MedicalXpress

Study help standardize use of therapeutic comas for epileptic patients

July 2 2018, by Haley Herfurth

Status epilepticus, a dangerous condition in which epileptic seizures follow one another for a duration of five or more minutes without the victim's regaining consciousness between them, is the second most common neurological emergency in the United States, with a recorded maximum of around 150,000-plus cases per year. In 60-70 percent of cases, the patient responds to antiepileptic medications and benzodiazepines.

But a combination of those medications doesn't always work, says Wolfgang Muhlhofer, M.D., an assistant professor of neurology in the University of Alabama at Birmingham Epilepsy Center. Up to 44 percent of status epilepticus cases progress to refractory status epilepticus, where the patient doesn't respond to those drugs, and more extreme treatments have to be used.

"These emergencies require prompt and effective treatment," Muhlhofer said. "The longer SE is going on, the higher the chances of brain damage or the body's being unable to compensate for the trauma, leading to other complications like cardiac arrest or kidney or heart failure. There's a lot of risk associated with this condition."

Muhlhofer specifically studies patients with refractory status epilepticus, who are at high risk for complications, death and disability due to their condition. The main treatment for RSE patients is inducing an artificial coma, where the patient is placed on a sedating or anesthetic agent and is intubated and put on a ventilator.

"The idea is to hit the reboot button on the brain, sedating the brain to a stage where there is no seizure activity and the patient is in a deep coma," Muhlhofer said. "Let the brain get some rest and have some time to reorganize itself."

While artificial coma is the agreed-upon treatment for RSE patients, Muhlhofer says there isn't an evidence-based consensus on how long patients should be kept in this state, and recent studies of this patient population have shown that, the longer a patient is kept in an artificial coma, the more likely they are to have complications during their hospitalizations or, worse, permanent problems with physical and cognitive functions.

Muhlhofer wanted to analyze RSE patients in a more systematic way, with the hopes of determining more specific guidelines regarding the lengths of what he calls "therapeutic coma." He designed a study of adult patients, admitted to UAB or University of California, San Francisco Medical Center during a seven-year period, who were placed in an artificial coma and who had a seizure recurrence within the first 48 hours of lightening the patient's sedative medications.

Particularly of interest to Muhlhofer, who developed this idea about three years ago while a fellow at UCSF, are complications patients experience as a result of artificial coma, such as urinary tract infections, hospital-acquired or ventilator-associated pneumonia, deep vein thrombosis or pulmonary embolism, and strokes, among others. He also is studying whether the patient was discharged with a disability or need for physical rehabilitation or long-term care.

Muhlhofer had a small patient population gathered from his time at UCSF, but it was too small for the study. But UAB—"a large tertiary care center with lots of referrals and a big patient population"—is the "ideal fertile ground to recruit additional patients," Muhlhofer said.

He began with 42 patients from UCSF that fit his criteria. He then worked with the UAB Center for Clinical and Translational Science's Enterprise Data Warehouses to add about 100 more patients. When Muhlhofer paired those two collections with UAB's access to i2b2, a self-service application that enables UAB researchers to access de-identified patient data, he was able to double his sample size.

Muhlhofer plans to use the preliminary data he has gathering to apply for grants that will enable him to conduct a randomized clinical trial to look at different durations of therapeutic coma and take a specific look at health outcomes, primarily sustained seizure control.

"Do patients slip back into seizing the moment you take away the medications? The second question is whether there are issues during the hospital stay. Are there any complications right after their discharge? Up to a year after?" Muhlhofer asked, adding that the answers to these questions could help solidify clinical standards for what the best treatment plans are for RSE patients.

"Hopefully this is the springboard to something bigger," he said, "and to clarifying questions on a topic that's very controversial in the field right now."

This preliminary analysis, which i2b2 helped him create, gave Muhlhofer a better idea of potential sample sizes and how to calculate sample size for future study proposals. His goal is eventually to have a multicentered clinical trial across the United States.

"I think it's a very intuitive way of using different filters and criteria to narrow down a patient population, especially for creating preliminary data sets for applications," Muhlhofer said. "It's an excellent tool, and they're also continuously developing it, improving it and making it more user-friendly, trying to simplify it and make it more intuitive. I think

i2b2 will continue to be a very beneficial tool."

Provided by University of Alabama at Birmingham