



LEARNING MATTERS

Welcome to
Learning Matters
Special Edition 15
January 2021



Reducing the risk of oxygen tubing being connected to air flowmeters

Introduction

Severe harm or death can occur if medical air is accidentally administered to patients instead of oxygen. There has been a **significant increase** in the number of incidents reported regionally, where the patient has been inadvertently connected to medical air rather than oxygen. Nine serious adverse incidents (SAIs) have been reported by HSC Trusts since April 2020.

Unintentional connection of a patient requiring oxygen to an air flowmeter has been classified as a **Never Event** since 2018. This applies when a patient who requires oxygen is connected to an air flowmeter when the intention was to connect them to an oxygen flowmeter (NHS Improvement, 2018).

NHS Improvement Patient Safety Alert

In 2016, NHS Improvement issued a Patient Safety Alert (PSA) **Reducing the risk of oxygen tubing being connected to air flowmeters** available here:

<https://tinyurl.com/air-oxygen>

Reminders of the above letter were reissued to HSC Trusts in June and December 2020, due to the regional rise in SAIs/Never Events related to oxygen tubing being connected to air flowmeters

Impact of the COVID-19 pandemic on the rise in SAIs/Never Events

During the COVID-19 pandemic there has been an increase in the number of patients requiring oxygen and along with staff redeployment, these may be key **contributory factors** that have led to the notable rise in SAIs/Never Events across HSC Trusts from April 2020. It is therefore vitally important that all staff, including those redeployed due to COVID-19 are fully inducted into the ward environment and made aware of the NHS Improvement PSA **Reducing the risk of oxygen tubing being connected to air flowmeters**.



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Learning from SAIs/Never Events

In one of the reported SAIs/Never Events, the moveable flowmeter flap fitted to air flowmeters, which aims to provide an additional visual cue was in place, however it **did not** prevent the error occurring and the patient was inadvertently connected to air instead of oxygen. It is therefore important to recognise that the visual moveable flap is an error-reducing solution **rather than** an error-proofing solution (see figure 1).



Figure 1
AIR FLOWMETER WITH MOVEABLE FLAP

Differentiating medical air outlets from oxygen outlets

As below in Figure 2, medical air outlets and oxygen outlets are located beside each other but the outlet connections are different. Air flowmeters are coloured black and oxygen flowmeters are coloured white in the UK and Europe to differentiate them (HSIB, 2019)



Figure 2
OXYGEN AND AIR FLOWMETERS

Figure 3 provides detail of the various components of a flowmeter

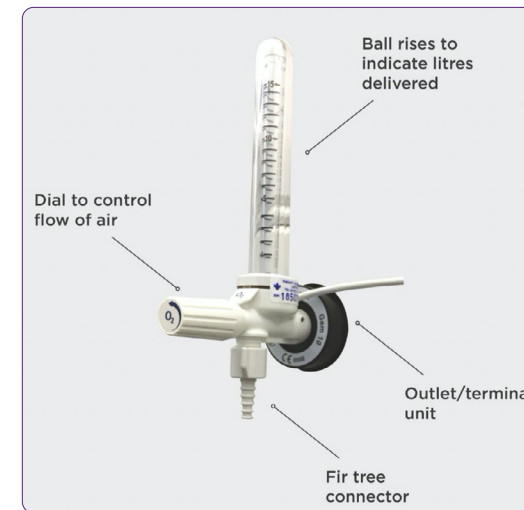


Figure 3
COMPONENTS OF A FLOWMETER

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Equipment Design

As seen in figures 2, 3 and 4, air and oxygen flowmeters have identical universal fir tree connectors, meaning medical gas tubing can fit on either, which is an additional equipment design issue that makes it easy for error to occur.

Barrier methods to reduce potential for error

Three distinct barriers to error have been recommended by the National Patient Safety Agency and British Thoracic Society (BTS).

- 1. Medical air terminal units (wall outlets) are covered with designated caps in areas where there is no need for medical air.** (Figure 5)

Medical air outlets were traditionally built into most clinical areas for the delivery of nebulised treatment but not all areas need them (e.g. they never have patients who need nebulisers, or they have access to electrically driven compressors or ultrasonic nebulisers).

- 2. Medical air flowmeters are removed from terminal units (wall outlets) and stored in an allocated place when not in active use.**

Removing unnecessary equipment is a more effective method of reducing human error than adding labels or warnings alone.

- 3. Air flowmeters are fitted with a labelled, movable flap.** (Figure 1)

The lettering on the flap is larger and more visible than on the flowmeter itself and this flap has to be lifted to attach a tube. This acts as a further barrier to unintended connection if staff occasionally forget to remove medical air flowmeters after a period of active use. This will provide visual and tactile prompts but may not be sufficient to prevent all errors.

Oxygen flowmeter fir tree connector



Air flowmeter fir tree connector



Figure 4

FIR TREE CONNECTORS – OXYGEN AND AIR



Figure 5

DESIGNATED MEDICAL AIR DEVICES ONLY CAP



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KEY LEARNING

- ✓ The three barrier methods described above should ALL be in place in ALL relevant clinical areas
- ✓ Oxygen and medical air and use of barrier methods should be included in safety briefings and staff huddles
- ✓ Oxygen and medical air safety, including Medical Gases Safety training should be included in induction and training programmes for relevant staff working in clinical areas, including those who have been redeployed during the COVID 19 pandemic
- ✓ Failure of oxygen saturation levels to respond to treatment/therapy may indicate that insufficient oxygen has been given, the patient has deteriorated clinically or that there is a problem with the oxygen delivery system (HSIB, 2019)

Useful Resources:

NHS Improvement Patient Safety Alert Reducing the risk of oxygen tubing being connected to air flowmeters, 2016 and Supporting information.

<https://www.england.nhs.uk/publication/patient-safety-alert-reducing-risk-oxygen-tubing-being-connected-air-flowmeters/>

These resources include a short video animation.

<https://youtu.be/17HkUck0bzQ>

Healthcare Safety Investigation I2018/017, Feb 2019
<https://www.hsib.org.uk/investigations-cases/piped-supply-medical-air-and-oxygen/>

References

1. Department of Health (2018) HSC Revised Never Events List
<https://www.health-ni.gov.uk/sites/default/files/publications/health/HSC-SQSD-36-18.pdf>
2. Healthcare Safety Investigation Branch (2019) Piped Supply of Medical Air and Oxygen. Healthcare Safety Investigation I2018/017
https://www.hsib.org.uk/documents/89/hsib_report_piped_supply_medical_air_oxygen.pdf
3. NHS Improvement (2016) Patient Safety Alert: Reducing the risk of oxygen tubing being connected to air flowmeters
<https://tinyurl.com/air-oxygen>

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