

COVID-19: Very Rapid Updates and Safety (ViRUS)

Sudden HME Filter occlusion during proning

What happened?

An ICU patient was proned on a dry ventilator circuit. There was a sudden deterioration in ventilation, with poor tidal volumes. There was no displacement of the endotracheal tube, but large volumes of secretions and moisture had entered the HME filter during the turn, rapidly increasing its resistance.

Why might this be more likely than usual to happen during the COVID-19 pandemic?

There have been conscious decisions by many to use HMEF, instead of a heated circuit, because of a potentially greater risk of aerosol generation if a heated/actively humidified circuit is used and is then disconnected during ventilation. In addition, some centres had looked for an alternative method of humidification using HME filters, because they did not have enough active humidifiers for all patients. Many staff, especially those redeployed, are unfamiliar with the risks and signs of increased airway resistance that can occur with HME filters and the need for frequent changes.

How could this have been identified early in its course/how it could have been prevented or mitigated if recognised earlier?

Warning signs would include: PaCO₂ becoming significantly elevated and tidal volumes not being achieved for desired pressure applied via the ventilator. If in volume control mode, pressures would rise. Anticipation of this in patients with high secretion load especially on turning prone. An awareness that there may be a sudden increase in resistance through the filter on turning.

How have you managed to resolve this issue or create a work around?

Anticipate the need to suction airway secretions prior to a turn. Consider replacing the filter prior to the turn and having another new replacement filter immediately available, in case the new filter becomes rapidly occluded on turning. Consider changing back to “wet” humidified circuit, with active humidification and no HME filter in the connection between catheter mount and patient Y piece and inspiratory and expiratory tubing from the ventilator. A viral filter between expiratory tubing and expiratory port on ventilator could be used and replaced frequently (even this could become occluded). Staff made aware of risks.