



Veterans Health
Administration

Patient Safety Alert

Issued by VHA Central Office

AL18-01

March 12, 2018

Item: Use of thermal fuses may reduce the severity of fires involving home oxygen delivery systems

NOTE: This version has been modified for Internet release.

Specific Incident: Between October 2006 and October 2016, the VA National Center for Patient Safety (NCPS) received 746 patient safety reports from VA facilities describing burns to Veterans or fires involving home oxygen delivery systems. Some of these reports describe a fire or extended damage to the residence or adjacent apartments that was not confined to the Veteran or home oxygen delivery system. While fires are reported from a small percentage of the total number of patients receiving home oxygen therapy, action can be taken that may reduce the likelihood that a fire involving a home oxygen delivery system will result in death or property damage.

Thermal fuses can be inserted in line with a patient's home oxygen tubing. A thermal fuse melts when heated and blocks the flow of oxygen in the delivery system tubing in the event of a fire. Stopping the flow of oxygen removes a major source of fire acceleration, potentially preventing ignition of the oxygen source or nearby materials.

General Information: Home Oxygen Delivery Systems
Home oxygen delivery systems consist of an oxygen source connected to a length of plastic tubing ending in a nasal cannula or mask (that is worn by the patient). Oxygen acts as an accelerant, which causes nearby material to ignite more easily and burn more intensely. Oxygen is most commonly provided through an oxygen concentrator but may also be provided from a gas cylinder or liquid reservoir. Patients receiving home oxygen therapy may use a combination of these sources to meet their needs and all three sources pose a risk of accelerated combustion.

Home Oxygen Fires in VHA
NCPS has received over 70 reports of fires involving home oxygen delivery systems each year since 2010. Although smoking is the leading ignition source reported for fires involving home oxygen delivery systems, numerous other ignition sources have also been reported. The following ignition sources have been reported to NCPS and are listed in order of reported prevalence from highest to lowest:

- Smoking
- Open flames (e.g., candles, gas stoves, incense, etc.)
- Power tools
- Power strips
- Static electricity
- Portable electronic devices
- Grills/barbecues
- Welding
- Electric heaters
- CPAP devices
- Pilot lights
- Firearms

Identifying risks associated with home oxygen therapy such as fires is a 2018 National Patient Safety Goal (NPSG) of The Joint Commission (15.02.01). Additional resources that focus on preventing fires involving home oxygen delivery systems are included in the Additional Information section.

Oxygen Thermal Fuses

Thermal fuses are briefly described in the Specific Incident section. They are sometimes referred to as fire-safe, oxy-safe, or fire-break valves and may reduce the consequences of fires involving home oxygen delivery systems.

A thermal fuse **will not prevent all burns** to the patient's face, neck, or internal airways, especially those burns that occur at the onset of a fire and before activation of the thermal fuse. However, a thermal fuse may decrease the severity of those burns, the potential for additional burns to the patient and family members, and/or damage to the surrounding and neighboring buildings.

Original thermal fuses worked only when installed in one orientation into the oxygen tubing (i.e., unidirectional). This allowed the thermal fuse to be installed in the wrong orientation, in which case it provided no benefit in the event of a fire. Some thermal fuses that are now available work regardless of which direction they are inserted into the oxygen line (i.e., bidirectional). This bidirectional design eliminates the potential for misconnection into the home oxygen tubing. A diagram showing the recommended thermal fuse positioning in a home oxygen delivery system is provided in Attachment 1.

It is important to be clear about the limitations of thermal fuses to prevent a false sense of security. NCPS has received reports of fires involving home oxygen delivery systems in which patients believed it was safe to smoke as long as they had a thermal fuse in place. **A thermal fuse does not make it safe to smoke while using oxygen.** While a thermal fuse is designed to block

the flow of oxygen in case of a fire, removing a major source of fire acceleration, it should be emphasized that thermal fuses will not prevent burns to the face, neck, and airways if the ignition occurs at or near the nasal cannula. A thermal fuse does not prevent the start of a fire nor extinguish a fire; it simply limits the flow of oxygen that might continue to feed the fire.

Actions:

1. By Close of Business (COB) March 19, 2018, the **Medical Center Director** shall ensure that staff involved with the prescription, supply, and monitoring of home oxygen therapy are made aware of this Patient Safety Alert. Such staff may include, but are not limited to, primary care providers, respiratory therapists, pulmonologists, contracting staff, home oxygen coordinators, home care staff, prosthetics staff, IntegratedEthics® staff, occupational safety and health staff, the home oxygen delivery system vendor staff, and appropriate VISN level staff.

2. By COB April 6, 2018:

If a VISN utilizes a network level contract(s) for home oxygen delivery, the **VISN Network Director** shall ensure that formal processes have been started to ensure that home oxygen vendor contracts are written or amended to incorporate the mandatory requirements for thermal fuses and reporting of fires involving home oxygen delivery systems listed in Attachments 2 and 3.

If a VHA facility utilizes a local contract(s) for home oxygen delivery, the **Medical Center Director** shall ensure that formal processes have been started to ensure that home oxygen vendor contracts are written or amended to incorporate the mandatory requirements for thermal fuses and reporting of fires involving home oxygen delivery systems listed in Attachments 2 and 3.

If a VHA facility does not utilize a third party home oxygen vendor, the **Medical Center Director** shall ensure that the facility has formally started to implement the mandatory requirements for thermal fuses and reporting of fires involving home oxygen delivery systems listed in Attachments 2 and 3.

3. By COB September 14, 2018:

If a VISN utilizes a network level contract(s) for home oxygen, the **VISN Network Director** shall ensure that home oxygen vendor contracts have been written or amended to incorporate the mandatory requirements listed in Attachments 2 and 3.

If a VHA facility utilizes a local contract(s) for home oxygen delivery, the **Medical Center Director** shall ensure that home oxygen vendor contracts

have been written or amended to incorporate the mandatory requirements listed in Attachments 2 and 3.

If a VHA facility does not utilize a third party home oxygen vendor, the **Medical Center Director** shall ensure that the facility has processes in place to meet the mandatory requirements listed in Attachments 2 and 3.

NOTE: VHA is currently transitioning to the Joint Patient Safety Reporting system (JPSR) as the expected VHA Patient Safety Information System for patient safety incident reporting. If your facility has not yet transitioned to JPSR, fires involving home oxygen delivery systems shall be reported using WebSPOT until the transition is completed. If your facility has transitioned to JPSR, duplicate reporting of fires involving home oxygen delivery systems in WebSPOT is not required unless a root cause analysis is being conducted.

4. By COB September 21, 2018, the **Patient Safety Manager** must document on the VHA Alerts and Recalls Web site (<http://vaww.recalls.ncps.med.va.gov/WebRecalls/Recalls.html>) that medical center leadership has reviewed and implemented these actions. Facilities that do not prescribe home oxygen therapy may mark this Alert as “not applicable,” including their justification.

NOTE: When closing out this Patient Safety Alert on the VHA Alerts and Recalls Web site, it is recommended that facilities enter the total number of patients currently enrolled in home oxygen therapy in the “estimated number of patients affected per month” field.

Additional Information: The following home oxygen safety resources include guidance on smoking cessation programs, patient and caregiver education, home oxygen risk assessment, environmental assessment, oxygen safety agreements, and ethical considerations.

- VHA Directive 2006-021: *Reducing the fire hazard of smoking when oxygen treatment is expected.*
http://vaww.va.gov/vhapublications/ViewPublication.asp?pub_ID=1407

NOTE: While this directive has an expiration date of May 31, 2011, it should still be followed until the directive is either updated or replaced.

- *Home Oxygen Safety: A Veteran’s Story*
The Northern Arizona VA Health Care System, in conjunction with the National Fire Safety Organization, has produced a home oxygen safety video, which is available at the NCPS Internet site below. This video contains a Veteran’s story and shared personal experience with fires

involving home oxygen delivery systems. All patients, caregivers, and staff involved with home oxygen are encouraged to view this video.

<http://www.patientsafety.va.gov/veterans/oxygen.asp>

- *The Joint Commission Standards BoosterPak™ for home oxygen safety.*
<https://customer.jointcommission.org/contentPublishing/Pages/SBPaksNew.aspx>

NOTE: You will need a *The Joint Commission Connect™* account. If you do not have an account, you can access this reference by creating a Guest account using your local facility.

- *Ethical considerations that arise when a home care patient on long term oxygen therapy continues to smoke.* National Ethics Committee of the Veterans Health Administration.

This report may be obtained by emailing vhaethics@va.gov to request access.

Sources:

Issue briefs and safety reports submitted to NCPS from VA medical centers

References:

- 1) US Department of Veterans Affairs, Veterans Health Administration. (May 2006). VHA Directive 2006-021: Reducing the fire hazard of smoking when oxygen treatment is expected.
http://vaww.va.gov/vhapublications/ViewPublication.asp?pub_ID=1407
- 2) The Joint Commission. (2018). National Patient Safety Goals Effective January 2018. Home Care Accreditation Program. 2018 National Patient Safety Goal 15.02.01: Identify risks associated with home oxygen therapy such as home fires.
https://www.jointcommission.org/assets/1/6/NPSG_Chapter_OME_Jan2018.pdf
- 3) Ahrens, M. (August 2008). National Fire Protection Association (NFPA). Fires and burns involving home medical oxygen.
<http://www.nfpa.org/~media/files/news-and-research/fire-statistics/major-causes/soxygen.pdf?la=en>

Attachments:

- 1) Thermal fuse positioning diagram
- 2) Mandatory requirements for use of thermal fuses
- 3) Mandatory requirements for reporting fires involving home oxygen delivery systems

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Contributors: NCPS acknowledges the contributions of the National Pulmonary/Critical-Care/Sleep Medicine Service, National Prosthetics and Sensory Aids Service, National Center for Ethics in Health Care, Office of Occupational Safety, Health, and Green Environmental Management Systems (GEMS) Programs, the VA medical center and VISN subject matter experts, and the field reviewers that contributed to the development of this Alert. While complete agreement between subject matter experts was not always reached, the content of this Alert was informed by the input, analysis, and thorough discussion from the expert contributors and reviewers.

Contact: The National Center for Patient Safety (NCPS), (734) 930-5890

ATTACHMENT 1: Thermal fuse positioning diagram

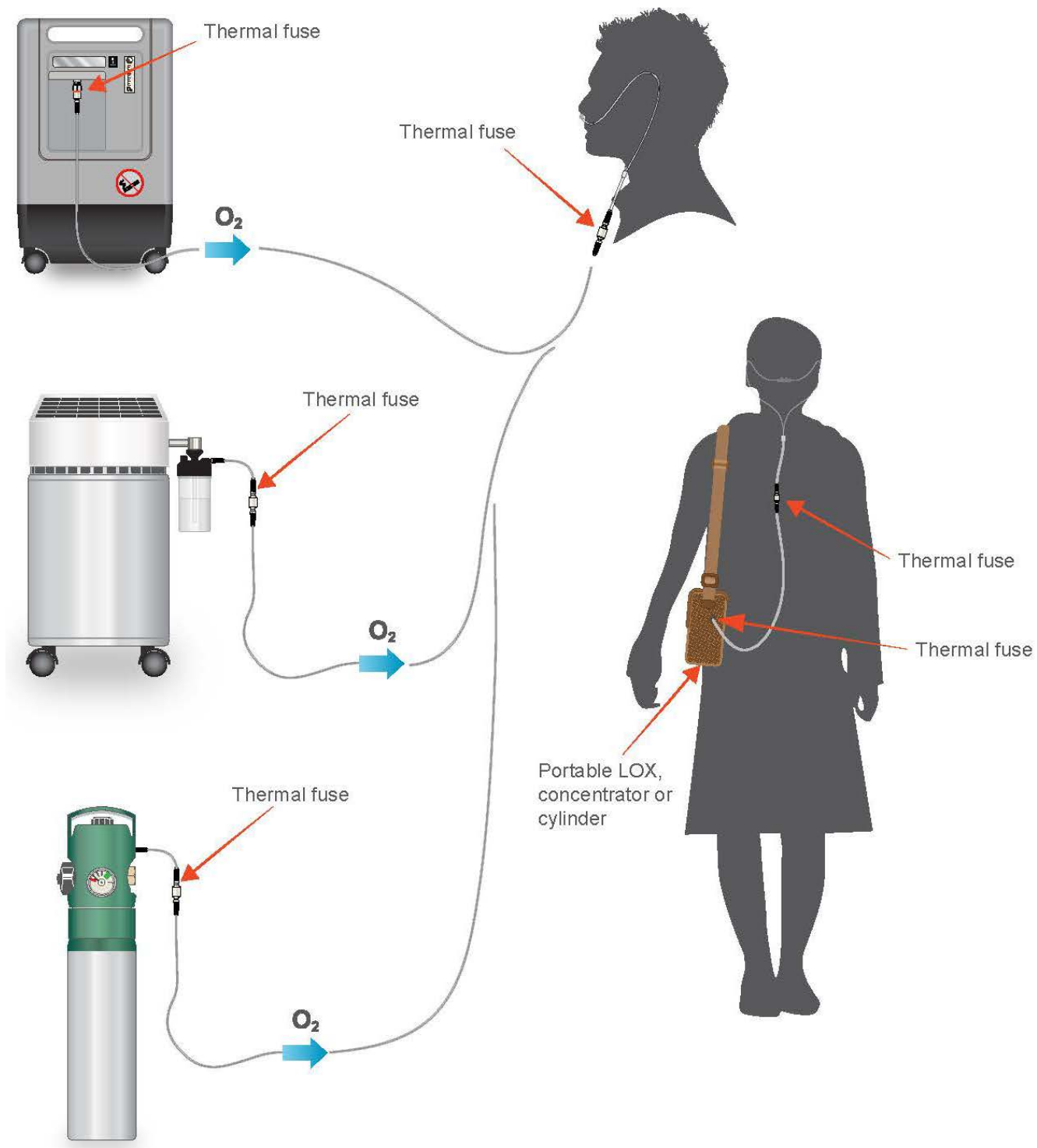


Diagram provided by and used with permission of bpr Medical Gas Control.

ATTACHMENT 2: Mandatory requirements for use of thermal fuses

Mandatory requirements for use of thermal fuses are as follows:

- a. Thermal fuses must be provided for all patients on home oxygen therapy unless there is a documented clinical contraindication (e.g., patients using heated humidity, patients with flow rates in excess of 25 Liters per minute, patients with behavioral conditions that make use of thermal fuses impractical). If thermal fuses are not provided due to clinical contraindication, this must be documented in the patient's medical record.
- b. Two thermal fuses must be provided and installed in each home oxygen delivery system (one at the patient end and one at the oxygen source). This must be done for the patient's primary oxygen therapy equipment as well as any portable oxygen therapy equipment.
- c. Thermal fuses are not required for portable pulse dose/intermittent oxygen therapy equipment when the equipment does not have a continuous flow setting.
- d. Thermal fuses provided must work regardless of their orientation in the oxygen tubing (bidirectional) or have a design that prevents them from being installed in the wrong orientation (e.g., source end of thermal fuse has threads or bayonets that make backwards installation impossible).
- e. Existing unidirectional thermal fuses that are capable of being installed in the wrong orientation must be replaced at the next scheduled home oxygen visit or sooner if possible.
- f. At the time of installation, education must be provided to the patient describing the proper use and placement of thermal fuses, including that a thermal fuse does not make it safe to smoke, be near people who are smoking, or be near any source of sparks or flame while using oxygen.
- g. Thermal fuses must be replaced at the end of their expected life per manufacturer's guidelines.
- h. Thermal fuses must be replaced if actuated or involved in a fire.

ATTACHMENT 3: Mandatory requirements for reporting fires involving home oxygen delivery systems

All incidents of fires involving home oxygen delivery systems shall be reported using the VHA Patient Safety Information System. **Do not include patient or provider identifiable information in the report.**

When classifying incidents of fires related to home oxygen delivery systems in JPSR, the following classification must be used in the Event Classification section.

Event Type: Environmental Events

Event Sub-Type: Burn incurred from any source in course of patient care process

Event Detail: Burn or fire related to home oxygen delivery system

The following information must be collected and reported by the VHA facility when a home oxygen fire occurs.

Section 1: To be collected by the home oxygen vendor and provided to the local VHA facility or provided by the local VHA facility if a third party oxygen vendor is not used.

- a. What was the reported cause of the fire (primary ignition source)?
- b. Where did the fire originate (e.g., kitchen, bedroom, vehicle, patio, store)?
- c. What date and time did the fire occur?
- d. What was the first item that ignited (e.g., nasal cannula, clothing, bedding)?
- e. Describe the extent of injury to the patient, family, and others.
- f. Describe the extent of property damage.
- g. How many thermal fuses were in use and where were they installed in the home oxygen delivery system or tubing?

Section 2: To be collected by the local VHA facility.

- h. Has the patient experienced a home oxygen related fire before?
- i. Provide the patient's full problem list from the electronic health record.
- j. Provide the patient's full medication list (medication names) from the electronic health record.
- k. Describe any other information that contributes to understanding of the event.