

Section Editors
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Taking epilepsy medications consistently

Why it makes a difference

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In their article “Early pediatric antiepileptic drug nonadherence is related to lower long-term seizure freedom,” Dr. Modi and colleagues¹ studied the relationship between taking medications consistently and long-term disease control. Recognizing that no one is perfect, they looked at 2 groups. The first group took their medications very accurately. This group was “near perfect,” taking their medication correctly an average of 96.8% of the time. They compared this group to the group who did not do as well at taking their medication, who they termed “nonadherent.”

Dr. Modi and colleagues have looked at this problem in the past and published articles on how well people take their medication. The past studies showed that there are many factors that influence how well a person takes his or her medicine. In addition, their study showed that there was a subset of people who did well right from the start. In this study, they compared the group who did well right from the start (near-perfect adherence in the first 6 months of treatment) vs those who did not do as well.

Dr. Modi and colleagues are pediatric epilepsy specialists. They studied adherence to treatment in children aged 2 to 12 years. All of the children had just been diagnosed with seizures. All were started on medication. None of the children had other medical problems. Dr. Modi and his group at Cincinnati Children’s Hospital saw the children 1 month after diagnosis and then once every 3 months thereafter. They continued to follow the group for a total of 4 years from the diagnosis. They started the study in 2006.

It took 3 years to assemble a group of 124 children. The study ended in the early part of 2013. At the end of the study, some of the kids had “dropped out.” For instance, some had moved away from Cincinnati and no longer saw Dr. Modi. At the end of the study, there were 99 children who had been followed for the full 4-year time frame. Fifty of these had “near-perfect” adherence and 49 were “nonadherent.”

It can be difficult to know whether a person is taking his or her medication consistently. Self-reporting may not be the best method since people might lie about how well they take their medicine. Dr. Modi used a high-tech way to follow this: MEMS Track-Cap. These are electronic bottle caps that can be put on a medicine bottle. Every time the bottle is

opened, the electronic device records the date and time. Assuming that each time the bottle was opened a pill was removed, this is an excellent and detailed way of tracking how consistent a person is with taking medication.

Dr. Modi measured the response to medication by tracking the children’s seizures. This was done through patient and family reporting. In addition, medical testing, such as electroencephalography (EEG), was used to determine whether subtle seizures were happening. At the 4-year time point, children were “seizure-free” if they had not experienced a seizure for 1 year or longer.

RESULTS Dr. Modi and colleagues found that children who were near-perfectly adherent to their treatment in the first 6 months of treatment were 3.24 times more likely to become seizure-free than those who were not. Another way of looking at this is that 31% of the children who were near perfect became seizure-free. Only 12% of the nonadherent children became seizure-free.

WHY IS THIS IMPORTANT? On one hand, the study showed that children who take their medication do better. This may not be a surprising result. However, in combination with Dr. Modi’s earlier study, this study showed that how well people do in the first 6 months of treatment correlates with how well they do in the long run. Several factors can influence how well a person (and his or her family) adheres to treatment. By understanding these better, doctors can help to improve patient and family attitudes and behaviors in medical treatments. Dr. Modi’s study suggests that if we can influence how well a person stays with treatment in the first 6 months, we can greatly improve the person’s seizures (or perhaps any chronic medical illness).

Of course, the study has some limitations. We do not know whether adolescents or adults follow this same pattern. Perhaps other factors influence their adherence to treatment. Further study is needed in these areas.

REFERENCE

1. Modi AC, Rausch JR, Glauser TA. Early pediatric antiepileptic drug nonadherence is related to lower long-term seizure freedom. *Neurology* 2014;82:671–673.

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About epilepsy

From: Karceski S. Temporal lobe epilepsy surgery: What is the best approach? Neurology 2013;80:e192–e194.

WHAT IS A SEIZURE? A seizure is a disruption in the normal electrical activity of the brain. Normally the brain is very active, passing electrical messages back and forth between nerve cells. When a person has a seizure, there is abnormal firing of nerve cells and the messages become jumbled in part or all of the brain. A seizure may cause a variety of different symptoms, such as twitching or shaking in an arm, leg, one side of the face, or the whole body; repetitive movements or gestures; confusion; feelings of fear or other emotions; hallucinations (odd smells, tastes, sounds, or seeing things that are not there); loss of consciousness; and convulsions.

WHAT IS EPILEPSY? Epilepsy is an episodic recurrence of seizures that are not due to fever, active infection, drug effects, or other triggering causes. It may be caused by a variety of conditions that injure a part or all of the brain. This can be due to problems in development of the brain that occur before birth, inherited disorders of the brain or nervous system, brain trauma, brain tumors, stroke, infections, and poisoning. About 70% of cases have no known cause. Each year there are 125,000 new cases of epilepsy. About 2.5 to 3 million people in the United States have some form of epilepsy.

WHAT IS PARTIAL EPILEPSY? Seizures can be classified as either generalized or focal (partial is another term for focal). A partial seizure is one that originates from a specific area of the brain. This is different from a generalized seizure, where the seizure essentially starts “all over the brain” or “everywhere all at once.” Partial seizures are divided into different types. Partial seizures are called complex if they cause loss of awareness. When the person remains awake and aware of what is going on, the partial seizure is called simple. Another term for a simple partial seizure is an aura. It should be noted that even though the partial seizures start at a specific area of the brain, they can sometimes spread to other brain areas. When they spread to the whole brain, they look just like generalized seizures (with stiffening of the arms and legs and shaking all over).

WHAT ARE SOME OF THE TREATMENTS FOR EPILEPSY? Even though epilepsy has been recognized as a disease since ancient times, it was not until 1857 that the first antiepileptic medication was discovered. Over the next 100 years, 9 medications were found to be

effective in controlling seizures. In the last 18 years, the discovery rate is much higher, with 12 new medications approved for use by the US Food and Drug Administration (FDA). Although there are many new medicines, approximately 30% of patients still have seizures that do not stop with medication. In addition, many people do not like their medication because of side effects.

In 1997, the FDA approved the first implantable device, called a vagus nerve stimulator (VNS), as adjunct therapy for refractory partial seizures. The VNS sends a small electrical impulse to a nerve in the neck called the vagus nerve. This impulse travels back to the brain, where it helps to reduce or stop seizures. With this device, about 5% to 6% of patients stop having seizures, and up to 70% find that their seizures are reduced by 50% or more.

In November 2013, the FDA approved a second device for the treatment of epilepsy. Called Neuropace, the device responds to a person's seizures by sending a small electrical impulse to the brain.¹ After 3 months of treatment, Neuropace reduced seizures by 40%. At 1 year, 43% of people had experienced a significant decrease in their seizures; 7.1% stopped having seizures.

In addition to medications and devices like the VNS, brain surgery can be a very effective way to stop seizures in people with partial epilepsy. Although effective, brain surgery carries a risk of bleeding, stroke, and infection. Although rare, these complications can sometimes cause permanent neurologic problems.

Many research studies on new treatments for epilepsy are currently under way. As new medications and implantable devices are being discovered, we are moving closer to our goal: better seizure control and few (or no) side effects.

FOR MORE INFORMATION

AAN Patients and Caregivers site

<http://patients.aan.com/go/home>

Epilepsy Foundation of America

<http://www.epilepsyfoundation.org>

Citizens United for Research in Epilepsy (CURE)

<http://www.CUREepilepsy.org>

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1. Morrell MJ, on behalf of the RNS System in Epilepsy Study Group. Responsive cortical stimulation for the treatment of medically intractable partial epilepsy. *Neurology* 2011;77:1295–1304.

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