Oximetry Management Guidelines for Community Settings & Residential Care

Site Applicability

- All VCH Community Sites, Home Health, Primary Care, Palliative Care Teams and Residential Care
- Urgent and Primary Care Centers (UPCC)

Practice Level

Basic Skills for the following Professions:

- NP, RN, RPN, LPN
- PT, RRT

Policy Statement

- Oximetry will be used on clients according to this guideline and can be used by a variety of individuals and appropriately trained personnel in any setting (clinic, home, residential care, etc)
- Oximeters are required to be maintained annually by Biomedical Engineers. Each site will determine their process.

Need to Know

- There is shift in management of clients with increasing levels of severe illness to be cared for in the community. There is an increasing prevalence of chronic respiratory diseases such as Chronic Obstructive Pulmonary Disease (COPD). COPD is one of the top reasons for admission and readmission to acute care and ED visits.
- Detailed assessment is needed to ensure adequate respiratory condition of our clients which will include diligent monitoring of oxygenation by oximetry.
- Oximetry uses a non-invasive light to show percent of oxygen bound hemoglobin in arterial blood. Results are recorded as a percent of oxygenated blood by pulse oximetry (SpO2). Due to limitations inherent in all oximeters, oximetry is not as accurate as analysis of an arterial blood gas sample to determine oxygen content of arterial blood, but it is much more versatile, portable, and results are immediate.
- With a thorough understanding of the applications and limitations of this technology a health care professional can achieve reliable and more accurate results. On the other hand, without the knowledge of oximetry can lead to deleterious effect of management due to false positive or false negative results. (Elliott, M). An oximeter is a useful tool to help evaluate cardio-respiratory illness. (Carroll, P) and can be considered the fifth vital sign (Bewick, et al).
- Redness and second degree burns at the site can occur if unapproved non-proprietary probes are mismatched with the oximeter regardless if the connection fits or if left on too long. Accuracy of results will also not be reliable. Original, proprietary or manufacturer approved probes only should only be used for each oximeter.
- Normal SpO2 ranges between 95 – 100%, however lower values can be expected and still be considered normal in the elderly population and in people with chronic disease.
- Oximetry is not diagnostic for a specific disease, however it can assist in the comprehensive management of clients (Vora, V).

- Client must be at rest for at least 10 minutes prior to recording unless activity measurements are being assessed.
- Most programs provide only spot checks (see Assessment Procedure).
- Continuous overnight monitoring is only available through the Home Oxygen Program (HOP) and Community Respiratory Services at certain Community Health Centres.
- Oximetry may be more useful when comparing values over a period of time versus a single spot check.
- When the results are in question (e.g. when palpated pulse rate does not match oximeter, or does not match the clinical appearance, etc) do not document the results. See Appendix A for limitations of oximetry and some solutions to achieve reliability.
- The user must be familiar with the proper use of site specific oximeter(s) including exchange of batteries and choice of probes
- The user must be familiar with proper disinfection since an oximeter is a potential source of infection between clients. Adequate disinfection practices are important.
- Oxygen therapy is indicated when hypoxemia is evident (SpO2 < 88%); it is not indicated to treat dyspnea without hypoxemia.

Clinical Indications

- Upon initial assessment of clients with a chronic, acute, or unstable respiratory status (e.g. those who are at risk for low blood oxygenation such as clients with COPD, Pulmonary Fibrosis, acute asthma, haemodynamically unstable, etc.).
- Compare serial oximetry measurements in response to treatment or procedure (e.g. oxygen therapy, antibiotics, diuretics, postural drainage, pleural drainage, etc.).
- When clients are on home oxygen therapy, or other respiratory devices such as tracheostomy, ventilator or BiPAP.
- As a follow up for a patient discharged from hospital with a respiratory illness.
- Client has marked reduction in their activity tolerance or comfort related to dyspnea, or client's dyspnea has become more severe.
- Monitoring a client's response to exercise and/or activity (i.e. with cardio-respiratory compromise, COPD, CHF, etc).
- As a spot check to assist in the determination of the severity of illness or an early warning of a deteriorating respiratory condition especially in the elderly (e.g. Community Acquired Pneumonia (CAP), or if haemodynamically unstable). (Bewick, T, et al)
- When assessing for eligibility for oxygen therapy funding requirements through Home Oxygen Program (HOP), Veteran's Affairs (VAC), Non Insured Health Benefits (NIHB), WorkSafe BC (WSBC) funding, etc.
- As part of screening criteria for pulmonary rehabilitation program.
- Any time when a client's oxygenation is in doubt.

Contraindications

- There are no contraindications to the use of pulse oximetry in the community; however clinicians must be skilled in the operation of the pulse oximeter, and understand the results in relation to the client's overall clinical condition.

Limitations

- Ensure heart rate (HR) displayed on the machine matches the palpated pulse.
- Check the quality of the signal by the signal quality indicator on the machine. See owner's manual. A poor signal may display inaccurate SpO2 and HR readings.
- In all cases, the oximetry results must be compared with the client's clinical presentation before results are reported. When results are suspect, the causative factor(s) should be addressed when indicated and whenever possible. See Appendix A.

Equipment and Supplies

- Oximeters: variety may be available.
- Finger probe: standard for use on all oximeters.
- Oximeter printers: may be available.
- Ear probe: may be available and should be used when measurements obtained with a finger probe are suspect [e.g. with finger movement, poor perfusion to the site (cold fingers), tremor and advanced neuromuscular disease). These situations may create artifact and incorrect and unreliable readings.
- Forehead sensor: may be available on specific oximeters and used when other conventional probes are unable to pick up an accurate reading despite trying other probe styles. (e.g. scleroderma, severe peripheral vascular disease, etc). Is disposable and intended for single patient use. May reuse on same patient according to manufactures recommendations..
- Oximetry study form and Home Oxygen Program application form if oxygen therapy will be considered.
- Clinicians should do a visual inspection of the machine prior to use. For example, inspect the finger or ear probe to see if it is damaged, ensure battery holds sufficient charge, case is not damaged.

Practice Guideline

- Oximetry should be performed when clinically indicated.
- Oximetry values should be measured and recorded for appropriate clients with underlying cardio and/ or respiratory conditions during the assessment
- The oximeter should not be provided to the client; it is for clinician use only.
- Clinical correlation is important when assessing reliability of oximetry.

Assessment Procedure:

Pulse oximetry testing normally includes a reading at rest followed by a second oximetry reading during activity.

Note: The following testing may be performed for oxygen dependent clients to ensure adequate oxygen flow rate is used. In these cases, the target saturation is 90% or above.

Spot check at rest:

1. Place sensor as directed.
2. Allow for "steady state" reading after the client has been seated and on oxygen or room air for approximately 10 to 20 minutes.
3. Switch on power and after a few seconds, establish baseline readings: check for signal strength on the oximeter, read the SpO2 and heart rate and correlate with pulse rate. Note respiratory rate.
4. Adjust probe as needed to ensure accuracy of display (refer to Appendix A)
5. Record client's heart rate and SpO2 every 30 seconds while at rest and record in PARIS and/ or on oximetry study sheet.

Ambulation:

Ambulatory measurements may also be performed if clinician determines it is clinically appropriate and if indicated (perform after at rest study is performed). The study may be limited by the client due to client concerns/ abilities, or clinician concerns of over-exertion (extreme shortness of breath, cardiac signs of distress, imbalance, etc). There is no need to perform an ambulatory study if the resting oximetry is < 88%. The client should be considered for oxygen therapy.

Once client has reached "steady state" as above,
Have client walk on a flat surface for up to 6 minutes, and at the client's own pace.

1. Record client's heart rate and SpO2 every 30 seconds while ambulating and document in PARIS and/ or on oximetry study sheet.
2. Allow the client to stop at the usual limit of ambulation, at 6 minutes, or if SpO2 drops below 88% for > 1 minute.
3. At the end of the study allow the client to be seated and continue to monitor until the readings for SpO2, heart rate and respiratory rate are back to baseline.

Applying for oxygen funding:

If oximetry shows eligibility for oxygen therapy through HOP, fill out HOP application form and have physician sign. Fax the application form and the oximetry study form to HOP office at 604-301-3829. Call HOP office at 604-301-3814 if there are questions.

Note that there are other primary funding sources available in British Columbia including Veteran's Affairs (VAC), Non Insured Health Benefits (NIHB), WorkSafe BC (WSBC), and Extended Health Benefits are primary funding sources in British Columbia.

Alternate funding:

Client can opt to pay privately if HOP determines client is not eligible for funding, however, a physician's written prescription is required.

Expected Client/Family Outcomes

- Client will increase his/her knowledge of signs and symptoms of respiratory compromise.
- Client will be aware of the potential outcomes of pulse oximetry.
- Client will increase his/her comfort in self-care related to dyspnea.
- Client/ family will learn to independently manage symptoms of dyspnea.
- Client will understand how signs and symptoms of dyspnea are related to their ability to perform their activities of daily living.
- Client will be able to maximize or increase his/ her activity and exercise tolerance.
- Client's use of oxygen is optimized with appropriate education.
- A decrease in the number of unwarranted hospital visits.
- Staff will use pulse oximetry to safely optimize the physical function of their clients.

Patient/Client/Resident Education

- Monitoring will be done by a professional skilled and educated in pulse oximetry.
- Patient, Client or Resident will be informed why the monitoring is performed, the result, and the meaning (interpretation) according to the health care professional.

Evaluation

Competencies Required by Staff using Pulse Oximetry
Staff must demonstrate:

- Ability to identify clients that require monitoring of their oxygen saturation.
- Ability to use pulse oximetry in conjunction with physical assessment.

- Ability to interpret readings and related findings to underlying disease process and age of client.
- Understanding of limitations of the use of pulse oximetry and contraindications.
- Ability to operate the machine, choose probes, and exchange batteries.
- Ability to determine if and when oxygen therapy is needed.

Site Specific Practices

Biomedical:

- Oximeters need preventative maintenance on an annual basis. If more than one oximeter is used at each site or program, a maintenance schedule should be developed such that a minimum number of oximeters are always available. Inspection time is short, and details should be confirmed with the biomedical representative at each site to minimize the turn around time and maximize availability of equipment.
- VCH biomedical engineers should be involved with recommendation of equipment and replacement parts (e.g. probes or other).

Infection Control:

- No special precautions are necessary, but Standard Precautions are recommended:
- Most probes are intended for multiple client use; if so, the probe must be cleaned between clients. Wipe the probe twice between clients with an isopropyl alcohol swab and allow to air dry. Do not soak or immerse oximeter or probes in liquid unless specified by the manufacturer. Manufacturers may have other more specific recommendations for infection control.
- For disposable single patient use probes, discard the probe unless multiple readings will be done on the same client at a later date. The disposable probe can be left in the client's home.
- The external portion of the monitor (including bag or bumper if provided) should be cleaned according to manufacturer's recommendations whenever the device remains in a client's room for prolonged periods, when soiled, or when it has come in contact with potentially transmissible organisms.

Documentation

- Documentation of oximetry results will be done in PARIS cardiopulmonary assessment, vital signs grid or case notes. Documentation may also be done on oximetry study form, if applying for Home Oxygen Program funding (also include Dr signature).
- Document date, time of measurement, pulse oximeter readings, and probe type (e.g. ear/ finger probe, or forehead sensor).
- Document if recording was done on room air or on specific oxygen flow, while specifying the type of oxygen delivery device (e.g. nasal prongs).
- Document clinical appearance of client (subjective assessment of perfusion at measuring site, e.g. cyanosis, shivering, cold skin, etc).
- Document client's response to monitoring and if oxygen flow rate was adjusted as a result of oximetry.
- If the oximeter has print out strips, these strips may be photocopied and included in the client record or used to support the application for funding. (The print out strips from the printer attachments is thermal sensitive paper and will fade over time so should be photocopied).

Related Documents

- website: VCH Home Oxygen Program

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Developed By

CPD Developer Lead(s):
- Manager of Healthy Living Program & CNS for Chronic Disease Prevention & Management
- Coordinator VCH Home Oxygen Program and Community Respiratory Services Program

Other members:
- RRT, Vancouver Community, Raven Song Community Health Centre
- Advanced Community Physiotherapy Leader, Vancouver Community
- Professional Practice Leader, Providence
- Professional Practice Leader, Vancouver General Hospital
- Practice Leader, Richmond Hospital
- AOA Nursing Practice Council

Endorsed by

Regional SharePoint 2nd Reading - Endorsement by:
- Health Authority Profession Specific Advisory Council Chairs (HAPSAC)
- Health Authority & Area Specific Interprofessional Advisory Council Chairs (HAIAC)
- VCH Operations Directors
- VCH Professional Practice Directors

UPCC (Endorsed November 12, 2020):
- Director, Professional Practice, Nursing, Professional Practice, VCH
- Manager, Vancouver UPCC, Vancouver Fairview UPCC, VCH
- COS, Registered Nurse, Primary Care, VCH
- Project Manager, Primary Health Care Network, VCH

Final Sign-off & Approved for Posting by

Regional SharePoint Final Sign-off by CNO:
- Chief Nursing Officer & Executive Lead Professional Practice - VCH

Date of Creation/Review/Revision

Approved: October 28, 2011

Posted: November 4, 2011

November 12, 2020

APPENDIX A: Oximetry Limitations

Low perfusion or hypovolemia

- Try other hand or foot. Avoid placing probe on a scarred or damaged finger/nailbed.
- Check the strength of the client's radial pulse and the capillary refill of the fingertip.
- Increase the temperature of the room. May rub hands together, or warm hands with warm cloths or under warm water.
- Place hand below the heart level and avoid bending the arm to allow blood flow to the site.
- Use an ear clip. Ear clips are a little less accurate than finger probes.

Anemia

- Oximeter does not detect haemoglobin levels, just oxygen attached to haemoglobin.
- Oxygen levels may read normal but carrying capacity of the blood may be low.

Cold hands

- Try other finger, hand, or toe.
- Increase the temperature of the room. Rub hands together, or warm hands with warm cloth or under warm water.
- Try an ear clip, or forehead sensor. Ear clips may fall off.

Motion Artifact

- Subtle motion on the probe site may cause artifact and erroneous oximetry readings. Motion artifact may occur with conditions such as Parkinson's disease, or from activity such as walking, tapping the finger, shivering, or swinging the hand or clenching fist.
- Try another site, or hand, hold the hand still. Try an ear clip, or forehead sensor. Ear clips may fall off.
- Briefly stop the activity (e.g. if walking) or hold the hand still. Compare heart rate by palpation.

Nail polish/artificial nails

- Clear and coloured nail polish may make oximetry results inaccurate.
- Blocks or reflects light transmission of the oximeter probe.
- Wipe off polish or use other digit, foot, etc.
- Try an ear clip, or forehead sensor. Ear clips may fall off.

Dyshaemoglobinemia

- Oximetry cannot differentiate between functional and dysfunctional haemoglobins. Examples include Methaemoglobin and Carboxyhaemoglobin. Both can be saturated with oxygen but are not able to readily deliver oxygen to the tissues. (see reference article by Valdez-Lowe et al.)
  - Methaemoglobin can be formed by methylene blue intravascular dye, intratumor dyes and some nitrate therapies (e.g. nitroglycerin, amyl nitrate), which will display low oxygen saturation.
  - Carboxyhaemoglobin (COHb) results from the inhalation of carbon monoxide (CO). CO has a much greater affinity for haemoglobin than oxygen affects the accuracy of oximetry by providing an artificially high result.

Ambient light

- Intense ambient light directed on the probe site such as direct sunlight may affect the results.
- Shade the site with a cloth, etc.

Cardiac Arrhythmia

- Irregular heart rhythm may cause inaccurate oximetry readings especially when accompanied by low perfusion as the oximeter has difficulty picking up a pulse signal.

Hyperbilirubinemia

- Oximetry may not be accurate despite correlating pulse rate