
ASTHMA MEDICATIONS IN SCHOOLS: A CROSS-SECTIONAL ANALYSIS OF THE ASTHMA CALL BACK SURVEY

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INTRODUCTION

Asthma is the most common childhood chronic disease in the United States.^{2,6}

Asthma is one of the leading causes of absence in school due to a chronic illness.¹

Students with access to considerable health resources in schools may not miss more school than students without asthma.⁶

1. Asthma in Schools. American Lung Association. Available at: www.lungusa.org/lung-disease/asthma/in-schools. Accessed July 5, 2011.

2. Banda, E., Persky, V., Chisum G., Damitz, M., Williams, R., & Turyk, M. (2013). Exposure to home and school environment triggers and asthma morbidity in Chicago inner-city children. *Pediatric Allergy and Immunology* (24), 734-741. doi: 10.1111/pai.12162

3. Global Initiative for Asthma (GINA) (2019). Global strategy for asthma management and prevention. Retrieved from <https://ginasthma.org/wp-content/uploads/2019/06/GINA-2019-main-report-June-2019-wms.pdf>

4. Marahatta, S.B. (2013). Evidence based public health practice: Brief introduction. *Journal of Manmohan Memorial Institute of Health Sciences*.

5. Sawicki, G. & Haver, K. (2018). Asthma in children younger than 12 years: Initial evaluation and diagnosis. Uptodate. https://www.uptodate.com/contents/asthma-in-children-younger-than-12-years-initial-evaluation-and-diagnosis?search=pediatric%20asthma&source=search_result&selectedTitle=2~150&usage_type=default&display_rank=2

6. Millard MW, Johnson PT, Hilton A, Hart M. Children with asthma miss more school: fact or fiction? *Chest* 2009;135:303–306.

INTRODUCTION

Asthma action plans provided to schools help them prepare for students with asthma.

Quality treatment of asthma requires appropriate patient screening and education.^{2,4}

Long term goals of asthma management includes achieving symptom control.^{2,4,5}

1. Asthma in Schools. American Lung Association. Available at: www.lungusa.org/lung-disease/asthma/in-schools. Accessed July 5, 2011.

2. Banda, E., Persky, V., Chisum G., Damitz, M., Williams, R., & Turyk, M. (2013). Exposure to home and school environment triggers and asthma morbidity in Chicago inner-city children. *Pediatric Allergy and Immunology* (24), 734-741. doi: 10.1111/pai.12162

3. Global Initiative for Asthma (GINA) (2019). Global strategy for asthma management and prevention. Retrieved from <https://ginasthma.org/wp-content/uploads/2019/06/GINA-2019-main-report-june-2019-wms.pdf>

4. Marahatta, S.B. (2013). Evidence based public health practice: Brief introduction. *Journal of Manmohan Memorial Institute of Health Sciences*.

5. Sawicki, G. & Haver, K. (2018). Asthma in children younger than 12 years: Initial evaluation and diagnosis. Uptodate. https://www.uptodate.com/contents/asthma-in-children-younger-than-12-years-initial-evaluation-and-diagnosis?search=pediatric%20asthma&source=search_result&selectedTitle=2~150&usage_type=default&display_rank=2

ASTHMA ACTION PLAN EXAMPLE

ASTHMA ACTION PLAN

For: _____ Doctor: _____ Date: _____

Doctor's Phone Number: _____ Hospital/Emergency Department Phone Number: _____

GREEN ZONE															
DOING WELL <ul style="list-style-type: none"> No cough, wheeze, chest tightness, or shortness of breath during the day or night Can do usual activities And, if a peak flow meter is used, Peak flow: more than _____ (80 percent or more of my best peak flow) My best peak flow is: _____	Daily Medications <table border="1"> <thead> <tr> <th>Medicine</th> <th>How much to take</th> <th>When to take it</th> </tr> </thead> <tbody> <tr> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____</td> <td>_____</td> <td>_____</td> </tr> </tbody> </table>			Medicine	How much to take	When to take it	_____	_____	_____	_____	_____	_____	_____	_____	_____
	Medicine	How much to take	When to take it												
_____	_____	_____													
_____	_____	_____													
_____	_____	_____													
Before exercise	<input type="checkbox"/> _____	<input type="checkbox"/> 2 or <input type="checkbox"/> 4 puffs	5 minutes before exercise												
YELLOW ZONE															
ASTHMA IS GETTING WORSE <ul style="list-style-type: none"> Cough, wheeze, chest tightness, or shortness of breath, or Waking at night due to asthma, or Can do some, but not all, usual activities -Or- Peak flow: _____ to _____ (50 to 79 percent of my best peak flow)	1st → Add: quick-relief medicine—and keep taking your GREEN ZONE medicine. _____ Number of puffs Can repeat every _____ minutes (quick-relief medicine) or <input type="checkbox"/> Nebulizer, once up to maximum of _____ doses														
	2nd → If your symptoms (and peak flow, if used) return to GREEN ZONE after 1 hour of above treatment: <input type="checkbox"/> Continue monitoring to be sure you stay in the green zone. -Or- If your symptoms (and peak flow, if used) do not return to GREEN ZONE after 1 hour of above treatment: <input type="checkbox"/> Take: _____ Number of puffs or <input type="checkbox"/> Nebulizer (quick-relief medicine) <input type="checkbox"/> Add: _____ mg per day For _____ (3-10) days (oral steroid) <input type="checkbox"/> Call the doctor <input type="checkbox"/> before/ <input type="checkbox"/> within _____ hours after taking the oral steroid.														
RED ZONE															
MEDICAL ALERT! <ul style="list-style-type: none"> Very short of breath, or Quick-relief medicines have not helped, Cannot do usual activities, or Symptoms are same or get worse after 24 hours in Yellow Zone -Or- Peak flow: less than _____ (50 percent of my best peak flow)	Take this medicine: <input type="checkbox"/> _____ Number of puffs or <input type="checkbox"/> Nebulizer (quick-relief medicine) <input type="checkbox"/> _____ mg (oral steroid)														
	Then call your doctor NOW. Go to the hospital or call an ambulance if: <ul style="list-style-type: none"> You are still in the red zone after 15 minutes AND You have not reached your doctor. 														
DANGER SIGNS <ul style="list-style-type: none"> Trouble walking and talking due to shortness of breath Lips or fingernails are blue 	→ Take _____ puffs of _____ (quick relief medicine) AND Go to the hospital or call for an ambulance _____ NOW! (phone)														

See the reverse side for things you can do to avoid your asthma triggers.

ASTHMA ACTION PLAN EXAMPLE

HOW TO CONTROL THINGS THAT MAKE YOUR ASTHMA WORSE

This guide suggests things you can do to avoid your asthma triggers. Put a check next to the triggers that you know make your asthma worse and ask your doctor to help you find out if you have other triggers as well. Keep in mind that controlling any allergen usually requires a combination of approaches, and reducing allergens is just one part of a comprehensive asthma management plan. Here are some tips to get started. These tips tend to work better when you use several of them together. Your health care provider can help you decide which ones may be right for you.

ALLERGENS

Dust Mites

These tiny bugs, too small to see, can be found in every home—in dust, mattresses, pillows, carpets, cloth furniture, sheets and blankets, clothes, stuffed toys, and other cloth-covered items. If you are sensitive:

- Mattress and pillow covers that prevent dust mites from going through them should be used along with high efficiency particulate air (HEPA) filtration vacuum cleaners.
- Consider reducing indoor humidity to below 60 percent. Dehumidifiers or central air conditioning systems can do this.

Cockroaches and Rodents

Pests like these leave droppings that may trigger your asthma. If you are sensitive:

- Consider an integrated pest management plan.
- Keep food and garbage in closed containers to decrease the chances for attracting roaches and rodents.
- Use poison baits, powders, gels, or paste (for example, boric acid) or traps to catch and kill the pests.
- If you use a spray to kill roaches, stay out of the room until the odor goes away.

Animal Dander

Some people are allergic to the flakes of skin or dried saliva from animals with fur or hair. If you are sensitive and have a pet:

- Consider keeping the pet outdoors.
- Try limiting to your pet to commonly used areas indoors.

Indoor Mold

If mold is a trigger for you, you may want to:

- Explore professional mold removal or cleaning to support complete removal.
- Wear gloves to avoid touching mold with your bare hands if you must remove it yourself.
- Always ventilate the area if you use a cleaner with bleach or a strong smell.

Pollen and Outdoor Mold

When pollen or mold spore counts are high you should try to:

- Keep your windows closed.
- If you can, stay indoors with windows closed from late morning to afternoon, when pollen and some mold spore counts are at their highest.
- If you do go outside, change your clothes as soon as you get inside, and put dirty clothes in a covered hamper or container to avoid spreading allergens inside your home.
- Ask your health care provider if you need to take or increase your anti-inflammatory medicine before the allergy season starts.

IRRITANTS

Tobacco Smoke

- If you smoke, visit smokefree.gov or ask your health care provider for ways to help you quit.
- Ask family members to quit smoking.
- Do not allow smoking in your home or car.

Smoke, Strong Odors, and Sprays

- If possible, avoid using a wood-burning stove, kerosene heater, or fireplace. Vent gas stoves to outside the house.
- Try to stay away from strong odors and sprays, such as perfume, talcum powder, hair spray, and paints.

Vacuum Cleaning

- Try to get someone else to vacuum for you once or twice a week, if you can. Stay out of rooms while they are being vacuumed and for a short while afterward.
- If you must vacuum yourself, using HEPA filtration vacuum cleaners may be helpful.

Other Things That Can Make Asthma Worse

- Sulfites in foods and beverages: Do not drink beer or wine or eat dried fruit, processed potatoes, or shrimp if they cause asthma symptoms.
- Cold air: Cover your nose and mouth with a scarf on cold or windy days.
- Other medicines: Tell your doctor about all the medicines you take. Include cold medicines, aspirin, vitamins and other supplements, and nonselective beta-blockers (including those in eye drops).



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National Heart, Lung,
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For more information and resources on asthma,
visit nhlbi.nih.gov/BreatheBetter.

LEARN MORE
BREATHE BETTER

ASTHMA MEDICATION EXAMPLES

Types of asthma medications

Category	Purpose	Types
Long-term asthma control medications	Taken regularly to control chronic symptoms and prevent asthma attacks — the most important type of treatment for most people with asthma	<ul style="list-style-type: none"> • Inhaled corticosteroids • Leukotriene modifiers • Long-acting beta agonists (LABAs) • Theophylline • Combination inhalers that contain both a corticosteroid and a LABA
Quick-relief medications (rescue medications)	Taken as needed for rapid, short-term relief of symptoms — used to prevent or treat an asthma attack	<ul style="list-style-type: none"> • Short-acting beta agonists such as albuterol • Ipratropium (Atrovent) • Oral and intravenous corticosteroids (for serious asthma attacks)
Medications for allergy-induced asthma	Taken regularly or as needed to reduce your body's sensitivity to a particular allergy-causing substance (allergen)	<ul style="list-style-type: none"> • Allergy shots (immunotherapy) • Allergy medications
Biologics	Taken with control medications to stop underlying biological responses causing inflammation in the lungs — used to better manage severe asthma symptoms	<ul style="list-style-type: none"> • Omalizumab (Xolair) • Mepolizumab (Nucala) • Benralizumab (Fasenra) • Reslizumab (Cinqair)

RESEARCH QUESTION

Our objective was to analyze the amount of children with asthma permitted to carry medications in school and to assess the prevalence of children with an asthma action plan in school.

METHODS

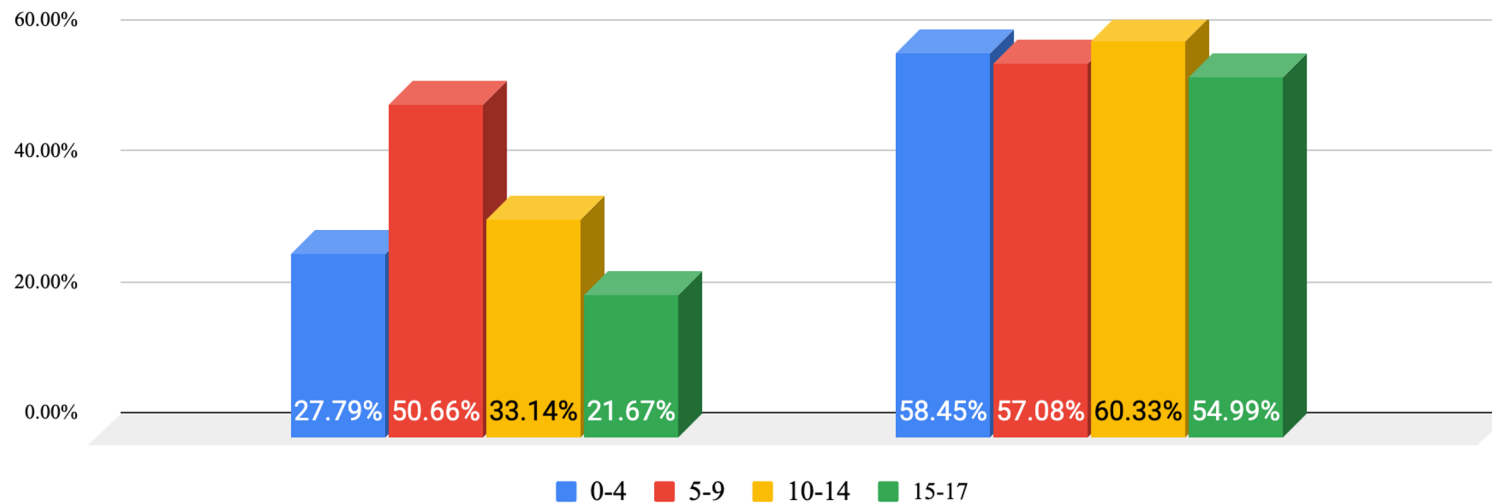
Using the CDC's 2017 & 2018 Behavioral Risk Factor Surveillance System (BRFSS) Asthma Call Back Survey for children, we assessed the prevalence of children in school that are allowed to carry medication and if they had an asthma action plan.

We assessed if there was a difference in allowance of asthma medication in schools or having asthma action plans based on *urbanicity* (rural vs. metro area).

METHODS

We included only children who were *in school* and were reported to *currently have asthma*, ranging in age from 0-17 in BRFSS defined *age groups* show in Figure 2.

Age groups of children with asthma whose school did not allow children to carry their medication with them (Left) and did not have an asthma action plan.



RESULTS

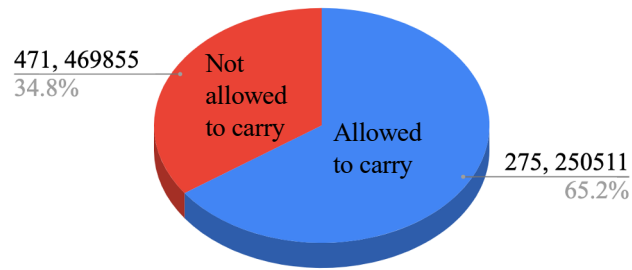
Nearly 35% of students reported they were not allowed to carry asthma medications and 58% did not have a written asthma action plan.

Reported urbanicity was not significantly associated with either medication access at school ($P=.46$) or having an action plan ($P=.57$).

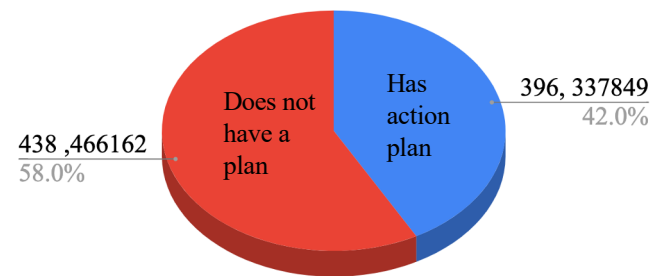
Nearly 51% of children ages 5-9 and 33% of children ages 10-14 were unable to carry medications at school.

RESULTS

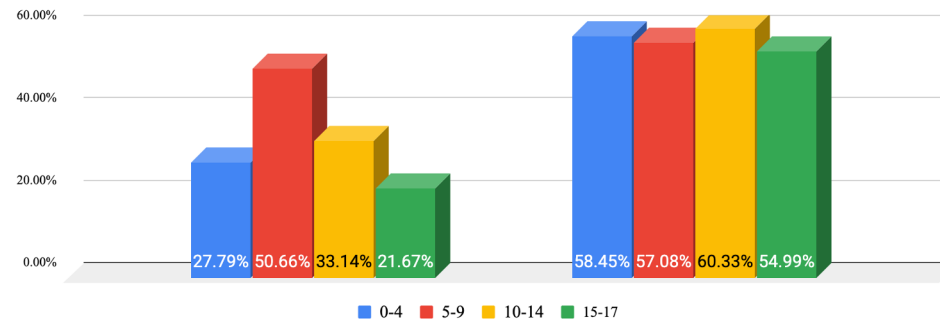
Asthma medications allowed in school



Written asthma action plan in school



Age groups of children with asthma whose school did not allow children to carry their medication with them (Left) and did not have an asthma action plan.



SIGNIFICANCE OF FINDINGS

Improving asthma control status positively impacts school absenteeism, academic success, and quality of life. These factors are further elevated with increased levels of asthma control, school environmental conditions, and teacher knowledge of student's condition.⁹

Establishing relationships between schools, healthcare students, and physicians is essential for effective asthma management plan implementation, especially in the educational setting.^{4,7}

4. Lemanske, Robert F., Jr, et al. "Creation and Implementation of SAMPROTM: A School-Based Asthma Management Program." *The Journal of Allergy and Clinical Immunology*, vol. 138, no. 3, Sept. 2016, pp. 711–23, doi:10.1016/j.jaci.2016.06.015.

7. McClure, Natasha, et al. "Using Academic Community Partnerships to Improve Asthma Care in Elementary Schools with Limited School Nurse Services." *The Journal of School Health*, vol. 90, no. 2, Feb. 2020, pp. 158–61, doi:10.1111/josh.12859.

9. Toyran, M., et al. "Asthma Control Affects School Absence, Achievement and Quality of School Life: a Multicenter Study." *Allergologia et Immunopathologia*, vol. 48, no. 6, Elsevier España, S.L.U, 2020, pp. 545–52,

SIGNIFICANCE OF FINDINGS

Asthma action plans require albuterol to be available in order to be effective. Additionally, implementing protocols for stock albuterol to be supplied in schools increases access to medication for children who are not permitted to carry it.⁸

The Osteopathic Principles and Practices should guide an osteopathic physician's asthma management plan through the understanding that the body is a unit of mind, body, and spirit; capable of self-regulation, self-healing, and self-maintenance once that unity is restored.

8. Volerman, Anna, et al. "Ensuring Access to Albuterol in Schools: From Policy to Implementation. An Official ATS/AANMA/ALA/NASN Policy Statement." *American Journal of Respiratory and Critical Care Medicine*, vol. 204, no. 5, Sept. 2021, pp. 508–22, doi:10.1164/rccm.202106-1550ST.

CONCLUSION

More than 1/3 of students were not permitted to carry asthma medications and nearly 3 out of 5 did not have a written asthma action plan.

These findings indicate the need for both access to medication in schools in addition to written action plans to improve asthma management in school.

QUESTIONS/CONTACTS

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