

Cost of treating dizziness in the emergency room soars

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A new Johns Hopkins research report says emergency room visits for severe dizziness have grown exponentially in recent years, with costs topping \$3.9 billion in 2011 and projected to reach \$4.4 billion by 2015. The investigators say roughly half a billion a year could be saved immediately if emergency room physicians stopped the routine and excessive use of head CT scans to search for stroke in dizzy patients, and instead used simple bedside physical exams to identify the small group of patients that truly needs imaging.

After analyzing records from two large, national public databases, the Johns Hopkins research team concluded that a large percentage of patients who come to the emergency department with dizziness are suffering from a benign inner-ear disorder, while just 5 percent of those whose major complaint is dizziness are having a stroke. Nearly half of all patients with dizziness now get CT scans, according to the report, published in the July issue of the journal *Academic Emergency Medicine*.

"A lot of resources are expended trying to diagnose dizzy patients, mostly to rule out stroke or other dangerous disorders," says study leader David E. Newman-Toker, M.D., Ph.D., an associate professor of neurology at the Johns Hopkins University School of Medicine. "What our study shows is that we need to realign our resources so that we image only the patients who need it, not the ones who don't. We need our emergency physicians to be able to confidently identify patients with benign ear conditions who can be safely treated and sent home, without imaging. Accurately and efficiently separating inner-ear patients from

the other dizzy patients who probably have strokes will save lives and money."

In their analysis of information from the Medical Expenditure Panel Survey and the National Hospital Ambulatory Medical Care Survey, Newman-Toker and his colleagues found that while the number of annual [emergency room](#) visits for all complaints nationally increased by 44 percent (from 70.7 million to 101.9 million) from 1995 to 2011, the annual number of visits for dizziness jumped even more, by 97 percent (from 2 million to 3.9 million) over the same period.

They also found that the proportion of dizziness visits that involved advanced imaging technology increased from 10 percent in 1995 to nearly 40 percent in 2011, while the use of imaging increased even more in patients without dizziness, whose scans increased from 3.4 percent to 19 percent over the study period.

Newman-Toker says CT scans are useful in detecting hemorrhagic stroke—a bleed in the brain—but this is rarely the cause of dizziness. When it is, patients almost always have other telltale symptoms, such as weakness or confusion, which make it clear that CT scans are the correct choice, he adds. For diagnosing the vast majority of strokes—*ischemic strokes*, which occur when blood flow is cut off from part of the brain—CT is the wrong diagnostic tool, he says, missing an estimated 85 percent of strokes in the first 24 hours after symptoms begin, and about 60 percent in the days that follow.

Newman-Toker says CT is particularly poor in diagnosing abnormalities in the back part of the brain, which controls balance and is usually involved if dizziness is the main stroke symptom. About one in three strokes whose primary symptom is dizziness is missed in the emergency room, sometimes with tragic consequences, including preventable deaths, he says. Newman-Toker believes unwarranted faith in a CT

scan's ability to detect stroke may contribute to these misdiagnoses by creating a false reassurance for both physician and patient that a normal scan means a stroke has been "ruled out."

Although they are technically noninvasive tests, CT scans are not without risk. CT scans combine a series of X-ray views taken from different angles and computer processing to create cross-sectional images of the bones and soft tissues. Since a single scan can represent the equivalent of up to 500 regular X-rays, there is enough radiation exposure that patients undergoing CT may have an increased chance of cancer later in life, he says.

Ideally, Newman-Toker says, fewer than 5 percent of dizzy emergency room patients would get CTs. MRIs, which do not involve damaging forms of radiation, take clearer pictures of the brain and are much more accurate for stroke diagnosis. But MRIs cost up to four times as much as CT scans and take longer, so they are only used in 1 to 2 percent of dizzy ER patients. Newman-Toker believes MRIs could be used on about 6 percent of dizzy ER patients to accurately diagnose strokes and other dangerous brain conditions, improving diagnosis while still cutting costs. The added costs for this subset of patients would be more than offset by reductions in unnecessary CT and hospital admissions in patients with benign inner-ear disorders, netting an estimated \$1 billion in cost savings annually, he projects.

"The trick is figuring out which patients need which imaging tests and which need none at all," he says, and the key there is clinical skill.

The answer is in the eyes, he points out. To distinguish stroke from a more benign condition, such as vertigo linked to an inner-ear disturbance, specialists typically use three eye movement tests, essentially stress tests for the balance system. In experienced hands, these bedside clinical tests have been shown in several large research

studies to be extremely accurate—"nearly perfect, and even better than MRI in the first two days after symptoms begin," says Newman-Toker.

One of those tests, known as the horizontal head impulse test, is the best predictor of stroke. To perform it, doctors or technicians ask patients to look at a target on the wall and keep their eyes on the target as doctors move the patients' heads from side to side. But, says Newman-Toker, it requires expertise to determine whether a patient is making the fast corrective eye adjustments that would indicate a benign form of dizziness, as opposed to a stroke.

Another option, studied by Newman-Toker and his colleagues, allows doctors to perform the same test using a small, portable device—a video-oculography machine that detects minute eye movements difficult for most physicians to notice. The machine includes a set of goggles, akin to swimming goggles, with a USB-connected webcam and an accelerometer in the frame. The webcam is hooked up to a laptop where a continuous picture of the eye is taken. Software interprets eye position based on movements and views of the pupil, while the accelerometer measures the speed of the movement of the head. In a small study published earlier this year in the journal *Stroke*, strokes were distinguished from benign inner-ear conditions with 100 percent accuracy.

Newman-Toker says funding is needed to study how to best educate more emergency room doctors to do the lower-cost eye movement tests, with or without the goggles and computer technology. With appropriate training, he believes fewer patients will need expensive imaging, and quality of care will be enhanced by improving diagnostic accuracy. By using existing medical evidence to guide diagnosis, he predicts 50,000 to 70,000 patients a year whose strokes are missed could be properly diagnosed quickly.

"This is not a problem without a solution," he says. "Experts can do this

now, and the ability to transfer that expert knowledge to the front lines of health care is a realistic possibility in the next couple of years.

"These are high-stakes judgment calls that emergency physicians make every day, to send someone home or to order expensive and potentially risky imaging. They're still uncomfortable about making the wrong decision and the fear of causing harm or getting sued plays no small part. We want to help doctors make better decisions for patients, while providing the best value for the money."

Provided by Johns Hopkins University School of Medicine

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