



Early Recognition of Physical Abuse: Bridging the Gap between Knowledge and Practice

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In 2009, approximately 200 child abuse pediatricians (CAPs) passed the first board certification examination. One major impetus for the new subspecialty was the high rate of missed child abuse cases and the dearth of high-quality research.¹ In particular, a landmark 1999 study by Jenny et al demonstrated that in 32% of cases of abusive head trauma (AHT), there had been a previous missed opportunity to make a diagnosis.²

Fast forward to 2018, when those CAPs are preparing to recertify, and the landscape of physical abuse recognition has changed dramatically. There are currently close to 500 board-certified CAPs equipped with clear recommendations regarding when and how to evaluate for suspected physical abuse,^{3,4} and the number of research publications has increased dramatically.

However, these advances have not significantly decreased the rate of missed abuse or the resulting morbidity and mortality. When Letson et al repeated the landmark Jenny study in 4 leading pediatric centers in 2016, the rate of missed AHT remained nearly unchanged at 31%.⁵ Multiple studies have demonstrated that the evaluation of physical abuse in even the greatest-risk populations remains variable, biased, and inconsistent.⁶⁻⁹ Perhaps most disturbing is that the number of deaths related to physical abuse has remained stable at approximately 600 annually.^{10,11}

Clearly, neither specialized expertise nor broad awareness has answered the problem of missed abuse. Because abusive caregivers are unlikely to seek out subspecialist CAPs, decreasing morbidity and mortality will depend on continuing to increase awareness as well as disseminating strategies for abuse recognition to all providers who care for children. In this review, we will highlight some of the advances of the last decade with a focus on how newer tools and ways of thinking can improve abuse recognition.

Understanding the Importance of Sentinel Injuries in Early Detection of Physical Abuse

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Many of us learned in medical school that we should consider abuse when we identify concerning social risk factors or abnormal family interactions. We now know that these factors are relatively insensitive, subjective, and may allow intrinsic bias to seep into evaluations.^{2,12} Instead, data now suggest that an evaluation for abuse should be performed in all young children with sentinel injuries regardless of the presence or absence of any social risks or protective factors.

Sentinel injuries—medically minor injuries, such as a bruise or mouth injury, which are associated with a high risk of escalating violence—have been the subject of much research in the last decade. Some authors feel that the term “sentinel injury” should be applied exclusively to infants who are precruising to emphasize the elevated risk to these children.^{13,14} Other authors use the term more expansively to include any injury with rates of abuse high enough to warrant routine evaluation for abuse. Naomi Sugar and the Puget Sound Research network published data in 1999 showing that any bruising was rare in young infants who were premobile, occurring in fewer than 1% of <6-month-old infants presenting for well-child care.¹⁵ This was followed by multiple studies demonstrating high rates of abuse—either at the time of presentation or in the future—in young children presenting with specific sentinel injuries.¹⁶⁻²⁰

In a landmark case-control retrospective study of 401 infants being evaluated by the hospital’s Child Protection Team for concerns of physical abuse, Sheets et al provided the first data about the prevalence of sentinel injuries in infants with physical abuse.¹⁴ They compared the rate of sentinel injuries among infants determined to have definite abuse, an intermediate concern for abuse, or no abuse. In the 200 infants with definite abuse, 27.5% had a previous sentinel injury compared with 8% of the 100 infants with an intermediate concern for abuse and 0% of the 101 infants who were not abused. Eighty-percent of the sentinel injuries

AHT	Abusive head trauma
BIBIS	Biomarkers of Brain Injury Score
CAP	Child abuse pediatrician
CPR	Clinical prediction rule
CPS	Child Protective Services
CT	Computed tomography
ED	Emergency department
EHR	Electronic health record
PECARN	Pediatric Emergency Care Applied Research Network
PIBIS	Pittsburgh Infant Brain Injury Score

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were bruises, with 66% occurring before 3 months of age. Importantly, medical providers were aware of the sentinel injury in 41.9% of cases, suggesting that early recognition of their importance as a precursor to further injury with subsequent changing of the environment might protect these children from repetitive abuse.¹⁴

More recent studies demonstrate escalating violence when sentinel injuries are not appropriately evaluated.^{16,20} In one prospectively planned secondary analysis of 146 infants <6 months old who were evaluated for abuse after presenting with apparently isolated bruising, skeletal surveys identified new injuries in 23%, neuroimaging identified new injuries in 27%, and abdominal injuries were identified in 3%.¹⁶ Overall, 50% (73/146) had at least one additional injury. No bleeding disorders were identified despite testing in 71% of children. Finally, a retrospective longitudinal cohort study by Thackeray et al using data from a pediatric Medicaid accountable care organization demonstrated increasing severity of injury with subsequent abusive events as defined by the New Injury Severity Score.²⁰ There were 914 subjects, each of whom had one billing code for abuse, completion of a skeletal survey, or injuries suspicious for abuse; 39% had at least 1 additional event, 12% had 2 additional events, and 5% had 3 or more events. One of the most important factors associated with a decreased risk of recurrent injury was a greater New Injury Severity Score at the time of the initial injury, suggesting that children with more minor injuries are either not reported to Child Protective Services (CPS) or their environment is not altered enough to protect them from further abusive events.

One criticism that had been raised is whether the data about infants with a sentinel injury who are referred to a CAP could be generalized to all infants with bruising because most infants with bruises are not initially seen by a CAP. In 2015, the state of Ohio developed a quality improvement collaborative entitled TRAIN, “Timely Recognition of Abusive Injuries.” This collaborative included all 6 of Ohio’s children’s hospitals. A key finding was that of all infants <6 months old who presented with a sentinel injury, 6.8% returned with a second injury within 12 months even with evaluation or intervention for the initial event. Just 38.7% of infants <6 months old in the study cohort had skeletal surveys completed, and skeletal survey completion was related to demographic variables such as insurance status (Jonathan Thackeray, personal communication, 2018).

The sum of all these data supports a change in the current practice, which relies heavily on clinical judgment and social intuition, to one in which screening for abuse in infants with a sentinel injury is routine in the same way that performing a lumbar puncture in a febrile neonate is standard and universal.²¹ Current recommendations from the American Academy of Pediatrics support this approach of standard screening,³ yet screening is still variable even among children’s hospitals.^{6,8,22} Using the Pediatric Health Information System database, Lindberg et al showed high rates of abuse for children evaluated for sentinel injuries at leading children’s hospitals but also showed highly variable rates of evaluation for abuse.⁸ Although much literature has focused on the use of the

skeletal survey as a critical screening tool, neuroimaging, liver function tests, and retinal examinations also have important roles in a subset of children with sentinel injuries.^{3,23-27}

Use of Clinical Prediction Rules (CPRs) to Improve Identification of Physical Abuse

With the growth of data about sentinel injuries, there has been a concomitant effort to develop CPRs to assist physicians in deciding when to evaluate for child abuse. Most infants with sentinel injuries are evaluated in general emergency departments (EDs); a study by Gausche-Hill et al reported that 89% of pediatric (age 0-14 years) ED visits occur in non-children’s hospitals.²⁸ However, because of the relatively small number of children evaluated in any single general ED, a given physician might only see 1 or 2 infants with a sentinel injury every year. The rarity of the event strongly supports the utility of a CPR.

In 2010, Pierce et al published the derivation of a CPR called the “TEN-4”—TEN refers to the locations (torso, ears, or neck) of the bruises that are highly associated with physical abuse and 4 refers to age (up to 4 years for bruising in concerning locations or *any* bruising in a child ≤4 months old).²⁹ The rule was subsequently enhanced to include additional injury locations that are concerning for abuse: frenulum, angle of the jaw, cheek, eyelids and subconjunctival hemorrhage, and patterned bruises. The expanded bruising clinical decision rule is referred to as TEN-4 FACESp. A multicenter prospective validation of TEN-4 FACESp recently was completed; 2182 children <4 years of age (excluding children in motor vehicle crashes) with bruising were enrolled at 5 children’s EDs. The rule was 96% (95% CI 94.2%-97.9%) sensitive and 87% (95% CI 84.9%- 88.1%) specific for predicting abuse. Another interesting point from this study was that the study cohort of 2182 children who had any bruises were derived from a sample of >18 000 children receiving care in the ED. The fact that most children (88%) had no bruising underscores the importance of a child abuse evaluation in all children who meet these criteria.³⁰

The concept of sentinel injuries also has moved beyond visible injuries, such as bruising or oral injuries, to include other high-risk clusters of symptoms. The Pittsburgh Infant Brain Injury Score (PIBIS) was developed to help physicians identify AHT in its mildest form before significant morbidity and mortality occurs. Infants with AHT who are greatest risk of being misdiagnosed are those who are well-appearing and who present without a history of trauma.²⁻⁵ These infants often present with symptoms such as vomiting without diarrhea, fussiness, unusual movements/possible seizures, or apnea/brief resolved unexplained event, all of which are soft neurologic signs but that may not be recognized as a symptom of AHT when not accompanied by a history of trauma. The PIBIS score combines infant age, hemoglobin, head circumference, and physical examination findings to predict the likelihood of an intracranial hemorrhage. A prospective multicenter validation of approximately 1000 infants demonstrated that a score

of 2 was 93% sensitive and 53% specific for identifying intracranial hemorrhage in this high-risk cohort.³¹ An implementation analysis is an important next step before the widespread use of PIBIS, but consideration of the components of PIBIS when evaluating infants with nonspecific symptoms may be helpful to physicians assessing these infants.

The Pediatric Brain Injury Research Network (Pedi-BIRN) derived³² and subsequently validated³³ a CPR to identify which children <3 years old admitted to the pediatric intensive care unit for traumatic brain injury should be evaluated for abuse. In a prospective validation of 291 such children, the CPR (acute respiratory compromise, TEN bruising, bilateral or interhemispheric subdural hematomas, or nonsimple skull fracture) had a sensitivity of 95%, specificity of 46%, positive predictive value of 55%, and negative predictive value of 93% for identification of the subset of patients with AHT (vs nonabusive traumatic brain injury).

It bears emphasis that the CPRs built to identify abuse need to be distinguished from CPRs such as the Pediatric Emergency Care Applied Research Network (PECARN) rules, which were designed to detect clinically significant brain injury.³⁴ In cases of suspected abuse, additional injuries—regardless of whether they require medical treatment—provide important information about the likelihood of abuse and the potential need for social, rather than medical, intervention. For example, although extensive retinal hemorrhages, posterior rib fractures, or classic metaphyseal fractures rarely require treatment, they are all highly specific for abuse. Several well-validated CPRs that are invaluable for determining the need for imaging after nonabusive trauma should be specifically avoided when there is concern for abuse.³⁵

Use of the Electronic Health Record (EHR) to Screen and Evaluate for Physical Abuse

The proper evaluation for physical abuse depends on both the age of the child and the injuries identified. For example, an unexplained humerus fracture in a neurologically normal 5-month-old child should prompt a skeletal survey, bloodwork, and neuroimaging even in the absence of symptoms of brain injury, and the same unexplained fracture in a neurologically normal 18-month-old child would prompt a skeletal survey and blood work but not neuroimaging. Given that most clinicians will encounter abuse in only a small fraction of their patients, it is unlikely that most clinicians would be able to recall the proper evaluation in any given scenario. The issue is not specific to the field of abuse, and numerous experiences outside the field of child abuse have demonstrated that having clinical guidelines is insufficient to standardize care.³⁶⁻³⁸

Literature in other fields demonstrates that the EHR can be used to standardize care, lead to improved compliance with guidelines and, thereby, improve outcomes.³⁹⁻⁴² The possibility of using EHR-based clinical decision support to guide child abuse evaluation is an important new area of research.⁴³⁻⁴⁵

In England, the Child Protection—Information Sharing project (<https://digital.nhs.uk/services/child-protection>

-information-sharing-project) is an EHR-based project of the National Health Service. As part of this program, CPS shares information with the National Health Service about children who are on a “Child Protection Plan.” If that child then receives medical care in any unscheduled care setting, such as an ED or urgent care center, the healthcare team is alerted and given access to the contact details for the CPS caseworkers and service providers. In addition, CPS is automatically notified that the child has been to the ED, and both parties can see details of the child’s previous 25 visits to EDs or urgent cares.

New South Wales, Australia, has a “Child-At-Risk” alert within their EHR. This alert is applied manually to patients’ EHR after any report is made to CPS. Since 2015, 2400 alerts have been applied. These alerts are visible to all treating clinicians when they open the EHR for that child at any hospital and outpatient community health service. The alert contains information about the date and reason for the initial report to CPS and other relevant information (eg, “patient has multiple prior missed appointments,” or “Please contact us if patient does not come for scheduled appointment”). The system is currently being evaluated for its impact on clinical practice.⁴⁶

Berger et al demonstrated that it is possible to embed a set of triggers into the EHR to identify young children with possible physical abuse. The 30 triggers identified children <2 years of age with possible, probable, or definite physical abuse with a sensitivity of 96.8% (95% CI 92.4-100.0%), specificity of 98.5% (95% CI 98.3.5-98.7), positive predictive value of 26.5% (95% CI 21.2-32.8%), and negative predictive value of 99.9% (95% CI 99.9-100.0%).⁴⁵ A randomized controlled trial evaluating the effect of the trigger system plus provider alerts and a physical abuse order set with age-specific guidelines for evaluation of physical abuse demonstrated remarkably high compliance with recommendations from the American Academy of Pediatrics for evaluation of suspected physical abuse when providers received the alerts and were linked directly to the order set (89%) and when providers did not receive alerts but still had access to the order set (86%). The compliance rate before the introduction of the child abuse clinical decision support system was also very high at 84%. It remains to be seen whether these alerts improve screening at a center with lower baseline compliance.⁴⁷

Riney et al evaluated a similar child abuse clinical decision support system at Cincinnati Children’s Hospital Medical Center. Using virtually identical clinical guidelines as Berger et al, they demonstrated that a suite of quality improvement tools, including a standardized order set, provider education, and a suggested communication strategy to speak with families about the need for an abuse evaluation resulted in a marked improvement in guideline adherence from 47% to 69%.⁴⁴ Importantly, the study by Riney et al only included children in whom the provider had already considered the possibility of abuse; they did not try to improve provider recognition of abuse. The fact that guideline adherence was initially only 47% among providers who already knew that they needed to evaluate for abuse is strong evidence for the need for a physical abuse-specific order set.

The use of a routine child abuse screen is likely to be one of the best ways to identify the largest number of children with abuse. In a series of well-designed studies, Louwers et al in The Netherlands developed and subsequently validated a routine child abuse screen for use in the ED setting.⁴⁸ Unlike previous studies in which child abuse screening tools were evaluated only in children with injuries,⁴⁹ the Louwers screen—called ESCAPE—was designed to be used as a universal screening tool in all children seeking care in an ED. ESCAPE is paper-based and not integrated into the EHR and was developed in a country without mandated child abuse reporting. Berger et al in the US recently reported on the implementation of a modified Louwers screening tool as a universal child abuse screen that is integrated into EHR of all the general EDs in a large hospital system. Data from the first 11 600 screens demonstrate significantly greater identification and reporting of abuse and neglect when the screen was used.⁵⁰

Early Identification of Risk in Children Exposed to Violence

Although an approach of using clinical guidelines rather than clinical gestalt to drive child abuse evaluation is important, it is also imperative to recognize that social factors do play an important role in recognizing abuse. Mounting evidence suggests that violence is often a disease that affects a household, not just a single child, and that household violence itself also should be considered an opportunity for early identification of sentinel injuries and/or intervention to stop the violence.⁵¹ Violence in a child's home, including intimate partner violence, is one of the adverse childhood experiences that have been shown to predict a wide range of adverse health outcomes.^{51,52}

In a large prospective multicenter study of children with suspected physical abuse, skeletal surveys were positive in roughly 12% of the asymptomatic siblings and contacts <2 years of age who shared a home with the abused child. Twins were at especially elevated risk.⁵³ The overlap between physical abuse and intimate partner violence, elder abuse, and even animal abuse has long been recognized, although precise rates are not well-described.⁵⁴⁻⁵⁶ A recent study showed a high (25%) rate of internal injury among a small group of young children who were brought for medical care after an episode of intimate partner violence. This small, provocative study raises the question of which children should undergo medical evaluations after being identified as living in a violent home.⁵⁴

Use of Predictive Analytics to Enhance Medical Data

Combining the concept of clinical decision support with data showing the importance of household social risks rapidly leads to the idea that a predictive analytic approach, based on public or administrative data, can improve early recognition of abuse risk. This type of approach can quantify the weight that household factors, such as maternal age, history of substance abuse

or mental health diagnoses, and previous referrals to CPS, can have to predict future social and medical outcomes such as injuries or substantiated CPS reports.⁵⁷ Many of these risks can be identified at the time of a child's birth.⁵⁸ Using a birth cohort of >4.3 million children born in California between 1999 and 2006, Putnam-Hornstein showed that after adjusting for risks factor at birth, a previous report to CPS, regardless of whether that report was indicated as abuse or neglect, was the strongest independent risk factor for injury mortality before the age of 5 years.⁵⁹

This type of predictive analytics approach currently is being used in Allegheny County, Pennsylvania, and other jurisdictions.⁶⁰ Using data from psychiatric treatment facilities, welfare benefits, drug and alcohol treatment centers, and CPS, an algorithm assists CPS screeners in Allegheny County at the point that they determine whether a report should be investigated or "screened out." Cases in the top 10% of estimated risk generally are designated for investigation, regardless of the screener's subjective estimate of abuse risk. Initial results suggest that the algorithm has increased investigations for children at greatest risk while decreasing investigations for children at lowest risk and perhaps mitigating race-based disparities in abuse reporting. Given the regular occurrence of fatalities in children previously reported and screened out by CPS, such a tool would seem to have strong potential for widespread implementation and could be a game-changer for CPS systems that are consistently faced with more reports than resources. Importantly, in the Allegheny County system, risk scores are only assigned in cases that are designated as "general protective services," meaning that generally, there are concerns about a child's safety rather than specific concerns about abuse such as a report of sexual or physical abuse. These latter cases—referred to as "CPS" cases—are all investigated regardless of the risk score.

However, a recent experience in Chicago is an important reminder that predictive analytics is only as good as the data that are used to make the predictions. Chicago's CPS recently ended a contract with a predictive analytics company after the system assigned thousands of children risk scores that gave them a $\geq 90\%$ probability of death and giving low risk scores in cases which ultimately resulted in near-fatalities or fatalities. As part of a post-hoc analysis of the program, multiple issues were raised, including errors in data entry, which could lead to inappropriate scores being assigned, and lack of linkage between index children, siblings, and other family members, which can impact the risk score. Additional issues were raised about the algorithm itself and the way in the contract was awarded.⁶¹

Another important part of a successful predictive analytic algorithm is that it must improve objectivity and decreases bias relative to human gestalt. Even a computer or an algorithm can have implicit bias if there is bias in the CPS, law enforcement, or welfare data on which the algorithm is based. What remains to be seen is whether the risk of algorithm bias is more or less than the implicit bias inherent in decisions made by individual human beings. Reports from Allegheny County suggest

that the predictive analytic approach may have decreased race-based disparities, but published data are pending.

Minimizing Risk to Infants and Young Children Undergoing Evaluation for Physical Abuse

Reasonable minds may differ about how to properly balance increased screening, which subjects children who are not being abused to testing that is ultimately unnecessary, against the risk of missed abuse, where outcomes can be profoundly tragic. For other clinical entities, we seem to accept testing yields that are in the 5%-10% range. For example, the current standard of care requires many, many negative lumbar punctures for every case of neonatal meningitis identified²¹ and in PECARN's large series of pediatric traumatic brain injury, the yield of computed tomography (CT) scanning for any traumatic brain injury was 10%,³⁴ much lower than the 20% or even greater rates of positive skeletal surveys in most publications.⁶²⁻⁶⁶ Regardless of whether you believe the minimum acceptable yield of a skeletal survey is 5% or 20%, any rational screening program will result in the evaluation of many children who will ultimately be determined not to be abused. Importantly, increasing screening is unlikely to lead to incorrect diagnoses of abuse; a skeletal survey that is negative does not lead to a diagnosis of abuse just as a negative CT of the head does not lead to the diagnosis of traumatic brain injury. Increasing screening, however, will result in more screening tests and as a result, we need to make every effort to ensure that the risks of evaluation are reasonable and fair and that we mitigate the risks as much as possible. The primary physical risk of an abuse evaluation to patients is the risk from ionizing radiation from the imaging tests to detect occult traumatic injuries. The radiation dose in a skeletal survey, by far the most common screening test in cases of suspected abuse, is 0.2 mSv; this radiation dose is approximately equivalent to the increased radiation exposure that would occur from spending 2 months in Denver, rather than Boston, due to increased altitude-related background radiation.⁶⁷ The dose from a CT of the head or abdomen is much greater, although these tests are done much less frequently.

All pediatric imaging should be conducted using pediatric parameters and dose-reducing methods. Follow-up skeletal surveys, which should generally be done 2-3 weeks after the initial skeletal survey should, in most cases, omit views of the skull, spine, and pelvis, which account for the majority of radiation exposure, while identifying relatively few additional fractures.^{68,69} Rapid magnetic resonance imaging techniques may also allow neuroimaging without the use of ionizing radiation.⁷⁰ This would be especially useful, because the risk of occult brain injury is greatest among the youngest infants, in whom the risk of radiation is greatest.²⁴

Multiple serum biomarkers have been evaluated as tools to target neuroimaging in infants at increased risk for AHT.⁷¹⁻⁷³ Until recently, none have shown promise for clinical care, as

the low baseline rate of abuse and relatively poor test characteristics meant that most tests had more false-positive than true-positive results. A recent prospective multicenter validation of a biomarker panel called the Biomarkers of Brain Injury Score (BIBIS) shows promise for early identification of acute intracranial hemorrhage in well-appearing infants who present with nonspecific symptoms such as vomiting or fussiness, which often are overlooked as signs of AHT.⁷⁴ BIBIS is a panel of 4 serum biomarkers—matrix metalloproteinase-9, neuron-specific enolase, vascular cellular adhesion molecule-1, and total hemoglobin—which when combined in a multivariable model can identify the subset of infants who would benefit from neuroimaging. At a cutoff of 0.182, the model was 89.3% sensitive (95% CI 87.7-90.4) and 48.0% specific (95% CI 47.3-48.9) for acute intracranial hemorrhage. Positive and negative predictive values were 21.3% and 95.6%, respectively. Importantly, the model was neither sensitive nor specific for atraumatic brain abnormalities, isolated skull fractures, or chronic intracranial hemorrhage. A false-positive BIBIS would not result in labeling a child as being abused just as a false-positive PECARN brain injury rule does label a child as having a brain injury. A positive BIBIS identifies the child as possibly needing a CT of the head to determine whether he/she has intracranial hemorrhage. If the CT is negative, then the infant does not have an intracranial hemorrhage. The recent Federal Drug Administration approval of the first serum biomarker for brain injury in adults creates a precedent and raises the likelihood that biomarkers for identification of acute intracranial hemorrhage have a pathway to market.⁷⁵

At least as important as the radiation risk from child abuse evaluations is the risk that comes from the stigma and judgment that currently is associated with an abuse evaluation. Because the decision to test for abuse has, for so long, been a decision based on clinical gestalt, it is not surprising that parents may feel judged or insulted by the decision to pursue a child abuse evaluation. This approach also leads to stress for the clinician faced with the high-stakes decision to pursue a workup that will be perceived as insulting vs the risk of missing abuse.

Although it is doubtful that we can ever remove all the emotional baggage from an abuse investigation, we can make substantial progress by emphasizing objectivity and confidentiality. It is instructive to compare the decision to perform a skeletal survey with the decision to obtain a pregnancy test in an adolescent girl with lower abdominal pain. Even if the adolescent strongly denies sexual activity, most clinicians would obtain pregnancy testing as a part of the standard of care—and would not base their decision on a subjective assessment of the girl's character, honesty, or wardrobe choices. If the patient is upset by the test being ordered, at least they do not feel that it is a personal judgement about themselves—it is just *what we do* based on weighing the low risks from the test against the possibility of a missed ectopic pregnancy. Only by constructing sensitive algorithms, based on objective factors, using low-risk testing, and then following these algorithms objectively, in a way that maintains confidentiality, can we reasonably use a similar paradigm for child abuse screening.

Conclusion: Where Are We Now and Where Are We Headed?

The important advances of the last decade present an opportunity to move from the old (failed) dogma in which abuse is identified using gestalt, social intuition, and individual red flags toward an approach that is more objective, fair and, ultimately, effective.¹² The development of clinical pathways and CPRs, EHR-based tools, and an expanding evidence base brings the field of child abuse pediatrics in-line with most other clinical specialties in the 21st century. Even though having strong data, raising awareness, and being able to consult with experts in child abuse pediatrics are all necessary to bring the practice of child abuse pediatrics into the 21st century, they are not sufficient.

We also will need to change the way all medical professionals who evaluate children think about abuse. We cannot rely on the small number of CAPs who only evaluate children in whom the concern for abuse has already been raised. The horse is already out of the barn, so to speak, once a CAP is consulted. To decrease the rates of missed abuse while decreasing the risks to children who are not abused and their families, there needs to be a shift in thinking and in practice so that child abuse is treated like the medical diagnosis that it is. It needs to be screened for, evaluated for, and treated like other common diseases, such as asthma or diabetes. And as with other medical diseases, screening and evaluation must be objective and evidence-based while minimizing the risks to patients. Skeletal surveys need to be thought of like a lumbar puncture—if you think of meningitis, you do a lumbar puncture and if you think of abuse in a young child, you do a skeletal survey. This does not mean that every child who gets a skeletal survey needs to be reported to CPS, just like every child who has a lumbar puncture doesn't need antibiotics. In both cases, the decision to perform the screening test needs to be objective based on the child's age and symptoms. Finally, and perhaps most importantly, clinicians, patients, and the public need to reframe the decision to pursue an abuse evaluation from being a judgment about a family or caregiver to being an objective weighing of risks (missed abuse or avoidable testing) and benefits (early abuse recognition). All the aforementioned new tools will allow us to make these risk:benefit calculations, but they will fall short if we continue to view the decision to test as a measure of a parent's character or social standing.

The next few years will be critical for the field of child abuse as we strive to translate data into a measurable decrease in morbidity and mortality through dissemination and implementation of what we know. With the growth of the new subspecialty of child abuse pediatrics, we are beginning to see an increase in research capacity in the field, and several studies are examining the use of more protocolized approaches. A recent consensus panel identified the need for multicenter research as a priority in the field and specifically identified research related to sentinel injuries and decreasing missed opportunities to identify abuse as high research priorities.⁷⁶ In 2013, the Institute of Medicine called for increased, sustainable research infrastructure, especially to link data from diverse

fields that touch abused children, including medical, legal, social, child protection, and others.⁷⁷ Although the path leading to dissemination and implementation is a difficult one, there really is no other choice for the thousands of children who die every year due to abuse and neglect. ■

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