

## EDUCATIONAL OBJECTIVES

At the end of this continuing education activity, pharmacists will be able to

- DISCUSS the most common acute and chronic diagnoses requiring medication administration at school, evidence-based treatments, and methods of decreasing dosing frequency
- IDENTIFY national policy statements and state or local policies that affect the way medications must be provided to students
- LIST conditions that predispose students to missed doses, exacerbated disease, or future addiction
- REVIEW conditions that may require emergency injectables and mechanisms to ensure the injectables are available and all involved know how to use them
- OUTLINE the pharmacist's role in increasing immunization uptake, ensuring appropriate medication use, and extending counseling to all stakeholders in school medication administration and policy

At the end of this continuing education activity, pharmacy technicians will be able to

- DESCRIBE the principle behind school medication policies
- IDENTIFY proper storage temperatures for medications to be used at school, and communicate the information effectively
- RECOGNIZE when to refer patients to the pharmacist for recommendations about strategies that ensure adherence at school



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## You Asked for It! CE



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## The A-B-Cs of Kids and Medication: Re-Schooling Pharmacists and Families for Best Outcomes

**ABSTRACT:** Chronic and acute illness is common in school-aged children in the United States. This requires medication administration during the school day. While various organizations have published guidelines on how to best manage medication in children who attend school, no universal policies exist. This creates opportunities for pharmacists. Each school district is in a position to create its own best practices. Pharmacists can work with school staff, parents, guardians, and affected youths to improve their understanding of childhood diseases and the medications needed to treat them. Emergencies also arise. Pharmacists can teach parents and school personnel how to recognize these situations and provide necessary training to best respond. The pharmacy team, pharmacists and technicians, play an important role in coordinating care for school-aged children and minimize the risks of missed doses and medication errors.

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## INTRODUCTION

Today's classrooms host many children with chronic illness or acute health problems. Kids spend up to 50% of waking hours at school. Ten to 20% of school-aged children have chronic health conditions, and 4% to 6% of them receive medication during a typical school day.<sup>1</sup> Among the most common chronic conditions are asthma, attention deficit hyperactivity disorder (ADHD), diabetes, food allergy, and opioid addiction. Schools need to provide medical attention for chronic conditions.

A positive learning environment promotes student success. The National Association of School Nurses' (NASN) 2017 position paper states that a student's health is directly related to his or her ability to learn.<sup>2</sup> Students need to focus on educational tasks; they may be impaired by unmet medical needs. Additionally, chil-

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dren cannot learn if they aren't in school, so missing school due to chronic or acute illnesses affects learning.

In each of these areas—chronic and acute—pharmacists can work with school staff, parents, guardians, and affected youths to improve their understanding of childhood diseases and the medications needed to treat them.

## RANGE OF DIAGNOSES PRESENTS A CHALLENGE

Many of today's school-aged children have chronic health conditions. Each comes with its own challenges regarding school-day medication administration.

### Asthma

Asthma affects about 9% of school children, requiring them to have rescue inhalers available at school.<sup>3</sup> Expert Panel Report 3 clinical practice guidelines—the gold standard of asthma treatment—advise a step-wise approach to symptom management in children 5 to 11 years of age. It recommends an inhaled short-acting beta<sub>2</sub>-agonist (SABA) on an as-needed basis as first-line treatment.<sup>4</sup> School-aged children must have a SABA available at all times, but this presents challenges.

Children and school personnel often fail to recognize symptoms requiring SABA administration. Teachers and administrators must recognize asthma symptoms (e.g., coughing, wheezing, shortness of breath) and know when to refer a child to the school nurse or another trained adult. A child's involvement in their own asthma care is also important. A responsible adult should counsel children on when to report to the nurse for shortness of breath. Students' autonomy in medication management, such as carrying inhalers to self-administer, leads to fewer medication errors.<sup>1</sup> A pharmacist can teach children to recognize symptoms and administer medication appropriately to help parents and school districts decide whether to allow self-medication on a case-by-case basis.

Inhaled SABAs come in various formulations. Patients and caregivers should store metered dose inhalers (MDI) at controlled room temperature (20-25°C) in an upright position to maintain the propellant's integrity.<sup>5</sup> School nurses need to know when doses are running low so they can promptly contact parents/caregivers for a new device when necessary. This can be tricky if an inhaler lacks an integrated dose counter. Previously recommended techniques for analyzing MDI for remaining doses, like floating it in water or testing to see if the inhaler still puffs, are inaccurate and not recommended.<sup>5</sup> Only about half of albuterol rescue MDI marketed in the United States (U.S.) are equipped with dose counters.<sup>5</sup> Pharmacy teams should suggest formulations with dose counters for school-aged children.



Proper inhaler use keeps children healthy and out of the hospital. Studies show that 28% to 68% of patients do not use MDI or powder inhalers correctly.<sup>5</sup> Studies of inhaler technique in children specifically have found that they miss up to 82% of administration steps.<sup>6</sup> Researchers have found that healthcare providers are often unable to operate devices properly, presenting a unique opportunity for pharmacists.<sup>5</sup> Pharmacists should emphasize the most frequent missed steps in MDI administration with children, parents, and school personnel<sup>5,7</sup>:

- **Shaking:** Vigorous shaking before each actuation homogenizes medication clumps into a suspension.
- **Priming:** The first actuation after prolonged storage usually delivers a diminished dose; patients should waste 3 to 4 puffs in the air when they start a new device and after 14 days of non-use.
- **Exhalation** (Most common error!): Before actuation, patients should exhale as much as comfortably possible away from the inhaler to empty the lungs.
- **Inhalation technique:** Slow, deep breaths, rather than rapid breaths, prevent drug from adhering to the back of the throat. Spacers, commonly used by children, increase the amount of medication inhaled effectively.
- **Holding breath:** After removing devices from the mouth, patients should hold their breath for as long as possible (up to 10 seconds) to allow medication to absorb into the lungs before exhaling.
- **Wait time between doses:** Between puffs, patients should breathe normally for one minute. This allows the initial dose to open airways slightly so the second dose can penetrate deeper into the lungs.

Studies report that repeated instruction about inhaler technique improves technique over time.<sup>6</sup> Additionally, having children demonstrate correct inhaler use is associated with good

**PAUSE AND PONDER:** What proportion of inhalers dispensed in your workplace go to children? How many children are counseled about technique?

inhaler technique. As mentioned, spacer use is common among pediatric patients, as they often struggle with MDI technique. Pharmacy staff should counsel patients and their parents/caregivers on the proper use of a spacer<sup>8</sup>:

1. Inspect the mouthpiece for foreign objects that could be inhaled
2. Remove MDI cap, shake the MDI, and insert the MDI into the non-mouthpiece opening
3. Push down on the canister one time immediately after initiating a slow, deep breath
4. Continue to inhale for 3 to 5 seconds; if you hear a whistling sound, breathe slower until the whistle disappears
5. Hold breath for as long as comfortably possible, up to 10 seconds
6. Repeat as prescribed

Importantly, patients should take six breaths for each puff of medication to ensure delivery of the entire dose.<sup>8</sup> Patients should still wait one minute between doses.

### Attention Deficit Hyperactivity Disorder

Emotional and behavioral problems, including ADHD, are on the rise in school-age children. About 9.4% of children in the U.S. are diagnosed with ADHD, and boys are more likely to be diagnosed (12.9%) than girls (5.6%).<sup>9</sup> Subsequently, more children need stimulant medication during the school day.<sup>1,10</sup> Long-acting agents are preferable to short-acting because a student can take a single dose in the morning that lasts throughout the school day. However, not all children with ADHD respond to long-acting formulations alone, as they require unique technology to release the drug over time. This ceates variations in drug release and absorption, and therefore effectiveness.<sup>10,11</sup> Some insurance formularies may also exclude certain extended-release formulations. Children whose ADHD is poorly controlled with long-acting medication may need additional doses during the school day.

This proves challenging, as 50% of children taking ADHD medication experience adherence barriers at school.<sup>1</sup> A study comparing medication errors in school-aged children showed that children with ADHD are less likely to remember to take their medication than those with other illnesses.<sup>1</sup> Missed doses are common; 12.1% of study participants reported missing a dose once a week and 27.2% once a month. Not surprisingly, missed doses in these children were most likely to cause concentration deficits.<sup>1</sup> Schools need to monitor and remind children with ADHD to ensure adherence.

ADHD symptoms are most likely to manifest while a child is at school, perfectly positioning teachers and school nurses to as-

**Table 1. ADHD Symptoms Improved by Medication and Possible Adverse Effects of Stimulant Drugs<sup>8</sup>**

Symptoms Showing Improvement	Possible Adverse Effects
Test taking ability	Appetite suppression
Concentration	Irritability
Listening	Tendency to cry
Note-taking	Anxiousness

sess medication effectiveness.<sup>10,11</sup> **Table 1** lists symptoms that should improve with treatment. These same individuals are well-placed to detect side effects. Pharmacists should counsel all caregivers, including those at school, to watch for the common adverse effects of stimulant medications in **Table 1**.

### Diabetes

Roughly 215,000 youths live with type 1 or 2 diabetes mellitus (DM).<sup>3</sup> Three-quarters of all type 1 diabetes cases are diagnosed in children younger than 18.<sup>12</sup> Type 2 DM is also on the rise among youths. The Centers for Disease Control and Prevention projects that the prevalence of type 2 DM in those younger than 20 will increase 2.3% per year and quadruple over the next 40 years.<sup>12</sup>

Most common in children, type 1 diabetes requires daily insulin injections. Recent advances, like the increased use of basal-bolus regimens, has improved glycemic control in children with type 1 DM. Diabetes-related tasks require collaboration between patient, parents, and other caregivers, including those at school.<sup>12</sup> Until recently, the U.S. Food and Drug Administration (FDA) had only approved two drugs for type 2 DM treatment in children: metformin and insulin. While metformin controls hyperglycemia in about half of youths with type 2 DM, many require insulin therapy within a few years of diagnosis.<sup>12</sup> Initial insulin regimens entail injections once to twice daily, but with increased insulin resistance and the need for tighter control, additional meal-time doses may be needed.<sup>12</sup> This is where school-day administration may be required.

Insulin's specific storage requirements can burden school nurses; it should be refrigerated (36-46°F) until opened. Once removed from the refrigerator and opened, a vial or pen is stable for 28 days at room temperature (not to exceed 86°F).<sup>15</sup> Parents and school personnel share the responsibility of monitoring insulin expiration dates. Often, children take such small doses that insulin vials or pens may have significant content remaining at their expiration date. Pharmacists who recognize this dilemma should advise a parent to notify the school to stop using the current supply after 28 days and send a replacement promptly. Some children with diabetes may also utilize insulin pumps for school-day insulin administration. This presents additional challenges, as bolus (i.e., mealtime) insulin doses are based on car-

bohydrate consumption. Pharmacists filling insulin prescriptions for pediatric patients using pumps should encourage patients and parents to have an open dialogue with school personnel to determine<sup>13</sup>

- where and when will the student test their blood glucose level?
- how will hypoglycemic episodes be treated?
- who will determine insulin dosing for lunch and snacks?
- how will insulin dosing be adjusted for exercise?
- is someone at school aware of how to troubleshoot the pump when it is disconnected?

Disposal of needles and other hazardous testing materials also challenges schools. Parents provide containers to schools that need them for proper disposal.<sup>15</sup>

In 2019, the FDA approved liraglutide to treat type 2 DM in patients 10 years and older. This is the first non-insulin diabetes medication approved for pediatric patients in nearly 20 years.<sup>14</sup> Patients only inject liraglutide once daily, so school-day dosing is unlikely. School personnel, however, may be tasked with identifying adverse effects. Pharmacists should advise parents to make school personnel aware that gastrointestinal adverse effects (e.g., nausea, vomiting, diarrhea, constipation, dyspepsia) and decreased appetite are possible.<sup>14</sup>

The American Diabetes Association (ADA) advises parents to actively coordinate school-day diabetes care for their child. Their *Safe at School* program suggests that children speak with certified diabetes educators (CDE) to prepare them for what to expect at school.<sup>16</sup> Community pharmacists can involve youth in their own care by counseling on what to do if emergent situations arise at school. While the ADA also suggests that parents connect school nurses with a CDE, they can also refer the nurse to their child's local pharmacist.<sup>16</sup>

As with inhalers, clinicians need to determine each child's ability to self-administer and necessary level of supervision on a case-by-case basis. Pharmacists can bolster a child's capacity with education. Important steps to remind those who administer or supervise a child's insulin injections include<sup>15,17</sup>

- check the expiration date and never use beyond this date
- examine the insulin before injecting to make sure it looks normal (i.e., no clumps, crystals, discoloration)
- use a new needle every time and perform an "air shot" of at least 2 units to clear bubbles from the needle
- rotate injection sites
- pinch and inject into the skin of a soft fatty area on the body
- hold the needle in for 10 seconds after injection is finished to prevent insulin leakage

Approximately 37% of children with Type 1 diabetes experience disease-related emergencies at school.<sup>18</sup> Healthcare clinicians must discuss symptoms of hypo- and hyperglycemia with all



### Pause and Ponder:

Have I taken the time to ask parents who pick up devices to treat anaphylaxis if they are aware of their school's policies? Am I aware of those policies?

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school personnel a child might encounter during the school day. Additionally, these individuals should know how to administer emergency agents.<sup>16</sup>

### Food Allergy

Eight percent of children have food allergies, and allergies are becoming increasingly common.<sup>3,19</sup> Each classroom, on average, has two children with food allergies, requiring appropriate precautions. Of these individuals, 25% experience their first anaphylactic reaction at school.<sup>19</sup> The American Academy of Asthma, Allergy, and Immunology (AAAAI) reports that eight foods cause the majority of allergic reactions: cow's milk, eggs, fish, peanuts, shellfish, soy, tree nuts, and wheat.<sup>20</sup> Many children consume breakfast, lunch, and snacks in schools, so the likelihood of a reaction is high and the need for injectable epinephrine is obvious. Consequently, having properly trained individuals in schools to respond to life-threatening anaphylaxis is vital.

While proper administration will be discussed later, pharmacists need to reinforce that parents and schools share the responsibility of emergency injectables availability. Carrying these medications back and forth to school daily is burdensome, so students may need a supply for home and one for school. These devices often have short expiration dates, too. Parents should make note of when a pen expires and school nurses should be cognizant of any pen that expires before the school year's end. Pharmacists and technicians should dispense devices that expire after the school year ends, whenever possible.

### Abuse and Addiction

Unfortunately, prescription opioid abuse and addiction are common among school-aged children. Among American teens, 1 in 4 (23%) report abusing or misusing a prescription drug at least once in their lifetime.<sup>21</sup> Prescription opioids are the second most frequent illicit drug used among adolescents and young adults, second only to marijuana.<sup>21</sup> Due to opioids' high street cost and reduced prescription availability, youths may seek more accessi-



ble alternatives. Consequently, lifetime use of heroin for 12- to 17-year-olds increased from 0.1% in 2013 to 0.8% in 2014.<sup>22</sup>

NASN supports making naloxone available in schools for acute overdose.<sup>2,21</sup> This life-saving medication can restore breathing to opioid overdose victims, but only if administered quickly and effectively. Schools need to train staff to administer naloxone as described later, and pharmacists can provide that training.

State naloxone laws differ. Pharmacy staff can review state and local laws and policies and should recommend, whenever possible, that school districts add the drug to their emergency preparedness and response plan.<sup>23</sup> Some insurers restrict coverage to patients currently taking opioids, while others will cover naloxone for third parties, such as concerned family or community members.<sup>24</sup> Pharmacists and technicians can work with school districts to determine what is most cost-efficient and allowed under state law.

### Acute Illness and Immunizations

Medication use at school is not limited to chronic conditions. Acute illnesses can—and do—occur on any given school day. The most common acute illnesses that are treated at school are<sup>25</sup>

- anaphylaxis/emergency response
- child abuse
- infection
- injury (note that up to 31% of acute pediatric injuries occur in or around school)
- outbreaks (e.g., influenza, lice, scabies)
- pregnancy/rape
- vaccination-related gaps.

In some of these areas (e.g., abuse, rape, pregnancy), state and federal law govern response and treatment options. In others (e.g., infection, outbreaks), drug selection and issues as basic as storage are critical.

Adequate immunization can significantly reduce the likelihood or magnitude of infectious illness. Most schools have good tracking methods to ensure students are vaccinated on time, but one area needs improvement. Adolescents are likely to have missed vaccinations required in pre-teen years, as many teens avoid pe-

diatrician offices for well visits. Meningococcal, tetanus-diphtheria-acellular pertussis boosters, and human papillomavirus (HPV) are among those recommended at this peak period of risk. Meningococcal disease kills more individuals in the 15 to 24 age group than any other.<sup>26</sup> The highest prevalence of cancer-causing HPV also exists among teenagers and young adults, requiring interventions for protection.<sup>27</sup>

Herd immunity requires the overwhelming majority of people to be immunized against a disease to provide protection to those who cannot be vaccinated. One school system in Indiana dramatically increased the percentage of students in compliance with vaccination recommendations from 66% to 99.6% using a school nurse-run catch-up program.<sup>26</sup> However, not all schools have a nurse engaged in this process, so a pharmacist can be a valuable resource for parents.

## HEALTH EMERGENCIES

### Anaphylaxis

Parents need to educate school employees about their children's symptoms of anaphylactic reaction. Parents and pharmacists can also ensure children know when to seek help for serious reactions by counseling on symptoms described in [Table 2](#). AAAAI also suggests that parents complete Anaphylaxis Emergency Action Plans and review them with school administrators.<sup>20</sup>

Epinephrine auto-injectors differ. Pharmacists should be vigilant to retrain parents and children if a new device is prescribed. The dispensing pharmacist should review each injector's unique caps, safety covers, and mechanisms with the child. For example, certain generic injectables require the user to hold the needle in place for 10 seconds, rather than the 3-5 seconds recommended for more common devices.<sup>28,29</sup> Additionally, pharmacists can recommend talking injectors if responsible individuals have limited understanding.

If the first dose of epinephrine is unsuccessful, a second dose should be given.<sup>28,29</sup> Pharmacists should advise parents that one injector at home and one at school is insufficient; a 2-pack

*(Text continues on page 7)*

**Table 2. Emergency Symptoms and How to Treat**<sup>20,28,29,31,32,34</sup>

Emergent Situation	Symptoms	Treatment
<b>Anaphylaxis</b>	<ul style="list-style-type: none"> <li>● Hoarseness, throat tightness, lump in throat</li> <li>● Wheezing, chest tightness, trouble breathing</li> <li>● Tingling hands, feet, lips, or scalp</li> </ul>	<p>Epinephrine IM injection:</p> <ul style="list-style-type: none"> <li>● Remove caps</li> <li>● Inject through clothes at 90° angle into thigh</li> <li>● Hold in place for 3-10 seconds per manufacturer instructions</li> <li>● Call 911</li> <li>● Second dose if needed</li> </ul>
<b>Opioid overdose</b>	<ul style="list-style-type: none"> <li>● Pinpoint pupils</li> <li>● Unconsciousness</li> <li>● Respiratory depression</li> </ul>	<p>Naloxone 0.4mg/mL IM/IN:</p> <ul style="list-style-type: none"> <li>● IM injection into upper thigh or upper arm; inject through clothes</li> <li>● IN administration of full dose into one nostril; must be atomized</li> <li>● Call 911</li> <li>● Second dose if needed</li> </ul>
<b>Hypoglycemia (mild)</b>	<ul style="list-style-type: none"> <li>● Shaky, dizzy, lightheaded</li> <li>● Sweating, chills, clamminess</li> <li>● Mood changes</li> <li>● Skin pallor</li> </ul>	<ul style="list-style-type: none"> <li>● Test blood sugar; treat if 70mg/dL or less                             <ul style="list-style-type: none"> <li>○ Consume 15 grams of carbohydrate orally:</li> <li>○ Glucose tablets/gel</li> <li>○ 4 oz. juice/regular soda</li> <li>○ 1 tbsp sugar or honey</li> <li>○ Hard candy, jelly beans, or gumdrops</li> </ul> </li> <li>● Re-check blood sugar in 15 minutes and re-treat if needed</li> </ul>
<b>Hypoglycemia (severe)</b>	<p>Occurs at blood glucose &lt;54mg/dL; above plus:</p> <ul style="list-style-type: none"> <li>● Seizures</li> <li>● Unconsciousness</li> </ul>	<p>Glucagon:</p> <ul style="list-style-type: none"> <li>● Have someone call 911</li> <li>● Position student on his/her side</li> </ul> <p><i>IM injection:</i></p> <ul style="list-style-type: none"> <li>● Inject all fluid from the syringe into the vial of powder and roll vial to mix</li> <li>● Draw prescribed amount of solution back into syringe</li> <li>● Inject into buttocks, thigh, or upper arm at 90° angle</li> <li>● Hold in place for 5 seconds and keep student on his/her side until they regain consciousness or emergency personnel arrive</li> </ul> <p><i>SQ prefilled syringe:</i></p> <ul style="list-style-type: none"> <li>● Pull cap straight off syringe</li> <li>● Pinch skin and insert needle into upper arm, stomach, or thigh at 90° angle</li> <li>● Push plunger as far as it will go</li> </ul> <p><i>SQ auto-injector:</i></p> <ul style="list-style-type: none"> <li>● Pull red cap straight off</li> <li>● Push yellow end into upper arm, stomach, or thigh and display window will turn red</li> </ul> <p><i>IN spray:</i></p> <ul style="list-style-type: none"> <li>● Remove shrink wrap by pulling on red stripe</li> <li>● Open lid and remove device from storage tube</li> <li>● Insert tip into one nostril gently until finger(s) touch outside the nose</li> <li>● Press device plunger all the way in until green line no longer shows</li> </ul>

IM=intramuscular; IN=intranasal; SQ=subcutaneous

should be available to the child at all times. **Table 2** outlines general administration techniques to emphasize.

## Opioid Overdose

Naloxone is the drug of choice for acute opioid overdose. First, school personnel need to recognize overdose symptoms. Classic symptoms, referred to as the “opioid overdose triad,” are pinpoint pupils, unconsciousness, and respiratory depression.<sup>30</sup> Potential first-responders should also be taught that when in doubt, they should administer naloxone. The drug is not harmful. If a patient is overdosing, prompt administration can save a life. If not truly overdosing, he or she will not be harmed. Also, in some cases a second dose may be required if the first does not reverse the overdose and restore breathing.<sup>24</sup> Pharmacists should suggest having multiple doses on hand at any given time.

Naloxone can be administered intranasally or intramuscularly via pre-filled auto injector or by drawing up from a vial into a syringe.<sup>24</sup> The ready-to-use packaging is ideal in an emergency, but can be costlier. Naloxone kits come with a syringe and a vial. The responder gives a 0.4 mg/mL dose in the victim’s upper thigh or upper arm and can give it through clothing.<sup>24</sup> A naloxone auto-injector delivers a single dose with a retractable needle to avoid needle sticks. The device also provides step-by-step instruction on how to use it. The responder should push the auto-injector hard into the victim’s thigh muscle until the voice directs otherwise.<sup>24</sup>

Intranasal naloxone comes in one requiring assembly and others with ready-to-use packaging.<sup>24</sup> The former requires a separate device to atomize the drug. This device is sold separately without a prescription, so pharmacists should advise schools they need both the drug and delivery device. The already-assembled product needs no extra device. In both cases, the responder gives the drug by inserting the nozzle into one of the victim’s nostrils and spraying the entire dose into one nostril.<sup>24</sup>

Responders should call emergency personnel immediately when an overdose occurs, regardless of naloxone administration. School administration must understand this.

## Hypoglycemia

Hypoglycemia can occur as a result of insufficient carbohydrate consumption following insulin administration.<sup>12</sup> Additionally, children younger than age 6 are likely to have “hypoglycemia unawareness.” They are particularly vulnerable to severe hypoglycemia because they don’t recognize symptoms or communicate their needs.<sup>12</sup> Low blood glucose symptoms are outlined in **Table 2**. Pharmacists can counsel children on hypoglycemia’s signs and when to call for help. Additionally, many indicators of low blood sugar can be mistaken for misbehavior. School personnel should be trained to take these symptoms seriously in children with diabetes and always seek medical attention.

If children present with any of these symptoms, a trained individual should test the child’s blood glucose. If the reading is 70 mg/dL or less, the child should consume 15 grams of carbohydrate immediately.<sup>34</sup> A school nurse or other designated individual should administer one of the recommended agents in **Table 2**. When a patient experiencing clinically significant hypoglycemia is unable or unwilling to consume carbohydrates by mouth, injectable or intranasal glucagon is indicated.<sup>12</sup> The FDA approved two formulations of glucagon for emergent hypoglycemia—intranasal spray and subcutaneous pre-filled syringe/auto-injector—for pediatric patients in 2019.<sup>31,32</sup> Intranasal glucagon is a ready to use (i.e., no reconstitution or priming) dry nasal powder that is absorbed passively in the nose (i.e., no inhalation required).<sup>31</sup> Newly-approved pre-filled syringes and auto-injectors contain a premixed, liquid formulation of glucagon that requires no mixing.<sup>32</sup>

Responders to hypoglycemic emergencies should administer glucagon following manufacturer instructions, outlined in **Table 2**. A usability study found that 88% of people could successfully administer a rescue injection with the glucagon auto-injector, while only 31% could do so with traditional glucagon emergency kits (i.e., those requiring reconstitution).<sup>33</sup> Pharmacists should recommend newer options for ease of use whenever feasibly possible. They should also counsel caregivers to treat even if they’re in doubt because severe hypoglycemia can cause brain damage or death. Although children may be nauseous or vomit when they regain consciousness, glucagon is harmless, even if blood sugar is high.<sup>35</sup> It may take 15 to 20 minutes for diabetics to regain consciousness, and here too, a responsible adult should call 911 while waiting.<sup>35</sup>

## POLICY AND PROCEDURE VARIES

Policy and procedure surrounding medication administration at school is inconsistent. While many organizations have recommendations, no universal guidelines exist. NASN publishes its position on this issue publicly. They believe that children with unmet health needs have a difficult time learning and that all schools should be equipped with a full-time registered nurse.<sup>2</sup> They also state that case management by a school nurse enhances quality of life for children with chronic illnesses.<sup>2</sup> While ideal, many school system budgets are tight and they may not be able to provide case management or lack school nurses entirely.

Similar to NASN, the American Academy of Pediatrics (AAP) publishes voluntary guidelines for schools. AAP suggests that prescription medications brought to school should be in original containers as labeled by a pharmacist or physician.<sup>37</sup> However,

**PAUSE AND PONDER:** A school district approaches you about what naloxone formulation to maintain on-hand. Assuming state law allows this, what formulation might you suggest?

the same does not apply to over-the-counter medications, where state regulations differ vastly. When medication does not require refrigeration or special security, AAP proposes that responsible students should be permitted to carry medication for urgent needs.<sup>37</sup> This creates gray area, as school administrators differ on security needs and student responsibility. School districts develop their own guidelines in accordance with state laws and implement protocols as they see fit. Again, this is an opportunity for pharmacy to collaborate.

No national laws or regulations govern school-day medical care. Section 504 of the Rehabilitation Act states that federally funded school districts must provide medication at school and make reasonable accommodations for students with disabilities.<sup>36</sup> This national directive ensures care, but it is vague about procedures. State and local regulations are disjointed, too. Researchers in Iowa surveyed 396 schools and found varying protocols statewide for medication administration. While 97% indicated that they had written guidelines for medication administration, these guidelines varied greatly between schools.<sup>38</sup> Day-to-day administration responsibility rested on a variety of individuals: primarily, school nurses (48%), but also secretaries (38%), health aides (11%), teachers (2%), other individuals (1%).<sup>38</sup> Additionally, policies regarding field trips only existed in 73.6% of schools, most commonly those with younger students.<sup>27</sup> Pharmacists, therefore can work with school administration and the tools provided to coordinate care better for school-aged children.

## PHARMACY TEAM'S ROLE

### Recognize Pediatric Medications and Potential Problems

School districts and parents are often dissatisfied with the lack of guidance and regulation surrounding medications at school. One study found that the most common barriers to addressing children's health concerns were lack of student and parent knowledge, lack of parent-school-physician communication, and lack of resources (e.g., cannot afford a second inhaler for school).<sup>3</sup> Families and school systems should see community pharmacists as valuable resources to address these and other issues. **Table 3** lists reputable resources.

Half to two-thirds of school nurses and others who give medication report medication administration errors.<sup>1,37</sup> "Missed dose" is most common.<sup>1,37,39</sup> Missed doses of maintenance medications affect a child's ability to focus on education. The most common reasons for these errors include students not coming to the nurse's office, staff error, and lack of communication between parents and schools.<sup>1,37</sup> Additionally, when students share the responsibility of medication administration, such as carrying their own inhalers, fewer errors occur.<sup>1</sup> If pharmacists understand how school medication errors occur, they can counsel children and school staff on ways to anticipate and avoid them.

**Table 3. Additional Resources for Pharmacy Teams and Parents/Caregivers**

Resource	What to Expect
<b>National Association of School Nurses –</b> <i><a href="https://www.nasn.org/home">https://www.nasn.org/home</a></i> (866) 627-6767	Guidelines and position statements on medication administration in schools
<b>American Diabetes Association Safe at School</b> <i><a href="http://www.diabetes.org/living-with-diabetes/parents-and-kids/diabetes-care-at-school/">http://www.diabetes.org/living-with-diabetes/parents-and-kids/diabetes-care-at-school/</a></i>	Resources for parents on meeting diabetes management needs for their child while they are at school
<b>American Academy of Pediatricians –</b> <i><a href="https://www.aap.org/en-us/Pages/Default.aspx">https://www.aap.org/en-us/Pages/Default.aspx</a></i>	Guidelines for parents and providers on pediatric medication use and school-day care
<b>Naloxone training</b> <i><a href="http://www.getnaloxonenow.org">http://www.getnaloxonenow.org</a></i>	Bystander training on naloxone administration
<b>American Diabetes Association Training Resources for School Staff</b> <i><a href="https://www.diabetes.org/resources/know-your-rights/safe-at-school-state-laws/training-resources-school-staff">https://www.diabetes.org/resources/know-your-rights/safe-at-school-state-laws/training-resources-school-staff</a></i>	Clinical pearls and training for school personnel caring for students with diabetes

### Label Medication Appropriately

Simple steps open lines of communication and develop cooperative relationships between students, parents, schools, and pharmacists. This process begins at data entry. Pharmacy technicians filling pediatric medications with multiple daily doses or for emergencies should ask if the drug may be administered at school. Especially for new medications, simply offering an additional properly labeled container can galvanize communication with parents. Additionally, if pharmacists send vials or devices to school with identical labels, parents and school administration have identical contact information for the pharmacist.

### Suggest Alternatives

Pharmacists and technicians who work with insurance billing can help parents find cost-efficient options. The pharmacy team can work with prescribers and insurances to obtain approval for sufficient medication and supplies. The pharmacy team can also suggest long-acting alternatives when appropriate to reduce or avoid school-day administration.

Opportunities exist with epinephrine auto-injectors. With cost on the rise, the pharmacy team can help. Generic versions have recently become available, and pharmacists should work with insurers and prescribers to select the best product for patients. Coupons are available to reduce costs for nearly every formulation.



## Teach Autonomy

While children infrequently accompany parents to retrieve prescriptions, pharmacists should capitalize on opportunities to counsel school-aged kids directly (see **SIDEBAR** for tips). By age 5 to 7, most children are able to understand medication instructions, so their participation in counseling is important.<sup>40</sup> This becomes especially important in situations where parents can't advocate for them, like school. The most commonly self-administered medications by school-aged children are inhalers (70%), asthma medications (48%), and insulin (44%).<sup>39</sup> Counseling children on proper administration techniques, and focusing on these drug classes, could make them feel more confident at school.

## CONCLUSION

School-aged children suffering from chronic and acute illness are a poorly-managed population. In the absence of universal regulations, pharmacists have an opportunity to aid caregivers and educate all parties involved in school-day healthcare. Communi-

### SIDEBAR. Pro-Tips for Counseling Pediatric Patients<sup>41</sup>

1. Use open-ended questions to determine the child's cognitive level
2. Be aware of facial expressions, gestures, and tone of voice
3. Avoid medical jargon, and introduce medical and technical terms progressively
4. Use words with few syllables and short sentences
5. Young children can retain 2 to 3 messages, while older children can retain 7 to 14
6. Use a mixture of text and illustration

ty pharmacists are in a unique position to facilitate medication administration at school, and prevent it whenever possible.

**Figure 1** lists ways to provide the best care to kids in school.

## Figure 1. The Pharmacy Team's Role in Providing Care for School-aged Children

### Best

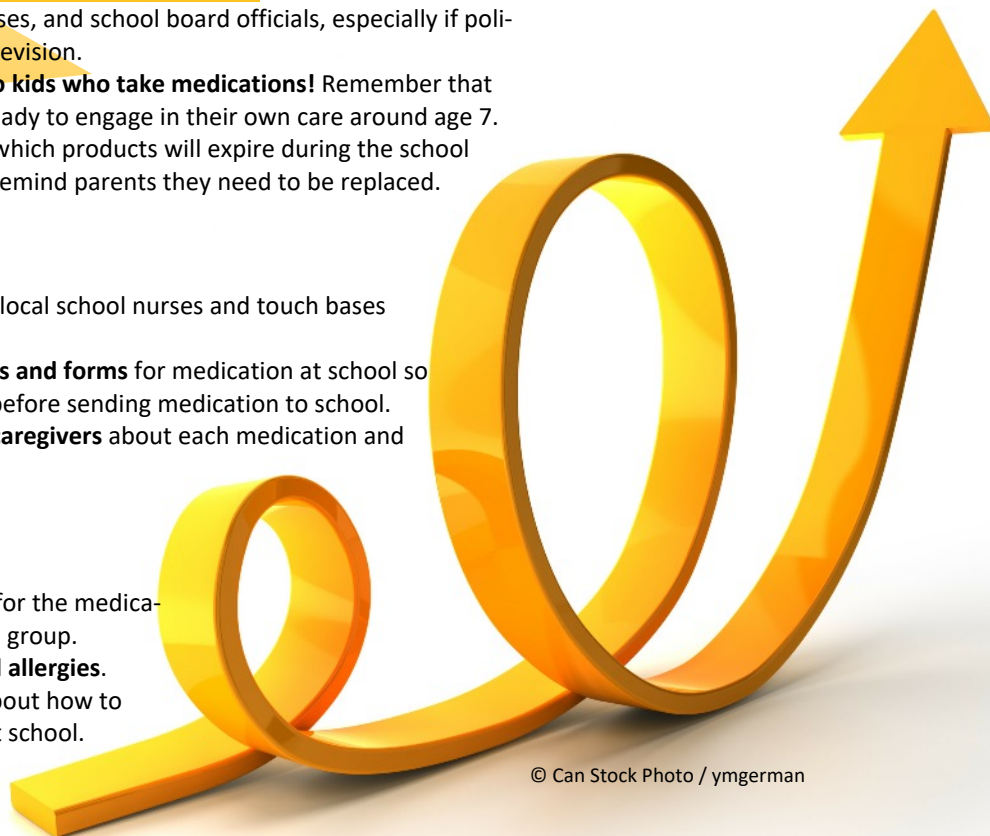
- ① **BE COMMUNITY CHAMPIONS.** Talk with parents, school nurses, and school board officials, especially if policies need revision.
- ② **Talk to kids who take medications!** Remember that they are ready to engage in their own care around age 7.
- ③ Know which products will expire during the school year, and remind parents they need to be replaced.

### Better

- ① **Develop rapport** with local school nurses and touch bases with them periodically.
- ② **Learn the local policies and forms** for medication at school so parents can be prepared before sending medication to school.
- ③ **Counsel parents and caregivers** about each medication and its potential side effects!

### Good

- ① **Be familiar with pediatric dosing** for the medications most likely to be used in this age group.
- ② **Always ask for the child's age and allergies.**
- ③ **Invite parents to ask questions** about how to ensure the medication can be given at school.



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