

The logo for Technology for Living features the word "technology" in a blue sans-serif font, with a yellow gear icon replacing the letter "o". This is followed by "for living" in a dark blue sans-serif font, with a blue house icon replacing the letter "i".

technology for living

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PROP Pre – Reading Package

Technology for Living (**PROP**)

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(Southbridge Business Park)

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Welcome to the Provincial Respiratory Outreach Program (PROP)! PROP is a peer-driven, not for profit program that originated in 2001 and operates under the direction of Technology for Living (TFL). We provide services and support at no charge to our Patients (Members). Being peer-driven means majority of our board of directors are Members of the program so they can better advocate for Members of the program with our resources. Our community model of care is "Member Directed" which means that Members are an active participant in their own care.

We have 7 Respiratory Therapists and over 850 Members on our program. We service the entire province of British Columbia with annual in-person assessments, respiratory education (machines, supplies, diagnostic procedures...), phone support and facility to home discharges.

What to expect

Please arrive promptly at 9:30 am, and your Preceptor will greet you at the front door. A tour of the office, warehouse, and Biomed workshop will be provided, alongside a review of the various ventilators, both invasive and non-invasive, and the commonly used modes for our members.

We employ the term "Members" to foster a non-medicalized perspective on their lives outside healthcare facilities. During your rotation, efforts will be made to arrange a home visit. **Dress code is smart casual (no graphic tees or ripped jeans)**, and we recommend comfortable clothing. Don't forget to bring water and a snack. **Your day will conclude at 4:30 pm.**

At PROP we primarily collaborate with members who have neuromuscular disorders that impact their respiratory system, necessitating respiratory support. Clinically we offer support in many ways:

- **Invasive Ventilation via Tracheostomy tube**
 - Assist Control Ventilation
 - Volume
 - Pressure
 - Pressure Support
 - SIMV

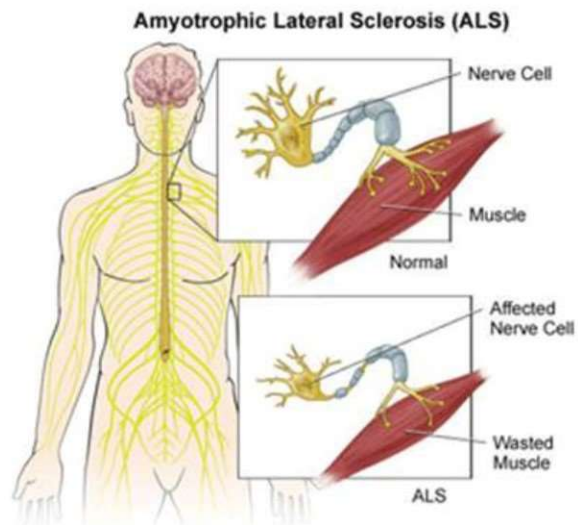
- **Non-Invasive Ventilation (BiPAP)**
 - Spontaneous timed mode
 - Spontaneous mode
 - iVAPS mode
 - AVAPS mode
 - Pressure control Ventilation (PCV)
 - Mouth Piece Ventilation (MPV)

Examples of neuromuscular disorders commonly seen at PROP:

Amyotrophic Lateral Sclerosis (ALS)

Amyotrophic Lateral Sclerosis (ALS), formerly known as Lou Gerig's disease, is a neurological disorder that affects motor neurons. Neurons experience protein changes which causes degeneration of the upper and lower motor neurons leading to loss of function. Eventually, in people with ALS, the brain loses its ability to initiate and control voluntary movements such as walking, talking, chewing and other functions, as well as breathing.

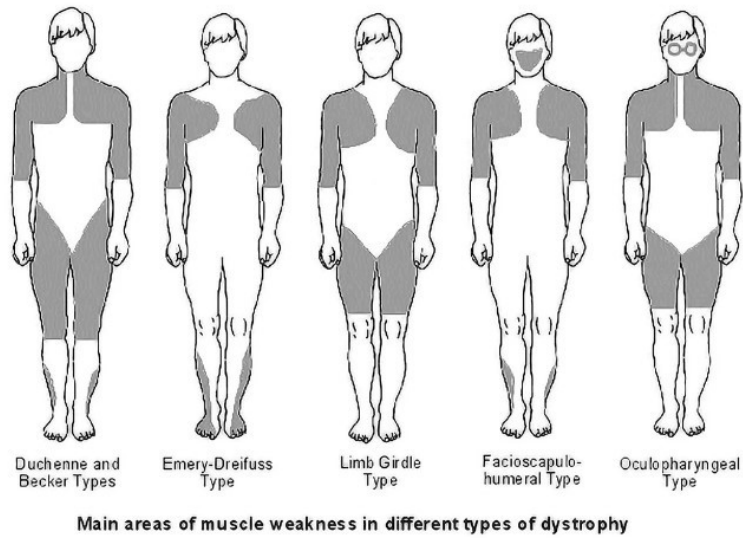
- Incidence increases with age
- Symptoms usually begin in the limbs and progress centrally
- Poor prognosis, death usually within three years
- No cure
- Does not affect mental function or the senses
- Is not contagious



Muscular dystrophy (MD)

Muscular dystrophy (MD) is a group of diseases that cause progressive weakness and loss of striated muscles. In muscular dystrophy, abnormal genes (mutations) interfere with the production of proteins (dystrophin) needed to form healthy muscle. The muscle fibers are excessively fragile. There is no cure but medications such as corticosteroids can help slow the progression of the disease. There are many different types of MD, the most common are:

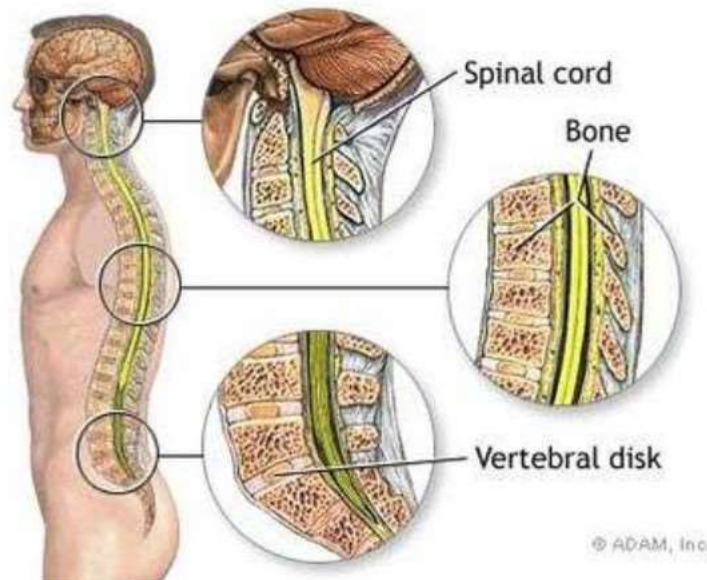
- Duchenne:
 - o signs and symptoms apparent at age 3-7
 - o mostly affects males
 - o in late phase muscle fibers are replaced by connective and adipose tissue
- Becker:
 - o Mostly affects males
 - o Symptoms usually seen in early 20's



Spinal Cord Injury (SCI)

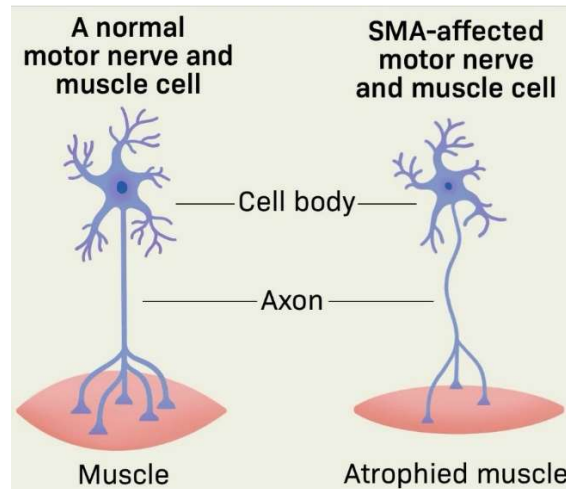
A spinal cord injury (SCI) is damage to the bundle of nerves and nerve fibers that sends and receives signals from the brain. The spinal cord extends from the lower part of the brain down through the lower back.

SCI can be caused by direct injury to the spinal cord itself or from damage to the tissue and vertebrae that surround the spinal cord. This damage can cause temporary or permanent changes in feeling, movement, strength, and body functions below the site of injury.



Spinal Muscular Atrophy (SMA)

Spinal muscular atrophy (SMA) is an autosomal recessive disorder affecting the motor neurons that control voluntary muscle movement. These cells are located in the spinal cord. Because the muscles cannot respond to signals from the nerves, they atrophy from inactivity.

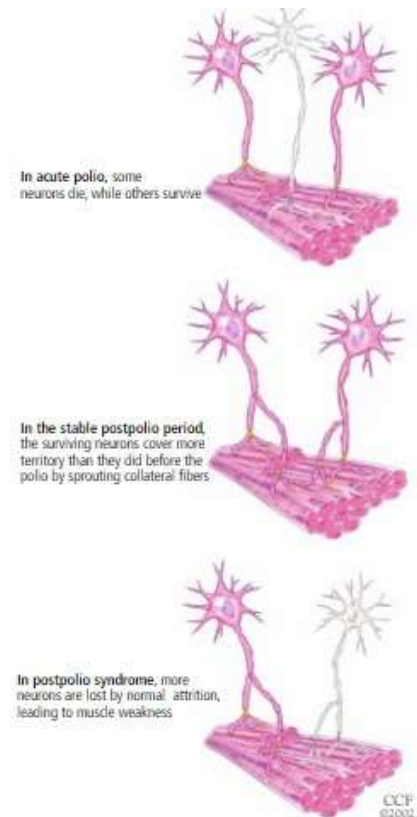


Polio Myelitis (Post-Polio)

Polio, or poliomyelitis, is an infectious viral disease that can harm the nervous system. Post-polio syndrome (PPS) usually occurs 15-40 years after the infection and recovery. PPS is believed to be the result of a deterioration of motor neurons over many years that leads to loss of muscle strength and dysfunction.

Polio and post-polio syndrome are caused by poliovirus. Unlike polio, PPS is not contagious. Only a polio survivor can develop PPS yet not everyone who survives polio will develop PPS.

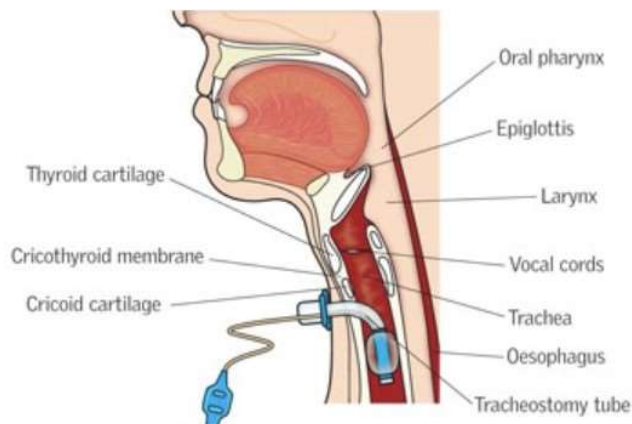
The polio vaccine has essentially eradicated polio from the U.S. However, polio still exists in some countries and cases of PPS still arise.



Tracheostomy Tube

At PROP it is common to see a Member with a Tracheostomy. There are a few different types of Tracheostomies a PROP RT will encounter in the community, but the majority are cuffless.

Tracheostomy tubes provide an artificial airway through which the member breathes.



There are different types of trach tubes, including different brands/manufacturers, different tube types and different sizes. All tracheostomy tubes have a standard 15 mm connection to facilitate attachment of adaptors for ventilator circuits, speaking valves, heat moisture exchangers (HMEs), baggers and caps.

A tracheostomy tube may be either “cuffed” or “cuffless” (uncuffed). Majority of community trach tubes seen at PROP are cuffless.



A tracheostomy tube in the community is changed every 1-3 months. This can be done either at home or at a health care facility. PROP RTs DO NOT change tracheostomy tubes.

Independent Breathing Time (IBT):

Independent Breathing Time (IBT) is the amount of time a person can breathe effectively without the assistance of mechanical or manual (“bagging”) ventilation. It is important to know if the member has the ability to breathe on their own - completely independent of their ventilator. A member who is not able to take even one breath on their own is said to have NO Independent Breathing Time (IBT). A member who can breathe for 15min off the ventilator would be said to have 15min IBT, etc.

There are many factors that can affect a member who has IBT:

- **Position** - for many members IBT is completely position dependent. That is, a member may have 15 minutes of IBT when sitting upright but that same member may have no IBT when lying down (or vice versa).
- **Tracheostomy tube** - Know whether the member performs their IBT with a cork (plug), Passy Muir Valve, heat moisture exchanger (HME) or if the trach tube is left open with perhaps just a filter in place.
- **Time of day** - Know when the optimal time of day for the member is to practice IBT. Perhaps the morning works better for the member versus the afternoon or evening (or vice versa). IBT can be thought of as exercise for the respiratory muscles, therefore a member who is exhausted, feeling unwell or partially asleep may not tolerate IBT.

Communication is the single most important factor when assisting a member to practice IBT. Know if the position is correct, should the trach be plugged or not and is the member able to practice IBT at this time? Never assume a member can practice their optimal IBT at any given time. Communicate with your member and know their capabilities at that time.



Invasive Ventilation

Some PROP member's use a ventilator nocturnally or are fully dependant on it (24hrs/day). Comfort is a priority for PROP Members in the community which is why it's important to be familiar with different home ventilators and different modes.



PB 560



Trilogy 100

Ventilator Parameters

Volume (Vt): The amount of air delivered each breath. Normally measured in millilitres

Pressure (PC/PS): The amount of pressure set for the circuit to pressurize to

Respiratory Rate (RR or BPM): The number of breaths per minute delivered by the ventilator.

Inspiratory Time (I/T) (%) or I:E Ratio (I:E): The I:E ratio is the relationship between inspiratory and expiratory time.

Waveform: Square or Decelerating

Trigger or Sensitivity: The amount of effort necessary to trigger a machine delivered breath.

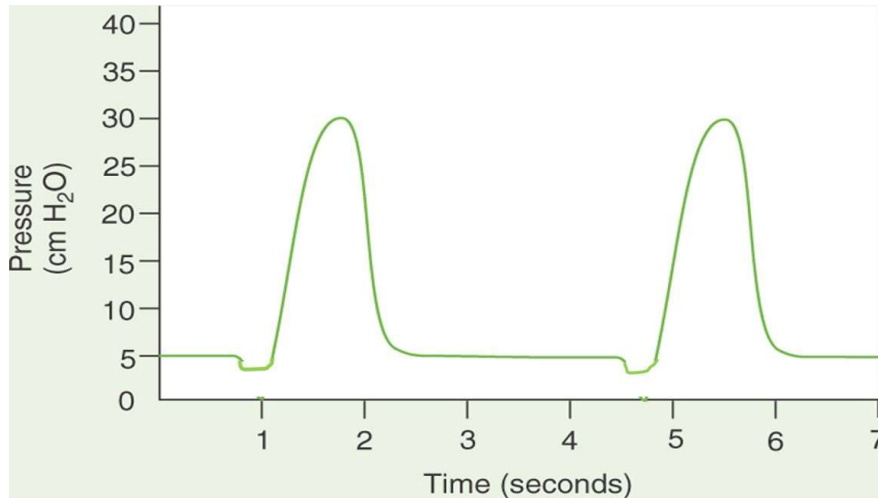
PEEP: Positive End Expiratory Pressure (PEEP)

High Alarm: The High Alarm is a safety feature that limits how much pressure or volume the member is exposed to with each breath.

Low Alarm (Disconnect): The Low Alarm is a safety feature that indicates a low pressure, low volume or disconnection situation.

Assist Control Ventilation

The ventilator or member may trigger ventilation, the member can trigger as many breaths as they want above the set rate. Each breath triggered delivers a mandatory breath. Mechanical breaths can be delivered with either a set volume or a set pressure.

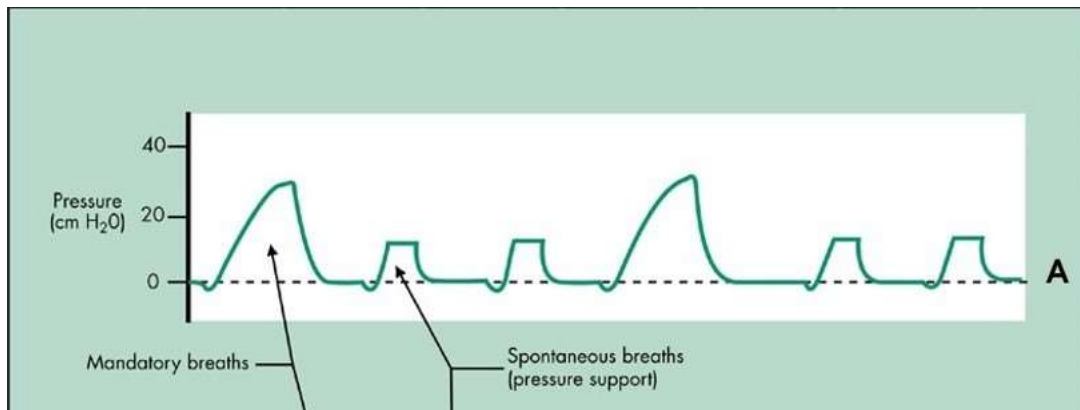


Pressure Support

Provides pressure during member’s inspiration to reduce their work of breathing. Delivered breaths are entirely dependant on the member triggering the breaths. Mechanical breaths delivered remain the same pressure level. Breaths delivered are more synchronized to member’s respiratory rate.

Synchronized Intermittent Mandatory Ventilation (SIMV)

Mandatory breaths are delivered based on ventilator rate setting. The Member can breathe spontaneously between mandatory breaths the mandatory breaths are synchronized with the patients breathing and are usually pressure supported.



Non-Invasive Ventilation (BiPAP)

Majority of PROP Members are supported by non-invasive ventilation, primarily BiPAP machines provide a level of breathing support in the form of air pressure. There are two pressure levels that are set: **IPAP** (Inspiratory Positive Airway Pressure) and **EPAP** (Expiratory Positive Airway Pressure). The IPAP assists with inspiration and the EPAP helps to maintain open airways during expiration. Comfort is also heavily prioritized with non-invasive ventilation. It's important that the right mode is selected along the right mask (full face, nasal, nasal pillows).



Nasal Pillows



Full Face Mask



Nasal Mask

Different modes available via Non-Invasive (BiPAP):

Spontaneous (S) mode:

In Spontaneous mode, you may set two treatment pressures—one for inspiration (IPAP) and one for expiration (EPAP). The device senses when the member is inhaling and exhaling and supplies the pressures accordingly. The difference between IPAP and EPAP levels helps determine the tidal volume.

Spontaneous timed mode:

In ST mode, the device augments any breath initiated by the patient, but will also supply additional breaths should the member's breath rate fall below the set "backup" breath rate.

Intelligent Volume Assured Pressure Support (iVAPS) mode:

In iVAPS mode a height is inputted along with a target alveolar minute ventilator and a pressure support range (PS min and PS max). The BiPAP adjusts to a member's respiratory rate, targets alveolar ventilation and automatically adjusts pressure support as needed to accommodate each member's unique needs, even as their disease progresses. Seen on Resmed products.

Average Volume Assured Pressure Support (AVAPS) mode:

AVAPS mode uses automatically adapting pressure support to deliver a guaranteed average tidal volume calculated by the RT beforehand based on height. Seen on Respironics products.

Pressure control Ventilation (PCV)

In PCV a set pressure control level and rate are set by the clinician. The member can breath above the set rate if desired but the delivered pressure control level remains the same pm every breath (triggered or set).

Mouth Piece Ventilation (MPV)

Mouthpiece ventilation (MPV) is a form of non-invasive ventilation that uses a home ventilator and mouthpiece circuit. It is helpful for individuals requiring daytime support, often due to conditions such as neuromuscular diseases, spinal cord injury, or musculoskeletal conditions. Unlike traditional forms of ventilation that involve the use of a mask or an invasive tracheostomy procedure, MPV utilizes a specially designed support arm, circuit, and mouthpiece that the member holds in their mouth.

The main benefit is greater comfort and mobility since the member doesn't need to be connected to a stationary machine via a mask interface. This can lead to improved quality of life and easier communication for members. With some training, they can learn to breath stack, a technique to trigger and hold consecutive breaths to fully expand the lungs. This can lead to a better cough and secretion clearance.

However, mouthpiece ventilation is not suitable for everyone. Members must have sufficient strength and good range of head motion to grasp and grip the mouthpiece. In addition, they must be alert, cooperative, and able to communicate, as they need to be aware of their breathing needs and initiate their own breaths. When used properly, they will have full control of their breathing and allow for increased independence.

