

Background Factors Affecting SpO2 Accuracy

1. Placement on Patient

- a) The emitters and receivers should always be optically aligned (across an arteriolar bed) especially when using “Y” Probes.
- b) The emitter should always be on the nail
- c) The light should pass through the nail; differences of $\pm 4\%$ can be obtained just by manipulating the position, especially on small patients.
- d) Errors will be observed if large finger probes are used on small children. Most manufacturers recommend a minimum weight of around 20Kg.
- e) Nail varnish and artificial fingernails should be removed.
- f) The site should be well perfused
- g) Ideally the site should be at heart level
- h) Oedematous tissue (an excessive accumulation of fluid in the intercellular spaces of the tissue) should be avoided as this can cause light to scatter.
- i) Toes can be used as an alternative site.
- j) Place the probe so that the cable runs back along the hand.

2. Environment

- a) Extraneous light can affect the receivers. Some manufacturers recommend covering the site in the presence of sunlight, phototherapy lights, surgical lamps, bright bedside lamps or infrared warmers.
- b) Adhesive tape can cause restrictions to the blood flow.
- c) The probe site should be changed at least every 24 hours, but examined regularly every 4 hours to ensure the integrity of the skin, correct alignment and no adverse effects on circulation
- d) The patient should not be mobile, as movement can affect the light path, and therefore the value displayed
- e) Electro-surgery may cause burns, particularly if the sensor is wet.
- f) Non-invasive BP cuffs on the same limb can cause erroneous readings.
- g) Catheters inserted into the same limb can cause errors.
- h) Tourniquets and restrictive bandages will affect accuracy.
- i) Contamination on the windows can reduce and scatter the light beams.
- j) Probes should not be used in an MRI environment.

3. Fractional and Functional

The difference in readings between fractional and functional is around 2%. The original manufacturer sometimes automatically adjusts the software to take into account these differences. Some manufacturers have changed from one to the other, between series or software upgrades. Other manufacturers leave the user to decide – sometimes by flipping a switch. This should be taken into account if two manufacturers, or even two monitors from one manufacturer, give different readings on the same patient.

4. General Mathematical Accuracy

The best accuracy being claimed at present is ± 2 digits on adults and ± 3 digits on neonates.

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