

Strategic National Stockpile: Overview and Ventilator Assets

Eileen M Malatino RN MSc

Introduction

Strategic National Stockpile

Strategic National Stockpile Ventilator Assets

Requesting SNS Ventilators

Ventilator Kits and Ancillary Equipment

Ventilator Maintenance and Recovery

Summary

Acquiring a resupply of critical medical assets following a national emergency will be crucial to saving lives. The Strategic National Stockpile is a national repository of various medications, vaccines, antidotes, and medical/surgical equipment that would be used to augment federal, state, and local public health agencies in the event of a terrorist attack or other public health emergency. Portable ventilators are included in the stockpile Managed Inventory. These ventilators and the ancillary equipment needed for one adult or one pediatric patient are kitted in a durable case that is staged and ready for deployment. A state that requires these assets initiates a request for federal assistance through established guidelines. This paper provides an overview of the Strategic National Stockpile, the types of ventilators and ancillary equipment currently available, and the process for requesting these assets. Key words: Strategic National Stockpile, 12-hour Push Package, Managed Inventory, Technical Advisory Response Unit, ventilator. [Respir Care 2008;53(1):91-95.]

Introduction

Mass casualty scenarios will result in the need for not only various pharmaceutical and vaccine countermeasures,

Eileen M Malatino RN MSc is affiliated with the Division of Strategic National Stockpile, Coordinating Office for Terrorism Preparedness and Emergency Response, Centers for Disease Control and Prevention, Atlanta, Georgia.

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but also for specialized equipment such as mechanical ventilators. Anticipating this and other catastrophic events, in 1999 Congress charged the Department of Health and Human Services with establishing a repository of medical assets with a quick-response posture. This program, formerly called the National Pharmaceutical Stockpile, has evolved into what is known today as the Strategic National Stockpile (SNS). In 2003, when the National Pharmaceutical Stockpile became the SNS, it was managed jointly by the Department of Homeland Security and the Department of Health and Human Services. When the Project BioShield legislation was enacted in July 2004 (<http://www.whitehouse.gov/infocus/bioshield>), the SNS oversight returned to the Department of Health and Human Services and is now a division within the Coordinating Office for

Correspondence: Eileen M Malatino RN MSc, Centers for Disease Control and Prevention, 1600 Clifton Rd NE, MS D-08, Atlanta GA 30333. E-mail: ejm7@cdc.gov.

Terrorism Preparedness and Emergency Response at the Centers for Disease Control and Prevention.¹

Strategic National Stockpile

The SNS is not designed as a first-response asset but as a back-up or resupply resource for state and local medical materiel in limited supply or depleted by a large-scale emergency. Local officials will usually determine the need for additional resources and request assistance through their emergency management agency or health department. That request is then forwarded to the governor or his/her designee. If the governor supports the need, he or she will formally request assistance from the Division of SNS (DSNS) through either the Department of Health and Human Services or the Centers for Disease Control and Prevention. Following this request, the Centers for Disease Control and Prevention and Department of Health and Human Services evaluate the situation and determine how best to respond.

Support from the SNS may come in different ways. For an unknown threat, a broad range of pharmaceutical and medical supplies can arrive within 12 hours of the federal decision to deploy them, in what is referred to as a 12-hour Push Package. If, however, the threat is known, the SNS can send large quantities of items that are tailored to respond to the specific threat. These tailored items come from the SNS Managed Inventory. Managed Inventory shipments can arrive within 24–36 hours of the federal decision to deploy them. Items unavailable in either a 12-hour Push Package or Managed Inventory shipment may be requested and procured following federal approval via the DSNS surge purchasing capability. This process is a streamlined ordering and shipping mechanism that allows for a more rapid response. These decisions will be made by federal officials, based on the items requested at the time of the event.

Individual states must have a plan in place to receive, store, and stage the requested SNS assets. Guidance for developing the plan is provided by DSNS Program Services Consultants. Additionally, each state has a SNS Coordinator who, along with other regional and state emergency preparedness personnel, develops the plan and manages those functions related to receiving the SNS assets. If a 12-hour Push Package is requested, a DSNS Technical Advisory Response Unit (TARU) will also be deployed to the affected state. A TARU team consists of a team lead, operations officer, logistics, liaison, and communications personnel. The role of this team is to provide critical technical assistance and hands-on support to local and state authorities during the transfer of SNS assets to the state SNS Coordinator or his/her designee. The TARU team does not accompany Managed Inventory shipments;



Fig. 1. Strategic National Stockpile ventilators. Left: Uni-Vent Eagle 754. Right: LP10.

these items may be delivered to specific locations, as determined by DSNS Logistics and local and state officials.

Strategic National Stockpile Ventilator Assets

In early 2000, and again in 2002, subject matter experts were asked to develop criteria for mechanical ventilators that could be used in mass casualty situations. The first phase for the group was to develop qualitative and quantitative criteria for the SNS to consider when developing a request for proposals/information from vendors or manufacturers. The second phase was a formal review of the submitted proposals. As part of phase 2, the panel convened to review the responses and devices. Members of the panel included medical and Department of Defense experts, representatives from national societies, and individual leaders in various fields of interest.

The panel recommendations on criteria were divided into 3 areas: clinical/technical, operational, and logistical specifications. Capabilities desired included, but were not limited to, the ability to administer positive end-expiratory pressure, extended battery life, audible alarms, technical support, latex-free construction, portability, and no pending obsolescence. Since storage is a major concern for the SNS, the space required for storing the ventilator and ancillary supplies was also important. The funding appropriated allowed for the purchase of approximately 4,000 ventilators. Because of manufacturing constraints, the ventilators did not all arrive at the same time. The ventilator model acquired in 2001 was the Uni-Vent Eagle 754 (Impact Instrumentation, West Caldwell, New Jersey), followed in 2003 by the LP10 (Puritan Bennett, Pleasanton, California) (Fig. 1). In August 2006, the DSNS received notification from Puritan Bennett that the company would cease manufacture and worldwide sales of the LP10 by November 2006. Once parts, service, or proper operation are no longer feasible, the LP10 ventilators will be phased out of the SNS inventory. Market availability and determination of current and future needs for ventilators are under consideration.

Requesting SNS Ventilators

The SNS ventilators are not part of the 12-hour Push Package, but are maintained in Managed Inventory. The process for requesting SNS ventilators and other Managed Inventory, however, is similar to that for requesting the 12-hour Push Package. In this instance, the need for ventilators may be determined and initiated at the local level by a hospital or other medical treatment facility. Using the hospital's incident command system or other emergency operation protocol, the request is forwarded to the local emergency management agency or health department, then to the Governor or his/her designee for approval. The Governor or his/her designee ultimately makes the request to the Department of Health and Human Services Secretary's Operation Center or Centers for Disease Control and Prevention Director's Emergency Operation Center. Discussions with the state and multiple federal organizations and levels are subsequently initiated. From these discussions at the federal level, a decision to deploy available assets is made by the Department of Health and Human Services. Depending on the size and scope of the event, the allocation of ventilators may be determined by the Department of Health and Human Services. In a quickly developing situation, such as pandemic flu, deployment decisions may be made at the federal level without a request being initiated by a state.²

Following approval for deployment, the ventilators and other assets will be sent to a site(s) determined by the DSNS and the requesting state. From that site, state and local officials decide where the ventilator kits will be sent.

Ventilator Kits and Ancillary Equipment

Each ventilator is packaged in a durable carrying case (Fig. 2) with the ancillary supplies to ventilate one adult or one pediatric patient (Table 1). Table 2 lists various ventilator specifications, such as dimensions, weight, and battery life. Also included is the user manual, in print, VHS (video home system video cassette tape), and CD (compact disc) format, and the Project XTREME DVD (digital video disc) and CD developed by Denver Health for Department of Health and Human Services Office for the Assistant Secretary for Preparedness and Response and the Agency for Healthcare Research and Quality.³ The Project XTREME DVD contains a program for cross-training respiratory extender personnel who may be needed to manage ventilated patients during a mass casualty situation. The manuals, DVD, and CD are also available to state SNS Coordinators and other approved persons on an SNS password-protected Web site.

Since just-in-time instructions for using the ventilators may not be sufficient, prior familiarization with the ven-



Fig. 2. Strategic National Stockpile Ventilator cases and kits. Uni-vent Eagle 754 kit closed (A) and open (B). LP10 kit closed (C) and open (D).

Table 1. Ancillary Items in the SNS Ventilator Kits

	Uni-Vent 754 Kit	LP10 Kit
Alternating current (AC) adapter	Yes	Built in
12-volt direct-current power cable	Yes	No
User manual/VHS/DVD	Yes	Yes
Cloth carrying case and shoulder strap	Yes	No
1 adult circuit	Yes	Yes
1 pediatric circuit	Yes	Yes
1 bacterial filter	Yes	Yes
1 heat-and-moisture exchanger	Yes	Yes
1 oxygen reservoir kit	Yes	Yes
1 PEEP valve	Built in*	Yes
1 oxygen enrichment kit	Built in*	Yes
1 oxygen elbow for $F_{IO_2} < 40\%$	Built in*	Yes
5 inlet filters	Yes	Yes
Kit case	Yes	Yes

*Positive end-expiratory pressure (PEEP) and fraction of inspired oxygen (F_{IO_2}) controls are built into the Uni-Vent 754.

SNS = Strategic National Stockpile

VHS = video home system video cassette tape

DVD = digital video disc

tilators is important for end-users, such as respiratory therapists and other critical care personnel. In order to facilitate opportunities for this type of training, the SNS has collaborated with organizations such as the American Association for Respiratory Care and the Society of Critical Care Medicine to provide hands-on training with SNS ven-

Table 2. Characteristics of the Strategic National Stockpile Ventilators

Characteristic*	Uni-Vent 754	LP10
Weight (kg)		
Ventilator	6	16
Ventilator kit	15	28
Dimensions (cm)		
Ventilator	30 × 23 × 12	25 × 37 × 34
Ventilator case	26 × 59 × 45	38 × 72 × 51
Battery life (h)		
When using ambient air	3	≤ 1
When using gas from a tank	12	ND

*All values are appropriate

ND = no data available



Fig. 3. Strategic National Stockpile ventilator air cargo container.

tilators. The SNS will continue to work with these and other professional organizations and societies to help make this training available.

The ventilator kits are stored in specially designed cargo containers (Fig. 3) for efficient deployment. Each container holds 28 Uni-Vent Eagle 754 ventilator kits or 10 LP10 ventilator kits. Additional ancillary ventilator supplies, such as patient circuits and bacterial filters, are also part of the SNS Managed Inventory and may be requested from the SNS. Other related airway management products are also available in the 12-hour Push Package and/or from Managed Inventory, including endotracheal tubes, manual pulmonary resuscitator bags, laryngoscopes, oropharyngeal airways, nonbreather masks, O₂ nasal cannulas, por-

table suction machines, and suction catheters. Some of these items are available in various adult and pediatric sizes. Pulse oximeters, in-line suction catheters, metered-dose-inhaler adapters, and oxygen are not included in the SNS inventory at this time. Other respiratory-related products available in Managed Inventory include medications for sedation, analgesia, and neuromuscular blocking. It is important for end users to anticipate and request additional ancillary and airway management supplies as soon as possible, since these items are usually not sent automatically.

Ventilator Maintenance and Recovery

Effective maintenance of ventilators in the SNS includes proper storage, charging, and periodic preventive servicing. Maintenance of the SNS ventilators is conducted by DSNS logistics staff in conjunction with the manufacturers. The DSNS technicians ensure that periodic charging of the ventilator batteries and other scheduled maintenance occur according to the manufacturer's guidelines, thus ensuring that proper operation and warranty requirements are met. The ventilators are considered recoverable assets, and the SNS will attempt to recover this equipment when no longer needed in the affected area. To prevent possible transmission of infectious materials to the DSNS recovery team, the end-users of the ventilators (ie, hospitals) will be responsible for ensuring the ventilators are sanitized according to their facility's infection control guidelines, prior to SNS recovery. All of the ancillary equipment used with the ventilators is disposable, and only the ventilators, electrical cords, and kit cases will be recovered.

Summary

The rapid distribution of specialized life-saving equipment and medical countermeasures during a national emergency is one of the major responsibilities of the SNS. The need for newer and better medical materiel in the SNS is routinely being evaluated by various subject matter experts. The hope is that these items will never be needed, but continued extensive preparedness efforts will help to ensure that the SNS will be ready to respond when requested.

REFERENCES

1. US Department of Health and Human Services. Radiation event medical management: strategic national stockpile. <http://www.remm.nlm.gov/sns.htm>. Accessed October 16, 2007.

STRATEGIC NATIONAL STOCKPILE: OVERVIEW AND VENTILATOR ASSETS

2. US Department of Health and Human Services. Supplement 7: antiviral drug distribution and use. <http://www.hhs.gov/pandemicflu/plan/pdf/S07.pdf>. Accessed October 16, 2007.

3. US Department of Health and Human Services. Project XTREME: cross-training respiratory extenders for medical emergencies. <http://www.ahrq.gov/prep/projxtreme>. Accessed October 16, 2007.

Discussion

Daugherty: Could you comment briefly on what personal protective equipment may or may not be available in the Strategic National Stockpile?

Malatino: The only personal protective equipment currently in the Stockpile are N95 respirators. Other personal protective equipment, such as

face shields and gowns, are not currently part of the Stockpile inventory.

Daugherty: Are those supplies in vendor Managed Inventory or in the push packages? Do respirators and gloves need to be requested separately from Push Package supplies?

Malatino: Masks are in both the 12-hour Push Packages and the Managed Inventory. If a state was only request-

ing gloves, then these items would probably be sent from Managed Inventory.

Wilgis: Eileen, just a quick question. What is the annual cost for managing the CDC [Centers for Disease Control and Prevention] stockpile?

Malatino: Management runs in the millions and is part of the annual budget of the Stockpile.



12-hour Push Package configured for shipment
Courtesy Centers for Disease Control and Prevention