

UW-Madison researcher's 'smart' inhaler pinpoints where and when attacks occur

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By marrying GPS technology with asthma rescue inhalers, University of Wisconsin-Madison researcher David Van Sickle hopes to better understand the environmental triggers of asthma attacks and improve the way people with asthma control their disease.

The research, which began this year, is a [pilot study](#) that is testing the reliability of the system and assessing how comfortable people are carrying the device.

About 17 million Americans -- 6.4 percent of the population -- have [asthma](#), according to the National Institute of Allergy and Infectious Diseases.

As of late May about 35 people with asthma, most of them from Madison, were involved in Van Sickle's study.

"Patients during the first month of participation record in a diary where and when they use their medication. Then we compare the data that comes from the device with that," says Van Sickle, a medical anthropologist who is part of UW's department of population health sciences.

His own testing of the device finds that it is accurate 95 percent of the time.

The use of the device potentially offers great insights into controlling

asthma, says Sheryl Magzamen, an epidemiologist in the UW population health sciences department.

"It's really challenging to understand how to capture an asthma exacerbation," she says, referring to the use of the rescue inhaler.

In her seven years of research into understanding asthma, she has had to use medical records and patient reports on hospitalizations, which have limited value. Those records don't have the full spectrum of inhaler use, she says.

With Van Sickle's device, she says, she can get the full range of asthma exacerbations from minor to serious.

"Asthma etiology (causation) is not well understood. For each patient there's a set of triggers that might exacerbate their asthma. It might be pollen, pets, changes in the weather, stress," Magzamen says, adding that Van Sickle's device can provide the time and location that the inhaler is used, allowing her and other researchers to better understand why it's used each time.

Study participants receive weekly e-mails showing when and where they used the inhalers the previous week. According to national guidelines for asthma care, the rescue inhalers should have to be used no more than twice weekly. The preventive medication that asthma patients take daily should keep the disorder under control.

One study participant, Shannon Sparks, 39, finds the information she gets valuable.

"It helps me think about what the triggers are that cause my asthma to act up at that particular time," she says. As a result, it can lead her to modify her behavior, such as avoiding or spending less time in certain

locations.

Sparks says she's taken her daily [preventive medicine](#) regularly for the past several months. But if she weren't, she says that getting a written report of the location and frequency of her rescue inhaler use would persuade her to take the preventive medicine more often.

The failure of many asthmatics to use that preventive medicine is a major concern among physicians treating asthmatics, says Madison allergist Neal Jain, who is working with Van Sickle.

Those who use their rescue inhalers frequently, he says, run a higher risk of hospitalizations and possibly death.

One reason for the use of these inhalers is because people fail to use their preventive asthma medication.

"Awful" is how Jain describes how devoted asthmatics are to taking their medication as prescribed.

The preventive medicine must be inhaled, which is simply not as easy as swallowing a pill, he says.

Another reason is the nature of asthma.

"It's an intermittently symptomatic problem in many patients; so if they're not symptomatic, they don't feel as though they need to take a medication," says Jain, a member of the Wisconsin Asthma Coalition.

He hopes the e-mail reminders to patients will help them take their medication as prescribed. He says other studies, which have used computerized systems to remind patients to use their preventive medicine, have shown improved adherence.

The study also will help physicians who treat asthmatics get a better understanding of their patients' needs, says Teresa Morrison, with the U.S. Centers for Disease Control and Prevention, which is funding Van Sickle's work.

"It will help the provider understand more what type of symptoms their patients are having, so they can appropriately classify their severity and assess their control on subsequent visits," says Morrison, a medical epidemiologist specializing in air pollution and respiratory health.

While Van Sickle's research appears to be the first of its kind devoted to asthma, his method of gathering data is becoming increasingly widespread in scientific research circles. Known as real-time data capture, the technique offers a number of important advantages, says Saul Schiffman, a University of Pittsburgh psychologist.

Getting data in real time avoids "the fallibility and biases in memory" that can occur when people are asked to recall events, he says.

The technique also "involves repeated measurements over time, and it's a very powerful way to get accurate and deep insights into medical conditions and behavior," says Schiffman, who co-edited a book on the use of the technique.

Schiffman, who is chief scientific officer of invivodata, a company that provides the technology to capture real-time data, says drug companies are beginning to use this technology to get information in the drug-approval process, because it can be obtained easily and accurately.

For more on the study, go to www.asthmapolis.com .

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