U.S. races to get millions of swine flu doses ready

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In a contest that pits human against virus, the U.S. government is evaluating the safety and effectiveness of swine flu vaccine in hopes of having millions of doses ready for use before the next wave of the pandemic H1N1 sweeps across the nation.

Last week the virus struck first, infecting a handful of students at the University of Wisconsin-Madison.

Across the United States, thousands of other students have reported influenza symptoms, though many have not been tested for swine flu, according to college officials and a survey by the American College Health Association.

"Well, I think it's going to be a race," said Douglas Reding, vice president of the Marshfield Clinic. "It could potentially be neck and neck depending on when the next outbreak occurs."

The race comes at a time when the federal government is in the midst of a multibillion-dollar effort to boost America's flu vaccine capacity and just as vaccine makers are moving into new technologies.

Toward the end of the bird flu scare about four years ago, the U.S. committed $5.6 billion to boosting preparations to fight the next pandemic, including at least $2 billion to develop new production methods for vaccine.

"We're probably a couple of years away from the big transition," said Mike Perdue, director of influenza and emerging disease for the federal Biomedical Advanced Research and Development Authority in Washington, D.C.

But Perdue stressed that the current vaccine production technology, which relies on millions of chicken eggs, is "tried and true" and from all indications should be an effective weapon against swine flu -- unless the virus mutates.

Perdue said health officials still are not sure whether people will need one or two shots of the H1N1 vaccine, a question they hope to answer in the clinical trials under way.

Vaccines have been used to protect people against influenza since 1945.

The method blends science and educated guesswork. Each year, health officials around the globe pick the dominant strains of virus circulating in the most recent flu season and submit recommendations to the U.S. Food and Drug Administration, which chooses three and provides them to vaccine companies.

The selection takes place about eight months before the next flu season is expected to begin.

Companies grow each of the three flu strains separately, and then combine them to make one vaccine. The manufacturers rely on millions of specially prepared, fertilized chicken eggs to grow the virus strains. Each egg is injected with one strain, stimulating the production of virus-fighting antibodies.

Eggs are allowed to incubate for a few days until virus-ladened fluid can be removed. The virus is purified, then inactivated. Viral fragments

from the three strains are combined to make the vaccine.

One company, MedImmune, uses a different system involving a live, but much weakened, virus. The end result is FluMist, a vaccine that is sprayed into patients' nostrils rather than injected into muscle.

Much the same techniques used to make vaccines for seasonal flu are being employed to produce the vaccine for H1N1.

Although egg-based technology has worked well with flu for the most part, the influenza virus circulating the world can change while companies are still preparing their vaccines. That means by the time people receive the vaccine, it may match an old version of the virus rather than the version it is being called upon to fight. Also, people who are allergic to eggs cannot receive the vaccine.

Perhaps most important in a year when a novel strain of influenza has grown into a pandemic, it is not so easy to quickly scale up vaccine production when using egg-based technology.

"The hens can only lay so fast," said Ruth Karron, a professor at the Johns Hopkins School of Public Health who directs the university's Center for Immunization Research.

And eggs present other disadvantages, as the vaccine marker Novartis has discovered this year in preparing swine flu vaccine.

"The virus is not growing as well in eggs as we had anticipated," said Eric Althoff, global media relations director for the pharmaceutical giant.

Althoff said Novartis currently is producing only 30 percent of the amount of vaccine for swine flu that it would usually produce for a non-

pandemic flu strain.

Other companies have had similar problems, and in August the U.S. Department of Health and Human Services announced that it had scaled back its estimate that 120 million doses would be ready by mid-October.

The department said about 45 million doses should be ready by then with another 20 million doses expected to arrive each week thereafter.

In addition, one company, MedImmune, has managed to produce more than 50 million doses of swine flu vaccine, much more than the 13 million the American government has contracted to buy, said Ben Machielse, executive vice president of operations. MedImmune is in negotiations with the U.S. to sell the additional doses.

For the other vaccine makers, the source of the problem was simple: They were getting fewer doses from each egg than anticipated.

"It's this old, arcane procedure that's been around and no one has changed it because there's been no incentive to do it -- and now we're paying for it," said Paul Radspinner, president and chief executive officer of FluGen Inc., a Madison, Wis., start-up developing a technology many experts believe will join and perhaps even replace egg-based vaccine production.

FluGen expects to grow vaccine in mammalian cells.

Novartis already has developed a way to make vaccine from viruses grown in dog kidney cells. In 2007, the company was licensed to produce this vaccine in Europe.

So far, though, the technique has not been licensed in the U.S., and Novartis remains the only company marketing influenza vaccine grown

in this manner.

Donna Cary, spokeswoman for Sanofi Pasteur, which makes about 45 percent of the world's influenza vaccine, cautioned that flu vaccine plants take years to build and license, and she said no technique has proved that it can compete commercially with the egg-based system.

Cary said she believes the next advance will be the so-called universal influenza vaccine intended to provide protection against all known human strains of influenza A. In 2008, a British-American biotech company called Acambis reported preliminary success in Phase I trials of a universal influenza vaccine.

In the meantime, vaccine makers and health experts believe the influenza shots for H1N1 should provide strong protection. Although there remains time for H1N1 to undergo mutations, "We have not seen significant changes in the virus generally, which I think is important," said Karron at Johns Hopkins.

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