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Hospitals Short on Ventilators if Bird Flu Hits

By DONALD G. McNEIL Jr.

No one knows whether an avian flu virus that is racing around the world might mutate into a strain that could cause a human pandemic, or whether such a pandemic would cause widespread illness in the United States. But if it did, public health experts and officials agree on one thing: the nation's hospitals would not have enough ventilators, the machines that pump oxygen into sick patients' lungs.

Right now, there are 105,000 ventilators, and even during a regular flu season, about 100,000 are in use. In a worst-case human pandemic, according to the national preparedness plan issued by President Bush in November, the country would need as many as 742,500.

To some experts, the ventilator shortage is the most glaring example of the country's lack of readiness for a pandemic.

"This is a life-or-death issue, and it reflects everything else that's wrong about our pandemic planning," said Dr. Irwin Redlener, director of the National Center for Disaster Preparedness at Columbia University. "The government puts out a 400-page plan, but we don't have any ventilators and there isn't much chance we're going to get them."

A typical hospital ventilator costs \$30,000, and hospitals, operating on thin profit margins, say they cannot afford to buy and store hundreds of units that may never be used. Cheaper alternatives can be deployed in a crisis, but doctors say they are grossly inadequate to deal with a flu pandemic.

Congress authorized only \$3.8 billion of the \$7.1 billion that Mr. Bush requested for flu preparedness, and nearly 90 percent of it is earmarked for vaccines and the antiviral drug Tamiflu. Buying enough ventilators for a flu outbreak like that of 1918 would cost \$18 billion.

"We only have a certain amount of money to spend on preparedness," said Thomas W. Skinner, a spokesman for the federal Centers for Disease Control and Prevention in Atlanta. "We can't invest strictly in respirators."

The federal preparedness plan leaves preparations for medical care up to state and city health officials, but the only government agency that amasses ventilators is the Strategic National Stockpile, created in 1999 by the disease centers to store medicine and equipment for use in a terrorist attack or a disaster. But the agency has only 4,000 to 5,000 ventilators, according to a federal official who spoke on the condition of anonymity because of a dispute between government health and security agencies about whether the size of the stockpile ought to be kept secret.

There is also a shortage of trained personnel, said Dr. Michael T. Osterholm, director of the Center for Infectious Disease Research and Policy at the University of Minnesota.

"Ask any respiratory therapist — you have to adjust the gases, the pressures," he said. "We don't have enough trained people to maintain them."

In a recent emergency drill, said Dr. John L. Hick, a professor of emergency medicine at the Mayo Medical School in Minnesota, the 27 hospitals in his area could come up with only 16 extra ventilators when faced with a hypothetical outbreak of 400 cases of pneumonic plague.

"In a pinch," Dr. Hick said, "you can hand-bag people," a procedure in which a fat plastic bellows is squeezed to push air into the lungs. "But in a pandemic, you're stuck."

Dr. Hick wrote a recent paper for The Journal of Academic Emergency Medicine suggesting guidelines to determine in a crisis which patients should be taken off ventilators and allowed to die.

In a national emergency, he said, "it will come down to some really thin cuts on a scoring system."

"Families are going to be told, 'We have to take your loved one off the ventilator even though, if we could keep him on it for a week, he might be fine,' " he went on. "How do you think that's going to go over? It's going to be a nightmare."

Representatives of three of the country's largest hospital chains, HCA, Tenet Healthcare and Triad Hospitals, said they were aware of the potential shortage. "We're considering the feasibility of acquiring additional ventilators, but I can't say we're even close to making that decision," said Jeff Prescott, a spokesman for HCA.

Steven Campanini, a spokesman for Tenet, said the company had looked at seven models from \$40 to \$30,000, but had not made any extra purchases. "There are split camps about whether or not bird flu will mutate," Mr. Campanini said. "But we recognize the threat and, should the need arise, we'll work with state and local officials to meet it."

Dräger Medical, a German company that is the world's largest maker of hospital ventilators, can double its assembly line capacity in a week, said Mandy Hartman, a vice president for marketing. In a year, that would add "more than 10,000" ventilators to the world supply, said Ms. Hartman, who declined to be more specific.

In interviews, experts in respiratory medicine and emergency preparedness offered other suggestions for dealing with an emergency, including the use of hand bags by teams of volunteers or family members as was done in New Orleans hospitals during Hurricane Katrina. But hand-bagging is exhausting, and flu patients may need assistance for weeks.

"You can do it for maybe 10 minutes before your forearms turn to jelly," said Amy Nichols, an infection control specialist at the [University of California](#), San Francisco. "Think of squeezing a mushy football — that's the kind of pressure you have to create to fill engorged lungs."

A few hospitals are stockpiling disposable emergency ventilators normally used by paramedics and powered by the pressure of the oxygen tank. Their plastic valves can be set to deliver oxygen at various pressures, and they cost \$50 to \$100 each. They can run for hours if attached to a large bedside tank, or indefinitely on a hospital's oxygen supply.

Mark Nunes, an emergency preparedness consultant to the Washington State Hospitals Association, said hospitals in the state had stockpiled about 1,500 of one brand, Vortran Automatic Resuscitators. But

doctors said they required care to operate: too little pressure would not deliver enough oxygen to lungs made inflexible by fluid and mucus, while too much pressure could damage them, increasing the chances of fatal bacterial infections.

"They'll keep somebody alive," Mr. Nunes said. "But they need to be monitored. You can't just intubate somebody and walk away."

James Lee, a senior vice president of Vortran Medical Technology, said his company had sold thousands of disposable resuscitators to hospitals worried about blackouts, terrorist attacks, storms and other emergencies.

"In a \$30,000 I.C.U. ventilator, you're paying for a computer with a lot of alarms," Mr. Lee said. "In a pinch, ours can do pretty much everything you need to do — but they have to be monitored."

Although they are meant to be used only for minutes or hours, he said, models have worked in tests for two months, "although, obviously, you wouldn't have someone on for that long," he added.

Another alternative, said Michael Olesen, an infection control specialist at Abbott Northwestern Hospital in Minneapolis, would be the thousands of home machines used by people with sleep apnea and severe snoring.

Those machines, which cost \$300 to \$600 and are known as C-PAP for continuous positive airway pressure, are not ideal because they do not develop the pressures needed to inflate fluid-filled lungs, nor do they release the pressure to let the lungs empty. (They have been likened to breathing with one's head outside a speeding car.)

"It's not normal ventilation," he admitted. "But it helps get oxygen to the lungs."

Not everyone takes alternative plans very seriously.

Dr. Hick said he thought most ventilators that lacked alarms and fine-tuned pressure controls would be "worthless" for seriously ill patients, and Dr. Rex Archer, chief health officer for Kansas City, Mo., and president of the National Association of County and City Health Officials, laughed a bit contemptuously when told of the backup plans and said: "Yeah, and maybe we should pull out some of the old iron lungs sitting around in museums."