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Introduction to Powered Air Purifying Respirators (PAPRs)

Protection

A powered air purifying respirator is a device that protects the wearer from breathing contaminated air. These types of respirators do not fit tightly to the face and use a blower to deliver filtered air to the wearer. The function of a PAPR protects the wearer in three ways. The first, is by drawing air from the surrounding area through a filter. This clean air is delivered through a tube to the hood, worn by the user. The second layer of protection is pressure of the delivered air as it leaves the hood. This helps remove exhaled carbon dioxide and prevents the contaminated room air from entering the hood. Lastly, the hood helps to protect the wearer's eyes, nose, and mouth from splash and splatter of contaminated bodily fluids.

Uses

There are many uses for PAPRs throughout many industries. We use them in healthcare to help prevent against the contamination of our team members from contagious airborne diseases and fumes from hazardous medication spills.

Limitations

Our PAPRs do not deliver supplemental oxygen and cannot be used where oxygen levels are expected to be below 19.5%, normal room air level. PAPRs must be used with the parts and pieces they were designed and approved with to ensure proper protection. The exhaled air from the wearer is not filtered before being released from the hood, and therefore, the user must wear a procedure mask over their mouth and nose while wearing the PAPR. Additionally, to help prevent asymptomatic transmission, all team members wearing a PAPR should also wear a procedure mask.

OSHA Regulations

Under the United States Department of Labor, the Occupational Safety and Health Administration regulates the requirements for a respiratory protection program. OSHA standard 1910.134 addresses respiratory protection that includes many different respirators. Below are the key components, regarding PAPR usage:

- Each team member expected to wear a respirator must complete the OSHA respiratory questionnaire. This must be completed and reviewed by a physician prior to wearing a PAPR.
- This questionnaire must be completed on an annual basis, for those team members expected to need to wear a PAPR during their normal work routine, per Spectrum Health guidelines.
- If a respirator is required for use by the employer, the employer must provide a respirator to each employee expected to need one. Many team members will require the use of a respirator. Powered air purifying respirators should be reserved for those team members that cannot safely wear a tight-fitting respirator mask.
**PAPR Tips for Success**

- Team Members must have completed the annual respiratory questionnaire on Ready set and be reviewed by physician to use any respirator/PAPR
- PAPRs operate by filtered positive pressure flow, therefore a tight fit/seal is not needed or expected
- A procedure mask is **required** to be worn under the PAPR hood, to protect staff between users from contamination by asymptomatic team members
- 3M filters are good for 5 months in the unit unless visibility soiled or can no longer pass a flow test
- The TR-6530N, Purple and Yellow label, is required for hazardous medication spills/cleanup and is a **onetime use** item because of the charcoal filter protection needed
  - If needed for a hazardous cleanup a new, in manufacture package filter should be obtained
- Inspect PAPR each use, checking for signs of damage and Battery level, if an issue is present report to the PPE Coach or designee
- A flow test (with flow meter) and an occlusion test with hand over the hose connection must be completed each time the PAPR is used
  - Flow Meter itself, not the PAPR unit must be level, up and down at eye level to complete flow test
  - The Occlusion test takes about 30 sec for unit to alarm then another 30 seconds for unit to recover self
- Put on PAPR unit, tighten straps to ensure correct fit/unit will not dislodge while in use
- If at any time unit alarms/turns off during use, leave environment immediately

**Whirlpool Specific Tips**

- Size the backpack harness for correct/comfortable fit prior to attaching blower unit
- Tape corners of bag down first, then have user flatten bag over face shield, removing any creases to ensure adequate visibility, while a second team member tapes excess material behind users head
- Whirlpool PAPR hoods are single use only, discard after use
- Only use battery with more than three lights for extended use, 2 lights are fine for quick, 10 min use

If any part of PAPR fails inspection or is damaged and needs to be replaced **DO NOT USE**, contact the PPE coach or designee. Replacement parts can be obtained from Supply Chain following standard practice.

If you have any questions regarding correct use of PAPR or if the PAPR is approved for intended environment/use, reach out to the PPE coach or designee.

**Versaflo PAPRs**

Spectrum Health currently uses two different models of the 3M Versaflo PAPR to provide respiratory protection against airborne diseases. The pictures below are representative of the parts of the Versaflo PAPR system. Following the pictures is an outline of the key differences of the two models (TR-600; TR-300+). 3M filters are good for 5 months from the date of manufacture, indicated by a sticker on the filter, or when they are visibly soiled or can no longer pass a flow test.
For respiratory protection when cleaning up spills of hazardous medication, you need model number TR-6530N. This filter cartridge has two layers of protection. The first layer is a high efficiency particulate filter. The second layer is a charcoal filter, which protects against harmful vapors from the hazardous medication. You can easily identify this filter cartridge by its yellow and purple label and the model number, as shown below.

- The charcoal portion of this filter deteriorates rapidly and should be considered unusable once finished with the spill cleanup.
# 3M Versaflo TR-600 & TR-300+ PAPR Startup

<table>
<thead>
<tr>
<th>Seq. No</th>
<th>Task Description:</th>
<th>Key Point / Image / Measure (what good looks like)</th>
</tr>
</thead>
</table>
| 1.      | **Inspect the VERSAFLO PAPR system.**  
  • Motor/blower. Inspect for cracks, holes, damage to user interface panel and belt attachments.  
  • Battery pack. Confirm case is intact. Press TEST button on pack to confirm charge is sufficient for duration of the work period.  
  • Breathing tube. Examine breathing tube for tears, holes or cracks. Bend the tube to verify that it is flexible and not showing signs of wear. Ensure the o-rings located at both ends of the breathing tube are present and intact.  
  • Filter/cartridge. Closely inspect filter/cartridge plastic housing including the corners and latches, outer rectangular barrier, and inner circular filter seal gasket for cracks, tears, cuts, distortion, indentations or debris. Replace filter/cartridge if damaged. If the filter/cartridge has been mishandled or dropped, re-inspect fully. If you have any concern, contact 3M Technical Service for guidance.  
  • Headgear. Inspect the headgear for tears, cuts, loose stitching, cracks, discoloration or other signs of damage. | ![Push ‘Test’ button to confirm battery charge = 5 bars = 80-100%](image) |
| 2.      | **Perform flow check.**  
  • Insert air flow indicator TR-971 into the outlet on the VERSAFLO motor/blower unit.  
  • Start motor/blower. Run for 1 minute.  
  • With the airflow indicator TR-971 in a vertical position, bottom of the floating ball must be at, or above, the minimum flow level indicated on airflow indicator chart for your ‘zone’. If not above minimum level, respirator system must not be used until evaluated and repaired. |  |
• Remove air flow indicator TR-971 and perform low flow alarm test per VERSAFLO User Instructions.

  • **Low flow alarm check**: Check the low airflow alarm by simulating a low airflow condition. With the motor/blower on:
  • Remove the airflow indicator and tightly cover the outlet of the motor/blower with the palm of your hand. The motor should automatically speed up, attempting to compensate for the low airflow condition.
  • Continue to press your palm tightly against the end of the outlet, making a tight seal.
  • **TR-600** In less than approx. 30 seconds, the unit will sound an audible and vibratory alarm, and the bottom bar on the filter loading/low flow indicator will flash red.
  • **TR-300+** In less than 30 seconds, the unit will sound an audible alarm and the red fan shape LED will flash.
  • Remove your hand from the outlet of the blower/motor. In less than approx. 30 seconds, the audible alarm and the flashing red LED should both stop when the motor returns to the selected speed.
  • **NOTE**: If the low airflow alarm fails to sound, do not use the unit. Contact 3M Technical Service.
3. • Attach motor/blower to belt or backpack.  
   • Insert the end of the breathing tube with the two small prongs into slots in the motor/blower air outlet. Twist the breathing tube ¼ turn to the right (clockwise) to lock.  
   • Attach breathing tube to headgear. Push the QRS end of the breathing tube (blue pinch clip) onto the air inlet of the headgear. Headgear will secure with a distinct click. Gently pull to confirm a secure connection.

4. **Don Versaflo system**  
   • Turn on motor/blower by pressing and holding blue on/off button.  
   • Use belt to attach PAPR to wearer.
Whirlpool PAPR

Spectrum Health partnered with Whirlpool to develop a PAPR system to use in response to the COVID-19 pandemic. These PAPRs have been placed in strategic locations throughout the system. The pictures below are representative of the parts needed to complete the setup of a Whirlpool PAPR system. Filters for these PAPRs are good for three months from the date they are opened, when they become visibly soiled, or can no longer pass a flow test.

| Shoulder Harness | Blower and Filter Assembly | Battery |

**DOFFING PAPR:**
- Remove Hood from back to front.
- Remove PAPR assembly and place in designated “dirty” area.
- Doff remaining PPE, per procedure.
- Disinfect all parts, except for filter, and place PAPR in designated “clean” area.
- Remove battery from PAPR and place on charger.

* • Pull headgear overhead and adjust. Adjust following the user instructions for the specific headgear.*
Whirlpool PAPR Startup

This device is approved for use by the National Institute for Occupational Safety and Health (NIOSH). This device does NOT supply supplemental oxygen and cannot be used in areas with less than 19.5% oxygen. The following steps will ensure proper function of the Whirlpool PAPR.
### Tips for success:
- Size the backpack harness for fit, then attach blower/filter assembly.
- Size the fit of the face shield at the beginning of the shift to assure it's ready in emergent situations.
- Straw must be bent at 45-degree angle for flow test.
- Battery switch must be in the on “-” position when charging.

### Key points to remember
- Be sure to adjust shoulder harness and headgear straps to allow for snug fit.
- Do not use a battery with less than 3 green lights, when needed for extended use.
- Leave hazardous area immediately if PAPR equipment begins to fail (reduction in airflow, tear in hood).

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verify battery has charge level of 3 green lights or higher</td>
<td><img src="image" alt="Battery Charge Level" /></td>
</tr>
<tr>
<td>Connect power cord from PAPR to battery</td>
<td><img src="image" alt="Power Cord Connection" /></td>
</tr>
<tr>
<td>Install Battery</td>
<td><img src="image" alt="Battery Installation" /></td>
</tr>
<tr>
<td>Turn on Battery</td>
<td><img src="image" alt="Battery Turn On" /></td>
</tr>
<tr>
<td>Perform airflow check</td>
<td>Bend the straw 90 degrees at the corrugated section. Hold the face shield upside down, so the air outlet is pointing up. Place the long end of the straw into the airflow tube, as far as it will go. If the airflow lifts the straw that creates a gap between the end of the tube and the short end of the straw greater than 1 inch, the airflow is adequate for use. See illustration.</td>
</tr>
<tr>
<td>Don the PAPR</td>
<td><img src="image" alt="Wearing PAPR" /></td>
</tr>
<tr>
<td>Place hood over headgear</td>
<td><img src="image" alt="Hood Placement" /></td>
</tr>
<tr>
<td>To ensure good visibility, make sure hood is held firmly against visor, as helper tapers the excess securely to back of hood.</td>
<td><img src="image" alt="Hood Adjustment" /></td>
</tr>
<tr>
<td>DOFFING PAPR: Remove Hood from back to front, away from body and discard. Remove PAPR assembly and place in designated “dirty” area. Doff remaining PPE, per procedure Disinfect all parts, except for filter, and place PAPR in designated “clean” area. Remove battery from PAPR and place on charger.</td>
<td></td>
</tr>
</tbody>
</table>
Cleaning Versaflo PAPR

1. Sanitize Hands
2. Don PPE
3. Prep cleaning area
4. Wipe outside of PAPR hood with approved hospital disinfectant, allowing for adequate kill time per disinfectant direction
5. Wipe inside of PAPR hood with a NEW approved hospital disinfectant wipe, hang cleaned hood to dry, allowing for adequate kill time per disinfectant direction
6. Wipe down PAPR hose/unit with hospital approved disinfectant allowing for adequate kill time
7. Placed cleaned PAPR unit in designated clean holding area
   a. Check PAPR Battery for charge level, replace battery with fresh charged battery if less than 50% charged
8. Disinfect dirty PAPR holding area ie. pink basin with approved hospital disinfectant, allowing for adequate kill time per disinfectant direction
9. Doff PPE
10. Sanitize Hands

Cleaning Whirlpool PAPR

1. Sanitize Hands
2. Don PPE
3. Prep cleaning area
4. Throw away PAPR hood
5. Wipe down PAPR face shield, outside and inside, with approved hospital disinfectant, allowing for adequate kill time per disinfectant direction
6. Wipe down PAPR hose/PAPR unit with approved hospital disinfectant allowing for adequate kill time per disinfectant direction
7. Place cleaned PAPR unit in designated clean holding area
   a. Check PAPR Battery for charge level, replace battery with fresh charged battery if less than 50% charged
8. Disinfect dirty PAPR holding area ie. pink basin with approved hospital disinfectant, allowing for adequate kill time per disinfectant direction
9. Doff PPE
10. Sanitize Hands
Daily PAPR Survey Standard Work

From the InSite Homepage, select the “COVID-19 Information Center” mosaic.

COVID-19 Information Center: The steps we are taking and resources for you

**NEW INFORMATION: Week of Nov. 10, 2020**
- **Command Center Status:** Yellow, Limited Impact to Operations: Phase Activated
  - ICU census remains high in many of our hospitals across SWAM.
  - Spectrum Health has recommenced the Senior Resource Allocation Committee (SRAC), which earlier in the pandemic fueled the development of the **Spectrum Resource Centers**. We hope that we can meet the highest standards regarding resource allocation. But if we do, this committee of experienced clinicians, professionals and leaders representing our communities is prepared to make them in the most ethical, equitable, and human way possible.

- To meet surging demand in SWAM hospitals, we are asking team members to voluntarily pick up shifts in our adult inpatient units. See a list of opportunities and to sign up: **Addison St. Personnel** Refer to these FAQs.
- Spectrum Health team members who are required to wear an N95 respirator for their role must remove facial hair that prevents a proper fit in line with the CDC-recommended facial hair regulations. Refer to these FAQs.
- **Take care of yourself:** All team members have free access to **Healthwise**, the state-of-the-art mobile app. Use **services** and/or **Train Member Resources** for support.

**FAQs, resources & daily updates**
- Clinical Education and Training
- User Interface Resources, Instructors, Screening, Training
- Virtual Health
- Daily PAPR Survey
- Resource Management
- Preventive Resources
- Telehealth Resources
- COVID-19 Resources
- Standard Work Resources
- Pandemic Resource
- COVID-19 Survey
- COVID-19 Return To Work Algorithm
- Virtual Training Tools
- Virtual Training
- COVID-19 Testing Survey
- COVID-19 Testing
- Daily Survey
- Spectrum Health Age Screening and Reporting

Click the “Daily PAPR Survey” button.
Select today’s date from the pop-up calendar.

Select your hospital from the dropdown list.

Select your unit from the dropdown list.

Continue to page 3 of 3
• If you have more than one unit to report, you will need to complete the survey for each unit separately.
• Only submissions for the current day will be accepted.
• Questions and comments can be directed to Kenneth.Shawl@spectrumhealth.org

Information will be posted to the COVID-19 Supply Chain and Pharmacy Dashboard. Hovering over the number of PAPRs will open a window showing a detailed list.