

## **False Positive Rate of Carbon Monoxide Saturation by Pulse Oximetry of Emergency Department Patients.**

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### **Introduction**

Symptoms of carbon monoxide (CO) poisoning are non-specific. Diagnosis requires suspicion of exposure, confirmed by measuring ambient CO levels or carboxyhemoglobin (COHb). An FDA-approved pulse oximeter (RAD-57) can measure CO saturation (SpCO). The device accuracy has implications for clinical decision-making.

### **Materials and Methods**

From 4/1/2008 to 8/15/2008, study personnel measured SpCO and documented demographic factors at time of clinical blood draw in a convenience sample of 1,363 patients presenting to the Emergency Department at Intermountain Medical Center, Murray, Utah. The technician then assayed COHb. Carboxyhemoglobin and SpCO values were compared by subject; false positive or negative values were defined as SpCO at least 3percentage points greater or less than COHb level, reported by the manufacturer to be  $\pm 1SD$  in performance.

### **Results**

In 1,363 patients, 613 (45%) were male, 1141 (84%) were light-skinned, 14 in shock, 4 with CO poisoning. 122 (9%) met criteria for a false positive value (range 3.0-19.0 percentage points), while 247 (18%) met the criteria for a false negative value (-13 to -3 percentage points). Risks for a false positive SpCO reading included being female and having a lower perfusion index. Methemoglobin, body temperature, and blood pressure also appear to influence the SpCO accuracy. There was variability among monitors, possibly related to technician technique, as rotation of monitors among technicians was not enforced.

### **Conclusions**

While the RAD-57 pulse oximeter functioned within the manufacturer's specifications, clinicians using the RAD-57 should expect some SpCO readings to be significantly higher or lower than COHb measurements, and should not use SpCO to direct triage or patient management. An elevated SpCO could broaden the diagnosis of CO poisoning in patients with non-specific symptoms. However, a negative SpCO level in patients suspected of having CO poisoning should never rule out CO poisoning, and should always be confirmed by COHb.