

Pulse Oximeters Demonstrate Different Responses During Hypothermia and Changes in Perfusion.

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Introduction

Several new pulse oximeters using updated algorithms are marketed as being resistant to motion and hypoperfusion. The purpose of this study was to compare the performance of three pulse oximeters under conditions of hypothermia and altered perfusion.

Methods

Ten male volunteers were enrolled in this study after Institutional approval and obtaining informed consent. The probe of the Dolphin 2100, Nellcor N-595, or Masimo SET Radical version 4.2 was attached to the left index finger. Time from 'power on' to acquire the pulse wave and oxygen saturation (SpO₂), time from the application of air tourniquet with 250 mmHg on the upper arm to loss of pulse wave and SpO₂, and time from the release of the tourniquet to acquire the pulse wave and SpO₂ were measured. Then, the patient's left hand and arm were cooled gradually to 27 degrees C dermal temperature in a room at 19 degrees C. The temperatures at loss of the pulse wave and SpO₂ were recorded.

Results

The Nellcor N-595 was the slowest to detect SpO₂ and pulse wave at 'power on'. The Masimo SET showed pulse wave and SpO₂ longer than the other two monitors after 'tourniquet on'. The Nellcor N-595 was the fastest to show pulse wave and SpO₂ following tourniquet release.

Conclusion

The Masimo SET was the slowest to respond to the changes in perfusion, and the Nellcor N-595 responded the fastest. However, the Nellcor N-595 was the slowest to show SpO₂ and pulse wave at 'power on'.