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Use of Intranasal Midazolam for Seizures

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 School Nurse Notes, DSHS brings you the latest research, evidence-based practices, and resources in school nursing related to a topic of interest. If you have any questions or comments about this publication, please contact Anita Wheeler, School Nurse Consultant, at (512) 776-2909 or at anita.wheeler@dshs.state.tx.us.

Background

There has been an increase in the number of children who come to school with physician’s orders to administer intranasal midazolam for the emergency treatment of seizures. While the medication has been utilized as an off-label medication for this purpose, the school nurse is bound by the Nurse Practice Act to promote the safety of the student, as well as to know the rationale and effects of medications and be able to administer them correctly.

In order to assist the school nurse in promoting safety and gaining the information necessary to utilize nursing judgment in determining if it is safe to administer this medication in the school setting, the following information may be helpful.

The Medication

Midazolam (MID aye zoe lam) is classified as a benzodiazepine drug. ¹ It is supplied as a solution for injection or as a syrup for oral use. It is used as a sedative/anesthesia in preoperative settings and known as Versed. However, midazolam is also prescribed for off-label use in the treatment of status epilepticus (SE) and may be supplied via the intranasal route. ², ³
Why the Medication May be Prescribed

- A prolonged seizure is harder to stop than a brief seizure. The majority of seizures remit spontaneously. Status Epilepticus (SE) is defined as a tonic-clonic (convulsive) seizure that lasts for more than five minutes; a prolonged non-convulsive seizure; or multiple seizures that occur without recovery to baseline between events.

- The longer the seizure, the longer the recovery period for patients.

- Rescue medications can prevent seizure progression to SE, transportation to an emergency department, and the associated costs of escalated treatment.

- Seizure emergencies, such as SE or changes in typical seizure clusters or frequency, are rare but can be life threatening.

Research

The following articles have been compiled from a review of the scientific literature. For assistance in obtaining an article, please contact the DSHS Library at library@dshs.state.tx.us and mention inclusion of the requested article in the School Nurse Notes. The articles are presented on a continuum, ranging from those providing basic seizure information to those specifically addressing the use of intranasal midazolam for SE. Following each citation is a portion of the article’s abstract.

   Eighty-three school nurses completed an electronic survey. School nurses are comfortable managing seizures in a school setting. However, a specific seizure plan for each child and education on intranasal midazolam and vagus nerve stimulator magnet use are needed.

   Intranasal medication delivery offers an alternative method of drug delivery that is often as fast in onset as intravenous medication, usually painless, inexpensive, easy to deliver, and effective in a variety of pediatric medical conditions. This article briefly reviews the most common uses for intranasal medication delivery in pediatrics: pain control, anxiolysis, and seizure control.
Convulsive status epilepticus (CSE) is a medical emergency with an associated high mortality and morbidity. . . . Current guidelines recommend the use of benzodiazepines (BNZ) as first-line treatment in CSE. . . . Regular use of home rescue medications such as nasal/buccal midazolam by patients and caregivers for prolonged seizures and seizure clusters may prevent SE, prevent emergency room visits, improve quality of life, and lower health care costs.

Results: 1,243 questionnaires were completed by 302 school teachers, 883 preschool teachers, 56 students and 2 unclassified participants. . . . Only 214 (17 percent) of respondents felt sufficiently prepared for an emergency. . . . only 186 respondents (15 percent) stated they would be willing to administer a prescribed rescue medication under any circumstances.

This review discusses management of status epilepticus (SE) in children involving both anticonvulsant medications and overall management approaches. . . . An example management pathway is provided. . . . SE is a common neurologic emergency in children and requires rapid intervention. Having a predetermined SE management pathway can expedite management.

We present the findings from an exploratory telephone survey of 128 healthcare professionals (HCPs) (85 pediatric neurologists and neurologists, 28 community pediatricians, and 15 epilepsy nurses) from 6 EU countries, conducted as part of the PERFECT™ initiative. . . . Results of this HCP survey have identified several gaps that need to be addressed: clearer guidance that spans all settings of care, greater dissemination of such guidelines across the chain of care, more open communication and better links between HCPs and schools, and systematic training of all relevant caregivers on the appropriate management of prolonged convulsive seizures.
This clinical report highlights issues that providers may consider when prescribing seizure rescue medications and creating school medical orders and/or action plans for students with epilepsy. Collaboration among prescribing providers, families, and schools may be useful in developing plans for the use of seizure rescue medications.

The *American Academy of Pediatrics* (AAP) recently published a clinical report recommending expanded options for seizure rescue medications in the school setting. School nurses can assist health care providers in determining the rescue medication most easily delivered and monitored in the variety of activities that are part of the school experience, including transportation to and from school, field trips, and before- and after-school activities, all beyond the regular classroom setting.

This article aims to provide an overview of intranasal midazolam in the acute management of epileptic seizures. . . . Local mucosal irritation seems to occur in less than one-third of cases while serious side effects such as respiratory depression in about one percent. . . . Moreover, comparisons with buccal midazolam are warranted.

Intranasal midazolam (INM) is faster at aborting seizure activity than rectal diazepam and quicker to administer than intravenous diazepam. . . . [INM’s] shorter elimination half-life may also be beneficial in that patients may more quickly return to normal function because of rapid offset of effect. On the other hand, the faster rate of elimination of midazolam may expose patients to a higher rate of seizure recurrence compared to diazepam.

This paper will review available data pertaining to the efficacy, safety, cost, pharmacokinetics of intranasal midazolam versus rectal diazepam as treatment for acute seizures for children in the prehospital, home, and emergency department settings.
12. Holsti M, Dudley N, Schunk J, et al. **Intranasal midazolam vs rectal diazepam for the home treatment of acute seizures in pediatric patients with epilepsy.** *Arch Pediatr Adolesc Med.* 2010;164(8):747-753. There was no detectable difference in efficacy between intranasal midazolam via a Mucosal Atomization Device (IN-MMAD) and rectal diazepam (RD) as a rescue medication for terminating seizures at home in pediatric patients with epilepsy. Ease of administration and overall satisfaction was higher in IN-MMAD compared with RD.

13. Kyrkou M, Harbord M, Kyrkou N, et al. **Community use of intranasal midazolam for managing prolonged seizures.** *J Intellect Dev Disabil.* 2006;31(3):131-138. Following a literature review, a seizure management training package was developed to enhance the implementation of a trial treatment protocol for the administration of intranasal midazolam (INM). Parents, [caregivers], and education staff were later surveyed about their experiences and perceptions. INM was administered to 131 people (51 children and 80 adults), with 96.9 percent control of seizures, and only one minor adverse event.

**Training/Continuing Education**

**Presentations**
- American Academy of Pediatrics: [Rescue Medication and Seizure Emergency Planning in Education Settings](#) 4
- Neurocritical Care Society: Guidelines for the Evaluation and Management Status Epilepticus 5

**Continuing Education**
- Epilepsy Update Part 2: Nursing Care and Evidence-Based Treatment—Includes Resources, First Aid, and Teaching Points (2.5 hours) 6
- Epilepsy Foundation: [Managing Students with Seizures: A Training for School Nurses](#) (3.2 hours) 7

**Tools and Resources**

**General Guidance**
- American Academy of Pediatrics: [School Nurse Poster](#) 8
- Seattle Children’s Hospital: [How to Use Nasal Midazolam](#) (hand-out with photos) 9
- New Hampshire Family Voices: [Seizure Description Tool](#)—Available in English and five other languages 10
- Epilepsy Foundation: [Seizure Observation Record; Questionnaire for Parent of Student with Epilepsy](#) 11
✓ Children’s Hospital Colorado: Training, Delegation Authorization and Supervision Record – Intransal Midazolam (copyrighted) 12
✓ Pediatric Neurology Nurse Video: Administration of Intransal Midazolam 13
✓ National Association of School Nurses: Medication Administration in the School Setting; Anti-Epileptic Drugs (AEDs) 14
✓ Grapevine-Colleyville ISD School Health Services: Intransal Midazolam (Versed) Administration Guidelines with Consent and Release 15
✓ Michigan School Nurse Advisory Council: Guidance Document for Michigan Schools—Midazolam (Versed) Intranasal Administration in the School Setting 16

Tools to Personalize
✓ New Hampshire Family Voices: Seizure Action Plan 17
✓ Nevada (Clark County): Sample Policy and Administration Procedure 18

References
For assistance in obtaining any resources, please contact the DSHS Library at library@dshs.state.tx.us and mention inclusion of the requested resource in the School Nurse Notes.

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   http://online.factsandcomparisons.com/printsection.aspx?id=fandhc
   hcp12786&section=bibliography. (Accessed on 10/20/16)
7. Epilepsy Foundation. Managing students with seizures: School nurse training program.  


https://www.cde.state.co.us/healthandwellness/intranasalmidazolam. (Accessed on 11/16/16)


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