World Health Organization
REGIONAL OFFICE FOR Africa

COVID-19 RESPONSE

WORLD HEALTH ORGANIZATION REGIONAL OFFICE FOR AFRICA SUPPORTS THE COVID-19 RESPONSE

WHO/AFRO: Response to COVID-19 outbreak

Interim Guidance for Member States - On the Use of Pulse Oximetry in Monitoring Covid-19 Patients Under Home-Based Isolation and Care

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Background

Patients with no symptoms or mild forms of COVID-19 infection are sometimes isolated and managed in their home after meeting criteria for home-based isolation and care (HBIC) (see guidance on home-based care for further details). Although there are no symptoms or the symptoms are mild in nature, these individuals need to be closely monitored. This is to identify danger signs and intervene quickly. One of such danger signs is the reduction in oxygen saturation level in the red blood cells called hypoxaemia.

Target audience

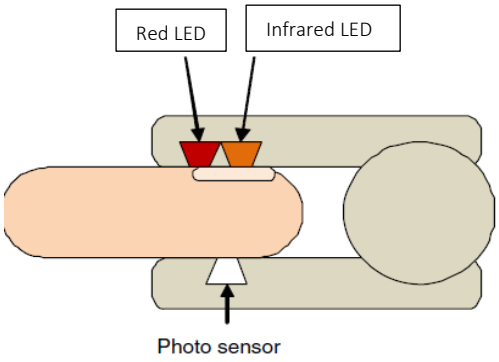
This guidance is to provide quick guide to clinicians and home monitoring teams (nurses, community health workers, voluntary health workers, etc.) involved in home-based isolation and care of patients (asymptomatic and mild).

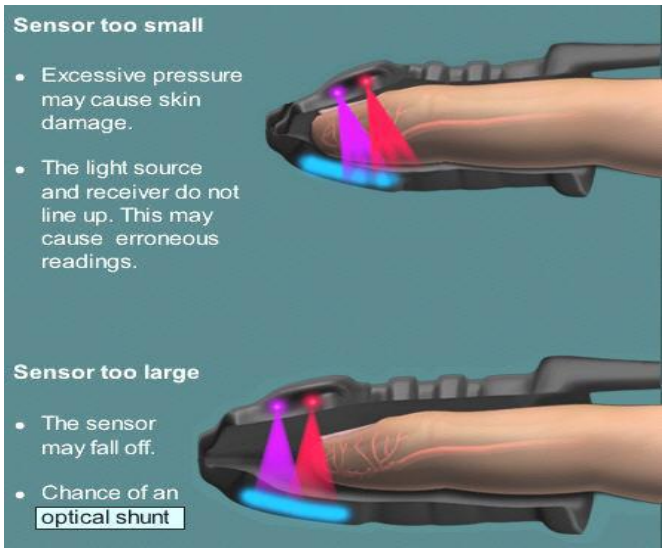
Pulse oximeter

A pulse oximeter is a device that measures the oxygen saturation of haemoglobin in arterial blood described as SPO_2. It consists of a monitor that has batteries and a display, and a probe that detects the pulse. It is usually used on the second finger of the patient. The monitor displays the oxygen saturation level. It is used to detect hypoxia, defined as abnormally low levels of oxygen in the body. Some pulse oximeter monitors display a pulse waveform which illustrates the pulse detected (Pulse rate in beats per minutes).

Mechanism of measuring oxygen saturation

It is based on the principle that oxyhaemoglobin and deoxyhaemoglobin absorb red and near infra-red light at different wavelengths. Oxyhaemoglobin absorbs more infra-red light than red light while deoxyhaemoglobin absorbs more red light. A light sensor containing two light sources (red and infra-red) transmits light through tissues, is absorbed by haemoglobin and detected by a photo sensor. The ratio of absorbance at the 2 wavelengths (red-660nm, infra-red-940nm) is calculated and calibrated against direct measurements of arterial oxygen saturation to derive SPO_2 reading.





Usefulness of pulse oximeter in HBIC

A. Pulse oximeter use for home-based isolation care include:

- Detection of "silent hypoxia", in the absence of shortness of breath and accompanying danger signs
- Monitoring and early identification of deterioration of clinical condition
- Confirmation of oxygen saturation levels

B. Practical use of the pulse oximeter – step-by-step guidance:

- Switch on the pulse oximeter. It undergoes internal calibration and checks once turned on
- Remove applied nail polish from nails before attaching the pulse oximeter probe
- Use the appropriate probe for the selected site, paying attention to the correct probe size

- Connect the probe to the pulse oximeter
- Ensure that the probe is well positioned, without being too tight or loose on the finger
- Wait for 30-60 seconds, while calm, for the device to detect a pulse and calculate the oxygen saturation
- The oxygen saturation and pulse rate are displayed once the device detects a good pulse
- Values should be measured 2-3 times a day, and trends in oxygen saturation and pulse readings recorded

C. Trouble shooting if no signal is detected by the pulse oximeter using:

- Is the probe working or correctly positioned? Try an alternative site to ensure the probe is functioning
- Is the limb cold? Warm the limb
- Ensure the patient has signs of life!

D. Interpretation of pulse oximeter readings

1. $SPO_2 \geq 94\%$ with no emergency signs (chest pain, dyspnoea, shortness of breath, altered mental status)- normal reading. Continue monitoring at home
2. $SP0_2 \leq 94\%$- patient requires hospitalisation for monitoring and further management. Arrange to transfer the patient to a designated treatment facility.
3. $SP0_2 \leq 90\%$ is a medical emergency and requires referral to a health facility with an intensive care unit or high dependency unit.

E. Causes of inaccurate pulse oximeter readings include:

1. Nail polish, artificial nails cause falsely low oxygen saturation readings.
2. Poor perfusion due to hypotension, hypovolemic shock, or cold extremities.
3. Poor probe positioning resulting in decreased red and infrared light absorption.
4. Excessive movement with motion artefacts.
5. Abnormal haemoglobin.
6. Carbon monoxide poisoning gives a falsely high reading.

Conclusion

Patients with asymptomatic and mild COVID-19 infection can be isolated and managed at home, after the criteria for HBIC are fulfilled. Close monitoring of vital signs including oxygen saturation level is crucial to monitor patients, detect deterioration and danger signs that require prompt intervention.

References

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