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Introduction

Mechanical ventilation is one of the most common interventions in human critical care (SICS 2020). This intervention is often life-saving, but can also lead to lifethreatening complications. With more established veterinary ICUs across the world, mechanical ventilation of cats and dogs is of growing importance in veterinary critical care medicine.



Whilst there is a plethora of evidence for safe practice, care bundles and consensus guidelines in human medicine, there are numerous gaps within the veterinary literature. Evidence based care bundles are now common practice in human health care. These grouped interventions are aimed at reducing errors and improving morbidity and mortality although ventilator associated pneumonia (VAP) occurs in 10-20% of mechanically ventilated patients (Hellyer et al 2016).

Rationale and Aims

In veterinary medicine, the prevalence of VAP was recently documented to be 46.2% (Fox et al 2020). There is little published veterinary specific evidence for effective ways in reducing VAP or delivering gold standard nursing care to the mechanical ventilation patient. The Emergency and Critical Care team at the Royal Veterinary College have created a care bundle for their ventilator patients based upon the recommendations within human health care. The hope is that this bundle of care will decrease the incidence of VAP in veterinary patients.





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"Take a deep breath whilst we talk veterinary ventilation!" Eleanor Haskey RVN BSc(hons) PGCert FHEA VTS(ECC) VPAC A1

Nothing to Disclose



Airway management Intubation

Place a sterile endotracheal tube using sterile gloves \succ For >6 mm and <10 mm ET tube use a tube with sub-epiglottic suction port \succ Tie the tube utilising sterile iv set

- \succ Check cuff pressure (25 cmH₂O) every 4 hours and reposition tube Cuff should not be fully deflated

 - endotracheal tube should be performed prior to deflation
- Re-tie the ET tube every 4 hours
- Change the tube tie every 24 hours use a sterile giving set

Suctioning airway

- Suction frequency based on the individual patient requirement
- \succ Define secretion M = mucous, P = Purulent, B = Bloody (can be PM)
- \blacktriangleright Define quantity 1 = minimal, 2 = moderate, 3 = plentiful

Oral Care

- Oral care should be carried out every 4 hours Suction the oropharynx
- \succ Glycerine can be applied to the tongue to keep the mucous membranes moist
- \succ Keep the tongue inside the mouth where possible do not leave swabs in the mouth
- and reposition both in the mouth
- > Suction after oral care if there is excessive fluid in the mouth care not traumatize the oropharyngeal mucosa

Ventilator breathing circuit

- change, suctioning etc to prevent repeated loss of PEEP
- > Care with position of ventilator tubing as condensation sits in the dependent limb of the circuit
- leading to an obstruction Change the circuit every 7 days

Additional nursing considerations and interventions

- Physiotherapy and patient positioning
- Passive Range of Motion and massage every 8 hours
- Urinary management
 - Every 4 hours calculate UOP and measure USG

 - prevent bacterial contamination
- hours
- > Eye Care
 - Flush both conjunctival fornices with sodium chloride 0.9% every 12 hours

 - > Apply a layer of Night time gel/Lubrithal to each eye every four hours

Record keeping

- Ensure all paperwork is complete and up to date: Record vital parameters every hour (HR,RR,T,BP,SP02,etC02)
 - Record ventilator settings every hour
 - Make thorough detailed notes as per any events or procedures

Veterinary bundle of care

All ventilator patients are barrier nursed to reduce the risk of hospital acquired infection

Endotracheal tube maintenance (*carried out after subglottic suctioning and oral care*)

 \succ If full deflation is required, oral care and suctioning of the oropharynx and down the

> Change ET tube as required in a sterile manner utilising a sterile ET tube and sterile gloves

Closed suction is preferred method - preoxygenate patient and premeasure suction catheter

> Inspect the mouth (especially under the tongue) for presence of ulcers and alert the case vet \succ Wipe the pulse oximeter and plastic mouth gag with chlorhexidine 0.05% solution every 4 hours

 \succ Check the water trap in the circuit and breathing circuit for excessive residual water every 8 hours and empty as necessary – time this when disconnecting for other reasons such as tube

 \succ Change recumbency every 2 – 4 hours, where possible keep the front end in sternal

> Flush diluted chlorhexidine 0.05% into the vestibule or prepuce every 8 hours > Wipe the urinary catheter (proximal to distal) with chlorhexidine 0.05% every 8 hours to

> Calculation of ins (including intravenous fluids, parenteral or enteral nutrition and medication volume) and outs (including U.O.P, pleural/abdominal effusions and diarrhoea) every 6-12

 \succ Apply one drop of Celluvisc to both eyes every two hours (hourly for brachycephalics) > Perform fluoresceine stain every 24 hours and report positive uptake to the case vet



 \succ Drug choice – dependent on individual (common combination: fentanyl, midazolam, propofol +/- medetomidine)

- catheter
- risk of oxygen toxicity

Care bundles and checklists have long been shown to standardise care, reduce error, improve patient outcomes and are a useful training tool for new staff. As part of our care bundle we have created the following checklists: \diamond Set up **♦**Machine SST ♦ Machine shut down \diamond The next step is to compare VAP incidence with a historical control group and re-audit. Research to determine best practice is required and specifically to evaluate the effect of specific nursing care interventions in relation to the incidence of VAP in our patient population

Hellyer TP, Ewan V, Wilson P, Simpson AJ. 2016. The Intensive Care Society recommended bundle of interventions for the prevention of ventilator-associated pneumonia. Journal of Intensive Care Society. 17(3):238–243.

- 2021}. https://tinyurl.com/vdfphts
- 31: 66– 73
- MO: Saunders/Elsevier.







Individual patient considerations

Nutrition – aim for early enteral nutrition via NG tube vs parenteral nutrition Daily weaning – dependent on patients underlying disease

Nebulisation – dependent on patients underlying disease

 \succ Tracheostomy Tube – something we are doing more in neurological patients Indwelling devices – dependent on individual – jugular catheter, PICC line,

feeding tube, urinary catheter, arterial catheter, thoracostomy tubes, faecal Foley

Fi02 – dependent on individual – aim for pa02 >80mmg and wean fi02 to reduce

Summary

References

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