# NIH News in Health

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## When a Medical Emergency Strikes

### Saving Your Life Can Be a Race Against the Clock

It can happen to anyone. You're driving to work when you're struck by another car. If you're seriously injured, your recovery—and even your life—can depend on how quickly the emergency medical team arrives, what type of treatment you get and how fast they get you to a hospital.

Unexpected injuries are the leading cause of death for Americans ages 1 to 44. Most are from car crashes. Burns, gunshot wounds, serious falls and sudden cardiac arrest are other medical emergencies that require immediate treatment.

The minute a life-threatening injury occurs, the clock starts ticking on the "golden hour." That's a term used by emergency crews. They know that the first 60 minutes after severe trauma can be critical to survival. Quick action is even more crucial in the case of cardiac arrest, when the heart stops beating and the person passes out. Starting treatment within the first few minutes can mean the difference between life and death.

The good news is that emergency medical care has greatly improved over the past 4 decades. It's critical to call 911 or your local emergency number right away if someone's life seems to be in danger. Your prompt call summons trained emergency medical crews to the scene. They can begin medical care immediately. For life-threatening injuries, their goal is to get the patient to a trauma center or hospital as quickly as possible.

"If the pre-hospital time is very short, patients with severe trauma will have better results," says Dr. Rao Ivatury, a trauma surgeon at the Virginia Commonwealth University Medical Center. "If not for the paramedics bringing patients to us in a timely manner, I think trauma deaths would be 2 or 3 times higher than they are today."

Questions remain, though, about how to best manage the precious few minutes after medics arrive at the scene. NIH is now funding one of the largest research efforts to test several promising drugs, medical devices and techniques that can be used by emergency staff. Studies conducted by the Resuscitation Outcomes Consortium (ROC) are mostly performed right at the scene where the patient collapses or is severely injured. The studies are being conducted in 10 regions across the United States and Canada.

Several ROC studies are looking at how to improve survival from cardiac arrest. Each year more than 300,000 people in the U.S. have cardiac arrest away from the hospital. "The sad news is that only about 5 or 6% of these patients actually survive long enough to later leave the hospital alive," says Dr. Joseph Ornato, chairman of emergency medicine at Virginia Commonwealth University. "If we could improve survival by just 1 or 2%, we'd save thousands of additional lives each year."

In 1 ROC study, researchers looked at data from 10,000 cases of cardiac arrest that were called in to 911. They found that more lives were saved when bystanders went into action

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### Web Links

For links to more information about medical emergencies, see this story online:

- http://newsinhealth.nih.gov/2008/April/docs/01features_01.htm

### Inside News

## Definitions

**CPR**
An emergency lifesaving procedure that's performed when a person's breathing or heartbeat has stopped.

**Defibrillator**
A device that delivers an electric shock to the heart to restore its normal rhythm.

**Immune System**
The system that protects your body from invading viruses, bacteria and other microscopic threats.

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right away, giving cardiopulmonary resuscitation (CPR) and a "shock" from a battery-powered defibrillator. But their success depended on ready access to the portable defibrillators, called AEDs. These devices are now cropping up in airports, shopping malls and other public places.

"If you don't have medical training and you see a person collapse—and the person has no pulse—we want you to call 911 right away. We want you to start CPR right away, if you know how. And if there's an AED nearby, bring it to the victim's side right away. Turn on the power switch, and the device will begin talking to you," Ornato says. "It gives you step-by-step instructions on how to use the AED safely and effectively."

Once the emergency crew arrives, they may need to deliver an electrical shock to the heart immediately if it has stopped. "But recent data suggest it may be better to do a couple of minutes of high-quality CPR before administering that first shock if the patient's heart has been stopped for more than just a few minutes," says Ornato. He's leading a ROC trial to test the 2 approaches.

ROC researchers also want to find the best way to save trauma patients. If they've lost a lot of blood, they usually get an intravenous (IV) infusion of saline before they reach the hospital. That helps to improve blood pressure and bring oxygen to vital organs like the heart and the brain. The ROC study will test different types of saline fluids to see which work best.

Unfortunately, once a critically injured patient is stabilized in the hospital, the danger is not yet over. In many cases, the body's immune system can overreact to the initial injury. This "second hit" can arise 1 or 2 weeks after the initial injury. It can cause even more damage than the original trauma. The organs can become inflamed and malfunction. This multiple-organ failure often ends in death.

"We see these patients develop kidney failure, lung failure and other organ failures sequentially a few days down the line," Ivatury says. "Multiple organ failure—that's what we're trying to prevent."

NIH-funded researchers want to know why some trauma and burn patients develop this deadly immune reaction while others don't. "If you're a clinician standing at the foot of an intensive care unit bed, you can't tell what trajectory the patient will take," says Dr. Ronald Tompkins, a surgeon and biomedical engineer at Massachusetts General Hospital.

Tompkins heads a nationwide group of researchers and emergency staff working to discover what triggers these harmful immune responses. The scientists are examining whether patterns of turned-on genes can help predict which patients are likely to have multiple-organ failure within 48 hours. Eventually, the scientists hope to improve early diagnosis of organ failure and design drugs to prevent it.

The Tompkins team and other researchers are also working to establish standard procedures in emergency rooms and intensive care units. Research suggests that using standardized guidelines can help significantly cut the number of deaths from major trauma.

Scientists continue their efforts to improve emergency treatment. The most important thing you can do is call 911 when a medical crisis strikes. And, if you're able, help the victim before emergency teams arrive. ■

## Wise Choices
### When to Call 911

Call 911 right away if you think someone's life is in danger. Here are some signs of a medical emergency:

- Uncontrolled bleeding
- New or sudden difficulty breathing
- New chest or upper abdominal pain or pressure
- Loss of consciousness
- Unexplained seizures or convulsions
- Sudden dizziness, weakness or change in vision

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# Guard Your Liver

## Protect Yourself From Hepatitis

Hepatitis can make you feel as if you have the flu, but it's a completely different disease. Flu is caused by viruses that attack your lungs and respiratory system; hepatitis is a liver disease. Some forms of hepatitis get better on their own. But others can inflict serious liver damage, and may even leave you needing a new liver.

Several different viruses—named the hepatitis A, B, C, D and E viruses—can cause hepatitis. Researchers believe others might cause the disease as well. These viruses attack your liver and keep it from working right. This can make you feel tired and sick to your stomach. You could get a fever, lose your appetite or have stomach pain, diarrhea, dark yellow urine or light-colored stools. You may even develop yellowish eyes and skin.

All the hepatitis viruses can cause acute, or short-term, hepatitis. Some can also cause chronic hepatitis, in which the infection lasts a long time, sometimes for your whole life. Chronic hepatitis can eventually lead to scarring of the liver tissue, liver failure and liver cancer.

You can't live without a functioning liver. The liver clears poisons from your blood and helps control infections. It also makes proteins involved in blood clotting and the bile that helps you absorb fats and vitamins. While the liver can heal itself to some extent, repeated or extensive damage can overwhelm it.

Different hepatitis viruses spread in different ways. Hepatitis A, the most common, is spread through food or water contaminated by feces from a person who has the virus. Hepatitis B, the next most common type, is spread through contact with an infected person's blood, semen or other body fluid. Hepatitis C and D are spread through contact with an infected person's blood. Hepatitis E spreads the same way as hepatitis A does, but is not common in the U.S.

A vaccine for hepatitis A first became available in 1995, and hepatitis A rates in the U.S. have declined by 89% since then. The U.S. Centers for Disease Control and Prevention recommends vaccination for children ages 12- to 23-months old as well as for adults at high risk for infection.

There's also a vaccine for hepatitis B. All infants and unvaccinated children, adolescents and at-risk adults should get it.

If you do get hepatitis, several medications are available to treat hepatitis B and C, and other drugs are being developed and evaluated. Most people with hepatitis A get well on their own after a few weeks. By young adulthood, most who get acute hepatitis B infections also recover on their own. Infected newborns, however, are more likely to progress to chronic hepatitis B.

NIH continues to support research into the nature and transmission of the hepatitis viruses, as well as new treatments and methods of prevention. In the meantime, the best way to prevent hepatitis is to reduce your risk of being exposed to these viruses. If you suspect you might have hepatitis, see your doctor for a blood test. ■

### Wise Choices
**Preventing Hepatitis**

While there are treatments for some types of hepatitis, it is still a potentially dangerous disease. To prevent it:

- **Wash your hands** after going to the bathroom and before fixing food or eating.
- **Use latex condoms**, which may lower the risk of transmission.
- **Avoid tap water** when traveling to certain countries or regions. Ask your doctor about risks before you travel or call the Centers for Disease Control and Prevention at 877-FYI-TRIP.
- **Don't share drug needles.**
- **Don't share personal items**—such as toothbrushes, razors and nail clippers—with an infected person.

### Web Links

For links to more information about hepatitis, see this story online:
http://newsinhealth.nih.gov/2008/April/docs/01features_02.htm

# Health Capsules

## Allergens in Homes Linked to Asthma

A little housecleaning may help to reduce asthma symptoms in people who have both asthma and allergies. A national survey found that allergy-triggering substances, called allergens, are quite common in most homes. Households with asthmatic people are more likely to have higher levels of multiple allergens.

Asthma is one of the most common chronic ailments in the U.S. It affects more than 22 million people. Asthma can be triggered by a wide range of allergens.

NIH scientists and their colleagues examined survey results from nearly 2,500 people in 75 locations across the country. The researchers looked at how allergen levels in homes were related to asthma. The allergens included those from dog, cat, mouse, cockroach, dust mite and a common indoor fungus.

The research team found that most U.S. households have several types of indoor allergens. Just over half of homes had at least 6 detectable allergens. Nearly half had increased levels of 3 or more allergens.

The scientists found that a quarter of the households had at least one person who had been diagnosed with asthma. Higher levels of at least 4 allergens were found in 23% of the homes of people with asthma, compared with 16% of homes where no asthmatic people lived.

More research is needed to understand the factors that contribute to asthma. Regular household cleaning, however, is a simple way to help reduce exposure to allergens. If someone in your family has asthma, you may be able to improve their symptoms by reducing allergen levels in your home. ■

### Web Links

For links to more information from NIH about the topics in these stories, visit this Health Capsules page online:

- http://newsinhealth.nih.gov/2008/April/docs/02capsules.htm

## Diet and Metabolic Syndrome

A new study has implicated meat, fried food and, surprisingly, diet soda in the development of metabolic syndrome. More research is needed to explain these intriguing findings.

Metabolic syndrome increases your risk for heart disease and stroke. Doctors consider someone to have metabolic syndrome when they have 3 or more risk factors. These include high blood pressure, low HDL (good cholesterol) and diabetes or pre-diabetes.

Although scientists know that diet is linked to metabolic syndrome, they don't completely understand how. In this new study, NIH-funded researchers looked at the eating habits of almost 10,000 middle-age adults.

Within 9 years, nearly 2 out of 5 people had developed metabolic syndrome. Their risk was greater if they ate a Western diet, with lots of refined grains, processed meat, fried foods and red meat.

The researchers found that hamburgers, hot dogs, processed meats and fried foods were each linked to a higher risk of developing metabolic syndrome. In contrast, whole grains, refined grains, nuts, coffee or fruits and vegetables did not appear to be linked to the syndrome. On the other hand, people who ate more dairy were less likely to develop metabolic syndrome.

Strikingly, diet soda was strongly associated with an increased risk for metabolic syndrome. Sweetened drinks like regular soda and fruit drinks, however, weren't.

These findings aren't conclusive. Earlier studies found that whole grains are linked to a lower risk of metabolic syndrome, but this study didn't. Certain foods may not in themselves contribute to metabolic syndrome. Instead, they may serve as markers for other behaviors that do lead to metabolic syndrome. Scientists hope future research will clarify this picture. ■

### Featured Web Site
**Anabolic Steroid Abuse**

**www.steroidabuse.gov**

Anabolic steroid abuse by professional athletes has been all over the news. Concerns about body image and athletic performance may lead teens, as well as adult men and women, to use steroids. This site was designed by NIH's National Institute on Drug Abuse to alert the public to the fact that these are dangerous drugs.