

# Oxygen Therapy, Acute Care

## Site Applicability

PHC Acute Care Sites

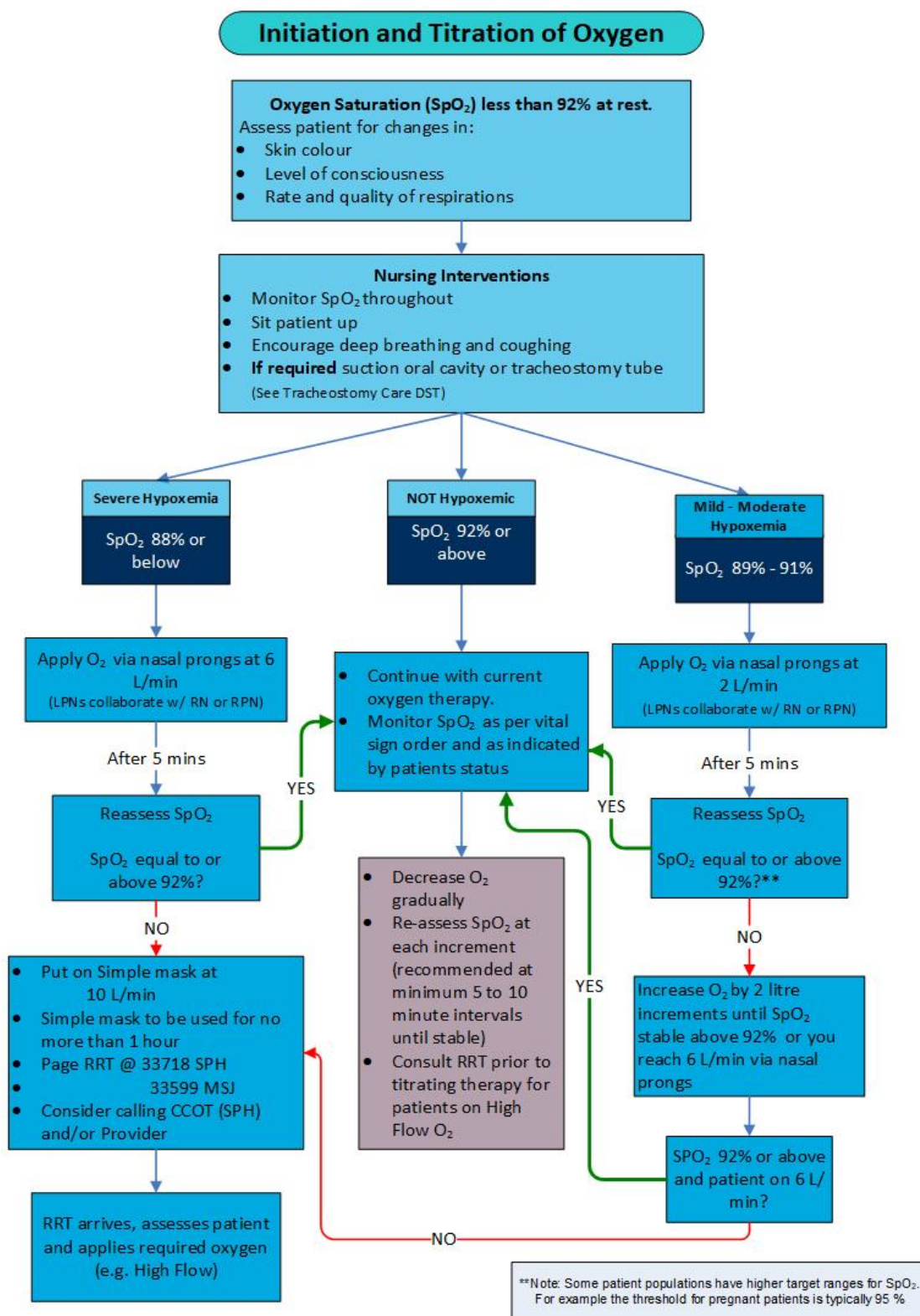
## Practice Level

RN/RPN: Basic Skill

LPNs: Administer oxygen after completing additional education during general orientation and following this decision support tool

Registered Respiratory Therapists: basic skill

## Algorithm



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## Need to Know

1. Registered Nurses and Registered Psychiatric Nurses do not require an order to administer oxygen therapy.
2. LPNs can initiate oxygen therapy to treat hypoxemia, collaboration with RN/RPN is required.
3. Oxygen is administered to treat hypoxemia/hypoxia at the lowest concentration required to maintain oxygen saturation levels equal to or greater than 92% (or as prescribed).
4. Providers should be consulted to assess and treat underlying cause of hypoxemia and/or provide direction for ongoing management, including target SpO<sub>2</sub> when:
  - a. Oxygen requirements are ongoing
  - b. Underlying cause of hypoxemia is not known
  - c. High Flow oxygen required
  - d. Any other concerns regarding patient condition.
5. COPD is not a contraindication to oxygen therapy and oxygen should not be withheld or limited to an arbitrary maximum flow rate if they are exhibiting signs of hypoxemia. COPD patients who are hypoxemic should have oxygen administered at whichever flow rate is required to maintain oxygen saturation levels equal to or greater than 92% (or as prescribed).
6. Some patient populations have higher target oxygen saturations e.g. pregnant patients, cardiac patients. Refer to specific protocols or provider orders.
7. The Registered Respiratory Therapist (RRT) should be contacted:
  - a. If unable to maintain SpO<sub>2</sub> targets on 6 LPM (litres per minute) via nasal prongs and a simple mask is started at 10 LPM
  - b. When internal transport of patient receiving greater than 6 LPM oxygen is anticipated or patient has an artificial airway such as a tracheostomy tube
  - c. When there are concerns/questions about equipment or patient
  - d. To assess for need to initiate, titrate or wean high flow oxygen
8. Caution is used in administering oxygen therapy to patients receiving bleomycin, mitomycin (chemotherapeutics) or cyclophosphamides.
9. Use of oxygen is a fire hazard when used in the presence of an open flame, high heat source and cigarettes due to the fact that oxygen supports combustion.
10. Oxygen cylinders should be maintained or stored in a secured and upright position. For safety, **tanks should not be left free standing at any time.**
11. Nasal Cannula can be put in the mouth if the nares are not an appropriate option. Do not switch over to a simple mask if patient requires less than 6 LPM.

## Protocol

### Assessment

1. Assessment of vital signs: heart rate, blood pressure, respiratory rate/effort, oxygen saturation - minimum every shift and / or as indicated by patient condition.

Note: when assessing oxygen saturation consider factors that may affect readings – refer to [Appendix A](#)

2. Chest auscultation every shift and / or as indicated by patient's condition.
3. Assess equipment every shift and as needed (safety check). Ensure that:
  - a. The delivery device is applied correctly to patient (e.g. prongs in both nares)
  - b. There is sufficient sterile water in reservoir (if applicable)
  - c. Settings correct, oxygen flowmeter turned on
  - d. If using portable oxygen there is sufficient reserve in the cylinder – refer to [Appendix C](#)

The following signs and symptoms are indicative of **hypoxia/hypoxemia**

System	Signs and Symptoms
Neurological	Restlessness/agitation Anxiety/apprehension Inability to concentrate Fatigue Dizziness Decreased level of consciousness
Respiratory	SpO <sub>2</sub> less than 92% Shortness of breath Use of accessory muscles Decreased or adventitious lung sounds
Cardiovascular	Increased heart rate, dysrhythmias Increased blood pressure (initial response)
Other	Pallor Cyanosis Diaphoresis

## Interventions


1. Position patient with head of bed elevated to maximize lung expansion and comfort.
2. Patients requiring high flow oxygen at rest should not be changed to nasal prongs for meals. Teach/assist patient and family to remove mask to place food in mouth then replace mask while chewing.
3. Using the [algorithm](#) initiate, titrate and maintain oxygen therapy to keep O<sub>2</sub> saturations greater than 92%, or as directed.
4. In acute care it is recommended that oxygen therapy be commenced at 6 LPM for oxygen saturation less than 88% in order to most rapidly correct a potentially severe hypoxemia.

## Equipment


Routine oxygen delivery devices are disposable. Anything labeled “Respiratory” is to be kept. Page RRT to collect.

RN/RPN/LPN may set up the following equipment:

### 1 to 6 LPM

<p><b>Nasal Cannula</b></p> 	<ul style="list-style-type: none"> <li>• Used to administer oxygen 1 to 6 LPM</li> <li>• Extension tubing available. Do not use more than four lengths of extension tubing together</li> <li>• Humidification is not required</li> </ul>
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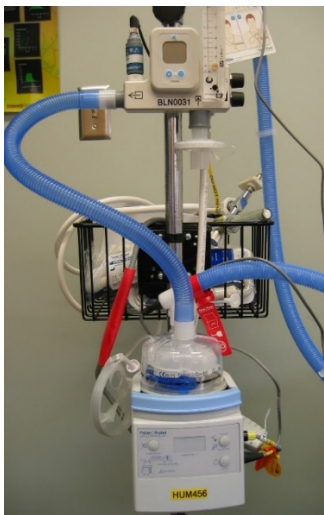

### 6 to 10 LPM




<p><b>Simple Mask</b></p> 	<ul style="list-style-type: none"> <li>• <b>Only</b> applied as short term interim measure until patient can be assessed by RRT</li> <li>• Apply simple mask and adjust flow to 10 LPM and call RRT</li> <li>• DO NOT WEAN to flow less than 6 LPM <ul style="list-style-type: none"> <li>○ Low flow rates can be associated with carbon dioxide accumulation and hypercapnia</li> </ul> </li> </ul>
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### Greater than 10 LPM

The following equipment must be set up by the RRT.

Patients on high flow oxygen will need to be assessed by the RT prior to any transportation off the unit. Advise RRT as soon as possible if plans are made to transfer the patient or if tests are booked. RRT to manage Optiflow and titrate FiO<sub>2</sub> to prescribed SpO<sub>2</sub> targets.

<p><b>OPTIFLOW Heated Humidity High Flow Oxygen Therapy</b></p> <p>Oxygen Analyzer (displays set FiO<sub>2</sub>)</p> 	<ul style="list-style-type: none"> <li>• The OPTIFLOW system allows for higher FiO<sub>2</sub> at higher flow rates, while providing heated humidity</li> <li>• Preferred high flow device for patients under airborne or droplet precautions due to the absence of aerosol generation</li> <li>• Uses 1 L sterile water inhalation bags for humidity (RRT to provide); shared RRT/RN/RPN responsibility to monitor water level in humidifier (self-filling autofeed humidifier)</li> <li>• Flowmeter, blender, oxygen analyzer and humidifier are to be adjusted by <b>RRT only</b></li> <li>• Call RRT for any audible alarm conditions</li> <li>• The RRT will determine the appropriateness of OPTIFLOW use based on patient assessment and clinical guidelines for use</li> <li>• Refer to <a href="#">Aerosol Generating Medical Procedures</a> DST for more information</li> </ul>
<p><b>OPTIFLOW via High Flow Nasal Cannula</b></p> 	<ul style="list-style-type: none"> <li>• High flow nasal cannula (HFNC) may improve patient comfort and compliance with therapy</li> <li>• Less claustrophobic than face mask</li> <li>• Patient can eat, drink, talk, wear glasses and take oral medications without compromising oxygen delivery</li> <li>• For nebulized bronchodilator treatments the medication nebulizer mask is placed directly over high flow nasal cannula</li> </ul>

<p><b>OPTIFLOW via Tracheostomy</b></p> 	<ul style="list-style-type: none"> <li>• Connects directly to tracheostomy tube</li> </ul>
<p><b>Small volume medication nebulizer</b></p>  <p><b>Nebulizer with T connector for patients on high Flow oxygen with mask interface</b></p> 	<ul style="list-style-type: none"> <li>• For administration of nebulized medications (e.g. Salbutamol)</li> <li>• Nebulizer mask should be connected to air control valve</li> <li>• Nebulizer mask should be placed directly over the nasal prongs/cannula for nebulizer treatment - do not remove NP or discontinue oxygen delivery</li> <li>• Contact RRT for T-connector</li> </ul>



## Documentation

**I-View → Adult Quick View → NEWS & Vital Signs → Oxygenation →**  
Respiratory rate, Oxygen saturation, Oxygen therapy, Oxygen flow rate

Remember to 'double click' the blue band under the current time column to attain NEWS score (a NEWS score will still generate with 1 or more blank VS)

Adult Quick View		01-Mar-2023 12:41 PST
National Early Warning Score		
VITAL SIGNS		
<b>Δ National Early Warning Sc...</b>		
<b>Δ Respirations</b>		
Respiratory Rate	br/min	
NEWS Respirations Score		
<b>Δ Oxygen Saturation</b>		
SpO2	%	
SpO2 Scale		
NEWS Oxygen Saturatio...		
<b>Δ Air or Oxygen</b>		
Oxygen Flow Rate	L/min	
Measured O2% (FIO2)	%	
NEWS Supplemental O2...		

Adult Quick View		28-Feb-2023 12:06 PST
National Early Warning Score		
VITAL SIGNS		
COVID-19 Screening		
PAIN ASSESSMENT		
Pain Modalities		
Continuous Medication Infusions		
Insulin Infusion		
Heparin Infusion		
Infusion Related Activities		
Infusion/Chemo Adverse Reaction		
Apnea/Bradycardia/Desaturation Episode		
Mental Status/Cognition		
Sedation Scales		
Provider Notification		
Environmental Safety Management		
Activities of Daily Living		
Gastrointestinal Tubes		
Measurements		
Glucose POCT Whole Blood		
Behaviour Log		
<b>Find Item</b>		
<input type="checkbox"/> Critical <input type="checkbox"/> H		
<b>Result</b>		
<b>Δ Oxygenation</b>		
Respiratory Rate	br/min	
Measured O2% (FIO2)	%	
Oxygen Activity		
Oxygen Therapy		
Oxygen Flow Rate	L/min	
Humidification T...	DegC	
End Tidal CO2	mmHg	
Skin/Nare Check		
SpO2	%	
SpO2 Site		
SpO2 Site Change		
Pre-Ductal SpO2	%	
Post-Ductal SpO2	%	
<b>Δ PAIN ASSESSMENT</b>		

### Environmental Safety Management

- Oxygen – Oxygen flow meter with nipple adaptor, nasal prongs, simple mask, oxygen extension tubing

### Documentation → Nursing Narrative Note → Title – Oxygen Therapy

- Document any adverse events, who was called, interventions ordered and administered, patient outcomes



## Patient and Family Education

1. Explain the purpose of oxygen therapy
2. Provide written patient teaching material where appropriate
3. Inform patient and visitors of safety precautions while on oxygen

## Related Documents

[B-00-07-13080](#) – Aerosol Generating Medical Procedures (AGMP) in the context of COVID- Infection Prevention and Control

## References

1. British Columbia College of Nurses and Midwives. (2023) Scope of Practice for Registered Nurses. Retrieved February 22, 2023 from <https://www.bccnm.ca/Pages/Default.aspx>
2. British Columbia College of Nurses and Midwives. (2023) Scope of Practice for Registered Psychiatric Nurses. Retrieved February 22, 2023 from <https://www.bccnm.ca/Pages/Default.aspx>
3. British Columbia College of Nurses and Midwives. (2023) Scope of Practice for Licensed Practical Nurses. Retrieved February 22, 2023 from <https://www.bccnm.ca/Pages/Default.aspx>
4. Oxygen Therapy: Nasal Cannula or Oxygen Mask. Elsevier Clinical Skills (2022). St. Louis, MO. Elsevier. Retrieved February 22 2023 from [www.elsevierskills.com](http://www.elsevierskills.com)
5. Global Initiative for Chronic Obstructive Lung Disease (2023) Global strategy for prevention, diagnosis and management of COPD. Retrieved February 22, 2023 from <https://goldcopd.org/2023-gold-report-2/>
6. Siemieniuk, R. A. C., Chu, D. K., Kim, L. H.-Y., Güell-Rous, M.-R., Alhazzani, W., Soccia, P. M., Karanickolas, P. J., Farhoumand, P. D., Siemieniuk, J. L. K., Satia, I., Irusen, E. M., Refaat, M. M., Mikita, J. S., Smith, M., Cohen, D. N., Vandvik, P. O., Agoritsas, T., Lytvyn, L., & Guyatt, G. H. (2018). Oxygen therapy for acutely ill medical patients: a clinical practice guideline. *BMJ (Clinical Research Ed.)*, 363, k4169. <https://doi.org/10.1136/bmj.k4169>
7. O'Driscoll B.R., Howard, L. S., Earis, J. on behalf of the BTS Emergency Oxygen Guideline Development Group, *et al* British Thoracic Society Guideline for oxygen use in adults in healthcare and emergency settings *BMJ Open Respiratory Research* 2017;4:e000170. doi: 10.1136/bmjresp-2016-000170
8. Barnett, A, Beasley, R, Buchan, C, Chien, J, Farah, CS, King, G, et al. Thoracic Society of Australia and New Zealand Position Statement on Acute Oxygen Use in Adults: 'Swimming between the flags'. *Respirology*. 2022; 27: 262–276. <https://doi.org/10.1111/resp.14218>
9. Nagler, J. (2021) Continuous oxygen delivery systems for the acute care of infants, children and adults. In: UpToDate, Parson, P.E, Torrey, S.B. (Ed), UpToDate, Waltham, MA, 2023.
10. Sood, S. (2022). Evaluation and management of the nonventilated, hospitalized adult patient with acute hypoxemia. In: UpToDate, Manaker, S. (Ed), UpToDate, Waltham, MA, 2023

**Appendices**

- [Appendix A:](#) Pulse Oximetry Tips and Techniques
- [Appendix B:](#) Grab n'Go Oxygen Cylinders
- [Appendix C:](#) Oxygen Cylinder Reserve

**Appendix A: Pulse Oximetry Tips and Techniques**

- Ensure patient is not moving the limb with the oximeter probe (motion artifact)
- Do not obtain measurements on the arm with the BP cuff in use
- Ensure the waveform and/or the pulse tone on the monitor is consistent with patient pulse rate (exception may be with atrial fibrillation)
- Vasculopathy, hypotension, poor peripheral perfusion – may not obtain an oximetry measurement; measurements obtained may not be accurate
- Ensure probe on patient for 30 to 60 seconds, and that the saturation reading is in a steady-state and not fluctuating before recording measurement
- Dark nail polish may interfere with saturation measurement or indicate a false value
- May need to try various sites before a reliable saturation is obtained (fingers, toes, earlobes). Consider wrapping hands in warm blanket.
- \*\*\*Use clinical assessment skills\*\*\* Is the saturation value obtained consistent with the patient's presentation?
- Note: ABG's are not appropriate simply for assessing oxygenation – use clinical assessment skills to determine patient condition.

**Appendix B: Grab n' Go Oxygen Cylinders**

- Lightweight aluminum cylinder (silver colour with green top)
- Flows up to 25 LPM (for RRT use at high flows)
- High Pressure take-off connector (RRT use only)
- Should be maintained or stored in a secured and upright position

**Cylinders should not be left free standing at any time, knocking them over can cause the pressurized oxygen to escape rapidly, propelling the cylinder.**



### Appendix C: Oxygen Cylinder Reserve

	Gauge Pressure (psi)			
Flow (L/min)	2000 psi	1500 psi	1000 psi	500 psi
<b>0.5</b>	22.5 hours	16.5 hours	11 hours	5.25 hours
<b>1</b>	10.5 hours	7.75 hours	5 hours	2.25 hours
<b>1.5</b>	7 hours	5 hours	3.25 hours	1.25 hours
<b>2</b>	5 hours	3.5 hours	2.25 hours	1 hour
<b>3</b>	3.25 hours	2 hours	1.25 hours	45 min
<b>4</b>	2.25 hours	1.5 hours	1.17 hours	35 min
<b>6</b>	1.56 hours	1.17 hours	47 min	---
<b>8</b>	1.17 hours	53 min	35 min	---
<b>15</b>	37 min	---	---	---

\*All times are approximate & are calculated allowing for approximately a 30 minute buffer

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