

Assessing, Identifying, and Mitigating Gaps in Mechanical Ventilatory Capacity in New York City Hospitals

Erich Giebelhaus, MPP

Lew Soloff, MD

New York City Department of Health and Mental Hygiene
Bioterrorism Hospital Preparedness Program

Web: www.nyc.gov/health/bhpp

NYC DOHMH / Greater New York Hospital Association
Pandemic Influenza Preparedness and Response Plan

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Critical Care Surge Capacity

- Staff, space, and ventilators are limiting factors
- Ventilator purchase is one strategy to augment patient care capacity
- 11/2005 DHHS Pandemic Influenza Plan, along with CDC 2006 pandemic influenza funding, provided framework and unique opportunity

Ventilator Assessment Objectives

- Estimate shortfalls in New York City hospital critical care/ventilatory capacity
- Make informed ventilator pilot purchase
- Determine effectiveness of selected ventilator in hospital setting prior to larger stockpile purchase

Assessing New York City (NYC) Ventilatory Capacity, 12/2005 – 11/2006

Objectives

Estimate Shortfalls in NYC Critical Care Capacity

Make Informed Ventilator Pilot Purchase

Determine Effectiveness of Selected Ventilator; Plan for NYC Stockpile

Methods

Conducted NYC Hospital Survey; Linked Results to CDC Planning Models

Evaluated Ventilators With Respiratory Therapy Input; Conducted Initial Purchase

Evaluate Acceptability of Ventilators and Training in Hospitals

Peak Impact of Pandemic Flu Patients on NYC Hospitals (1957/68 Scenario)

Variable	# Related to Flu Patients	% of Existing Capacity Required by Flu Patients
Daily Hospital Admissions	1,129	23%
Hospital Beds (n = 26,177)	5,512	21%
Intensive Care Unit Beds (n = 1,713)	2,662	155%
Mechanical Ventilators (with 40% of 2,688 vents available, n = 1,075)	1,331 Gap: 256	50%

Note: Impact estimated at Week 5 of 8-week pandemic; 35% attack rate; 10-day vent use; 25% of flu patients require ICU care; 50% of ICU patients require ventilation

Peak Impact of Pandemic Flu Patients on NYC Hospitals (1918 Scenario)

Variable	# Related to Flu Patients	% of Existing Capacity Required by Flu Patients
<u>Daily</u> Hospital Admissions	8,016	31%
Hospital Beds (n = 26,177)	39,155	160%
Intensive Care Unit Beds (n = 1,713)	18,907	1,104%
Mechanical Ventilators (with 40% of 2,688 vents available, n = 1,075)	9,454 Gap: 8,379	352%

Note: Impact estimated at Week 5 of 8-week pandemic; 35% attack rate; 10-day vent use; 25% of flu patients require ICU care; 50% of ICU patients require ventilation

NYC DOHMH Critical Care Capacity Survey Results, December 2005 (N=65 Hospitals)

<u>Result</u>	<u>Implication</u>
2,688 full-featured mechanical ventilators	Shortage of ventilators expected during influenza pandemic
1,385 full-time equivalent respiratory therapists	Citywide shortage in respiratory therapists; need to cross-train staff
3 (5%) hospitals familiar with ventilators in the U.S. Strategic National Stockpile (SNS)	No clear advantage to use or stockpile vents in the SNS
49 (76%) hospitals willing to store, maintain & train staff on new vents	Most hospitals willing to build hospital-based cache
60% of ventilators in average daily use during 2004-2005 flu season	Maintaining essential medical services will require vents for non-pandemic illnesses

NYC Ventilator Need Estimates and Cost Model Based on Severity of Pandemic

	<u>1957/68 Scenario</u>	<u>1918 Scenario</u>
# of NYC hospital-based full-featured ventilators (12/2005)	2,688	2,688
# of available ventilators for pandemic patients; 60% already in use for non-pandemic patients	1,075	1,075
# of ventilators needed for pandemic influenza patients	1,331	9,454
Estimated Shortfall	-256	-8,379
Estimated Costs to Address Shortfall (vent+durable med. equip. = \$8,400)	\$2.2 million	\$70.4 million

Assumptions: 8-week pandemic; 10-day vent use; 35% attack rate; 25% of flu patients require ICU care; 50% of ICU patients require ventilation

Ventilator Selection Process

February – August 2006

- Developed cost model for ventilator and durable medical equipment
- Initiated vendor selection process
- Recruited respiratory therapists and critical care specialists for Ventilator Advisory Committee
- Developed ventilator evaluation tool

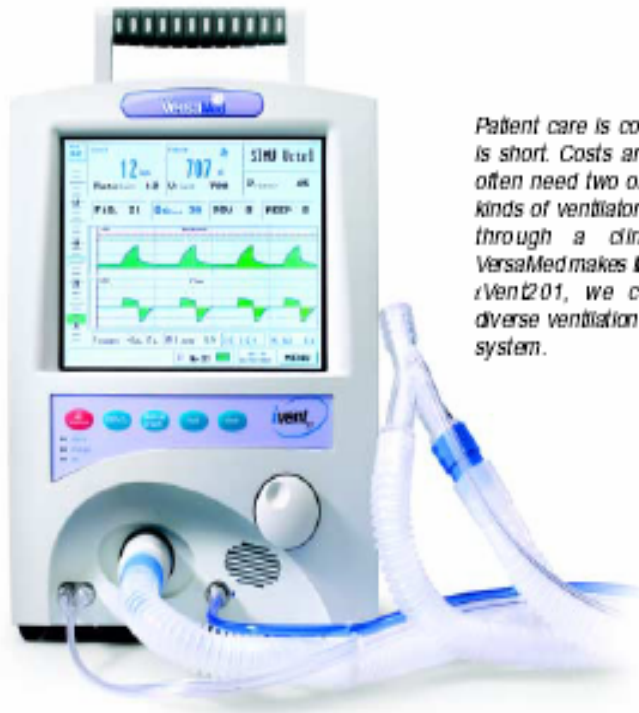
Ventilator Evaluation Tool

- FDA-approved for both adults and pediatrics
- Battery life adequate
- Ease of use/set-up
- Ability to provide and maintain PEEP
- Adequate flow rate
- Ability to provide closed circuit in-line suctioning while maintaining PEEP
- Loudest noise < 75db
- Good alarm system
- Visible/Audible alarms
- Weight
- Size
- Warranty
- Recalls

Ventilator Evaluation Tool

- Non-proprietary circuits
- Training programs including just-in-time training and “quick-reference” cards
- Documented continuous use for at least one month
- Oxygen consumption calculations for specific patient types
- Durability
- Minimal downtime for preventive maintenance
- Cost

The iVent201. Because every breath is important.



Patient care is complicated. Time is short. Costs are high. Patients often need two or three different kinds of ventilators as they move through a clinical episode. VersaMed makes it easier. With the iVent201, we can meet your diverse ventilation needs with one system.



Use it with a mask or an endotracheal tube.

Use it in the emergency room, critical care, sub-acute and transport

Add new modes with software upgrades.

Make each breath more comfortable.

Reliable Critical Care Moves with the Patient

The iVent201 offers critical care that's truly portable. A powerful ventilator, it's ideal for the emergency room and the ICU. But it doesn't stop there. The iVent201 goes everywhere your patient goes — nonstop. Equipped with rechargeable batteries and a turbine air source, it's designed to work while traveling from critical care to sub-acute and even home care—so you never have to switch machines.

Two Machines in One Both Face Mask and Invasive

The iVent201 can be used with an endotracheal or tracheostomy tube or a face mask when you use the Adaptive Bi-Level option. Seamlessly transfer patients between leak-tolerant and invasive ventilation modes without having to switch machines. Save valuable time -- especially in the emergency room. Minimize training and equipment costs.

Remote Monitoring SpO2 Monitoring

The iVent201 has groundbreaking features you won't find anywhere else—like remote monitoring and SpO2 Monitoring. With our remote feature, you can watch a graphic simulation of the ventilator working on your patient from anywhere via a standard phone connection. And now you can conveniently monitor oxygenation with one device.

Groundbreaking Comfort Patient Compatibility

The iVent201's Adaptive Flow™ and Easy Exhale™ features provide unprecedented patient comfort. These breakthrough technologies keep patients from "fighting the ventilator" by letting their needs spontaneously determine flow rate. It's the difference between helping someone breathe and forcing them to breathe.

Easy to Learn Easy to Use

A machine you can master in minutes. Just dial in the patient's weight to start ventilating instantly. Monitor waveforms and diagnostics on the graphics screen and use the rotational control knob to make adjustments.

Simple Upgrades Savvy Investment

The iVent201 is PC-based. So enhancements are just a download away. Stay up-to-date and reduce the need for costly new equipment and training. Use one machine for a variety of situations from EMS and ICU to transport and home care.

FDA-Approved for use in Children and Adults

ReSCCIPP (Respiratory Surge Capacity and Capability Improvement Pilot Project)

- Results of our survey, in context with projected gaps in citywide ventilatory capacity, support development of citywide ventilator stockpile.
- The effective use of stockpiled ventilators by hospitals would require
 - staff familiarity with ventilators
 - effective training materials
 - an understanding of citywide plans to supplement existing hospital resources
- Hospitals invited to express interest in ReSCCIPP; 34 hospitals applied

Hospital Feedback During Pilot Project

- 24 selected hospitals will provide feedback on ventilators over 9 months for a minimum of 2,000 patient-use hours in varied settings:
 - Transport
 - ICU
 - Pediatric
 - Adult
 - Chronic care

Project Objectives (1)

- Supplement existing hospital-based ventilatory capacity
- Evaluate the use/acceptability of these ventilators in multiple hospital settings
- Evaluate Versamed *iVent 201* ventilator training and supporting materials that will be provided by Versamed to hospital respiratory therapists in a “train-the-trainer” format

Project Objectives (2)

- Develop and evaluate “just-in-time” training materials for respiratory care “extenders”, i.e. non-respiratory therapist staff who could be called upon to assist in the ventilation of patients in an influenza pandemic or other emergency
- To develop a closer working relationship between NYC DOHMH and hospital respiratory therapy departments

Where We Are in the Process

- The 24 selected hospitals have been notified
- DOHMH is working with our Advisory Committee partners to develop ventilator evaluation criteria and hospital reporting tools
- Initial delivery to start in mid-December to the first five pilot hospitals
- Remaining 19 hospitals to choose the dates of delivery and training by mid-January
- At the end of the 9-month evaluation period, we will recommend the next course of action

Summary / Recommendations

- Pandemic influenza modeling highlighted need for critical care beds and ventilators
- Working with hospital partners optimized creation of ventilator evaluation tool, selection
- Pilot project will inform stockpile purchase

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