Study identifies patterns in abuse

One-third of all child-abuse victims will see an orthopaedist sometime during childhood for abuse-related injuries. As a result, says Daniel Bullock, M.D., it's important for orthopaedists such as himself to be able to recognize cases of abuse. While he was a resident at DHMC, Bullock led a study comparing injuries caused by child abuse to injuries resulting from other factors. The results, published in the *Journal of Pediatric Orthopaedics*, offer insight for orthopaedists into the difficult task of determining the likelihood that an injury was caused by abuse.

Visits: Working with several members of the Department of Orthopaedics, Bullock examined data from a nationwide inpatient sample of cases of physical injury in children younger than 18. Of the more than 650,000 hospital visits during the years Bullock studied, 11,554 were determined to have been caused by child abuse. To tease out any relevant differences between injuries related and not related to abuse, Bullock looked at factors such as demographic characteristics, the timing of the visit, and the type of injury.

The strongest findings related to the age of the child. More than half (57%) of the cases that involved abuse were in children under the age of one. Children between one and two years old had the next highest likelihood of an injury being related to abuse, with 13% of the cases falling in that age range. Bullock says these findings were not especially surprising, given previous research on the topic.

More surprising was the fact that injuries that occurred on weekdays were more likely to be the result of abuse. It's possible, Bullock surmises, that parents or other caregivers might be under more stress during the workweek than on weekends.

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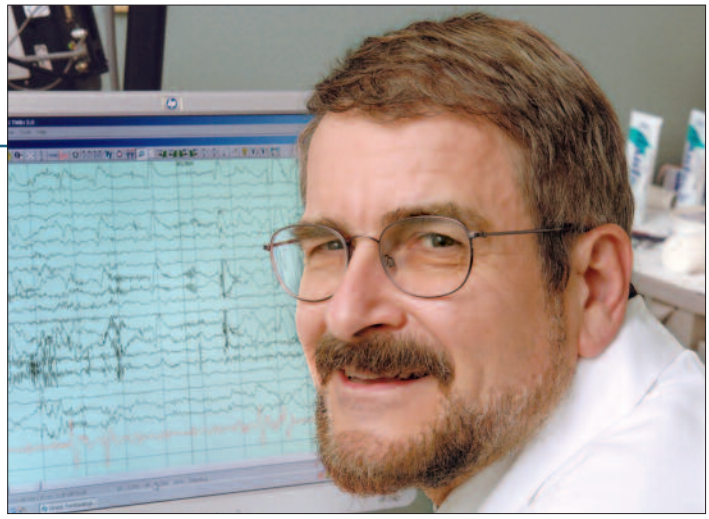
There was also a seasonal difference. Injuries suffered in winter were more likely to be the result of abuse than injuries in other seasons, though winter did not have the highest raw number of abuse cases. One possible explanation of this finding, Bullock says, is that "in the summer, children are out and about, playing in circumstances where they're likely to fall in a non-child abuse circumstance. Whereas in the winter, particularly in northern climates, that opportunity is less available."

Payment: Another finding was related to payment. Cases in which Medicaid was the payer were about twice as likely to involve abuse as were cases involving any other payer.

Now an orthopaedic surgery sports medicine fellow in Aspen, Colo., Bullock hopes his research will help orthopaedists when they encounter possible cases of abuse. "It is something that orthopaedists are taught to try and recognize, but there are so many gray areas that it remains difficult," he says. He notes that his findings are not meant as definitive guidelines, but as "one more component to help either lower or raise someone's suspicion of child abuse." Amos Esty



JON GILBERT FOX

Holmes found that suppressing post-seizure signals *increased* brain damage.

A surprising finding about seizures

A seizure can be a scary thing. Brain cells fire freely, causing random muscles to twitch and brain activity to spike. When a seizure lasts more than 30 minutes, a situation known as status epilepticus (SE), severe brain damage can result from cell loss and abnormal neuronal growth. SE affects 20% of people with epilepsy, and the damage can continue even after the seizure ends.

That's why Gregory Holmes, M.D., is studying new treatments to reduce damaging activity in the brain during and after SE. In a recent paper in the journal *Seizure*, he reported an unexpected finding.

Brain: "One of the techniques [for post-SE treatment] is to shut the brain down" using drugs, Holmes explains, in order to prevent neurons from being able to refire and trigger another seizure. But some patients don't respond immediately to the drugs, and, even in those who do, the treatment doesn't stop all brain activity. Neurons deep in the hippocampus—the part of the brain involved in long-term memory and the limbic system—keep firing, which may continue to cause brain damage. Knowing this, Holmes and his colleagues hypothesized that if these electrical signals were also suppressed, perhaps SE-related brain damage could be lessened.

To test their hypothesis, they gave controlled doses of a drug called tetrodotoxin (TTX) to adult rats, post-SE, to stop all electrical activity in the brain. TTX works by blocking neurons from firing. Much to their surprise, Holmes and his team found that two weeks after treatment, the brains of the TTX-treated rats had more damage than the brains of untreated rats—a control group that received saline infusions. The TTX-treated brains showed increased cell loss and abnormal neuronal growth, known as mossy fiber sprouting.

Holmes is now rethinking the direction of future studies; he believes a better approach might be to use a cocktail of drugs to prevent cell death and abnormal neuron growth. Holmes's paper was the first published demonstration of the effects of suppressing all electrical brain activity after SE. And although his results turned out to be negative, they're likely to lead to some positive effects for people who have epilepsy and others who suffer from SE. Boer Deng