

# Lanarkshire Oximetry Index

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**Purpose:** Non-invasive procedure using a pulse oximeter for assessment of peripheral arterial perfusion to determine if it is safe to apply venous compression bandaging.

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**Indications:** - Assessment of peripheral arterial perfusion when:

- Evidence of calcified vessels (ABPI >1.3)
  - Difficulty locating arteries with Doppler
  - Diabetic patients
  - Lymphedema patients
  - Facilities with infrequent vascular assessments required
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**Precautions:**

The pulse oximetry signal may be difficult to detect if the patient has grossly dystrophic toe nails, extreme cyanosis, or, in conditions where there is peripheral vasoconstriction, such as Raynaud's disease. Additionally, LOI will not detect localized arterial disease where there is adequate collateral circulation. If it is necessary to assess blood flow to individual arteries, Doppler ABPI should be used. *(Bianchi J 2005; Bianchi, J et al. 2000; Bianchi & Douglas, 2002)*

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**Frequency:**

- Per facility/agency policy
  - Arterial perfusion may deteriorate over relatively short periods, thus reassess every 3 months or more frequently if the clinical situation indicates a change.
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**Equipment:**

- Sphygmomanometer with appropriate size cuff (The cuff sizes suggested below are guidelines for arm circumference but may also be applied to leg circumference)
    - Limb circumference 22–26cm: small adult cuff 12x22cm
    - Limb circumference 27–34cm: adult cuff 16x30cm
    - Limb circumference 35–44cm: large adult cuff 16x36cm
    - Limb circumference 45–52cm: adult thigh cuff 16x42cm.
  - Fingertip Pulse oximeter with SpO2 and Pulse Rate
  - Writing Instrument and paper
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**Steps** *(Bianchi J 2005; Bianchi, J et al. 2000; Bianchi & Douglas, 2002)*

1. Explain the procedure to the patient.
2. Ensure the patient is comfortable with both feet elevated in a semi-recumbent position.
3. Place an appropriately sized blood pressure cuff around the upper arm.
4. Place the pulse oximeter sensor on index or middle finger. The pulse oximeter unit will display two numbers: the first represents the patients' heart rate; the second is the percentage of circulating oxygenated hemoglobin. Pulsatile blood flow is also displayed, either by a waveform or by a column of lights.
5. Record a baseline reading. Inflate the sphygmomanometer cuff to 60mmHg, then in 10mmHg increments, allowing approximately 10 seconds in between increments. Once 100mmHg is reached, the incremental changes can be increased to 20mmHg.
6. Record the pressure reading that is one below the point where the audible signal is lost on the pulse oximeter; for example, if the signal is lost at 180mmHg, record a pressure of 160mmHg.
7. Do not inflate the cuff further if 180mmHg is reached before the loss of the audible signal, and record a maximum pressure of 180mmHg.
8. Repeat the measurement on the other arm, and when calculating the Lanarkshire Oximetry Index (see step 13) use the higher of the two readings.
9. Place an appropriately sized cuff around the ankle, immediately above the malleoli. It is important to protect any fragile skin or ulcers beforehand: for example, with a sterile towel or cling film.
10. Place the oximetry sensor on one of the first three toes.

11. Inflate the cuff in the same way as outlined above and record the pressure at which the signal is lost (or 180mmHg if this is reached before the loss of the signal).
12. Repeat the measurement on the other leg, when calculating the Lanarkshire Oximetry Index use the higher of the two readings.
13. The LOI for each leg is calculated by dividing the toe pressure by finger pressure and expressing the figure gained as a decimal. For example, where toe pressure = 140mmHg and finger pressure = 120mmHg, the LOI is equal to toe pressure/finger pressure (140/120) = 1.17.
14. The readings are similar to ABPI readings:
  - Normal: LOI=0.8
  - Moderate arterial disease: LOI=0.5–0.8
  - Severe arterial disease: LOI=0.5
15. Reassessment following the application of compression
  - Where patients are deemed suitable for compression, apply an appropriate graduated stocking to the leg, and then place the sensor on one of the first three toes.
  - Check the signal with the leg horizontal, then elevate the leg slightly for 30 seconds and check the signal again. This will ensure that the blood flow is still present and not adversely affected by the compression or the position of the leg.
  - A loss of signal is indicated by flattening of a waveform on the oximeter, loss of SpO<sub>2</sub>, >10% drop in SpO<sub>2</sub> from the baseline. If there is a loss of signal, arrange for further assessment before proceeding with full compression.

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