NHS Improvement

Patient Safety Alert

Risk of harm from inappropriate placement of pulse oximeter probes

18 December 2018

Alert reference number: NHS/PSA/W/2018/009

Warning Alert

Measurement of oxygen saturation, using a pulse oximeter probe, is routinely undertaken as part of patients' vital signs during diagnosis and ongoing monitoring. Oxygen saturation readings are a key component of the National Early Warning Score (NEWS2).[1]

Oximeter probes can be single or multiple use and are designed to attach to specific parts of the body. Adult oximeter probes can be attached to either a finger or an ear, but are not interchangeable between these sites, whilst probes for babies and children need to be selected according to the patient's weight.

If an oximeter probe intended for the finger is attached to the ear (or vice versa), or a probe intended for an adult is attached to a baby or a child (or vice versa), it can produce a reading up to 50% lower or 30% higher than the real value.[2,3,4] The clinical implication of an inaccurately high reading, especially as part of NEWS2, is that staff may be falsely reassured about a patient's condition, when in reality the patient is deteriorating, or may make an inappropriate intervention when in fact a patient is stable or improving.

The national patient safety team was made aware that this issue may be under-recognised. To gain further information, we carried out a survey of clinical staff and observed clinical practice. Key issues identified were:

- a substantial proportion of staff do not know that finger probes can give misleading results if attached to ears
- a quarter said they do not have access to probes specifically for the ear, even though in almost all clinical settings some patients will need these
- once probes are removed from their packaging there is no easily visible prompt to remind the user where to attach the probe
- staff may not be aware of other factors that can affect the accuracy of the reading.

Although no reports were found in the National Reporting and Learning System (NRLS) relating to this issue, the scale of these gaps in knowledge and equipment suggests the potential for severe patient harm is high.

The local actions required by this alert will help reduce the risk of incorrect probe selection and placement. To reinforce and embed these local changes, NHS Improvement and the Medicines and Healthcare products Regulatory Agency (MHRA) are asking manufacturers to review device labelling and provide prompts for correct attachment. NHS Improvement have also asked the Clinical and Products Assurance (CAPA) arm of NHS Supply Chain (NHSSC) to review the oximeter probe descriptions in its catalogue.

Actions

Who: All organisations providing NHS funded-care where oxygen saturation probes are used as part of routine or emergency monitoring of patients

When: To commence immediately and actions completed by 18 June 2019

1. Identify a clinical leader to bring together people with responsibilities for medical device training and education, clinical skills assessment, NEWS2 implementation and procurement of pulse oximeters.

2. Develop an action plan to reduce the risk of inappropriate placement of pulse oximetry probes. This should:
   - arrange for ongoing access to adult finger and ear probes in all clinical areas where oximetry is used (including for the range required for babies and children where appropriate)
   - provide point-of-use reminders on why it is vital to use the correct probe for fingers and for ears, and for babies and children
   - provide point-of-use reminders on other factors that may interfere with the accuracy of the reading.

3. Once your organisation's action plan for managing these risks has been agreed, communicate the key messages in this alert and the plan to relevant clinical staff, clinical education/training staff, and patients or their carers who self-monitor oxygen saturation levels.

See page two for technical notes, stakeholder engagement and advice on who this alert should be directed to.

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Technical notes

Patient safety incident reporting
This issue was first raised with the NHS Improvement national patient safety team on social media.

As those attaching finger probes to ears or vice versa were unaware this could result in misleading readings, NRLS incident data could not be used to identify how often this error has delayed the recognition and response to deterioration.

We therefore engaged with the National Patient Safety Response Advisory Panel and used a questionnaire to survey 81 clinical staff from 12 organisations (acute and community), through our Medical Device Safety Officer (MDSO) network. Most respondents (80%) said they would attach a finger probe elsewhere, to the ear or another extremity, if they could not obtain a good recording from the finger. Of respondents, 74% reported they had local access to specific oximetry consumables that attach to ear lobes. Most did know that different oximeter probes were available for adult and paediatric patients and would not use an adult oximeter probe for a child.

Notes
This alert is designed to address the patient safety risks associated with inappropriate placement of pulse oximeter probes. It is outside the scope of this alert to provide comprehensive information on how pulse oximeters work and the many different factors that can interfere with their accuracy. Organisations should refer to manufacturers' instructions of oximeters in local use and use those to provide guidance and training for their staff to ensure accurate readings.

References

1. Patient Safety Alert: Resources to support the safe adoption of the revised National Early Warning Score (NEWS2) https://improvement.nhs.uk/news-alerts/safe-adoption-of-NEWS2/
2. Haynes JM (2007). The ear as an alternative site for a pulse oximeter finger clip sensor. Respiratory Care. 52(6):727-9. http://rc.rcjournal.com/content/52/6/727
3. Mannheimer PD (2007) The Light-Tissue Interaction of Pulse Oximetry. Anesthesia & Analgesia. December 2007 - Volume 105 - Issue 6 - p S10-S17 https://journals.lww.com/anesthesia-analgesia/fulltext/2007/12001/The_Light_Tissue_Interaction_of_Pulse_Oximetry.3.aspx
4. Walters TP (2007). Pulse oximetry knowledge and its effects on clinical practice. British Journal of Nursing 16(21):1332-40. https://www.ncbi.nlm.nih.gov/pubmed/18073672

Stakeholder engagement
- National Patient Safety Response Advisory Panel (for a list of members and organisations represented on the panel, see improvement.nhs.uk/resources/patient-safety-alerts/)

Advice for Central Alerting System officers and risk managers
This alert needs co-ordinated implementation rather than separate action by individual teams or departments. Pulse oximeters will almost certainly be used in at least some circumstances in almost all types of trusts and by general practitioners. If you are unsure who will co-ordinate implementation of this alert: for acute trusts, seek initial advice from a lead nurse in critical care outreach; for ambulance trusts, mental health trusts, community services, and general practices, seek advice from a senior clinical team member in a nursing, medical or paramedic role.

This alert also applies to staff in care homes where pulse oximeters are used.

Acknowledgement
Thanks to all the clinical staff who took part in the survey and therefore helped to inform this alert.

Sharing resources and examples of work
If there are any resources or examples of work developed in relation to this alert you think would be useful to others, please share them with us by emailing patientsafety.enquiries@nhs.net