigations conducted by Child Protective Services (CPS).

In the United States, CPS conducts investigations involving alleged child physical abuse. Many of these cases involve medical evaluations and resulting diagnoses regarding abuse. This information may be critical in determining the outcome of CPS abuse investigations. A major function of the CAP subspecialty is to provide Child Protective Services (CPS) with information regarding the diagnosis of physical abuse in children with suspicious injuries; however, this service may not be available in all locations. In these instances, CPS must rely on physicians without specialized training in child abuse to assess the likelihood of abuse in an injured child, even when cases are difficult, complex or time-intensive. Previous studies have documented physicians' mistrust of CPS and lack of willingness to report some cases of child abuse (Flaherty, Jones, & Sege, 2004; Jones et al., 2008). Some physicians may withhold a specific diagnosis regarding abuse in an effort to decrease involvement in an abuse investigation and/or decrease likelihood of receiving a subpoena to testify regarding the diagnosis of abuse. Additionally, some physicians may feel uncomfortable making a diagnosis regarding abuse based solely on information available at the time of the medical evaluation or due to a lack of expertise. As such, physicians may not provide CPS with a diagnosis regarding abuse in some cases. Additionally, the added expertise of CAP physicians, coupled with continual availability to CPS that allows CAP physicians and CPS to work in concert over time on cases of possible physical abuse, may result in changed diagnoses regarding abuse in some cases.

Previous studies have documented challenges in accurately diagnosing physical abuse in younger children. Jenny found that cases of missed abusive head trauma were more common in younger children (Jenny, Hymel, Ritzen, Reinert, & Hay, 1999). In addition, many clinicians fail to consider developmental status of the child, which changes most rapidly and significantly during the first year of life, when assessing for abuse (Anderst, 2008).

Children in rural locations present a unique challenge when the possibility of child abuse arises. Previous research has shown that the diagnosis of abuse differs between dedicated children's hospitals, which are typically located in more populated areas, and general hospitals (Trokel, Waddimba, Griffith, & Sege, 2006). Clinicians providing care to children in rural locations may have less training in pediatrics (Goodman & the Committee on Pediatric Workforce, 2005) and potentially different relationships with families and communities than urban physicians (Shapiro & Longenecker, 2005). Additionally, CPS offices located in rural areas may cover a larger geographic region, have access to fewer physicians trained in pediatrics, and may conduct fewer physical abuse investigations. Obtaining medical assessments regarding abuse may be more difficult for CPS workers in these locations. It is unknown how these factors unique to the physicians in rural locations may affect the diagnoses regarding abuse provided to CPS.

We hypothesized that the diagnoses regarding abuse provided to CPS by non-CAP physicians would differ significantly from those provided by CAP physicians working in concert with CPS, and that, in many instances, non-CAP physicians would offer no information to CPS regarding the diagnosis of abuse. Additionally, we hypothesized that different diagnosis would be more common in children less than 1 year of age than in older children. Lastly, we hypothesized that different diagnoses would be more common in children from rural locations than in children from urban locations.

Methods

The authors abstracted information from a local database involving all patients referred by CPS to a CAP subspecialty group from 11/06 to 6/07. This time period was selected as the CAP clinic opened in mid-2006, and by late 2006, data collection processes were standardized to allow for appropriate information collection. From its inception, the CAP clinic was made available to and advertised to local and regional CPS offices and investigators. In the months following the end of the study period, advertisement of the clinic to the local medical community commenced. Knowledge of the CAP clinic

by other medical providers could result in non-CAP physicians withholding diagnoses in the anticipation that the CAP team would eventually evaluate the case.

The CAP subspecialty group consisted of 3 full-time child abuse pediatricians employed by the Department of Pediatrics at a large metropolitan medical school in the United States. All members of the CAP subspecialty group will be eligible for board certification in the subspecialty when the first qualifying exam is administered in 2009. Through a formal contractual agreement, the Forensic Assessment Center Network (FACN), the CAP subspecialty group is available to CPS workers for medical consultations for cases arising from 26 counties extending more than 200 miles from the CAP clinic. During the study period, CPS conducted approximately 11,750 physical abuse investigations in the region assigned to the CAP subspecialty group. No other formal system exists to provide medical information to CPS in potential physical abuse cases in the area covered by the CAP group. CPS workers, at their discretion, may bring potentially physically abused children to any physician for assessment. The CAP group is available as a first evaluation option, or as a second opinion, based on the discretion of CPS. In the geographic area included in the study, there is no contractual obligation for a physician to provide CPS with a diagnosis regarding abuse, with the only exception being the CAP group.

Study inclusion criteria were children between the ages of 0 and 18, referral to CPS for suspected physical abuse, an initial assessment for abuse by another physician without specialized training in Child Abuse Pediatrics (non-CAP physician), and a second assessment by the CAP team. Cases in which there was no diagnosis provided by the non-CAP physician, and the case was directly referred to the CAP group by other physicians at the same medical school, were excluded. These physicians may have withheld information regarding diagnosis of physical abuse in anticipation of the CAP group evaluation. Cases referred due to concern of neglect or other types of abuse were not considered in this study, and the diagnosis of neglect was not considered in this study.

For the cases in this study, reports of possible physical abuse of a child were made to CPS by either nonmedical personnel (schools, law enforcement, relatives) or non-CAP medical providers. If the report was made by a nonmedical professional, CPS then took the child to a non-CAP medical provider for an abuse evaluation. All non-CAP physicians either initiated a CPS investigation for suspected abuse or were consulted by CPS regarding the possibility of abuse. All non-CAP physician evaluations occurred in clinics, emergency departments, or inpatient settings, and included a physical exam and laboratory and/or radiographic tests as deemed necessary by the non-CAP physician. Documentation of the non-CAP evaluation was then obtained by CPS, including the diagnosis regarding abuse if the non-CAP physician made one. Following this evaluation, CPS consulted the CAP subspecialty group for a second assessment regarding the diagnosis of abuse.

In addition to verbally conferring with CPS, the CAP evaluation included review of the medical information from the previous non-CAP assessment, and at least one of the following: interview and evaluation of the child and interview of the caregivers, photograph review, radiograph review, and/or further testing such as additional radiographs or blood tests. CAP physicians were available for repeated case follow-up with CPS, if needed, and worked in concert with CPS during the investigation process, if further investigation, such as scene investigation and potential witness interview, were necessary. CAP physicians then provided CPS with an assessment that included a diagnosis regarding abuse. CAP physicians reviewed cases individually; however, in cases where the CAP physician felt the diagnosis was not straightforward, all CAP physicians reviewed the case, and the diagnosis of "abuse" was made only if all 3 CAP physicians agreed.

Consultation of the CAP group was at the discretion of CPS, and not all children with allegations of physical abuse in the community were referred to the CAP group. Common reasons for referral to CAP by CPS included: need for medical opinion regarding likelihood of abuse, mechanism(s) and timing of injury, and clarification of medical findings in the case.

At the time of initial CAP consultation, CPS workers provided a case data sheet with child demographics, case information, and specific questions that they wanted the CAP physician to address in the assessment. Data collected included the child's age, location of non-CAP evaluation (urban vs. rural), non-CAP diagnosis regarding abuse, type of injury, and CAP diagnosis regarding abuse. Previous non-CAP assessments from metropolitan areas with a population greater than 100,000 people were classified as urban. All others were classified as rural. There were no dedicated children's hospitals or facilities with significant dedicated pediatric care available in the rural locations that were included in this study.

Non-CAP diagnosis regarding abuse was classified into three categories: abuse, nonabuse, and no opinion. Cases were classified as "no opinion" when the non-CAP physician did not provide a diagnosis regarding abuse to CPS, despite initiating the CPS case or being consulted by CPS regarding possible physical abuse. CPS and CAP physicians jointly determined classification of cases by non-CAP physicians at the time of CAP consultation. CAP assistance in this matter was necessary only when CPS workers did not understand the medical documentation provided by non-CAP physicians. CAP diagnosis regarding abuse was classified as abuse or nonabuse. CAP physicians made the diagnosis of abuse when the preponderance of evidence supported the diagnosis of child abuse, based on the Texas Administrative Code definition ([Texas Administrative Code, 2004](#)). All other cases were classified as nonabuse, including those where it was not possible to determine if abuse had occurred. All data was collected at the time of CPS consultation on data collection sheets used locally for the statewide Forensic Assessment Center Network (FACN). This data was entered into a computerized database used for FACN statistics. Data for this study was abstracted from the local database by the authors.

Physical findings concerning for abuse were divided into five primary injury subtypes based on the main injury that resulted in referral: head injury, fracture, burn, bruising, and other. Injuries in the "other" subgroup were typically skin findings that could not be clearly classified as bruises or burns (for example, scars or blisters).

Cases for which the non-CAP physician provided a diagnosis regarding abuse were compared to CAP diagnoses in the same cases. Differences in diagnosis existed when CAP assessment of abuse differed from non-CAP assessment. When a difference

Table 1
Comparison of groups with and without a diagnosis provided to CPS by non-CAP physicians.

Characteristic	Diagnoses provided	No diagnosis provided
Number	115	85
Mean age (SD)	2.99 (4.12)	3.36 (3.81)
Rural (%)	18 (15.6)	10 (11.8)
Injuries		
Head (%)	25 (21.7)	10 (11.7)
Fracture (%) [*]	26 (22.6)	10 (11.7)
Burn (%) [†]	7 (6.1)	16 (18.8)
Bruise (%)	44 (38.2)	38 (44.7)
Other (%)	13 (11.3)	11 (12.9)

^{*} $p < .05$.

in diagnosis existed, the CAP physician recorded his/her perception of the reason for the difference as one of the following: plausibility of mechanism, additional information gathered by CPS during the investigation, additional information gathered by the CAP physician, or different interpretation of radiographs or tests.

The institutional review board of the University of Texas Health Science Center San Antonio approved this study.

Data analysis

The kappa statistic (κ) for inter-rater reliability was calculated for all cases in which the non-CAP physician offered a diagnosis regarding abuse. κ was also calculated for the 5 primary injury subtypes. Additionally, unadjusted odds ratios (OR) for differing diagnosis based on urban versus nonurban location of non-CAP assessment, and age of the child were calculated. All data were analyzed using SAS version 9.1.

Results

Two hundred consecutive patients meeting inclusion criteria were included in the study, representing approximately 1.7% of all physical abuse cases investigated by CPS in the region during the study period. No cases were direct referrals by other physicians or medical providers. Mean age was 3.15 years ($SD = 3.99$), and median age was 2 years. Specific data on non-CAP physician training was not available for this study; however, some of the specialties of the non-CAP physicians were known and included Emergency Medicine, Pediatric Emergency Medicine, Pediatrics, Family Practice, Neurosurgery, and Orthopedics.

Table 1 compares children given and not given an assessment regarding the diagnosis of abuse by non-CAP physicians. Children with fractures were significantly more likely to be given a diagnosis regarding abuse than children with other injuries by non-CAP physicians. Burns were less likely to be given a diagnosis than other injuries. No other significant differences existed between the two groups.

In 42.5% (85/200) of all cases, non-CAP physicians did not provide CPS with a diagnosis regarding abuse. In those 85 children, CAP physicians working in concert with CPS diagnosed abuse in 27 (31.8%) and nonabuse in the remaining 58 (68.2%). We analyzed the agreement between the CAP physicians working in concert with CPS and non-CAP physicians for the 115 cases in which both the physicians provided a diagnosis regarding abuse (Table 2). No agreement beyond what would be expected by chance was seen ($\kappa = .14$, 95% CI $-.02, .29$). CAP physicians changed diagnoses provided to CPS in 49/115 (42.6%). The change in 81.6% of these cases was from abuse to nonabuse, whereas the reverse was true in 18.4%. The main reason for disagreement was plausibility of mechanism (87.8% of cases); disagreement in remaining cases was due to additional information gathered during multidisciplinary CAP evaluation or differing interpretation of tests or radiographs. In the analysis by injury subtype, the only injury subtype with significant agreement was head injury (Table 3). No κ was calculated for burns due to low numbers. Of the 115 cases where non-CAP physicians gave a diagnosis regarding abuse, 97 evaluations occurred in urban areas (Table 4). Difference in diagnosis was 3 times more likely to occur in rural locations than in urban areas (OR = 3.24; 95% CI, 1.01, 11.36).

Further characterization of cases with differing diagnosis regarding abuse in head injuries is found in Table 5. All discordant cases involving head injury had a previous diagnosis of abuse by non-CAP physicians. The rationale for the diagnosis of abuse

Table 2
Comparison of diagnoses provided to CPS by non-CAP physicians and CAP physicians working in concert with CPS (overall).

CAP diagnosis	Non-CAP physician diagnosis			Kappa (95% CI)
	Abuse (%)	Nonabuse (%)	Total (%)	
Abuse	50	9	59 (51.3)	.14 (–.02, .29)
Nonabuse	40	16	56 (48.7)	
Total	90 (78.3)	25 (21.7)	115 (100)	

Table 3
Comparison of diagnoses provided to CPS by non-CAP physicians and CAP physicians working in concert with CPS (by injury).

Injury	Other physician diagnosis, number (%)				Kappa (95% CI)
	CAP diagnosis	Abuse	Nonabuse	Total (%)	
Head injury	Abuse	11	0	11 (44)	.47 (.18, .75)
	Nonabuse	7	7	14 (56)	
	Total	18 (72)	7 (28)	25 (100)	
Fracture	Abuse	8	5	13 (50)	-.15 (-.5, 0.2)
	Nonabuse	10	3	13 (50)	
	Total	18 (69.3)	8 (30.7)	26 (100)	
Burn	Abuse	4	0	4 (57.1)	0 (0, 0)
	Nonabuse	3	0	3 (42.9)	
	Total	7 (100)	0 (0)	7 (100)	
Bruise	Abuse	24	4	28 (63.6)	.05 (-.21, .31)
	Nonabuse	13	3	16 (36.4)	
	Total	37 (84.1)	7 (15.9)	44 (100)	
Other	Abuse	3	0	3 (23.1)	.17 (-.07, .4)
	Nonabuse	7	3	10 (76.9)	
	Total	10 (76.9)	3 (23.1)	13 (100)	

Table 4
Comparison of diagnoses provided to CPS by non-CAP physicians and CAP physicians working in concert with CPS (by location).

Location	Other physician diagnosis			Kappa (95% CI)	
	CAP diagnosis	Abuse (%)	Nonabuse (%)		
Urban	Abuse	46	6	52 (53.6)	.2 (.04, .37)
	Nonabuse	31	14	45 (46.4)	
	Total	77 (79.4)	20 (20.6)	97 (100)	
Rural	Abuse	4	3	7 (38.9)	-.21 (-.6, .17)
	Nonabuse	9	2	11 (61.1)	
	Total	13 (72.2)	5 (27.8)	18 (100)	

Table 5
Differing diagnosis of head injury. All cases changed from non-CAP diagnosis of abuse to CAP diagnosis of nonabuse.

Case	Age	Mechanism	Injury	Rationale for non-CAP diagnosis
1 ^{a,c}	11 months	Fell of couch	Linear skull fx, small EDH	Delay in care
2 ^{a,c}	5 weeks	Fell from unfastened car seat on a stroller	Linear skull fx, small EDH	Teen mom
3	6 months	Fell off bed	Linear skull fx	24 h delay
4 ^{a,c}	8 months	Fell off bed	EDH	Delay in care
5 ^{a,c}	6 months	Fell off bed	Linear skull fx	2 day delay
6 ^{a,c}	8 months	Fell while cruising	Linear skull fx	Delay in care
7 ^{a,b,c}	8 months	None	SDH	None

Head CT obtained in all cases. See text for supporting references regarding CAP diagnosis.

^a Skeletal surveys obtained.

^b MRI with/without contrast and MRV obtained.

^c Ophthalmologist exam showed no retinal hemorrhages.

as documented in the medical chart by non-CAP physicians is included in Table 5. Table 6 describes discordant cases involving fractures. None of the subjects with fractures had any examination findings, medical history or family history suggestive of osteogenesis imperfecta (Bishop, Sprigg, & Dalton, 2007; Jenny, 2006). No children had evidence of poor ossification or bone dysplasia on radiographs. Supportive citations for CAP diagnosis in cases of fractures are listed in Table 6.

Of the 115 cases where non-CAP physicians provided a diagnosis regarding abuse, 41 were less than 1 year old. Of the remaining 85 patients, 19 were less than 1 year old. Non-CAP physicians were more likely to provide a diagnosis regarding abuse (OR, 1.92; 95% CI, 1.01, 3.64) in children less than 1 year of age compared to children older than 1 year; however, there was no association between age <1 and agreement with CAP/CPS team diagnosis.

Discussion

According to the US Department of Health and Human Services, there were 3.3 million reports of child maltreatment in 2006 (Department of Health and Human Services, Administration on Children, Youth and Families, 2008). With this large caseload, CPS workers need rapid access to quality medical feedback in cases of possible child physical abuse. However, many physicians are uncomfortable evaluating children who may be victims of abuse (Flaherty et al., 2004). Physicians have

Table 6
Differing diagnosis of fractures.

Case	Age	Mechanism	Injuries	CAP diagnosis	References for diagnosis
1	4 months	6 inch fall	Buckle fx of distal femur	Abuse	Pierce, Bertucci, Vogeley, and Moreland (2004), Helfer, Slovis, and Black (1977), Nimityongskul and Anderson (1987)
2	10 months	Fall from couch	Displaced spiral fx of humerus	Abuse	Pierce, Bertucci, Vogeley, and Moreland (2004), Helfer, Slovis, and Black (1977), Nimityongskul and Anderson (1987), Strait, Siegel, & Shapiro (1995), Kleinman (1998)
3	10 months	Fall from bed	Intertrochanteric fx of femur	Abuse	Pierce, Bertucci, Vogeley, and Moreland (2004), Helfer, Slovis, and Black (1977), Nimityongskul and Anderson (1987), Kleinman (1998), Jones, Feldman, & Bruckner (2004)
4	3 years	Unwitnessed fall	Suprachondylar fx of humerus, three other fx subsequently discovered	Abuse	Jenny (2006), Bishop, Sprigg, & Dalton (2007)
5	8 months (not cruising)	None	Healing transverse ulna fx	Abuse	Pierce, Bertucci, Vogeley, and Moreland (2004)
6	2 years	Fall backwards onto outstretched hand	Suprachondylar humerus fx	Nonabuse	Strait, Siegel, & Shapiro (1995), Kleinman (1998)
7	2 years	Fall	Suprachondylar humerus fx	Nonabuse	Strait, Siegel, & Shapiro (1995), Kleinman (1998)
8	2 years	Fall with twist	Spiral femur fracture	Nonabuse	Pierce, Bertucci, Vogeley, and Moreland (2004), Schwend, Werth, & Johnston (2000)
9	8 months	Fall in arms of caregiver with direct axial load onto femur	Buckle fracture of distal femur	Nonabuse	Pierce, Bertucci, Vogeley, and Moreland (2004)
10	10 years	Fall onto outstretched hand	Buckle fracture of radius	Nonabuse	Pierce, Bertucci, Vogeley, and Moreland (2004)
11	8 months	Caregiver rolled child over with humerus behind back	Oblique fracture of humerus	Nonabuse	Hymel and Jenny (1996)
12	18 months	Fell with twist	Toddler's fracture	Nonabuse	Kleinman (1998)
13	4 months ex-29 week premie	None	Rib fractures (patient had Rickets apparent on plain films)	Nonabuse	Kleinman (1998), Jenny (2006), Bishop, Sprigg, & Dalton (2007)
14	3 years	None	Toddler's fracture	Nonabuse	Kleinman (1998)
15	8 months	Injured in "Jumperoo"	Spiral tibia fracture	Nonabuse	Moineau and Plint (2005)

identified a lack of knowledge about child abuse, negative experiences with CPS, and the additional time required to evaluate suspected abuse as obstacles in these cases (Flaherty et al., 2004).

It is likely that in many, if not most, cases of physical abuse, non-CAP physicians may provide CPS with accurate, easily obtainable diagnoses regarding abuse, or CPS may not even need physician input to assess an abuse allegation. However, in over 40% of the cases referred to the CAP team by CPS, non-CAP physicians did not provide CPS workers with a diagnosis regarding physical abuse even though the physician was the reporter or the physician was asked by CPS to evaluate the child for abuse. This, however, may be the correct course of action if the non-CAP physician feels he/she does not have enough information, time and/or expertise to make such a diagnosis. In many cases, the CPS worker contacted the non-CAP physician to request their opinion regarding the diagnosis of abuse, but this information was not always provided. In instances where the physician does not give a diagnosis regarding abuse and there is no available CAP physician, the CPS worker must decide, despite minimal medical training, the plausibility of abuse or accident causing a child's injury. Potential "triggers" for CAP referral may include cases where non-CAP physicians feel they do not have the time, expertise, and/or willingness to provide continued support and feedback to CPS, cases where scene investigation (such as burns) or further interviews with potential witnesses may significantly affect the diagnosis, cases where practitioners with pediatric training and/or experience are not available, conditions where there is a significant potential for medical conditions mimicking abuse (such as osteogenesis imperfecta), or cases where CPS does not understand the medical information or has further questions regarding the case. Further study into the question of case characteristics that suggest the need for CAP involvement is warranted.

Even when a physician does make a diagnosis regarding abuse, these diagnoses may be based only the information available at that time and little coordination with investigators may limit the consideration of information from the scene investigation, interviews of potential witnesses, and other vital information. In our study, CAP physicians working in concert

with CPS changed over 40% of diagnoses previously provided to CPS by non-CAP physicians. Most of these changes (81.6%) resulted in a lower suspicion of abuse. In 18.4% of cases, the diagnosis was changed from nonabuse to abuse. Although it is not possible to discern specifically how many diagnoses were changed due to the process of continued investigation and CPS/CAP collaboration versus clinical expertise of CAP physicians, most of these changes were due to different interpretations of plausibility of mechanism. The information regarding injury mechanism is usually available to non-CAP physicians when the history is obtained from caregivers; however, the CPS scene investigation and interview process frequently adds information to the proposed mechanism of injury that is not available at the time of the child's medical care. Sometimes this additional information was obtained at the request of the CAP physician. The continued coordination between CPS and CAP, a service that most non-CAP physicians cannot provide due to time and other constraints, ensures consideration of all factors relevant to the child's injury. Additionally, CAP groups may frequently work as a team, consulting one another on difficult cases, and have additional time and access to resources (pediatric subspecialists and social workers, for instance) that non-CAP providers may not have. The process of continued availability to CPS and further evaluation beyond the initial presentation to medical providers may play a significant role in maximizing the potential for an accurate diagnosis regarding abuse.

Different physicians may have different thresholds for determining that abuse was likely the cause of a child's condition. For some physicians, the diagnosis of abuse is made if it is the *only* possible cause of the condition. For others, abuse is diagnosed if it is the *most likely* cause. These differing thresholds, in turn, may affect opinions provided to CPS. In our study, the majority of the changed diagnoses could be considered "overcalls" of abuse. However, as previously noted, non-CAP physicians making these diagnoses may frequently have only part of the necessary information. Reporting a suspicious injury that is later clarified as attributable to nonabusive causes may be preferable to missing abuse, provided that a CAP team is available to work in tandem with CPS to fully evaluate the case.

Given the increased odds of a changed diagnosis in cases originating from rural locations, CPS workers in rural locations may particularly benefit from the availability of a CAP group. Fewer physicians with pediatric training are available in rural locations (Goodman & the Committee on Pediatric Workforce, 2005). Additionally, physicians practicing in rural locations may have closer relationships with families and the community (Shapiro & Longenecker, 2005) which may impact decision making in possible abuse cases. We believe that our findings are due to a paucity of pediatric-trained physicians in the rural areas of the study's catchment area. Further investigation regarding how these unique characteristics of rural medicine affect assessments of potential child abuse is warranted.

Our study showed that children younger than 1 year of age were more likely to be given a diagnosis regarding abuse by non-CAP physicians. Physicians may be more confident in assessing the likelihood of abuse in very young children. Despite a greater tendency to provide a diagnosis in this younger age group, differences in diagnosis between the non-CAP and CAP physicians occurred at the same rate as in the older age groups.

Non-CAP physicians were less likely to provide diagnoses regarding abuse to CPS in children with a burn. Burns, more so than other injuries, require in-home investigation, such as determining water temperatures and the photographing the scene. Non-CAP physicians may have felt that they did not have adequate information to make diagnoses regarding abuse. Conversely, non-CAP physicians were more likely to provide CPS with diagnoses regarding abuse in children with fractures. However, agreement between the CAP/CPS collaborative team and non-CAP physicians was low for children with fractures. At least some of the lack of agreement may be attributable to further characterization of the mechanisms of injury, as discovered in the CAP/CPS investigative process, and knowledge of the current understanding of likely resulting fractures in children, as summarized in the provided references (Table 6).

Head injuries provide examples of the possible inappropriate use of perceived risk factors in making the diagnosis of abuse (Table 5). A diagnosis based on perceived risk factors for abuse, as documented by non-CAP physicians in the medical chart in these cases, may differ significantly from a diagnosis based on analysis of compatibility of the injury with the reported mechanism, taken in concert with details from a CPS investigation. Six of the seven cases of differing diagnosis involved impact injuries (linear parietal skull fractures and/or epidural hemorrhages). Short falls can cause these types of injuries (Choux, Grisoli, & Peragut, 1975; Helfer, Slovis, & Black, 1977; Jonker & Oosterhuis, 1975; Nimityongskul & Anderson, 1987). In five of the cases, non-CAP physicians cited a "delay in seeking care" as their main reason for diagnosis of abuse. In four of those cases, caregivers reported a history of a short fall with no subsequent ill symptoms seen in the child. Medical attention was sought at a later time when soft tissue swelling was noted on the child's head at the site of impact. One of these cases was supported by videotaped evidence discovered during the scene investigation conducted a week after the child's hospitalization. The remaining two cases consisted of a child with a growing epidural hemorrhage after a short fall and a child with a subdural hematoma with no history of trauma. The child with the subdural hematoma was diagnosed as "abused" by a neurosurgeon. Subsequent CAP evaluation, including an MRI with contrast and an MRV, noted a subdural hematoma with a neomembrane and a vascular malformation. Vascular malformations are known causes of subdural hematomas (Meyer-Heim & Boltshauser, 2003), and neomembranes can cause persistent bleeding into a subdural hematoma (Yamashima, 2000).

This study has several limitations. It is retrospective in design. It was impossible to know the full extent of information available to non-CAP physicians, as their assessments were evaluated based on information they provided to CPS. Non-CAP physicians did not have the benefit of review of the information gathered during the investigative process. As such, the data from this study should not be interpreted as a direct statistical comparison of accuracy of diagnoses between CAP versus non-CAP physicians; rather, this study supports continued evaluation of potential abuse cases and collaboration with CPS by physicians with subspecialty training. There was an inherent selection bias to the study, as a report had to be made to CPS and CPS had to consult the CAP group for children to be included in the study. This may have resulted in a higher percentage

of cases without a diagnosis from non-CAP physicians and a higher rate of different diagnosis. However, the main focus of the study was the impact of CAP availability on information provided to CPS. Thus, though the cases in this study were a select group of children at risk for abuse, the data obtained from their evaluation supports a need for CAP availability. Specific data regarding years of experience of type of training of non-CAP physicians was not available for this study. Future studies are needed to examine the effect of physician characteristics on abuse assessments.

There is a lack of an accepted “gold standard” in child abuse cases. Other fields, such as radiology and psychiatry also lack “gold standards” and diagnosis is based upon accepted standards, individual interpretation, and/or best available scientific evidence, as was cited in this study. It is highly unlikely that the non-CAP physicians in this study withheld diagnoses in anticipation of CPS consulting CAP, as the CAP consultation service had not been advertised and area physicians were likely unaware of these services at the time of our study. This is supported by the fact that none of the referrals to the CAP clinic without diagnoses were made by physicians; all were made by CPS. Discordant diagnosis among CAP physicians may exist (Lindberg, Lindsell, & Shapiro, 2008); however, it may be minimal when CAP physicians have access to and participate in the CPS investigative process, as in this study.

Conclusions

In many cases of possible child physical abuse, non-CAP providers do not provide CPS with a diagnosis regarding abuse despite initiating the abuse investigation or being consulted by CPS for an abuse evaluation. CPS consultation with a CAP specialty group as a second opinion, along with continued information exchange and team collaboration, frequently results in a different diagnosis regarding abuse. Non-CAP providers may not have time, resources, or expertise to provide CPS with appropriate abuse evaluations in all cases.

References

- American Board of Medical Subspecialties (2008). *Recognized physician specialty and subspecialty certificates*. Retrieved April 2, 2008 from http://www.abms.org/Who_We_Help/Physicians/specialties.aspx.
- Allasio, D., & Fischer, H. (2005). Immersion scald burns and the ability of young children to climb into a bathtub. *Pediatrics*, *115*(5), 1419–1421.
- Anderst, J. (2008). Assessment of factors resulting in abuse evaluations in young children with minor head trauma. *Child Abuse & Neglect*, *32*(3), 405–413.
- Bishop, N., Sprigg, A., & Dalton, A. (2007). Unexplained fractures in infancy: Looking for fragile bones. *Archives of Disease in Childhood*, *92*(33), 251–256.
- Choux, M., Grisoli, F., & Peragut, J. C. (1975). Extradural hematomas in children 104 cases. *Child's Brain*, *1*(6), 337–347.
- Committee on Child Abuse Neglect. American Academy of Pediatrics. (2002). When inflicted skin injuries constitute child abuse. *Pediatrics*, *110*, 644–645.
- Daria, S., Sugar, N., Feldman, K., Boos, S., Benton, S., & Ornstein, A. (2004). Into hot water head first: Distribution of intentional and unintentional immersion burns. *Pediatric Emergency Care*, *20*(5), 302–310.
- Department of Health Human Services, Administration on Children Youth and Families. (2008). *Child Maltreatment 2006*. Washington, DC: U.S. Government Printing Office.
- Drago, D. A. (2005). Kitchen scalds and thermal burns in children five years and younger. *Pediatrics*, *115*(1), 10–16.
- Duhaime, A. C., Gennarelli, T. A., Thibault, L. E., Bruce, D. A., Margulies, S., & Wisner, R. (1987). The shaken baby syndrome. A clinical, pathological, and biomechanical study. *Journal of Neurosurgery*, *66*(3), 409–415.
- Dunstan, F. D., Guildlea, Z. E., Kontos, K., Kemp, A. M., & Sibert, J. R. (2002). A scoring system for bruise patterns: A tool for identifying abuse. *Archives of Disease in Childhood*, *86*(5), 330–333.
- Feldman, K. W. (1992). Patterned abusive bruises of the buttocks and the pinnae. *Pediatrics*, *90*(4), 633–636.
- Flaherty, E., Jones, R., & Sege, R. (2004). Telling their stories: Primary care practitioners' experience evaluating and reporting injuries caused by child abuse. *Child Abuse & Neglect*, *28*(9), 939–945.
- Goodman, D. C., & The Committee on Pediatric Workforce. (2005). The pediatrician workforce: Current status and future prospects. *Pediatrics*, *116*(1), e156–e173.
- Helfer, R. E., Slovis, T. L., & Black, M. (1977). Injuries resulting when small children fall out of bed. *Pediatrics*, *60*(4), 533–535.
- Hettler, J., & Greenes, D. S. (2003). Can the initial history predict whether a child with head injury has been abused? *Pediatrics*, *111*(3), 602–607.
- Hymel, K. P., & Jenny, C. (1996). Abusive spiral fractures of the humerus: A videotape exception. *Archives of Pediatric and Adolescent Medicine*, *150*(2), 226–228.
- Jenny, C. (2006). Evaluating infants and young children with multiple fractures. *Pediatrics*, *118*(3), 1299–1303.
- Jenny, C., Hymel, K., Ritzel, A., Reinert, S., & Hay, T. (1999). Analysis of missed cases of abusive head trauma. *Journal of the American Medical Association*, *282*(7), 621–629.
- Jones, J., Feldman, K., & Bruckner, J. D. (2004). Child abuse in infants with proximal physeal injuries of the femur. *Pediatric Emergency Care*, *20*(3), 157–161.
- Jones, R., Flaherty, E., Binns, H., Price, L., Slora, E., Abney, D., Harris, D., Christoffel, K., & Sege, R. (2008). Clinicians' description of factors influencing their reporting of suspected child abuse: Report of the child abuse reporting experience study research group. *Pediatrics*, *122*, 259–266.
- Jonker, C., & Oosterhuis, H. J. (1975). Epidural haematoma. A retrospective study of 100 patients. *Clinical Neurology and Neurosurgery*, *78*(4), 233–245.
- Kleinman, P. K. (Ed.). (1998). *Diagnostic imaging of child abuse*. Mosby, MO: St. Louis.
- Lindberg, D. M., Lindsell, C. J., & Shapiro, R. A. (2008). Variability in expert assessments of child physical abuse likelihood. *Pediatrics*, *121*(4), e945–e953.
- Maguire, S., Mann, M. K., Sibert, J., & Kemp, A. (2005a). Are there patterns of bruising in childhood which are diagnostic or suggestive of abuse? *Archives of Disease in Childhood*, *90*(2), 182–186.
- Maguire, S., Mann, M. K., Sibert, J., & Kemp, A. (2005b). Can you age bruises accurately in children? A systematic review. *Archives of Disease in Childhood*, *90*(2), 187–189.
- Mathew, M. O., Ramamohan, N., & Bennet, G. C. (1998). Importance of bruising associated with paediatric fractures: Prospective observational study. *British Medical Journal*, *317*(7116), 1117–1118.
- Meyer-Heim, A. D., & Boltshauser, E. (2003). Spontaneous intracranial haemorrhage in children: Aetiology, presentation and outcome. *Brain and Development*, *25*(6), 416–421.
- Moineau, G., & Plint, A. (2005). Tibial fractures possibly linked to use of a baby stationary activity center. *Pediatric Emergency Care*, *21*(3), 181–183.
- Moritz, A. R., & Henriques, F. C. (1947). Studies of thermal injury: The relative importance of time and surface temperature in the causation of cutaneous burns. *The American Journal of Pathology*, *23*(5), 695–720.
- Nimityongskul, P., & Anderson, L. D. (1987). The likelihood of injuries when children fall out of bed. *Journal of Pediatric Orthopedics*, *7*(2), 184–186.
- Pierce, M. C., Bertucci, G., Vogeley, E., & Moreland, M. S. (2004). Evaluating long bone fractures in children: A biomechanical approach with illustrative cases. *Child Abuse & Neglect*, *28*(5), 505–524.

- Prange, M. T., Coats, B., Duhaime, A. C., & Margulies, S. (2003). Anthropomorphic simulation of falls, shakes, and inflicted impacts in infants. *Journal of Neurosurgery*, 99(1), 143–150.
- Raghupathi, R., Mehr, M. F., Helfaer, M., & Margulies, S. (2004). Traumatic axonal injury is exacerbated following repetitive closed head injury in the neonatal pig. *Journal of Neurotrauma*, 21(3), 307–316.
- Schwend, R. M., Werth, C., & Johnston, A. (2000). Femur shaft fractures in toddlers and young children: Rarely from abuse. *Journal of Pediatric Orthopedics*, 20(4), 475–481.
- Shapiro, J., & Longenecker, R. (2005). Country doctors in the literature: Helping medical students understand what rural practice is all about. *Academic Medicine*, 80(8), 724–727.
- Spiller, H. A., Winter, M. L., Weber, J. A., Krenzelok, E. P., Anderson, D. L., & Ryan, M. L. (2003). Skin breakdown and blisters from senna-containing laxatives in young children. *The Annals of Pharmacotherapy*, 37(5), 636–639.
- Strait, R. T., Siegel, R. M., & Shapiro, R. A. (1995). Humeral fractures without obvious etiologies in children less than 3 years of age: When is it abuse? *Pediatrics*, 96(4), 667–671.
- Sugar, N. F., Taylor, J. A., & Feldman, K. W. (1999). Bruises in infants and toddlers: Those who bruise rarely bruise. *Archives of Pediatric and Adolescent Medicine*, 153(4), 399–403.
- Texas Administrative Code (2004). The State of Texas. Retrieved April 21, 2008 from [http://info.sos.state.tx.us/pls/pub/readtac\\$ext.TacPage?sl=R&app=9&_dir=&p_rloc=&p_tloc=&p_ploc=&pg=1&p_tac=&ti=40&pt=19&ch=700&rl=511](http://info.sos.state.tx.us/pls/pub/readtac$ext.TacPage?sl=R&app=9&_dir=&p_rloc=&p_tloc=&p_ploc=&pg=1&p_tac=&ti=40&pt=19&ch=700&rl=511).
- Trokkel, M., Waddimba, A., Griffith, J., & Sege, R. (2006). Variation in the diagnosis of child abuse in severely injured infants. *Pediatrics*, 117(3), 722–728.
- Yamashima, T. (2000). The inner membrane of chronic subdural hematomas. *Neurosurgical Clinics of North America*, 11(3), 413–424.