

# Safety Alert

## Confusing a plain breathing circuit filter for a heat and moisture exchanging filter (HMEF)

The RCoA and FICM have received a coroner's Regulation 28 report to prevent future deaths. We are sharing the lessons from this tragic case to ensure they are incorporated into our practice.

### Situation

A patient being ventilated for COVID pneumonitis in a surge ICU sustained a cardiac arrest on day 7. At the time an anaesthetic machine was being used to provide ventilatory support due to lack of conventional ICU ventilators. The cardiac arrest was thought to have been precipitated by the tracheal tube becoming blocked by thick secretions. The patient was successfully resuscitated following replacement of the tracheal tube but subsequently developed acute renal failure. The patient sustained a further deterioration in ventilation six days later when a partially blocked tracheal tube was identified at bronchoscopy and replaced.

At this stage the patient was being ventilated with a conventional ICU ventilator. Following the second episode, it was realised that there was no humidification in the ventilator circuit as what was thought to be a HMEF was in fact a plain bacterial/viral filter. The plain filter included a sampling port (used for capnography) which led the staff to incorrectly consider that it was a HMEF. Sadly, the patient subsequently died from multiple organ failure secondary to COVID pneumonitis and the cardiac arrest was considered a contributory factor.

### Further Investigation

Further investigation identified up to 10 more patients who were not receiving humidification due to the incorrect use of a plain filter in place of a HMEF. The coroner was concerned that there was confusion between HMEF and filters by many staff over a number of days that could occur and that action was needed to reduce the risk of harm to future patients.

### Lessons

- HMEF and plain filter may be confused as they can look similar and the labelling may not be clear. Standardisation of labelling including colour coding could reduce the risk of a plain filter being mistaken for an HMEF. This has been referred to the MHRA for consideration. The presence of a sampling port on a plain filter may increase the risk of it being mistaken for a HMEF.
- The use of an anaesthetic machine as an ICU ventilator by staff unfamiliar with the equipment is likely to have contributed to the errors. Plain filters with sampling ports are designed only for use in anaesthetic machines when undertaking short cases and they should not be available in an ICU.
- All members of the MDT involved with managing ventilated patients must be aware of the difference between the plain filters and HMEFs in use on their unit and their correct placement in the ventilator circuit. If an HMEF is being used it must be at the patient end and there should be no other filter in the circuit. If an active humidifier is being used (heated water bath) then a plain filter should be placed in the expiratory limb of the circuit close to the ventilator.
- Regular checks of the ventilator circuit must be undertaken. This should be undertaken at least once per shift. A check list may assist the correct procedure. The check should ensure that an appropriate form of humidification (wet circuit with an active humidifier or use of an HMEF at the patient end but never both). The risks of combining a wet circuit and HMEF have been previously highlighted in a national safety alert (MRHA Patient Safety Alert NHS/PSA/W/2015/012. Risk of using different airway humidification devices simultaneously).