

specialists in pulse oximetry

Clinicians – there is a 1 in 3 chance your SpO₂ Sensor is putting your patients at risk.

Recent surveys conducted on pulse oximeter sensors in daily use have discovered that 1 in 3 have an error range greater than +/-3%. The worst examples showed severe error ranges, giving dangerously inaccurate readings.

The presence of such large errors means that the device is not working as the manufacturer claims it should. Add to this the multiplier effect, where low patient SpO₂ levels magnify any sensor error range, and the situation gets even more critical. For example, under these conditions, just a +/-2% sensor error range at normal SpO₂ could rise to:

- +/-7% at 80% SpO₂, and...
- +/-9% at 70% SpO₂.

This is further compounded by biological variability of +/-3%, making the overall accuracy at low SpO₂ up to +/-12%. So the more critical the patient, the more important it is that sensor accuracy is spot on. Failure

to use accurate equipment could easily lead to insufficient or excess oxygen being administered. It's worth remembering that every year in the USA there are still over 2000 cases of Retinopathy of Prematurity, and even

"anaesthetists think that they are using a system with an accuracy of +/-2%. The reality may be more like +/-4%, or even greater"

more in Europe.

Anaesthetists have said: 'Most colleagues think that they are using a system with an accuracy of +/-2%. The reality may be more like +/-4%, or even greater, and that is clinically unacceptable'.

These inaccuracies are not confined to older sensors; many brand new sensors are faulty too. But why? Fundamental to the pulse oximeter system are two light-emitting diodes (LEDs) within the sensors. If these are not accurate – as is all too often the case – the entire monitoring process

will be a fruitless exercise, with all subsequent clinical decisions being based on faulty data.

Which brings us to the matter of the other 'Big C' - compensation. With the spectre of litigation haunting the entire health service scene today, the question 'who is responsible?' cannot be avoided. While patients may no longer expect their doctors to be infallible, they certainly do expect them to take the elementary step of using the most accurate monitoring equipment available. In light of survey results such as these, it makes sense for clinicians to ensure that pulse oximeter sensors are checked regularly, and often.

Up till now there has been no instant method of checking sensor accuracy. But now there is a fast, convenient, on-the-spot testing option - the LIGHTMAN SpO₂ sensor tester. *see below and centre pages.*

LIGHTMAN SpO₂ Sensor Tester - micro spectrometer



Checking an SpO₂ sensor has, until now, meant removing it from the ward, at best for hours, at worst for days, for testing on lab-based equipment. But now there is a better testing option. LIGHTMAN is unique; a portable, hand-held, self-calibrating micro spectrometer which tests sensor LED wavelengths and other important sensor functions. With LIGHTMAN carers can deliver a new, higher standard of care than was previously possible.

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LIGHTMAN[®] does it all...

LIGHTMAN[®] is:

- Portable - Compact - Hand-held.
- Easily operated by non-technicians.
- Designed for speed and ease of use.
- Tolerant of sensor positioning.
- Latex free.



Adaptors available for all major brands including:

BCI
OHMEDA
NOVAMETRIX
NELLCOR
MASIMO
DATEX
DATASCOPE
CRITICARE
HEWLETT PACKARD

sensor adaptors

- Tests the most vulnerable components in the oximeter system: **Sensor LEDs and Photodiode.**



- Tests itself by self-calibrating to 3 neon/argon emission spectra.

- Tests LED accuracy - wavelength drift, intensity and for incipient failure.

- Tests the condition of LEDs quickly and on the spot and avoids taking complete oximeter system out of commission.

- Tests photodiode sensitivity.

- Tests for intermittent cable breaks.

- Tests 50 sensors per full charge.

- Tests sensor accuracy in isolation from the monitor.

- Tests sensors and indicates those within manufacturers' specification.

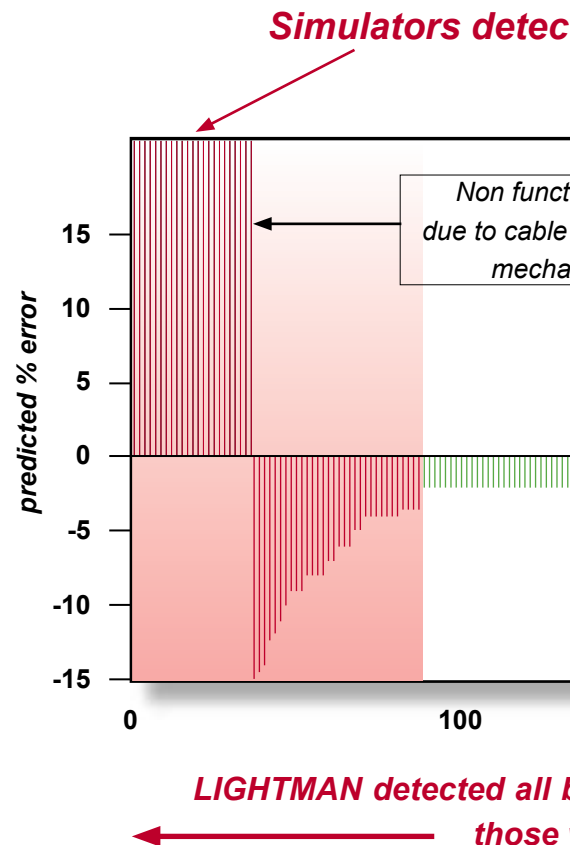
Simulators don't test sensor accuracy

It is widely – but wrongly – believed that simulators check the accuracy of pulse oximeter sensors. In fact, all they do is check electrical continuity, the software in the monitor, and light emission, not light wavelength.

What simulators fail to do is to check the wavelengths of light emitted by the LEDs in sensors. Consequently the true accuracy of the pulse oximeter system is unknown.

This is leaving a dangerous gap in the testing of SpO2 sensors, and one which is putting thousands of patients at unnecessary risk every day.

Before the arrival of the LIGHTMAN, it was not possible to check the true accuracy of pulse oximeter sensors without taking the whole system away for lab-based testing; a process that could take days. But now a new standard of care is possible; the LIGHTMAN is a portable micro spectrometer with inbuilt self-calibration - **it is not a simulator**. Using the LIGHTMAN, sensors can be checked on the spot, and in seconds, for wavelength accuracy, cable integrity, wavelength drift, and incipient LED failure.



Towards Best Practice with LIGHTMAN

Demonstrated last year at MEDICA, Cem is proud to announce the LIGHTMAN SpO₂ sensor tester micro spectrometer.

The LIGHTMAN was designed to make pulse oximeter sensor testing quick, simple, reliable and accurate. A big ask, but LIGHTMAN answers on every point.

First, and most important, LIGHTMAN is accurate. Before every single sensor test, LIGHTMAN self-calibrates against a known spectrum, so every test result can be trusted. There's no trade-off here between size and accuracy.

...hand-held and completely portable, so it can be taken to where it's most needed - the ward, the operating theatre, wherever...

LIGHTMAN is hand-held and completely portable, so it can be taken to where it's most needed - the ward, the operating theatre, wherever.

LIGHTMAN is simplicity itself to use. The sensor doesn't need to be positioned on the tester with mathematical precision, so the readings can be trusted, even under less than ideal working conditions. This means LIGHTMAN doesn't need a technician to operate it, so carers can check pulse oximeter probes as often as they feel necessary.

Lead the field and become an Exemplar of Best Practice by using the LIGHTMAN regularly and often on the wards, in the operating theatre, the neo-natal unit...

CEM - the company behind LIGHTMAN



Celtic ElectroMedical is a division of The Electrode Company Ltd. Formed in 1986, it is a completely self financed private company wholly owned by its two founders - Dr GR Mathews and Dr VM Hickson.

CEM's credibility with the end user comes from their complete independence from pulse oximeter manufacturers and from maintaining the very best technical expertise and delivery of the highest quality service.

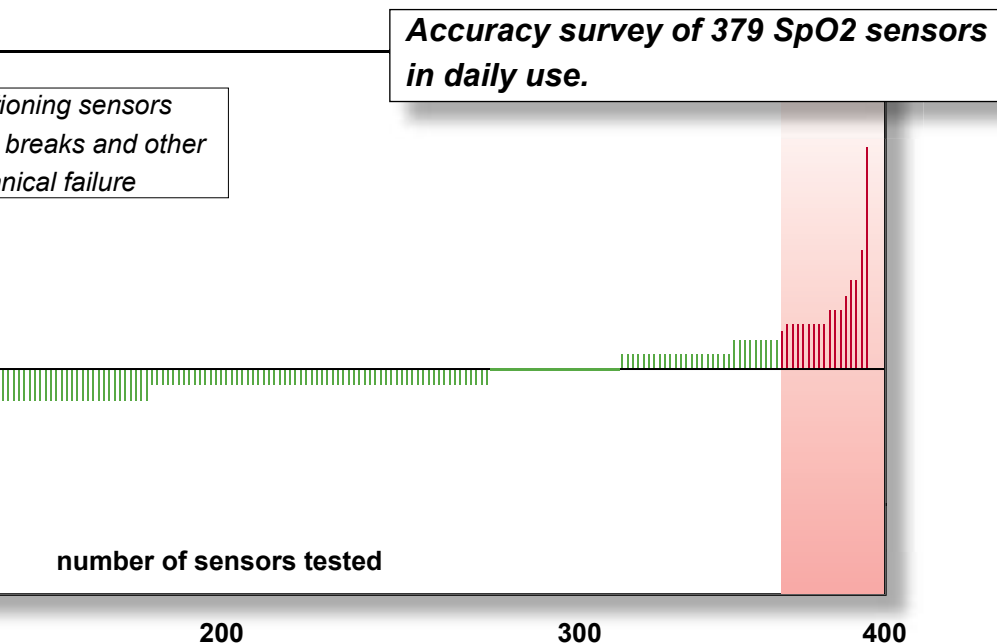
The company specialises in non-invasive monitoring, optical sensors and high performance pulse oximetry.



It has a personnel list with impressive qualifications and experience in the field of medicine, biology and medical physics.

CEM's technical achievements have received wide acclaim. CEM has been rated by IP Wales as one of the top five most innovative companies in Wales. Their research & development has redefined the accuracy of pulse oximeter probe measurement.

ted faults in this category only



broken and out of range sensors as well as indicating within manufacturers' specification.

Stop Press - See CEM at MEDICA

Managers - the buck stops with you

Around 50 per cent of adverse events suffered by hospital patients every year could be avoided, according to some estimates. That translates into a lot of disgruntled patients. Many will need extra time in hospital, and may go on to seek compensation.

So what can be done to help plug this financial drain? More often than not, adverse events are the result of a series of failures. And these don't have to be gross errors; minor failures, too, have been shown to have a cumulative effect.

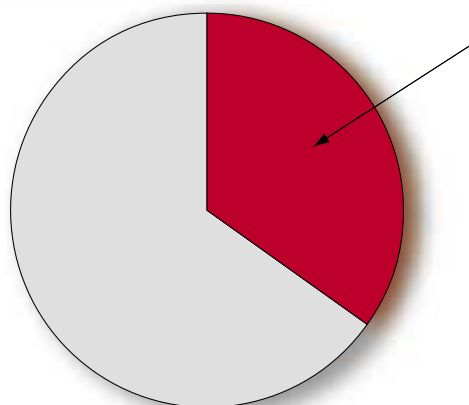
Take an item in everyday use – pulse oximeter sensors, used to monitor oxygen

In this scenario, a flashing blue light in your rear view mirror will soon let you know you're speeding. But in healthcare the results can be a whole lot worse: every year in Europe and the USA, over 5000 premature babies are visually impaired, a major cause of which is too much oxygen.

problems pinpointed fast

Up till now, astonishingly, there has been no way to check sensor accuracy. And it's no good looking for FDA clearance or CE marking for reassurance; these are no guarantee of sensor accuracy. But now, in one hit, is a new, portable, hand-held micro spectrometer – the Lightman – which measures sensor LED wavelengths, and gives an instant, on-the-spot read-out.

SpO2 Sensor Survey



35% of sensors tested were outside acceptable limits and represented a clinical risk to patients

Results of a survey of 379 SpO2 sensors in use from 8 leading hospitals

levels in patients' blood by shining two specific wavelengths of light through the blood. The light source is two LEDs in the sensor, but if these are emitting the wrong wavelengths, then the readings will also be wrong. And LEDs can develop faults through ageing, wear and tear, and so on. In fact, recent surveys of pulse oximeter sensors have discovered that 1 in 3 give readings well outside the manufacturers' claimed error range. (See front page.) This degree of inaccuracy can mean that readings are way off beam. To get a feel for what this means, try this analogy: imagine driving in a 30mph zone with your speedo showing anything between 20mph and 50mph - but you don't know it's faulty.

Lightman also pinpoints cable problems, and can be used on the ward, in the operating theatre, in fact literally anywhere where sensors are used. What's more, Lightman doesn't need a qualified technician to operate it.

a new standard of care

Lightman will introduce a new standard of care, and will prove a formidable defence against grounds for negligence. Its regular use will go a long way towards cutting the incidence of adverse events, and the resultant burden of additional hospital days, prolonged treatment, and, ultimately, law suits.

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