Safety Action Notice

Ref: SAN(SC)16/02 Date: 01 February 2016

Risk of using different airway humidification devices simultaneously

Summary

Use of a HME (heat and moisture exchanger) and HH (heated humidifier) simultaneously on a single patient may lead to airway occlusion as the HME will absorb water and may become obstructed.

Action

1. Identify if incidents involving airway humidification devices have occurred, or could occur, in your organisation.

2. Consider if any immediate action needs to be taken locally, and ensure that an action plan is underway, if required, to reduce the risk of such incidents occurring.

3. Distribute this Alert to all relevant staff who uses airway humidification devices.
   1. Share any learning from local investigations or locally developed good practice resources by emailing: patient.safetyenquiries@nhs.net

Action by

- All organisations providing NHS-funded care where airway humidification devices are being used

Deadlines for action

Actions complete: 7 March 2016

Equipment Details

Humidification devices

Problem / background

In normal breathing, air is filtered, warmed and moistened by the nose and the upper airway. If the upper airway is bypassed (e.g. in intubated and ventilated patients), it is essential that this natural humidification system is replaced to help prevent lung damage, airway obstruction and lung infection. There are two types of humidification devices in common use:
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- heated [water] humidifiers (HHs), usually located between the ventilator and the breathing system (a wet circuit); and
- heat and moisture exchangers (HMEs), placed at the patient’s end of the breathing system.

A recent paper [1] highlighted the risk of inadvertently using a HME and a HH simultaneously on a single patient. Without correction, this may lead to airway occlusion as the HME will absorb water and may suddenly become obstructed.

A search of the National Reporting and Learning System (NRLS) identified 76 incidents where a HME had accidentally been left attached to a wet circuit. In many cases the error was not recognised for several hours and caused respiratory distress. One incident seems to have resulted in severe cardiovascular instability and another for the patient to lose consciousness. In some cases nursing staff noticed that patients were deteriorating but they could not always identify the cause of the problem. A typical incident report reads: “I took handover of my patient from a senior band 5, she informed me that his ventilation had been problematic overnight…. Whilst doing my initial patient safety checks, I immediately noticed that there was an HME filter on the vent circuit, unfortunately this was a wet circuit and therefore it is contraindicated to use an HME…. I was on a day shift and have no idea how long the HME had been in situ but it was extremely sodden which would indicate that it had been there for some time.”

Most incidents were related to patients mechanically ventilated via an endotracheal tube. There were also two reports relating to patients on non-invasive ventilation and one relating to a patient with a tracheostomy. Reports suggested that incidents occurred after a patient had been transferred (e.g. from a scan or theatre back to the ward); in these cases it seems that the HME used for the transfer had not been removed when the patient was reconnected to the humidified circuit. There were also reports suggesting that incidents occurred after the ventilator had been set up or the breathing system had been changed.

If using wet humidification, the HME must be removed as it can get saturated with water and block the airway. Safety information about specific products is available in the manufacturer’s instructions and it is important that these are available and understood by staff. Local action taken to prevent incidents included performing routine safety checks, with a particular focus on patients recently transferred on ventilators; and adding the risk to the transport checklist.

Suggested Distribution

Anaesthetics, Burns Units, Cardiology, Care for the Elderly, Care Home Services, District Nursing, Health & Safety, Hospices, Intensive Therapy Units, High Dependency Units, Paediatric Intensive Care Units, Neonatal, Nursing, Practice Nurses, Risk Management, Respiratory Medicine, Special Care Baby Units, Children Hospitals, Wards

Technical Notes

NRLS search dates and terms

A NRLS search was undertaken on 23 November 2015 for the key words HME* and eat_moisture_exchange*. In total, 518 incidents were identified and all were reviewed.

It was found that 76 incidents had been reported in which a HME had accidentally been left attached to a ‘wet circuit’ and these reports were further analysed.

There were 442 incidents that did not describe the simultaneous use of HMEs and HHs but some of which described other risks, for example:
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- HMEs becoming obstructed for other reasons (e.g. occluded with sputum or through regular administration of nebulised drugs);
- no artificial humidification device attached to the ventilation system and therefore dry and cold air given to the patient; and
- incorrect set up of breathing system.

Circuit filters with no HME function can also become saturated with a consequent increase in circuit resistance and potential occlusion.

Stakeholder engagement

- Safe Anaesthesia Liaison Group (SALG)
- Intensive Care Society
- Faculty of Intensive Care Medicine
- British Society of Critical Care Nurses
- NHS England Surgical Patient Safety Expert Group


References


Enquiries

Healthcare Improvement Scotland (HIS) is responsible for the management of Patient Safety Alerts (PSAs) in Scotland. The Incident Reporting & Investigation Centre (IRIC) issues equipment oriented PSAs as Safety Action Notices (SANs) in Scotland on behalf of HIS.

All requests regarding return, replacement or modification of any equipment mentioned in this alert should be directed to the relevant supplier or manufacturer. Other enquiries (and adverse incident reports) in Scotland should be addressed to:

Incident Reporting & Investigation Centre (IRIC)
NHS National Services Scotland
Gyle Square, 1 South Gyle Crescent, Edinburgh EH12 9EB
Tel: 0131 275 7575   Email: nss.iric@nhs.net

Report options are available on the HFS website: How to report an Adverse Incident
Further information about reporting incidents can be found in CEL 43 (2009) or by contacting IRIC at the above address.