



STATE OF FLORIDA

Department of Health
Division of Emergency Medical Operations
Bureau for Preparedness and Response

State Ventilator Cache Assessment,
Strategic Plan and Recommendations
August 2011

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STATE VENTILATOR CACHE ASSESSMENT

Background

Following several national disaster events, (i.e., September 11th attacks on World Trade Center and the Pentagon and the 2001 Anthrax attacks) Florida began exploring the capacity to support a large scale disaster for patients requiring mechanical ventilation. State surveys examined hospital capacity and capability to sustain a large-scale event. Initial planning and work aimed strengthened the strategic reserve of mechanical ventilators by augmenting hospital capacity of ventilator equipment caches.

In 2006 the State Working Group Ventilator Task Team, now called the Hospital Surge Capability Team Ventilatory Sub-Committee (HSCTVSC) established standards for portable ventilators. The HSCTVSC made recommendations to the state to continue expanding ventilator capacity in hospitals through Health Resources and Services Administration (HRSA) funds for acute care hospitals supporting catastrophic events. These recommendations were supported as federal funding changed to the Assistant Secretary for Preparedness and Response (ASPR), Hospital Preparedness Program (HPP).

In 2008, prior to the onset of H1N1 Influenza, the HSCTVSC recommended Florida's strategy change to support a state cache of portable mechanical ventilators. Accomplishments supporting this change in tactic were outlined in a strategic assessment and plan for mechanical ventilator support.

The 2009, Florida purchased 787 portable mechanical ventilators through federal funding for pandemic preparedness for the build out of a state cache. The cache is warehoused in strategic locations across Florida based on population estimates facilitating rapid response. Each of Florida's State Medical Response Teams was provided a small cache of vents to augment the forward deployment of medical assets during a declared emergency.

Florida continues to assess the capacity and sustainment of the state's ventilator cache through strategic analysis and planning.

Planning Assumptions

In 2006, a goal of 5,500 portable mechanical ventilators was established based on 2012 Florida population projections and pandemic influenza planning models and assumptions. Economic events in 2010 altered Florida's population projections for 2012, declining from 20.8 million to 19.0 million. The current mechanical ventilator capacity estimate has been adjusted to indicate the change in population growth and to better align with the Florida Public Health and Health Care Preparedness 2011 - 2013 Strategic Plan. Relevant to the new estimate, the strategic goal of obtaining 5,500 portable mechanical ventilators has changed to 5,000, a number more accurate to Florida's population estimate for 2013.

The planning assumptions listed are based on a severe influenza pandemic model (e.g., 1918 Spanish Influenza) -

1. 35% Attack rate – total number of sick over total time of pandemic;
2. 10% Hospital beds (Hospitalization) – rate of those who are sick. Of note, if the sick are able to receive good care at home, or an AMTS, it would reduce the need for hospital beds (hospitalization);
3. 2% Case Fatality Rate – number of sick who will die;
4. 15% of all hospitalized patients will need Intensive Care Unit (ICU) care, half of all who need ICU care will need a ventilator; and,
5. 20% Max surge – estimated maximum daily hospital census during the peak 2 weeks of a pandemic wave.

- a. NOTE: 20% is Florida Department of Health, Bureau of Epidemiology estimate vs. approximately 27% CDC FluSurge estimate.
- b. Given an estimated 10 day hospital stay, average daily census over the two week peak would be approximately 1,439.

Results were based on two pandemic waves, 6-8 weeks per wave, both waves occurring within one year and separated by 6 months. Of note, we may experience one significant wave, not two.

Capacity Estimates (2004-2010)

<u>Federal Planning Assumptions:</u>		<u>2012 (FL Pop: ~20.8 m)</u>
Attack rate	.35 x Population	7.28 m
Outpatient care	.25 x Population	5.20 m
Hospital beds (Hospitalization)	.10 x Attack rate	728,000
Dead (2% Case Fatality Rate)	.02 x Attack rate	145,600
ICU`	.075 x Hospital beds	54,600
ICU with ventilator	.075 x Hospital beds	54,600
<u>Department of Health Maximum Surge Planning Assumptions:</u>		
Max surge hospital beds per wave	.20 x Hospital beds/2	72,800
Max surge ICU per wave	.20 x ICU/2	5,460
Max surge ICU with vent per wave	.20 x ICU/2	5,460

Revised Capacity Estimates (2011-2013)

<u>Federal Planning Assumptions:</u>		<u>2012 (FL Pop: ~19.3 m)*</u>
Attack rate	.35 x Population	6.75 m
Outpatient care	.25 x Population	4.82 m
Hospital beds (Hospitalization)	.10 x Attack rate	674,512
Dead (2% Case Fatality Rate)	.02 x Attack rate	134,902
ICU`	.075 x Hospital beds	50,588
ICU with ventilator	.075 x Hospital beds	50,588
<u>Department of Health Maximum Surge Planning Assumptions:</u>		
Max surge hospital beds per wave	.20 x Hospital beds/2	67,451
Max surge ICU per wave	.20 x ICU/2	5,058
Max surge ICU with vent per wave	.20 x ICU/2	5,058

* Source: Florida Demographic Estimating Conference, January 2010 and the Florida Demographic Database, August 2010.

Prior Funding

- FY 04-05: (\$2,664,027.00) 346 Impact Eagle Vents purchased and distributed to hospitals;
- FY 05-06: (\$1,332,013.50) 173 Impact Eagle Vents purchased and distributed to hospitals;
- FY 06-07: (\$3,000,000.00) Hospitals were allocated funds to purchase portable ventilators: average cost of portable ventilators \$8,000 = 375 vents;
- FY 07-08: (\$3,000,000.00) Hospitals were allocated funds to purchase portable ventilators: hospitals were able to spend 20% of their allocation on portable ventilator equipment, supplies and preventive maintenance. Estimate of number of portable ventilators purchased: 300
- FY 08-09: Strategy changed to include a state stockpile, regionally cached. No ventilators purchased.
- FY 09-10: 787 portable mechanical ventilators purchased through H1N1 Influenza funding.
- FY 10-11: No ventilators purchased.

Target Assessment

Below are three assessments of Florida's ventilator inventory.

1. In 2004, a Florida Hospital Association (FHA) survey revealed approximately 2,801 in-house hospital ventilators in the state and cached off-site ventilators were reported at 272 units. HRSA and ASPR HPP have funded approximately 1,194 portable ventilators totaling 4,267 ventilators available for surge. H1N1 Influenza grant funds allowed for the additional purchase of 787 ventilators.
 - a. Florida ventilator capacity = 5,054 units.
2. More recently, a 2009 ASPR Office of Preparedness and Response conducted the US Acute Care Hospital Mechanical Ventilator Inventory. It was reported that 155 acute care hospitals in Florida responded with a capacity of 3,519 full-feature critical care ventilators and 1188 pediatrics-capable, full-feature critical care ventilators. The inventory extrapolated an estimate of 4,307 full-feature critical care ventilators (23.5 per 100K Florida population) and 1454 pediatrics-capable, full-feature critical care ventilators (36.3 per 100K Florida population) from a ratio of respondent ICU beds / total ICU beds. The most relevant category for definitive mechanical ventilation in the ASPR Inventory is full-featured, critical care ventilators. The inventory reports:
 - 1) 43.1% of full-feature critical care ventilators can be used for pediatric or neonatal patients; and
 - 2) additional transport ventilators held in local and state stockpiles were not included in the inventory. H1N1 Influenza grant funds allowed for the additional purchase of 787 ventilators. The inventory's national response rate was 74.8% with Florida's response rate being 67.4%.
 - a. Florida ventilator capacity = 5,094
3. The 2011 Florida Hospital Association's (FHA) Hospital Preparedness Survey asked for a report of ventilator inventory in hospitals. FHA's survey had a response rate of 69% (N=145). The survey reports there are 3,083 full-feature critical care ventilators, 1,270 pediatrics-capable full-feature critical care ventilators and 976 transport ventilators. To add, the survey also reported there are 1,199 non-invasive ventilators / CPAP devices and 3,666 disposable automatic resuscitators. H1N1 Influenza grant funds allowed for the additional purchase of 787 ventilators.

- a. Florida ventilator capacity (full-feature critical care ventilators, pediatrics-capable full-feature critical care ventilators and Florida's cached ventilators) = 5,140

Stockpile Cache Estimate

State ventilator cache estimates are based on like planning formulas used in the Florida Department of Health Emergency Operations Plan, Pandemic Influenza Annex, Version 11.2, Table 23 (County Allocation for Pandemic Influenza Vaccine) on page 89.

Estimates of the percentage of regionally cached ventilators are based on 2013 population estimates from the Florida Demographic Estimating Conference and the Florida Demographic Database includes:

1. Domestic Security Region 1, 2, & 3 – 2013 population estimate = 3,947,744 (20.5%).
 - a. 20.5% of cache = 161 ventilators.
2. Domestic Security Region 4, & 5 – 2013 population estimate = 7,537,365 (39.1%).
 - a. 39.15 of cache = 308 ventilators.
3. Domestic Security Region 6 & 7 – 2013 population estimate = 7,786,624 (40.4%).
 - a. 40.4% of cache = 318 ventilators.

STATE VENTILATOR CACHE STRATEGIC PLAN

Goal 1: Attain a statewide level of 5,000 ventilators by the year 2012.

Objective 1.0 – Response capability and capacity: Ensure ventilator capacity needs for the state of Florida are met using methodology incorporating demographic, statistical, and other sources of data to determine an adequate number of ventilators for state and hospital access and use. **STATUS: COMPLETED.**

Strategy 1.0 - Establish a formula and methodology (based on annual population growth and pandemic influenza surge wave predictions) to meet the end target of 5,000 hospital-grade mechanical ventilators for use in an all-hazards public health response. **STATUS: COMPLETED.**

Objective 1.1 – Establish regional repositories of mechanical ventilator resources: Ensure the capability and capacity to provide safe mechanical ventilation during a public health event requiring mechanical ventilation above hospital surge capacity. **STATUS: COMPLETED.**

Strategy 1.1 - Establish regional caches of portable ventilators to serve as a reserve of medical surge equipment for sustained mechanical ventilator capability. **STATUS: COMPLETED.**

Strategy 1.1B – Maintain operational performance of portable ventilators cached according to manufacturer's recommendation and specifications. **STATUS: PENDING.**

Goal 2: Database for management of regional ventilator caches and distribution.

Objective 2.0 – inventory management for ventilator caches: Ensure effective data storage and information management systems are developed for stakeholder use before, during and after a public health event requiring mechanical ventilation. **STATUS: COMPLETED.**

Goal 3: Educated and informed licensed first responder and health care workforce within the state of Florida on portable ventilator capacity and capability.

Objective 3.0 – Sustain education for first responder and health care workforce: By 12/31/11, sustain opportunities for licensed first responders and health care workforce in the state of Florida to receive operational training and education on portable mechanical ventilators in the state cache. **STATUS: PENDING.**

Strategy 3.0 - By 6/30/11, sustain ventilator training to Florida's licensed EMS providers (e.g., paramedics and emergency medical technicians), licensed health care workforce (e.g., respiratory therapists, nursing, physicians), and accredited respiratory therapy education programs as needed. **STATUS: PENDING.**

Objective 3.1 – Inform health care workforce how to access portable mechanical ventilators cached in Florida: Provide information to hospitals and health system in Florida as to how cached portable mechanical ventilators can be accessed during a declared public health emergency. **STATUS: PENDING.**

Strategy 3.1 - By 12/31/11, make available on the Bureau for Preparedness and Response (BPR) hospital preparedness website information hospitals can use to request additional ventilator resources from the state cache. **STATUS: PENDING.**

Objective 3.2 – Educate and Inform first responder and health care student education programs: Provide information to accredited first responder and health care education programs to augment core curriculum related to their position and role in preparing for and responding to significant public health events. **STATUS: PENDING.**

Strategy 4.2 - By 12/31/11, provide an education program for first responder and health care programs in the state of Florida – focused on an all-hazards approach to disaster preparedness, emergency management and the role of the first responder and health care provider in Mass Casualty Incidents. **STATUS: PENDING.**

Objective 3.3 – Make available information and resources related to health care workforce extenders for disaster response: Provide information for health care workforce related to expanding the capability of professional medical services through the strategic use of voluntary extender programs. **STATUS: PENDING.**

Strategy 3.3 - Identify information and resources readily available for dissemination to hospital and health system partners related to the strategic use of voluntary medical extenders. **STATUS: PENDING.**

Strategies 3.3B - Identify additional training and education programs supporting the use of voluntary medical extenders. **STATUS: PENDING.**

RECOMMENDATIONS

The HSCTVSC makes the following recommendations: (placed in order of priority)

1. Further purchase of portable mechanical ventilators for a state cache is not recommended.
2. Cache all LTV 1200 GOPACS purchased according to the stockpile cache estimates in this document.
3. Provide adequate storage facility space that is climate controlled and has adequate power supply for continuous A/C electrical charge. (See Attachment 1 – Summary of Operational Maintenance Requirements and Cost Options).
4. Develop a standardized, preventative maintenance program for the state ventilator cache according to manufacturer recommendations and specifications. (See Attachment 1 – Summary of Operational Maintenance Requirements and Cost Options).

5. Provide warehouse personnel information about daily management of the cached LTV 1200 GOPACS ensuring compliance with manufacturer's care and maintenance recommendations.
6. Secure a provider to perform PM Service for all cached LTV 1200 GOPACS. (See Attachment 1 – Summary of Operational Maintenance Requirements and Cost Options).
7. Develop opportunities for first responder and health care training and education on the access, use, management, and reconstitution of ventilator resources in Florida.
8. Make available additional education and training information related to the strategic use of voluntary workforce extenders.
9. Continue to use the HSCTVSC in an advisory capacity as subject matter experts for Respiratory Care related issues to the Florida Department of Health.

Attachment 1 – Summary of Operational Maintenance Requirements and Cost Options

It is imperative that the 787 portable mechanical ventilators (LTV GOPACS) purchased for the state cache be operationally maintained on an on-going basis according to manufacturer's recommendations. This includes but is not limited to the following:

Storage

- Providing adequate storage facility space that is climate controlled and has adequate power supply for continuous A/C electrical charge.
 - This includes:
 - Sufficient storage rack space for all cached LTV 1200 GOPACS (LTV/Sprintpack units);
 - Heat and air conditioning systems to maintain consistent temperature parameters as recommended by the manufacturer;
 - Storage temperature range: - 4° F (-20° C) to 140° F (60° C)
 - Sufficient number of A/C power outlets to provide adequate current allowing for all cached ventilators to be continuously plugged in for 'trickle' charging.
 - Configuration may be –
 - 10 Amp A/C outlets allows for ten (10) LTV 1200 GOPACS yields current draw of 8.87 amp A/C.
 - 20 Amp A/C outlets allows for twenty (20) LTV 1200 GOPACS yields current draw of 17.74 amp A/C.
 - 30 Amp A/C outlets allows for LTV 1200 GOPACS yields current draw of 26.61 amp A/C.

Care and Maintenance

- Providing on-going preventative maintenance (PM) and service for every 10,000 hours of service or every 24 months as recommended by the manufacturer.
 - For Florida's 787 LTV GOPACS, the PM Service begins 24 months from the date the LTV GOPAC(s) is/are deployed (placed in service); or, for LTV GOPACS that are not deployed, the initial PM Service is due no later than 20 months from the invoice date;
 - For Florida's LTV GOPACS that are never deployed, the first PM Service is scheduled to occur in March, 2012.
 - After the first PM Service is performed, routine PM Service is to occur every 24 months.
 - There are 2 levels of PM Service recommended by the manufacturer, the 10,000 PM Service and the 30,000 PM Service (every 3rd PM);
 - The 10,000 PM Service includes the replacement of the internal battery, motor board, all filters, a software update, full factory calibration and testing.

- The 30,000 PM Service includes everything in the 10,000 PM Service plus the replacement of the solenoid manifold, fan, flow valve, turbine, oxygen blender (where applicable), rotary switch, solenoid mount assembly (where applicable), PEEP accumulator (where applicable) and all internal tubing.
- Florida's LYV GOPACS may receive PM Service on a 'rolling' schedule;
 - This would be based on a certain amount being serviced quarterly.
 - Cache location and number of units per cache site would be a variable.
 - Total quarterly PM Service performed is estimated to be approximately 197 units per quarter.
 - An alternative method would be to service each cache on a rolling quarterly schedule.
 - Domestic Security Region 1, 2, & 3: 161 LTV GOPACS; approx. 40 per quarter.
 - Domestic Security Region 4 & 5: 308 LTV GOPACS; approx. 77 per quarter.
 - Domestic Security Region 6 & 7: 318 LTV GOPACS; approx. 80 per quarter.
- Occasionally, a corrective maintenance problem may be detected requiring additional service not included with routine PM Service.
- Cost of PM Service is dependent on the how the service is facilitated. (See Recommendations).
 - Options may include:
 - Training state employee(s) to deliver PM Service
 - Cost estimate: Salary (Variable); Benefits (Variable); \$2,500.00 per employee to attend manufacturer authorized technician training (excluding travel costs for 2 nights); [NOTE: Manufacturer on-site training is available for approximately \$5,000.00 and is limited to eight student technicians]; 10,000 PM Service \$500.00 per unit; 30,000 PM Service \$2150.00 per unit; annual travel costs for PM Service.
 - Contracting with a qualified and authorized service center
 - Cost estimate: Variable. Standard rates for 10,000 PM Service are approximately \$965.00 per unit; standard rates for 30,000 PM Service are approximately \$2,360.00 per unit; Corrective Maintenance costs approximately \$65.00 per hour plus parts; travel costs included.
 - Factory PM Service delivered on-site
 - Cost estimate: Variable. Standard rates for 10,000 PM Service are approximately \$965.00 – 1,650.00 per unit; standard rates for 30,000 PM Service are approximately \$2,360.00 per unit; Corrective Maintenance costs may vary per hour plus cost of parts; travel costs included.
 - Direct factory PM Service

- Cost estimate: LTV 1200 GOPACS can be shipped to the factory or any authorized service center; Standard rates for 10,000 PM Service are approximately \$965.00 per unit (based on current list prices); standard rates for 30,000 PM Service are approximately \$2,675.00 per unit (based on current list prices).