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Vagus Nerve Stimulation for Epilepsy

To address the needs of school nurses, the Texas Department of State Health Services (DSHS)–School Health Program has developed this repository of information. With each issue of *DSHS-School Nurse Notes* (DSHS-SNN), professionals receive the latest research, evidence-based practices, and resources in school nursing related to a topic of interest. The School Health Program wishes to thank the Texas Board of Nursing for their collaboration on this publication, in particular Linda Laws, MSN, RN, for her contributions. If you have any questions or comments about this issue of DSHS-SNN, please contact School Nurse Consultant Anita Wheeler, M.S.N., R.N. at (512) 776-2909 or at anita.wheeler@DSHS.texas.gov.

Background

Epilepsy is a neurological condition that may lead to seizures. Seizures, caused by sudden changes in the brain’s electric activity, can affect all or part of the brain. The surge of energy caused by a seizure interferes with normal brain activity and can cause muscle jerking, stiffness, and other symptoms that a person cannot control. Although typically short term, seizures can lead to loss of consciousness and disruptions in sensation, speech, mood, and memory.¹

Vagus nerve stimulation can assist in managing epilepsy when other treatments have failed. The body contains two vagus nerves, running from the brainstem, to the chest, to the abdomen on either side of the body. Vagal nerve stimulators are installed in the left upper chest. Activation of a vagus nerve stimulator generates electrical pulses to the brainstem, which proceeds to activate certain areas of the brain.² Experiments began in 1988 with two single blind pilot studies that demonstrated the possibility and safety of this novel therapy.³

Approximately 35 percent of people with epilepsy don’t fully respond to anti-seizure drugs.³ Vagus nerve stimulation is therefore an option for seizure management. The Food and Drug Administration has approved vagus nerve stimulation for those ages 12 and older, those who suffer from focal epilepsy and for those who have seizures that cannot be managed with medications.²

While vagus nerve stimulation is not a cure for epilepsy or meant to replace traditional treatments, it can reduce seizure frequency and intensity and improve mood and quality of life.² With certain types of vagus nerve stimulators requiring the use of a special magnet to be stimulated during a seizure, the school nurse should be trained to assist students in vagus nerve stimulation.

Nursing Standards and License Considerations

The Nursing Practice Act or NPA (Texas Occupations Code, Chapter 301 et. seq.) and Board rules and regulations are written broadly so all nurses can apply them in various practice settings across the state. Because each nurse has a different background, knowledge, and level of competence, it is up to each *individual* nurse to use sound judgment when deciding whether or not to perform any particular procedure or act.

The Standards of Nursing Practice, found in [Board Rule 217.11](#), apply to all nurses and provides guidance to the use of vagus nerve stimulators. Some of the more applicable standards addressed in [Board Rule 217.11](#) section (1) include:

- (A): Requires the nurse to know and conform to not only the Texas NPA and the Board's rules and regulations but to all federal, state, or local laws, rules or regulations affecting the nurse's current area of nursing practice;
 - For a school nurse, there may be laws, rules, or regulations from the [Texas Education Agency](#), for example, that impact the use of this device. Therefore, school nurses should be familiar with the Texas Education Code and how it affects the delivery of nursing services to students.
- (B): Requires the nurse to implement measures to promote a safe environment for clients and others;
- (G), (H), & (R): Requires the nurse to obtain instruction, supervision, orientation, and training when encountering or incorporating a new task and be responsible for one's own continuing competence in nursing practice and professional growth;
 - This aids in determining if the nurse personally possesses current clinical competence to perform the task safely from

knowledge acquired in a basic nursing education program, post-basic program, or continuing education program.

- (T): Requires the nurse to accept only those nursing assignments that take into consideration client safety and that are commensurate with the nurse's educational preparation, experience, knowledge, and physical and emotional ability.
 - Prior to using the vagus nerve stimulator, nurses must ensure that they have the requisite knowledge and skill to safely accept an assignment. Each nurse is accountable to accept *only* assignments that are within the nurse's ability.

The step-by-step tool RNs and LVNs can use to determine if any task/procedure/act is within his/her scope of practice is the Texas BON's [Six-Step Decision-Making Model for Determining Nursing Scope of Practice](#). A "No" answer on any step means the task in question is not within the nurse's scope of practice. Also, the DSHS [Texas School Health Program](#) might have additional helpful information concerning this situation. Lastly, the [Texas School Nurse Association](#) or the [National Association of School Nurses](#) may be other resources for you.

Additionally, you may wish to review Position Statement 15.14, [Duty of a Nurse in any Practice Setting](#). The referenced position statement is important for nurses to understand that they must intervene or advocate on behalf of their patients and establishes that a nurse has a responsibility and duty to a patient to provide and coordinate the delivery of safe, effective nursing care, through the NPA and Board Rules. This duty supersedes any facility policy or physician order.

Board staff cannot speak to the laws and rules of other agencies and would recommend you contact the above entities directly if you have further questions and concerns. Also, while the Board does not have purview over employment policies, Board staff recommends you review the school district's policies and procedures that address emergency situations.

Texas Board of Nursing (BON) Resources

1. [Nursing Practice Act](#), Nursing Peer Review & Nurse Licensure Compact: Occupations Code and Statutes Regulating the Practice of Nursing. As Amended September 2017.

2. [Rules & Regulations](#) relating to Nurse Education, Licensure and Practice. Published October 2017.
3. [Position Statement:](#)
 - *15.14 Duty of a Nurse in any Practice Setting*
4. [Six-Step Decision-Making Model for Determining Nursing Scope of Practice](#)
5. [Six-Step Decision-Making Model for Determining the LVN Scope of Practice](#)

National Association of School Nurses (NASN)

- [Code of Ethics](#)
- Position Brief (2018): [Wearable Medical Technology in Schools- The Role of the School Nurse](#)
- Position Statement (2018): [IDEIA and Section 504 Teams- The School Nurse as an Essential Team Member](#)
- Position Statement (2017): [Students with Chronic Health Conditions: The Role of the School Nurse](#)

Texas School Nurses Organization (TSNO)

- School Nursing: [Scope and Standards of Practice](#)

Research

The following articles come from a review of the scientific literature. For assistance in obtaining an article, please contact the DSHS Library at library@DSHS.texas.gov and mention inclusion of the requested article in the *DSHS-School Nurse Notes*. Following each citation is a portion of the article's abstract or a summary of the article.

1. Kennedy PA, Schallert G. (2001). **Practical Issues and Concepts in Vagus Nerve Stimulation: A Nursing Review**. Journal of Neuroscience Nursing, 33(2), pp.105-112.
 Estimates of epilepsy incidence among the U.S. population range between 0.5% and 1%. Recent advances in biomedical technology and perfection in surgical techniques have shown vagus nerve stimulation (VNS™) using the Neuro Cybernetic Prosthesis (NCP®) system is an effective new treatment option in reducing seizure frequency. On July 16, 1997 the U.S. Food and Drug Administration (FDA) approved the use of the NCP® for vagus nerve stimulation, as an adjunctive treatment for refractory partial onset seizures in adults and

adolescents over 12 years of age. VNS represented the first therapy using a medical device approved by the FDA for the treatment of refractory seizures.

2. Pastrana EA, Estronza S, Sosa IJ. (2011). **Vagus Nerve Stimulation for Intractable Seizures in Children: The University of Puerto Rico Experience.** Puerto Rico Health Science Journal, 30(3), pp.128-131.

Vagus nerve stimulation (VNS) is considered an alternative treatment for patients with medically refractory epilepsy who are not candidates for respective surgery. It consists of intermittent electrical stimulation of the left vagus nerve in the neck. Such stimulation has been demonstrated to be efficacious, safe, and well tolerated, offering patients another option for seizure control. The aim of the study was to evaluate the experience of VNS at the University of Puerto Rico, and to examine demographic data, types of seizures, and seizure-control outcomes among treated subjects. The mean age of implantation was 12 years. Sixty-nine percent of patients demonstrated a reduction in month-seizure-frequency.

3. Orosz I, McCormick D, Zamponi N, et al. (2014). **Vagus nerve stimulation for drug-resistant epilepsy: A European long-term study up to 24 months in 347 children.** Epilepsia, 55(10), pp.1576-1584.

A retrospective multicenter study was conducted with a follow-up period of 24 months to learn about the long-term impact of vagus nerve stimulation (VNS) in children with drug-resistant epilepsy. Three-hundred-forty-seven children were monitored to assess changes in seizure frequency. At 6, 12, and 24 months after implantation, 32.5%, 37.6%, and 43.8%, respectively, of patients had $\geq 50\%$ reduction in baseline seizure frequency of the predominant seizure type. The results demonstrate that adjunctive VNS therapy in children with drug-resistant epilepsy reduces seizure frequency and is well tolerated over a 2-year follow-up period.

4. Fan H-C, Hsu T-R, Chang K-P, Chen S-J, Tsai J-D. (2018). **Vagus nerve stimulation for 6- to 12-year-old children with refractory epilepsy: Impact on seizure frequency and parenting stress index.** Epilepsy & Behavior, 83, pp.119-123.

Refractory epilepsy (RE) is frequently associated with neuropsychological impairment in children and may disrupt their social

development. Vagus nerve stimulation (VNS) had been reported to have beneficial effects on behavioral outcomes. The aim of this study was to compare Parenting Stress Index (PSI) scores before and after VNS device implantation in children with RE. Seizure frequency and PSI were measured before VNS implantation and 12 months after in a group of school-aged children. Treatment with VNS was significantly associated with reduced seizure frequency and improved PSI scores, especially within the child domain on the mood and reinforces parent subscales.

5. Terry D, Patel AD, Cohen DM, Scherzer D, Kline J (2016). **Barriers to Seizure Management in Schools.** Journal of Child Neurology, 31(14), pp.1602-1606.

The purpose of this study was to assess school nurses' perceptions of barriers to optimal management of seizures in schools. Eighty-three school nurses completed an electronic survey. Most agreed they felt confident they could identify a seizure give rectal diazepam, and handle cluster seizures; but fewer were confident they could give intranasal midazolam, had specific information about a student's seizures, or could swipe a vagus nerve stimulator magnet. Nurses were more likely to be available at the time of a seizure in rural versus suburban or urban schools. School nurses are comfortable managing seizures in the school setting. However, a specific seizure plan for each child and education on intranasal midazolam and vagus nerve stimulator magnet use are essential.

Resources

General Information

- Texas Guide to School Health Services: Health Conditions
 - [Epilepsy and Seizures](#)
- DSHS School Health Services: Nursing Practice Resources
 - [Individualized Healthcare Plans: Seizures IHP](#)
- Epilepsy Foundation
 - [A Quick Reference Guide for School Nurses: Managing Students with Seizures](#)
 - [Recommendations for Care of Children with Epilepsy](#)
 - [Placement, Programming and Safety of Vagus Nerve Stimulation](#)
 - [Vagus Nerve Stimulation](#)
- Emergency Action Plan: [Vagus Nerve Stimulator](#)

- Epilepsy Society: [Vagus Nerve Stimulation](#)
- Texas Children's Hospital: [Use of Vagal Nerve Stimulator in the School Setting](#)

Continuing Education

- Epilepsy Foundation
 - [Care Coordination for Children and Youth With Epilepsy](#)
 - [First Responder Training](#)
 - [Managing Students with Seizures School Nurse Training Program](#)
 - [Seizure Training for School Personnel](#)

Books for Purchase

- Epilepsy Foundation: [Books about Epilepsy](#)
- [Pellock's Pediatric Epilepsy: Diagnosis and Therapy, 4th Edition](#)

References

1. Aan.com. (2013). Summary of Evidence-based Guideline for Patients and their Families: VAGUS NERVE STIMULATION FOR TREATING EPILEPSY. Available at: <https://www.aan.com/Guidelines/Home/GetGuidelineContent/619>. [Accessed August 3, 2018].
2. MayoClinic.org. (2018). Vagus nerve stimulation - Mayo Clinic. Available at: <https://www.mayoclinic.org/tests-procedures/vagus-nerve-stimulation/about/pac-20384565>. [Accessed August 3, 2018].
3. Uthman B. Vagus Nerve Stimulation for Seizures. Archived Medical Research. 2000; 31(3):300-303.

For assistance in obtaining any resources, please contact the DSHS Library at library@DSHS.texas.gov and mention inclusion of the requested resource in the *DSHS-School Nurse Notes*.

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