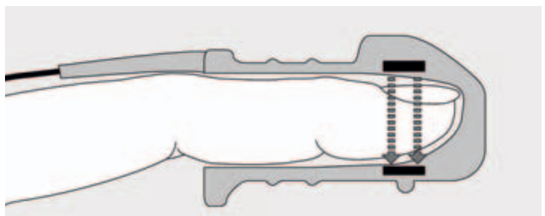
Understanding pulse oximetry

What is SpO_2?

- Non-invasive method of measuring the fraction of functional hemoglobin in arterial blood that is saturated with oxygen
- Also referred to as SaO_2
- Readings vary from 0-100%; **normal adults** range from 94-100%

How does pulse oximetry work?

Sensors are used on various parts of the body depending on the patient type. Within the sensor are light emitting diodes that shine red and infrared light through the tissue. Some light passes through the extremity, and a light sensitive detector opposite the light source receives it.



Red and infrared

Absorption at the sensor site

- Amount of light received by detector equals the amount of oxygen bound to hemoglobin in blood
- Oxygenated hemoglobin absorbs more infrared light
- Deoxygenated hemoglobin absorbs more red light
- Software algorithms compare the amounts of red and infrared light and the SpO_2 is calculated

How do I use SpO_2?

Many questions may be answered by referring to your instrument's and sensor's *Instruction for Use*.

General guidelines

Choosing an application site

- Sites with good perfusion
- Sites with low potential for generating motion artifact
- Sites that are comfortable for the patient
- Sites that allow easy application

Choosing a sensor

- Sensor is determined by size of the application site and the weight of the patient (the age of the patient is not a factor). Refer to the sensor *Instruction for Use*. Patient's medical condition may warrant using one type of sensor over another.

Infection control

For areas where infection control is a concern, disposable SpO_2 sensors are recommended.

Tips for optimal oximetry performance

Situation		Recommendation
Anemia	Reduced red blood cells and hemoglobin. (Functioning hemoglobin may be saturated with O_2 and SpO_2 may appear normal, but tissue may still be O_2 deprived)	Blood gases may need to be tested
Dyes	Affect light transmission through the blood	The following dyes may impact obtaining a reliable SpO_2: • Methylene blue • Indiocyanine green • Indiocarmine Blood gases may need to be tested
Hypothermia	Can cause constriction of peripheral blood vessels	Warming the patient/area may stimulate blood flow
Inadequate blood flow	Vessels are bound; blood cannot pass freely	Remove tight clothing or restraints. Avoid measuring blood pressure and SpO_2 on the same extremity
Light interference	External light sources may cause inaccurate readings	Cover the site with an opaque material to prevent incursion of external light
Medication	Medications, particularly nerve blockers, can lead to constriction of peripheral blood vessels	Measure SpO_2 at a core site or blood gases may need to be tested
Movement artifacts	Unusually strong movement may cause movement artifact	Measure SpO_2 at a site that is not susceptible to motion. If this is not possible, take and document SpO_2 measurement while you know the patient is not moving
Nail polish	Nail polish and false fingernails may cause false readings	Switch to another unpolished nail or consider another site
Perfusion	The site chosen for the SpO_2 measurement must be adequately perfused	Measure SpO_2 at a core site or blood gases may need to be tested
Shock	May cause reduced blood supply to the limbs and extremities	SpO_2 may give misleading readings. Measure SpO_2 at a core site or blood gases may need to be tested
Sensor site	Improper site selection may result in poor or inaccurate readings	• Check sensor regularly and move it if necessary (refer to sensor documentation) • The preferred application site for newborns immediately after birth is the right hand. SpO_2 values on the right hand (pre-ductal) are more representative for brain oxygenation • Pre- and post-ductal SpO_2 in preterm neonates with hyaline membrane disease or persistent ductus arteriosus (PPHN/PDA), it is important to place the sensor at the site relevant to the ductus arteriosus (right hand = pre-ductal; left hand/feet = post-ductal)

The Philips family of sensors – Sensors that last!

Philips offers a complete family of sensors that provides continuous, non-invasive measurement of arterial oxygen saturation.

Reusable

M1191A, M1191AL, M1191T, M1191B, M1191BL
- Patient size: > 50 kg (> 110 lb)

M1192A, M1192T
- Patient size: 15 – 50 kg (33 – 110 lb)

M1193A, M1193T
- Patient size: 1 – 4 kg (2.2 – 8.8 lb)

M1194A
- Patient size: > 40 kg (> 88 lb)

M1195A
- Patient size: 4 – 15 kg (8.8 – 33 lb)

M1196A, M1196T
- Patient size: > 40 kg (> 88 lb)

Disposable

M1131A (Adult/Pediatric Sensor)
- Patient size: > 20 kg (44 lb)

M1132A (Infant Sensor)
- Patient size: 3 – 10 kg (6.6 – 22 lb)

M1133A (Neonatal/Infant/Adult Sensor)
- Patient size: < 3 kg (6.6 lb)
- Patient size: 10 – 20 kg (22 – 44 lb)
- Patient size: > 40 kg (> 88 lb)

M1134A (Non-adhesive Sensor)
- Patient size: < 3 kg (6.6 lb)
- Patient size: 10 – 20 kg (22 – 44 lb)
- Patient size: > 40 kg (> 88 lb)

Across the care continuum

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