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Taking EMS Into Tomorrow: Part 3

Asthma affects millions of Americans—here's how to reduce its impact in your community

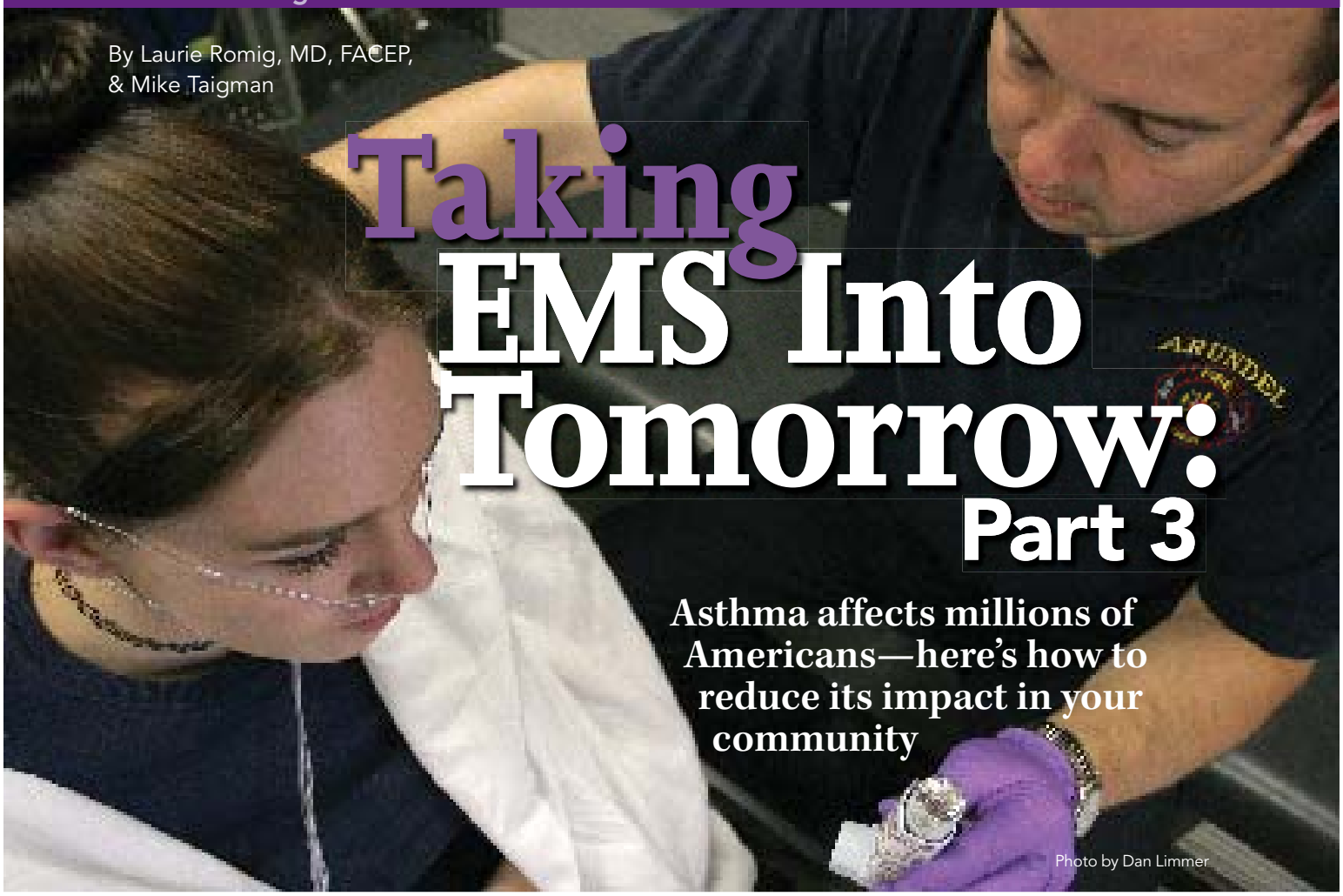


Photo by Dan Limmer

"While jogging, I get out of breath, just like anyone doing strenuous exercise. Each breath takes in less and less air as my lungs rebel against the exertion and begin to constrict. I stop running, and my breathing doesn't improve—it's shallow and strained. With each breath, less and less air is getting through. My head becomes light, and it pounds inside like someone's hammering. The blood feels like it's pooling in my head, trying to keep me awake. My diaphragm and rib muscles are no longer strong enough to draw air in—I have to bend halfway over and brace my hands on my knees, struggling to inhale. It feels like someone has covered my mouth and nose with a soaking wet washcloth, or that I'm trying to suck all of my air through a coffee straw. I begin to feel faint. I start to panic when I realize I can't exhale. I'm face to face with death."

—Asthma sufferer Chad Council, describing an attack

When someone calls EMS for an acute asthma attack, chances are good that the professionals who arrive can help them feel better fast. Along with people who are hypoglycemic from diabetes, asthmatics are among those patients for whom our treatment really makes a clear, quick difference. It's amazing how quickly people who feel like they're going to die can have their breath restored and their blood oxygenated.

In most communities, breathing problems are among the top reasons people dial 9-1-1. Asthma makes up a significant percentage of these calls. If you talk with EMS providers, most of them have regular asthma "customers." In most EMS systems these patients, after treatment, are transported to an emergency department. That's wonderful but inadequate. We have the capability to do much more for these folks than just opening up their tight lungs.

Each day in America:

• 40,000 people miss school or work due to asthma

• 30,000 people have asthma attacks

• 5,000 people are seen in emergency departments due to asthma

• 1,000 people (more than half of whom are children) are admitted to hospitals due to asthma

• 14 people die from asthma

WHAT IS ASTHMA?

Asthma is a Greek word meaning to exhale with open mouth, to pant. It appeared for the first time in the *Iliad,* and there meant a short-drawn breath. Asthma is a chronic inflammatory disease characterized by recurrent episodes of breathlessness, wheezing, coughing and chest tightness. An asthma attack causes the muscles surrounding the airways in the lungs to swell, become inflamed and tighten. Often, especially in the early stages of an attack, patients notice an inability to breathe out fully against the swelling in the airways. Air begins to "stack up" in the chest, and patients have to work harder to move air in and out. These exacerbations are triggered by a number of irritants and stressors.

The cause of asthma is still unknown. What we do know is that atopy, the genetic tendency to develop allergic diseases, is the most important predictor of whether a person will develop asthma. If one parent has asthma, chances are 1 in 3 that their child will have asthma. If both parents do, the chances are 7 in 10.

While asthma affects people of all ages, races and ethnic groups, it is not an equal-opportunity disease. Low-income groups and minority populations have higher rates of fatalities, hospital admissions and emergency department visits. Children from low-income families are five times more likely to be hospitalized for asthma than those who are financially better off. While asthma rates for African-American children are only slightly higher than those of white Americans, black children die from asthma at a rate four times that of whites. Puerto Ricans have significantly higher rates of asthma than all other groups.

CONTROLLING ASTHMA

Studies show that asthma attacks can be cut dramatically—by up to 73%—with proper use of medica-

Using a Metered-Dose Inhaler Correctly

1. Remove the cap and hold the inhaler upright.
2. Shake the inhaler and install the spacer, if you're using one.
3. Sit up straight and tilt your head back slightly.
4. Breathe out.
5. Open your mouth and hold the inhaler an inch or two away from it.
6. As you start to breathe in, slowly press down on the inhaler to release the medicine as you breathe in for 3–5 seconds. (If you're using a spacer, press down on the inhaler and then slowly begin to breathe in after waiting five seconds.)
7. Hold your breath for a count of 10 to allow the medicine to go deep into your lungs.
8. If you need another puff, wait one minute before the next one. This will allow your lungs to open so the next puff is more effective.

Tips:

Dry-powder capsule inhalers are used differently. To use a dry-powder inhaler, close your mouth tightly around the mouthpiece and breathe in quickly.

Keep the mouthpieces of all inhalers clean. They can become a breeding ground for bacteria and viruses that can trigger the very asthma attacks they're intended to prevent.

It's difficult to tell when an inhaler is running out of medication, so it's best to start with two and replace one each time it runs out.

Pharmaceutical companies have warned of a possible inhaler shortage in coming months. If people aren't able to fill their prescriptions, this could cause an increase in EMS calls for asthma.

EMS providers can inadvertently trigger or worsen a patient's asthma attack if their skin, hair or clothes smell of cigarettes.

tions, avoiding exposure to things that trigger attacks, and routine self-monitoring. But that doesn't mean all asthma sufferers take their disease as seriously as they should. One study of inner-city adolescents found that 41% did not know the names of their asthma medications, and only 38% carried their inhalers with them. Yet 39% reported having had asthma attacks that were so bad, they were afraid they were going to die. One study showed that fewer than half of children living in low-income inner-city areas were using anti-inflammatory medications such as steroid inhalers.

There are several things a person can do to reduce asthma attacks. One is to regularly use a *controller* medication, usually inhaled corticosteroids. These are taken every day to reduce inflammation in the lungs, which prevents or reduces the symptoms of asthma. *Rescue* medications, conversely, are taken at the first sign of symptoms, including wheezing, coughing, chest tightness or shortness of breath. Rescue medications can also be used before exercise to prevent an attack. To be effective, controller medications must be taken regularly, and rescue medications must be with the person at all times. Both must be administered properly to work properly. Fewer than half of people with asthma use their inhalers properly.

Regular monitoring of peak expiratory flow rates can give patients early warning of impending attacks. A peak flow meter for asthma is like a thermometer for a fever: It lets the patient know what's going on with their lungs at a level they may not be able to feel. It also gives them feedback on the effectiveness of their treatment and an ability to monitor the severity of their disease.

There are many things that can trigger an asthma attack, most of which can be controlled with minor changes in home and lifestyle.

Tobacco Smoke

Tobacco smoke is one of the most common asthma triggers. Of course asthma patients should not smoke, but it is also wise for other family members, housemates and visitors to not expose such patients to their smoke. This may act as a great motivator to get these friends and loved ones to stop smoking; if not, they should at least be prohibited from smoking in the house, car or any area the patient must enter frequently.

EMS providers can inadvertently trigger or worsen a patient's asthma attack if their skin, hair or clothes smell of cigarettes. Of course people who smoke in ambulances, front or rear, are harming their patients.

Dust Mites

Dust mites thrive in soft surroundings like pillows, mattresses, carpets and drapes. These microscopic organisms give off particles that cause allergic reactions when inhaled. They need moisture to survive, so they flourish in humidity. Hypoallergenic mattress and pillowcase covers provide a barrier between house dust mites and people with asthma. Down-filled pillows, quilts or comforters, which can contain large numbers of mites, should not be used.

Experts used to suggest synthetic pillows; however, recent studies have shown that more dust mite allergens can be found in synthetic pillows than in feather pillows. Research reported at the annual meeting of the American Academy of Allergy, Asthma and Immunology (AAAAI) shows that synthetic pillows may contain more pet allergens than feather pillows.

Regardless of its material, if the pillow is washable, wash it regularly. You can also fluff it occasionally in the dryer to remove dust mites, but make sure the dryer is on its hottest setting.

Remove stuffed animals from the bedrooms of children with asthma. That's easy for us to say; some parents reading this may be thinking, "Better to deal with an asthma attack than the wrath of a child who's had Fluffy wrestled from her clutch!" So if a child with asthma wants to play or sleep with a stuffed toy, it should be washed frequently in hot water (at least 130°F) or put in the freezer for a few hours every week (freezing kills dust mites as effectively as hot water). All bedding should also be washed weekly in hot water. Replacing drapes with blinds that can be cleaned more easily also helps. Tile or other hard

In large cities that have air pollution problems, people with asthma should remain indoors on high pollution alert days.

Using a Peak Flow Meter

These meters measure how forcefully a person is able to blow air out of their lungs. Single readings aren't very helpful in determining how well asthma is under control; patients should take and record morning and evening readings daily for several weeks.

To take a peak flow reading:

1. Set the pointer on the meter at zero.
2. Stand in an upright position (sit if unable to stand).
3. Hold the meter level and keep your fingers away from the pointer.
4. Take a deep breath and close your lips firmly around the mouthpiece.
5. Blow as hard as you can, as if you were blowing out candles on a birthday cake. Remember, it's the speed of the breath that's being measured.
6. Look at the pointer and check the reading.
7. Repeat this process three times and record the highest reading in your personal asthma journal.


Peak flow meters allow asthmatics to track their condition.
Photo by Dan Limmer

The highest number recorded over a two-week period when the patient is feeling well, with their asthma under good control, is the personal best. Once this personal best is determined, the patient's physician can calculate a "traffic light" system for rating the severity of the asthma:

- **Green Zone (80%–100% of personal best)—**No asthma symptoms, no changes in routine treatment or medications.
- **Yellow Zone (50%–80% of personal best)—**May be having an asthma episode that requires action to prevent exacerbation. Patient may be coughing, wheezing or short of breath, and rescue medication may be indicated. If measurement doesn't return to the green zone after treatment, patient should seek healthcare.
- **Red Zone (below 50% of personal best)—**Asthma alert; take an inhaled beta2-agonist right away. Contact 9-1-1 if the peak flow does not return to the yellow or green zone quickly.

Some physicians suggest zones with narrower bands. Patients should follow their physicians' guidelines.

flooring offers advantages over carpet; frequent floor and furniture dusting helps as well. There are also many products on the market, such as air-filtration systems and cleaning products, that promise to reduce allergens from dust mites and other household asthma triggers.

Outdoor Air Pollution

Pollution caused by industrial emissions and automobile exhaust can cause asthma episodes. In large cities that have air pollution problems, people with asthma should remain indoors on high pollution alert days. If vehicle travel is unavoidable, keep the windows rolled up and the air conditioner on. Keep this in mind as patients are transported in ambulances.

Pollens

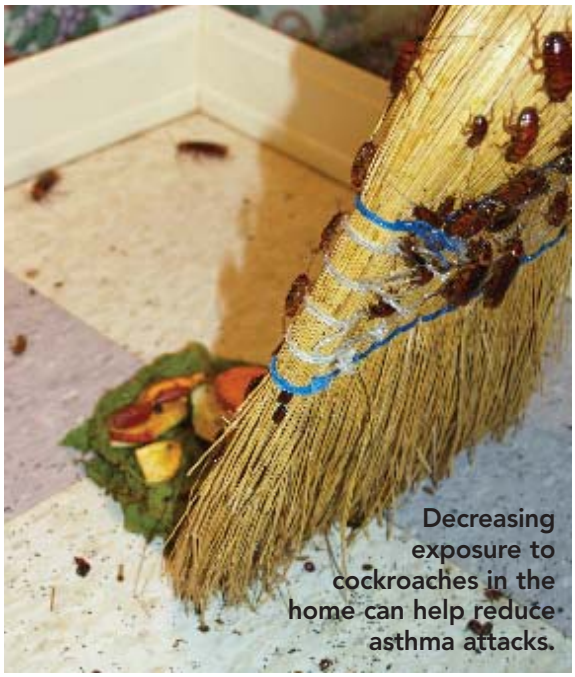
Many people with asthma also have seasonal allergies with sensitivities to various types of pollen. Interventions that can decrease exposure to these allergens can include wearing a surgical mask while outside, planning to be outside at times of day when pollen counts are lower (during afternoons and evenings or after heavy rains), keeping house windows closed and air conditioning or heat on, drying clothes in a dryer rather than outdoors, and monitoring area pollen counts and advisories via the Internet, television or newspaper.

Cockroach Allergens

Cockroaches can be found anyplace people eat food and leave crumbs behind. Decreasing exposure to cockroaches in the home can help reduce asthma attacks. These little creatures need food and water to survive. People tend to eat where they watch TV, so pay close attention to these areas. Remove sources of water and food, including pet food. Clean every 2–3 days using a vacuum equipped with a high-efficiency particle-arresting (HEPA) filter. Wash dirty dishes immediately after use. Discardable food containers should be thrown away in an outdoor trash bin. Standing water should be removed from all rooms. Don't forget to check the trays under self-defrosting refrigerators. Roach traps or gels can also be used to decrease the number of cockroaches in the home. Cleaning methods for removal of dust mites and animal dander also assist in removal of cockroach allergens.

Pets

Furry pets, particularly cats and rodents, may trigger attacks. People aren't allergic to their pets' fur; it's the dander that causes reactions, so giving a pooch a haircut will not help. Pets should not be allowed in the patient's bedroom—they should be kept outside as much as possible and bathed weekly. Frequent vacuuming will also help; if the floor has a hard



Decreasing exposure to cockroaches in the home can help reduce asthma attacks.

surface, it should be damp-mopped weekly to pick up dander. Use pet beds or blankets that are washable and launder them weekly. Finding another home for sufferers' pets would dramatically reduce allergens in the home, but that's not an option most pet owners would like to exercise. If an asthmatic person insists on having a pet, certain breeds of animals, especially dogs, may be more asthma-friendly than others.

Mold

Inhaling mold spores can cause an asthma attack. Mold can grow almost anywhere, outdoors and in, especially in humid areas like bathrooms, showers and basements. Controlling moisture levels by keeping humidity between 35%–50% helps decrease its ability to grow. A gauge called a hygrometer can be used to monitor humidity levels. Air conditioning and dehumidifiers help keep moisture levels under control. If, for some reason, a humidifier must be used in the home, it should be cleaned weekly with diluted bleach, and the water changed daily so that mold does not grow. Use an exhaust fan or open a window when cooking or taking a shower. Empty water pans found below self-defrosting refrigerators, in some wall-mounted air conditioners and in dehumidifiers weekly. Remove spoiled foods from refrigerators immediately and empty the trash frequently. Make sure the clothes dryer is vented to the outside. Dry clothes immediately after washing them. Ideally, people with asthma should not have their bedrooms on the basement level. Also, they should not have potted plants in their bedrooms, because the soil is a breeding ground for mold.

There are a multitude of other things and situations that can trigger asthma attacks, including strenuous physical exercise, cold air, high humidity, thunderstorms, some foods and food additives, rhinoviruses, domestic birds, formaldehyde, fragrances, aspirin, beta-blockers, sulfites in food (dried fruit) or beverages (wine) and respiratory infections. Strong emotional states can also provoke attacks.

WHAT EMS CAN DO

The primary focus for EMS, of course, is to provide appropriate treatment for acute asthma symptoms according to local protocols. This alone may keep you busy for the whole call, but more often than not, there's also time to do a little teaching. If you're transporting, the ambulance ride can be a perfect time for one-on-one education. If you're leaving the patient at home, a few moments spent helping them prevent that next attack can keep you from having to make a return call. If you can include family and friends as well as the patient, your efforts will have greater impact.

As part of your patient assessment, you should gather information about potential asthma triggers that may have caused this particular attack, and any recent illnesses and medication changes. You should also get a feel for your patient's compliance with their treatment program. You can use these points to assess the "asthma IQ" of your patient or their caregiver. Research shows that the more people know about their disease, the better their chances of controlling it. Find out whether they monitor their symptoms with a peak flow meter. If they do, have them show you how they use it and make sure they're doing it correctly. Ask if they have a journal of peak flow reading, symptoms and potential triggers. If they don't, encourage them to start keeping one.

Most patients lock their lips around their inhalers as if they were prom dates. Have them show you how they use theirs, and correct their mistakes. Reinforce the importance of using controller medications (corticosteroids) regularly and rescue medications (beta2-agonists) at the earliest sign of a problem.

Take the opportunity whenever you can to provide information about recognizing and decreasing exposure to asthma triggers. Use the list in this article to make a handout you can leave with the patient or their family. Take the time to point out specific actions they can take while you're in their home (e.g., "Move the litter box out of your child's bedroom.") Your service might even offer to provide asthma-trigger home inspections, like you do for fire prevention or fall prevention among the elderly.

Consider hosting asthma attack prevention education at your station or headquarters, like you do for CPR. With nearly one in 10 Americans having been diagnosed with asthma, you'll have a steady supply of students. Since more kids have problems with asthma than adults, consider providing asthma prevention

Breath-Activated Nebulizers

Most ALS EMS systems use nebulized beta-agonists to treat patients with asthma attacks. Research indicates that prolonged exposure to these medications may cause increased asthma in respiratory therapists. We recommend that EMS services consider replacing their constant-flow nebulizers with breath-activated nebulizers to decrease their occupational risk from exposure to these medications.

Nearly 31 million Americans—more than one in 10—have been diagnosed with asthma sometime during their life. According to the National Heart, Lung and Blood Institute, the cost of asthma in 2000 was $13.8 billion.

education to schools in your area.

Consider making regular contact with your sickest asthma patients and their families to support their self-care. Ask them about their peak flow meter readings and remind them to take their medications, wash their sheets and drink enough fluids.

We believe that with proper education and support, people with asthma can lead happier, healthier and more active lives that are free from ambulance rides and emergency department visits.

Tom Wagner, chief operating officer of the EMSA system in Oklahoma, says an asthma case was the worst call of his life. "It was a 16-year-old boy who was having an asthma attack while playing in a high school basketball game," Wagner says. "Apparently he kept playing, even though he was having trouble breathing, until he couldn't take it anymore and sat on the side of the court. We walked in with all the people in the bleachers watching us. He was moving almost no air. Even though it was more than 18 years ago, I can still see his eyes as he looked at me and died. If there's anything we can do to prevent that from happening to other people, we should do it." ■

Special thanks to Chad Council for allowing us to share his description of an asthma attack at the beginning of this article. His asthma is now under good control, and he's an active member of an urban search and rescue team.

Laurie Romig, MD, FACEP, is medical director for Pinellas County (FL) Emergency Medical Services. She's had asthma since her emergency medicine residency; however, she's controlled it well enough that she's never had to call EMS or visit the emergency department.

Mike Taigman is a lifelong student who is committed to helping EMS systems become better stewards of the health of the communities they serve. He has not had an asthma attack since he was 15 years old, and that was a long time ago. Contact him at www.miketaigman.com.

Resources

Heart, Lung and Blood Institute: www.nhlbi.nih.gov. Download the *National Asthma Education and Prevention Program Expert Panel Report 2: Guidelines for the Diagnosis and Management of Asthma* at www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm.

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