

## What is Pulse Oximetry?

**Pulse oximetry** is the non-invasive method of monitoring the oxygenation of a patient's haemoglobin.

A sensor is placed on a thin part of the patient's anatomy, usually a fingertip or earlobe, or in the case of a neonate, across a foot, and a light containing both red and infrared wavelengths is passed from one side to the other. Changing absorbancy of each of the two wavelengths is measured. Based upon the ratio of changing absorbance of the red and infrared light caused by the difference in colour between oxygen-bound (bright red) and oxygen unbound (dark red or blue, in severe cases) blood haemoglobin, a measure of oxygenation (the percent of haemoglobin molecules bound with oxygen molecules) can be made and displayed.

Pulse oximetry information is desirable whenever a patient's oxygenation is unstable, including intensive care, critical care, and emergency department areas of a hospital. A patient's need for oxygen is the most essential element to life; no human life thrives in the absence of oxygen. Although pulse oximetry is used to monitor oxygenation, it cannot determine the metabolism of oxygen, or the amount of oxygen being used by a patient. For this purpose, it is necessary to also measure carbon dioxide (CO<sub>2</sub>) levels. It is possible that it can also be used to detect abnormalities in ventilation but the time taken to alert the medic may be too slow.

Pulse Oximetry is a measurement solely of oxygenation, not of ventilation, and is not a substitute for blood gases checked in a laboratory as it gives no indication of base deficit, carbon dioxide levels, blood pH, or bicarbonate HCO<sub>3</sub>-concentration. The metabolism of oxygen can be readily measured by monitoring expired CO<sub>2</sub>. Saturation figures also give no information about blood oxygen content. Most of the oxygen in the blood is carried by haemoglobin. In severe anaemia, the blood will carry less total oxygen, despite the haemoglobin being 100% saturated.

False low readings may be caused peripheral shutdown in the are being monitored or more widespread , in the pre-hospital environment this may be due to shock or blood loss, incorrect sensor application; highly calloused skin; and movement (such as shivering), especially during hypoperfusion. To ensure accuracy, the sensor should return a steady pulse and/or pulse waveform. Falsely high or falsely low readings will occur when haemoglobin is bound to something other than oxygen. In cases of carbon monoxide poisoning, the falsely high reading may delay the recognition of hypoxemia (low blood oxygen level). Cyanide poisoning can also give a high reading because it reduces oxygen extraction from arterial blood (the reading is not false, as arterial blood oxygen is indeed high in early cyanide poisoning but the interpretation may be wrong).

Pulse oximetry only reads the percentage of bound haemoglobin. It can be bound to other gasses such as carbon monoxide poisoning and still read high even though the patient is hypoxemic.

**In the UK the National Patient Safety Agency recently released its new guidance for users of oxygen and are advising hospitals to follow their new safety guidance. You can read the details via the link below.**

[www.npsa.nhs.uk/site-map/npsa-advising-hospitals-to-follow-new-oxygen-safety-guidance/](http://www.npsa.nhs.uk/site-map/npsa-advising-hospitals-to-follow-new-oxygen-safety-guidance/)