

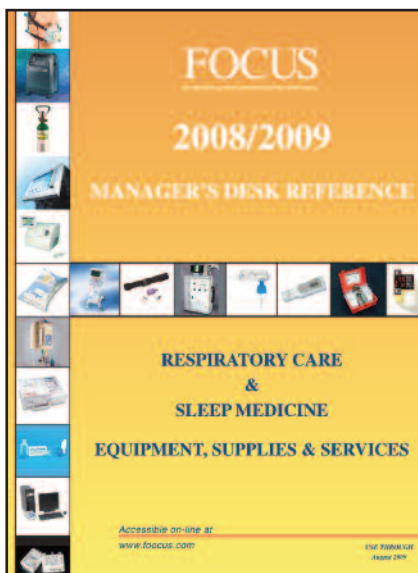
PULSE OXIMETRY AND CHILDREN

By Stephanie Richardson

From croup to congenital heart disease, respiratory clinicians have used pulse oximetry as a useful adjunct to clinical assessment in children. However, over the past five years, studies have shown that many pediatric health care providers, particularly nurses, are not as knowledgeable about pulse oximetry as they should be.

A decade ago, pulse oximeters were mostly found in operating rooms and intensive care units, but they are commonplace in more acute care settings today. Nicknamed the “fifth vital sign,” these devices see routine use in clinics, doctors’ offices, emergency departments and even homes. Like other vital signs and their monitors, and pulse oximetry and its applications must be understood so that the pediatric patient’s condition can be assessed correctly.

Although pulse oximetry data are vital in patient care, many pediatric caregivers do not have clinical expertise or formal training in this area. Here, we take a look at some of the most recent considerations for pediatric pulse oximetry to help boost the knowledge of our fellow health care workers.



Neonatal applications

A study released in June 2008 reported that pulse oximetry screening in neonates may promote early detection of congenital heart defects (CHD) and other potentially severe diseases.

Unrecognized congenital heart defects or other critical cardiopulmonary conditions may occur in apparently healthy newborn babies admitted to the nursery. The SpO₂ level may be low even if the infants look pink. Because these infants appear healthy, a significant proportion of babies with severe CHD are not detected in clinical screening before they are discharged home.

Pulse oximetry screening may be useful to identify defects associated with decreased SpO₂ levels before the development of heart failure and circulatory collapse. With pulse oximetry, the sensitivity rate for detecting CHD is high, and the false-positive rate is low.

Another study indicated that pulse oximetry is helpful under the most difficult clinical situations, including neonatal resuscitation and monitoring extremely low birth weight babies. Researchers noted that adequate and clinically useful reading of SpO₂ is possible during newborn resuscitation. They also determined that pulse oximeters with faster response times allowed for more rapid adjustments of oxygen during resuscitation, avoiding unnecessary exposure to hyperoxia.

Home oximetry

Pulse oximetry may be beneficial for children in the home care environment for the following scenarios:

- weaning from home oxygen therapy
- a change in a patient’s condition that requires adjusting his or her prescription for oxygen therapy
- determining the correct liter flow for oxygen therapy during exercise or sleep.

In these situations, adjustments to oxygen therapy can be made with short-term use of pulse oximetry. The patient’s caregiver can consult with a physician during visits to the doctor or through phone conversations.

Long-term pulse oximetry monitoring at home can be used in these situations:

- monitoring children that are using assisted ventilation and/or are tracheostomy dependent
- weaning children from assisted ventilation through a defined protocol

*The 2008/2009 Focus Manager’s Desk Reference
Reference it online at www.foocus.com*

Featured Pulse Oximeters



Digit® Finger Oximeter
Smiths Medical
800-558-2345
www.smiths-medical.com
Circle Reader Action# 49



Onyx II ® 9550
Nonin Medical, Inc
800.356.8874
www.nonin.com
Circle Reader Action# 50



Alarm Management System* (AMS)
for the Nellcor™ OxiMax™ N-600x™
Covidien
800-635-5267
www.covidien.com
Circle Reader Action# 51



Model C205 Pediatric Fingertip
Pulse Ox
Vacumed
800-235-3333
www.vacumed.com
Circle Reader Action# 52

Pulse Oximetry... Continued from page 56

- children with idiopathic pulmonary hemosiderosis (first sign of pulmonary hemorrhage is desaturation)
- children needing apnea monitoring who are at risk for disconnection, strangulation or injury from being tangled in apnea monitor wiring.

Diagnosing obstructive sleep apnea or following up on its treatment is one of the most common uses for home oximetry in children. However, the child's physician must be able to compare the child's clinical symptoms and oxygen desaturations measured by home pulse oximetry.

The American Academy of Pediatrics has stated that pulse oximetry related to diagnosing and managing sleep apnea has high specificity and low sensitivity. That means that while positive test results may be true, negative test results indicate the need to confirm diagnosis using overnight polysomnography. Pulse oximetry has been used with heart rate and thoracic impedance monitoring to detect apnea in infants in hospitals and homes.

Important to note, however, is that while using pulse oximetry at home to monitor obstructive sleep apnea is acceptable, other therapeutic interventions that improve the disease are more appropriate. For example, using home oximetry is not recommended compared to a heart rate and respiratory monitor for infants with apnea and chronic lung disease. The same goes for children at risk for sudden infant death syndrome.

Also, the use of pulse oximetry for any of these short-term or long-term scenarios in premature infants is inappropriate and has resulted in excess use of home pulse oximetry.

Latest innovations

In late 2008, one pulse oximetry manufacturer developed the first non-adhesive pulse oximetry sensor designed for extremely low birth weight (ELBW) infants, weighing less than 500 grams to 1,000 grams. The new sensor is made exclusively for ELBW babies and features special soft foam and non-adhesive attachments. These prevent injury to the most sensitive skin of premature infants. By not containing adhesive, these sensors prevent epidermal stripping and skin trauma associated with applying and repositioning adhesive sensors.

At just 20 mm in size, the single-patient use sensor is smaller than typical neonatal sensors. So, the distance between the emitter and detector on the sensor is much smaller, allowing it to fit more securely on tiny hands and feet. The sensor incorporates a hook and loop wrap so that it can be quickly and securely applied on wet and slippery sites, and easily repositioned.

Another developer's fingertip pulse oximeter has quickly made inroads into school nurses' offices nationwide. Touted as the world's smallest oximeter, the latest version of this device is wireless and interacts with other medical devices by way of Bluetooth® technology. It can be used to monitor children in the hospital or with caregiver supervision at home.

When used in the homecare arena, patients can take readings and then transmit the time-stamped data upon returning to the physician's office. The device's memory allows it to store a minimum of 20 single-point measurements.

Stephanie Richardson is a freelance medical writer based in Philadelphia.