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CHILD ABUSE IMAGING

Ethical challenges in child abuse: what is the harm of a misdiagnosis?

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Abstract

In this article the author examines ethical tensions inherent to balancing harms of false-negative and false-positive child abuse diagnoses, and he describes how such tensions manifest in courtroom proceedings. Child abuse physicians, including pediatric radiologists, shoulder heavy responsibilities weighing the potential consequences of not diagnosing child abuse when it could have been diagnosed (false negatives) against the consequences of making the diagnosis when it has not occurred (false positives). These physicians, who practice under ethical obligations to serve children's best interests and protect them from harm, make daily practice decisions knowing that, on balance, abuse is substantially more underdiagnosed than over diagnosed. Legal justice advocates, however, emphasize that clinical decision-making around abuse is not disassociated from endemic injustices that unduly incriminate individuals from socioeconomically underprivileged populations. Some defense advocates charge that child abuse physicians are insufficiently sensitive to harms of erroneous diagnoses, and they have characterized these clinicians as frankly biased. To support their claims in court, defense advocates have enlisted likeminded physician witnesses whose credentials as experts flout professional standards and who provide consistently flawed testimony based upon deficiently peer-reviewed literature. This article concludes that, to help mitigate these unhealthy circumstances, child abuse physicians might build trust with criminal defense advocates by instituting measures to alleviate perceptions of biases and by more explicitly acknowledging the potential harms of erroneous diagnoses. Professional societies representing these physicians, such as the Society for Pediatric Radiology, could take concurrent measures to help better prepare their constituent clinicians for expert testimony and make them more available to testify.

Keywords Bias · Child abuse · Diagnosis · Ethics · Expert witness · Radiology

> *In the face of partial knowledge and unpredictable outcomes, what requires courage in medical care is the ubiquitous and quite real fear of costly, damaging error. The stakes are high, the responsibility daunting, the resources inadequate and deceptive* [1].

Introduction: harms and values

Courage in medicine has been described as "the reliable disposition to approach with appropriate confidence situations that are fraught with the realistic fear of getting it wrong and causing harm" [1]. Within pediatric radiologic practice, such courage is never more necessary than in the context of child abuse, whether we are presented with a skeletal survey in a child when abuse is suspected, or a chest radiograph in a baby when it is not.

The most daunting potential harms boil down to those associated with false-negative and false-positive diagnoses. Consider the stakes of a false negative: If we fail to recognize demonstrated findings of child abuse when it has occurred — by misinterpreting imaging markers of abuse either as normal or as attributable to another diagnosis — we risk the child's returning to an unsafe environment where that child might experience further horrific injury. We practice with strongly evidence-based knowledge that child abuse overall is substantially underreported and underdiagnosed; that children who present for medical care after having been abused, but in whom the abuse is not diagnosed, suffer further injuries and death at alarming rates; and that earlier recognition reduces adverse recurrences [2–5].

We are also aware of the harmful repercussions that can ensue from our false positives, rarer though they may be [6–9]. If we incorrectly diagnose child abuse when it has not

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occurred, the child might not receive appropriate medical care. The child might be wrongly removed from his or her home, and an innocent individual might be erroneously accused, convicted and incarcerated. Both of these entail inestimable harm to the children, individuals and families involved.

These potential consequences of false negatives and false positives — of not diagnosing child abuse when it could have been diagnosed, or of making the diagnosis erroneously — sit in our primary consciousness when we interpret imaging studies where abuse is being questioned, and even when it is not. Our training enculturates us to treat chest radiographs in infants as screening exams for child abuse, regardless of clinical indication.

What is less well recognized, or at least openly acknowledged, is that balancing the likelihood of a false negative against that of a false positive represents a fundamental ethical calculus. Clinical practice sometimes forces us to decide which is the worse outcome. In other words, which outcome is more critical to avoid? This choice ultimately embeds a values-based determination about which outcome is associated with higher costs. On balance, is it worse that a child who should have been diagnosed as abused is not recognized as such, and then later dies from additional potentially preventable injuries, or that a child who has not been abused is removed from a caring and loving family, with disruption of the family and erroneous conviction and incarceration of an innocent individual?

In our clinical spheres as pediatric radiologists and child abuse physicians, this is where our courage is tested, and it manifests in myriad prosaic choices: Does a given clinical presentation merit a skeletal survey? Are additional views indicated on the basis of a given finding? Should a full skeletal survey that is not performed according to certain standards be repeated if it does not demonstrate abnormalities? Should we routinely use radiographic technique for skeletal surveys that requires higher radiation dosage than conventional radiography? Should routine follow-up skeletal surveys be performed? Should a pediatric radiologist be required to review an outside skeletal survey on a child who presents to an outpatient orthopedics clinic with a fracture that has not been reported as suspicious for child abuse? Many would justify such practices as trying to "get it right." That is, these practices are earnestly implemented to establish the diagnosis of child abuse correctly and avoid making the diagnosis erroneously. But an affirmative answer to these questions often enough implicitly embeds a value weighted toward never wanting to miss potentially diagnosable injuries from child abuse. This value resonates profoundly for those of us who dedicate our professional lives to the well-being of children. Answering "yes" to these questions affirms our overriding obligations as pediatric practitioners to protect children from harm and to act in their best interests. But we must be mindful that when we prioritize saving lives over, say, the risks of overdiagnosis, we are adhering to our strongly held values — not empirical truth. To see this, consider the U.S. Preventative Services Task Force's recommendations against routine screening mammography in women ages 40 to 50, in which the task force prioritized the harms of false positives (that is, overdiagnosis) — unnecessary anxiety, costs, procedures and morbidity — over the lives it knew could be saved by screening [10]. The American College of Radiology (ACR) steadfastly disagreed, citing the saving of lives as its foremost priority [11]. Just as these organizations differed strongly about the harms of false-positive diagnoses, so, too, do heated value differences exist in the realm of child abuse around the harms of false-positive and false-negative diagnoses, as we shall see later.

Social context

In exercising our professional responsibilities to protect children from harm, we must also consider that our obligations do not exist in a social vacuum. We operate daily within a social context that is infused with longstanding biases and injustices. In particular, the request to perform or evaluate a skeletal survey places us directly into an intersection with societal forces that have demonstrated substantial bias against socioeconomically disadvantaged individuals and families, particularly those of color. Compelling assertions charge that legal justice systems in the United States have been historically designed to disproportionately impugn, indict and incarcerate individuals of these backgrounds [12]. Our health care system has also historically demonstrated substantial bias against such individuals and families [13, 14]. The manifestations are manifold: worse health outcomes, undertreatment for serious medical conditions and for pain, greater likelihood of penalizing and criminalizing behaviors non-conforming to medical recommendations (such as in pregnancy), higher rates of coerced treatment and incarceration for substance abuse disorder. Whether or not we are aware, the requisition and interpretation of a skeletal survey that leads to reported allegations of child abuse plugs us directly into this societal context.

The clinical domain of child abuse medicine has not proved immune from such forces [15]. Children of color and those from socioeconomically disadvantaged backgrounds overall undergo evaluation for child abuse at disproportionately higher rates [16]. Children of color suffer higher rates of maltreatment than white children, though not necessarily when other socioeconomic factors are considered [17]. Even controlling for the likelihood of abusive injury, however, children of color have been more likely to undergo evaluation and reporting for child abuse than white children [18, 19]. Some reports support a theory that this relates to socioeconomic status while others isolate the effect to race [2, 16]. Either case implicates provider and institutional biases [20].

Perceptions of bias

An unfortunate and challenging perception exists that such implicit bias is among many that unduly sway health care provisioners toward over-diagnosing child abuse [21]. Katherine Judson, a University of Wisconsin Law School professor who has worked closely with the Wisconsin Innocence Project and the Center for Integrity in Forensic Sciences, directly alludes to such bias as being among myriad powerful biases at play when physicians are considering a child abuse diagnosis. Although she provides little or no data to support her claims, Judson nonetheless presents a compelling case for the potential role of biases in child abuse diagnosis. Implicit bias is only one. Many other biases she cites are familiar to practicing diagnosticians: confirmation bias, tunnel vision, role effects, conformity effects, diagnosis momentum, groupthink, premature closure, context bias, anchoring bias and sampling bias. These are, of course, well recognized cognitive biases to which everybody is susceptible [22]. Judson draws upon little more than anecdote to bolster her assertions that they apply with disproportionate relevance to child abuse diagnosis. Further, she stumbles upon her own tenuous biases, such as disregard for well-grounded research, irresponsible dismissiveness of the sober clinical expertise and sound deductive reasoning that characterize legitimate medical decision-making, and failure to acknowledge reasonable limitations of ethically obtainable pathological correlates to child abuse. Nonetheless, given what we understand about how biases can confound radiologic practice [23, 24], their role in child abuse medicine merits appropriate reflection about how to reduce potential undue effects.

Judson, who has spoken extensively on the illegitimacy of conventional theories about abusive head injury, is a passionate advocate for individuals who have been wrongly accused in our legal justice system. At the heart of her position is a conviction — a value — that an incorrect diagnosis of child abuse — a false positive — is equally as unacceptable as a failure to make the diagnosis when it could have been made. In staking this position, she explicitly casts herself as a foil to some in child abuse medicine. "Some experts," she writes, "have suggested that over diagnosing abuse is preferable because protection of children is paramount. But failing to properly diagnose a child [that is, making the diagnosis in error] is equally harmful and must be recognized as such."

Judson is not alone in espousing this value or in framing the community of child abuse physicians as unduly biased. Numerous advocates for individuals wrongly accused in the criminal justice system have successfully propagated this perspective in various academic forums, and they have found sympathy in the news media and among criminal defense attorneys [25, 26]. Perhaps most concerning for conscientious child abuse pediatric specialists, this chorus of advocates for the wrongly accused includes a cohort of likeminded radiologists and other physicians who have participated ubiquitously and exclusively as defense witnesses in child abuse legal proceedings. These physicians' viewpoints closely align with those of these criminal justice advocates. Radiologists who have worked most concertedly to dispute conventionally accepted tenets regarding the relationship of head injury and child abuse have co-authored law journal articles and partnered at legal conferences with criminal justice advocates from the Innocence Project and the Center for Integrity in Forensic Sciences [27, 28]. One of the most active defense witnesses in the country has been particularly outspoken against child abuse pediatrics specialists, characterizing them as criminally motivated and even pedophiles [29]. These individuals have been empowered by publication of recklessly peer-reviewed journal pieces that employ sophistry and mendacious ad hominin attacks to refute responsible, well-grounded research about the pathological and radiologic correlates to child abuse injuries [30, 31].

Distressing circumstances

The participation of such individuals as defense witnesses in child abuse proceedings has produced distressing if not disgraceful circumstances in court. Those of us who have testified in child abuse trials have seen expert pediatric imaging testimony offered by radiologists with no certification in pediatric radiology; career mammographers with certification in pediatric radiology but without relevant clinical experience beyond remote fellowship; opinions about appendicular skeletal manifestations of child abuse and metabolic bone disease rendered by pediatric neuroradiologists with no training in or clinical experience with pediatric body imaging; and expert testimony on pediatric brain and body imaging rendered by a radiologist trained in cardiovascular and interventional radiology whose previous domain of self-accredited expertise regarded the association of vaccines and autism.

These individuals' credentials as expert witnesses would seem at odds with requisite ACR standards: "*Education, training, and practical experience, as well as current knowledge and skill, concerning the subject matter of the case…*" [32]. Moreover, their close alignment with criminal defense advocates and outlandish characterizations of child abuse physicians belie reasonable ACR requirements for impartiality and objectivity. The results in court are predictable and well described: testimony that offers a grossly distorted conflation of the imaging appearances of metabolic and other systemic disorders with those of normal anatomical variants and genuine child abuse [33–35]. The testimony these individuals have provided directly mirrors illegitimate claims they have passed through peer review, making the claims sometimes challenging to refute, and rendering the peer review process these papers underwent as not only careless, but also dangerous [35–39].

Solutions

Trained pool of witnesses

The state of affairs regarding expert testimony for pediatric imaging in child abuse cases is, of course, itself ethically problematic. Highly biased physicians who do not meet professional standards as experts in pediatric imaging are being utilized ubiquitously as such, mostly for the defense of accused individuals. The solution to mitigate this problem seems relatively straightforward: Those who practice exclusively pediatric neuroradiology should not present themselves as experts in pediatric body imaging. Exclusively pediatric body imagers should not hold themselves as experts in pediatric neuroimaging. Those who do not routinely practice pediatric imaging should not cast themselves as pediatric imaging experts. Similar criteria should apply to journal reviewers.

The ready availability of reliable and credible witnesses remains a challenge. To facilitate the availability of an optimal witness pool, the Society for Pediatric Radiology (SPR) and American Academy of Pediatrics (AAP) could establish a cohort of trained radiology experts who are certified specifically to testify in child abuse cases. Training might require an accessible, standardized curriculum, which would be feasible utilizing a web-based format that combines various cases with recorded lectures and consensus-based best evidence literature curated by a multi-institutional group of experts. Funding could potentially be obtained through currently existing educational project grants available through the SPR and Radiological Society of North America. Some might argue that any certified pediatric radiology fellowship should be adequate to train individuals to serve as such witnesses, but the reticence and fear many experienced practicing pediatric radiologists express about such service indicates a widely perceived lack of confidence and preparation. Further, the American Board of Radiology's current certification process pays little attention to maintenance of qualifications regarding the diagnosis of child abuse, head injury, and metabolic bone disease. To my knowledge, of over 100 cases presented in the ABR's first-year Online Longitudinal Assessment for Pediatric Radiology, none covered a question of child abuse or metabolic bone disease.

Time and money

Even if a cohort of certifiably well-prepared radiologists were established, their availability to serve as witnesses would be preclusive within the context of their busy professional practices. At present, well-qualified and even willing individuals must expend substantial personal or academic time to serve as witnesses, which impedes participation. Individuals must depend on local departmental support, which places pressure on departmental leaders with multiple competing priorities. The financial pressures could be in part alleviated by establishment of a collective fund, administered through the SPR or ACR, that provides time-limited salary support for credentialed individuals who are in the witness pool. Such support could be used to protect time both for case preparation, which is sometimes considerable, and for depositions and testimony. Such a process would also help avoid perceptions of experts providing testimony for personal financial gain. Although it would offset financial losses to departments and individuals, such a fund would not offset lost productivity, which would have to be absorbed by other department members. This is a matter for discussion among SPR and Society of Chiefs of Radiology at Children's Hospitals (SCORCH) leaders as they consider their priorities.

Addressing underlying ethical tension

Even if pediatric radiology's leaders prioritize the establishment of a pool of well-qualified individuals to serve as expert witnesses in child abuse cases, a legitimate, fundamental ethical tension remains about the conflicting costs of a misdiagnosis (i.e. which is worse, a false negative or a false positive?). Moreover, it seems likely that advocates for accused individuals will continue to rely upon deficient, highly biased witnesses as long as they perceive child abuse diagnosticians as endemically biased themselves. If concomitant rancor is to cease, we will need to establish bridges for trust and healthy communication between legitimate representatives of the opposing viewpoints.

Perhaps the most courageous first step that the community of child abuse clinicians might take is to acknowledge explicitly the legitimacy of claims that a misdiagnosis in either direction is equally problematic. Such acknowledgment would not signify weakening or abrogation of our primary professional obligation to promote and protect the wellbeing of children. But it might signal openness to constructive dialogue with those whose primary perceived obligations are to protect other vulnerable individuals in society.

We might facilitate further discourse by taking steps to minimize perceptions of undue bias in our work, recognizing that the simple fact of reading a skeletal survey introduces some bias from the outset. Such steps might include implicit bias training, removing names and demographic information from imaging studies when child abuse is suspected, mandated and blinded double reads, and excluding clinical information as much as reasonable when studies are initially reviewed. Many would argue that such steps are both unnecessary and unlikely to make a difference in our clinical judgments, but at the least such actions would offer a message that we are willing to acknowledge and respond to reasonable concerns. We might gain further trust by insisting on blinded initial reviews of all cases for which we are asked to serve as expert witnesses. That is, when approached by an attorney to consider expert consultation, we might instruct them initially to present

the images without indicating the history, who is being represented, or what claims are under evaluation. The physician witness might be called by either side and should accept such while providing impartial and objective testimony. If we are able to garner trust that we will take action to mitigate potential bias where possible, we might be able to convince defense advocates and the public of the legitimacy of our diagnoses. This, in turn, might permit us to partner with them somehow to recognize a pool of credible witnesses for both sides.

Conclusion

According to the Centers for Disease Control, at least one in seven children experienced child abuse or neglect last year [40]. The enduring physical, social and emotional adverse consequences are profound. The social and environmental risk factors are undeniable, as are endemic societal injustices. Pediatric radiologists and other clinicians at the front lines of child abuse diagnosis and management practice inescapably within this social context. As we strive to meet our primary obligations to protect children, ever aware of the costs of missing a diagnosis, we must also remain mindful of the deep harms related to making the diagnosis in error. Further, we must demonstrate humility and respect toward viewpoints that perceive the harms of erroneous diagnoses of child abuse to be equally as grievous as those related to missed diagnoses. If we are somehow to convince advocates for accused individuals of our good faith in mitigating undue bias, perhaps we will be able to marginalize the highly biased and flawed witnesses whom they currently utilize as their defense witnesses, and replace them with a more balanced and well credentialed pool of conscientious experts. Otherwise, we will likely continue to face uphill battles in legal proceedings and in the courts of public opinion.

Compliance with ethical standards

Conflicts of interest Dr. Brown was a paid expert consultant for a child abuse case in February 2019.

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