Health, HEPA, and Vacuum Cleaners

By Dawn Shoemaker

On May 14, 1993, a young, healthy man living in the Southwestern part of the United States suddenly collapsed and was rushed to a hospital in New Mexico. He died a few hours later of severe circulatory problems.

Ironically and sadly, the man was on his way to attend the funeral of his fiancée, who had died in a similar way just days earlier. Within a few days, medical researchers in New Mexico identified three more deaths, all sudden and mysterious, in this same general area.

Stumped as to the cause, the New Mexico Department of Health contacted the Centers for Disease Control and Prevention (CDC) asking for their assistance. At first, the CDC indicated they could not find a common thread between the sudden deaths of these five young, apparently physically well and active individuals. However, three weeks later, they said they had found the pathogen responsible for the deaths: hantavirus.

Hantavirus is one of more than 200 diseases that can be transmitted from animals to humans. Found primarily in Asia and Europe, the disease affects the kidneys, causing severe
circulatory problems. Usually, only about 10 percent of its victims die, but the strain found in the Southwest was stronger, having a mortality rate of more than 50 percent.

The way hantavirus spreads is most alarming and is the reason it concerns the cleaning industry. It is passed from infected mice and similar such rodents to humans. Although it can be transmitted to humans through bites or breaks on the skin, this form of transmission is actually quite rare. Hantavirus is most commonly spread through “aerosolization.” As infected mice shed saliva, urine, or droppings, humans inhale these particulates, especially if the particulates are stirred up, causing them to become airborne.

**Airborne Impurities**

Though hantavirus is not widespread in the United States, mice and similar rodents are, making the potential of spreading the disease always a possibility. For example, this year, the Chicago Public Schools found evidence of so many mice and rats in a number of different school cafeterias that they were forced to close the schools until the rodents were exterminated and the buildings and the facilities thoroughly cleaned.

According to the Washington State Department of Ecology, mice are quite common in schools and many other types of buildings, especially during the winter months when they are looking for a
warmer place to live. “They also cause tremendous damage to the property because of their defecating and urination,” according to the department. “It is estimated that in a six-month period, one mouse will have 6,000 droppings . . . remnants of which can be inhaled by humans.”

We typically find an assortment of microscopic allergens and particulates in the indoor environment that easily become airborne. Some are known triggers causing an assortment of illnesses including childhood asthma. Allergens, particulates, and contaminants from mouse droppings and other sources become airborne in a variety of ways:

- A person simply sitting down or standing can generate about 2,500,000 particulates per cubic foot.

- Walking generates 10,000,000 particulates per cubic foot.

- Horseplay can stir up 30,000,000 particulates per cubic foot.

- Sweeping and vacuuming can add billions of particulates into the air.

One way the cleaning professional can help prevent these allergens from being recirculated into the atmosphere and the air
we breathe is by using specially designed vacuum cleaners that capture and trap these tiny particulates. With many commercial upright vacuum cleaners, specific components of the machine such as the roller brush (which agitates the carpet), the airflow, and the lift created by the machine are sufficient to draw even the most minute allergens into the vacuum cleaner.

Airflow, according to Allen Rathey of the International Custodial Advisors Network, Inc. (ICAN), is the volume of air moving through the vacuum cleaner, usually measured in cubic feet per minute (CFM). Lift is the ability of the vacuum cleaner to actually lift dirt and dust from a surface, such as a carpet. It is typically measured in inches of lift based on how many inches the vacuum cleaner’s airflow can pull water through a tube in a laboratory.

A vacuum cleaner with a roller brush and satisfactory airflow and lift is capable of pulling particulates into the machine. However, they can still escape through the vacuum cleaner and into the air we breathe. That is, unless the vacuum cleaner has a HEPA air-filtration system efficient enough to capture these tiny particulates, and a true-HEPA design, able to keep them trapped within the machine.

**True HEPA**

“We have heard about the virtues of HEPA-filtration systems for years,” says James Hlavin, National Sales Director with Tornado
Industries, makers of floor care equipment including commercial vacuum cleaners. “But now we know HEPA filters alone are not sufficient to prevent allergens and harmful particulates from entering the atmosphere.”

HEPA filtration means that the filter can remove 99.97 percent of particulates down to 0.3 microns in size, about 500 times smaller than the period at the end of this sentence. HEPA filters are able to filter out all known asthma triggers from pollen grains to dust mite fecal pellets as well as the contaminants that can become airborne and cause hantavirus.

“However, HEPA filters will do little good if impurities escape the casing of the machine,” says Hlavin. “It is critically important to use a vacuum cleaner that is completely sealed—all airflow must pass through and be cleaned by the HEPA filter with impurities deposited into the machine’s high-filtration paper bags and not released into the atmosphere. This is a true-HEPA vacuum cleaner.”

Hlavin adds that it is not only the casing of the machine that helps qualify it as a true-HEPA vacuum cleaner. The design of its components must also meet specific criteria. “During the two years we tested our CV30 true-HEPA vacuum cleaner, we watched for things like faulty seals, tearing, spilling, and gaps in the vacuum cleaner body, hose, and conduit connections, all of which
might allow contaminants to flow from the machine into the air.—
especially with the use and abuse most commercial vacuum
cleaners take on the job.

**Added Benefits**

A true-HEPA machine can have additional health benefits,
according to Hlavin. “By capturing so much indoor dust, dusting
cycles are reduced,” he says. “This can significantly cut down on
labor costs. Additionally, absenteeism is reduced, as are workers’
compensation claims because the air the cleaning professional
breathes while working is cleaner.”

Customers have also seen unexpected improvements when a
HEPA-filter vacuum cleaner is used. In one case, a manufacturer
of medical equipment saw the rejection rate of one of its products
drop from 10 percent to 4 percent—the result of better air quality
conditions in the factory because of the HEPA machine.

According to Hlavin, true-HEPA vacuum cleaners will become
more in demand in the coming years. “I see parallels between
true-HEPA and Green Cleaning,” says Hlavin. “Several years ago,
many saw Green Cleaning as a fad; however, today it is recognized
as a major force in the cleaning industry and as a way to help
keep cleaning workers, building occupants, facilities, and the
environment productive and healthy. True-HEPA vacuum
cleaners are doing the same. Their health and cleaning benefits
increasingly make them the vacuum cleaner of choice for today and certainly for the future.”

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Sidebar:

**Minimizing Your Exposure to Hantavirus**

1. Make your home, school, or office uninviting to rodents. Avoid leaving food where they can find it; seal openings with insulation or wire.

2. Avoid walking through areas that may be rodent-infested before you enter a building.

3. Refrain from stirring up dust, especially if you enter a building that has been closed up for a considerable amount of time.

4. If you find rodent droppings, do not sweep. Vacuum only with a true-HEPA-filter vacuum cleaner.