Cardiff Critical Care Standard Operating Procedure

SUSPECTED OR CONFIRMED COVID-19

SOP for prone ventilation

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Introduction:

The ultimate aim of this document is to provide a guideline for non-regular Critical Care Clinicians to feel empowered to make decisions about prone ventilation in intubated patients, From the available evidence it looks likely that intubated patients with COVID-19 infection will benefit from early prone ventilation. We expect high numbers of patients with COVID-19 infection to be treated outside of Critical Care, but it is imperative that their treatment remains as consistent as those within the department as possible. When this happens we hope to have teams set up within the hospital to specifically facilitate turning patients with moderate to severe hypoaemic respiratory failure. This document will assist these 'proning teams' to make decisions on when to prone patients with confirmed or suspected COVID-19 and when to discontinue proning. This is a deviation from 'usual practice' and must be considered as such.

As according to the protocol for the PROSEVA trial, the expectation will be for patients to remain in the prone position for around 16 hours in every 24.

Proning Team:

A proning team will consist of 7 members of staff. This must include:

- An ST5, or more senior, from Anaesthesia or Intensive Care Medicine.
- A prone team lead who will be either a member of regular Cardiff and Vale UHB Critical Care Nursing Staff nurse (band 5,6,7) or a Critical Care Physiotherapist/ Technician
- 5 other team members of a range of professions, grades, clinical specialities and volunteers

Indications to contact Prone Team:

Within normal working hours there will be a dedicated proning team covering specific areas. This team will include the Senior Anaesthetist or Intensivist (ST5+) and regular member of Critical Care Nursing staff or Physiotherapy team member that has been assigned to this area. The majority of patient turns should be restricted to within extended worked hours. The optimal time for **turning patients prone will be 16:00 – 20:00**, and for returning them to the **supine position between 08:00 – 12:00**. This timing Is important to improve the efficiency and coordination of the team, and also patient safety, ensuring they do not remain prone for excessive periods.

For patients requiring urgent proning overnight (i.e. if the patient is unable to maintain a PaO2 > 8 KPa despite a maximum PEEP = 16cmH_2O and FiO2 ≥ 0.60, or P:F ratio <20kPa) we are in the process of developing an emergency team to be activated via switchboard. Activation of the proning team should be treated as an emergency call and must be responded to as soon as possible.

Initial Prone Team Review:

Upon arrival of the proning team, the following checks must be undertaken:

1. Ensure PEEP delivery has been optimised – trial increased PEEP to maximum PEEP = 16cmH_2O, providing no contraindications.
    a. Undrained pneumothorax – if present, site intercostal drain prior to proceding. PEEP can be increased if drain in situ and no improvement in oxygenation
    b. Cardiovascular instability – seek expert advice regarding addition of second vasopressor/ inotrope if Noradrenaline requirement >0.5mcg/kg/min to maintain MAP >60mmHg; consider if Echo required prior to prone ventilation being commenced (if so, call Cardiology SpR on bleep 5770. State suspicion of Covid-19 infection)
    c. Uncontrolled intra-cranial pressure – seek expert advice if ICP > 25 cmH_2O

Some patients do not respond to increased PEEP and should therefore be maintained on the PEEP resulting in highest SpO_2. From risk/benefit perspective, FiO2 requirement should be ≥ 0.60, with P:F ratio <20kPa.

2. Review chest x-ray – this should be performed within 24hrs of the first proning of the patient, if acute deterioration or suspicion of altered ETT position. Ensure:
    a. No pneuomothorax
    b. Correct ETT position
    c. No large pleural effusion – seek help if uncertain regarding need to site intercostal drain
3. Ensure patient on mandatory mode of ventilation (PC, PRVC or SIMV preferred)
4. Ensure adequate sedation +/- paralysis. Paralysis should only be used by infusion if it has been demonstrated to significantly improve oxygenation, ventilation or airway pressures
5. If any ventilatory setting changes made repeat ABG after 15 minutes
6. If PaO2 remains <8kPa ensure no contra-indications to proning are present:

    Absolute:

    - Untrained staff
    - Spinal instability
    - Open abdominal / chest wounds
    - Undrained pneumothorax
    - Uncontrolled Intra-cranial pressure
    - Pregnancy
    - Abdominal compartment syndrome
    - Unstable fractures (esp. pelvic & facial)

Relative:

- Difficult intubation
- Recent tracheal surgery
- Cardiovascular instability (MAP <60mmHg) despite Noradrenaline ≥0.5mg/kg/min^{-1}
- Cardiac abnormalities (recent permanent pacemaker insertion, malignant arrhythmias, ventricular assist device, intra-aortic balloon pump)
- Recent thoracic/ abdominal surgery
- Massive haemoptysis

7. Providing the following criteria are met, prone ventilation can be undertaken WITHOUT direct discussion with the ICU Consultant on call. If further support with decision-making is required, seek Senior help from Lead Anaesthetist for patient area, or contact ICU Consultant (bleep 5490).

a. PaO_2 < 8kPa despite PEEP = 10 - 16cmH_2O and FiO_2 ≥ 0.60
b. No absolute contraindications
c. Relative contraindications have been considered and risk deemed < benefit
d. Checklist completed

8. If positive fluid balance AND blood pressure maintained with Noradrenaline <0.5mcg/kg/min, consider addition of furosemide 20mg BD to aim for neutral fluid balance

Prone Procedure:

Staffing:

- 1 Prone Team Lead (Regular member of Critical Care Staff – Band 5-7 Nurse, Physiotherapist or Physiotherapy Technician)
- 1 individual with Advanced Airway skills (ST5 or above in anaesthetics or ICM)
- 5 additional staff

Prone Equipment:

- Prone sheet (The sliding surface will face downwards onto the slide sheets)*
- 2 wide slide sheets (if starting from prone position) OR 2 wide & 1 standard (if starting from supine position)
- 3 Florescent prone straps (non-disposable)
- 3 pillows
- 2 flat sheets
- ECG stickers (consider placing defibrillator pads

*****Size the prone sheet [SMALL (green), MEDIUM (yellow), LARGE (red)]: Measure the patients shoulder width in cm to determine the correct prone sheet size (It is better to choose the smaller size rather than bigger)

Patient Preparation:

- **Airway**- Check the grade of intubation, current length of the
- Endotracheal (ETT) tube at the teeth and **secure the ETT / Trache tube**
- **Oral assessment and mouth care** should be performed
- **Eye care**- clean and lubricate with simple ointment place a gauze pad and tape the eyes closed
- **Aspirate the nasogastric tube** and disconnect the feed
- **Disconnect non-essential intravenous infusions** – position all IV lines to the top and bottom of the bed. Check that all IV lines are clean and secure
- Position al lines / drains etc towards the head end of the bed or towards the feet end of the patient
- Consider the position of any intercostal drains, any temporary clamping of the **chest drains** should only done by a senior doctor
- Consider the position of the **urinary catheter**
- **CVVHDF** should be put on blood re-circulation
- Assess the visible **pressure areas**; aim not to prone on a hard mattress
- Assemble the staff
- Ensure the patient is fully **sedated**
- Increase the **FiO_2 to 100%**
- Delegate specific tasks to individuals
- Remove the patient gown – maintaining patient dignity

Supine to Prone:

NB: PLACE THE STRAPS AND EXCESS SLIDE SHEET ON THE SIDE THE PATIENT IS BEING TURNED TOWARD

1. Increase the FiO_2 to 100%
2. Decide in which direction to turn (Consider the position of Arterial & CVC lines)
3. Brief the team and decide actions in the event of an adverse event during the procedure
4. Place the arms to the side (palms facing thighs)
5. Roll the patient to:
    i. Change the bottom sheet
    ii. Insert the slide sheet (excess slide sheet on the side the patient is being turned towards)
    iii. Then the prone sheet (On top of the slide sheets top edge level with the shoulder Fig 1.)
    iv. Roll the patient back onto their back
    v. Centre the patient on the prone sheet (adjust the patient's position if indicated)
    vi. Remove the ECG leads and stickers or any other monitoring if required
    vii. Place the 3 pillows horizontally across (Fig 2.). 1. Chest (level with the shoulder clear of the airway); 2. Pelvis and 3. Knees

6. Position straps – Lock the loop of the strap (Cilp facing out), onto the handle of the prone sheet on the side the patient is turning to face, place strap through the handle on the other side and lay them over the patient (1 strap over chest, pelvis and knees Fig 3.).
7. Slide the patient so their head is off the bed and slide to the opposite corner of the bed
8. Position the staff - 3 nurses on the side the patient is turning to face, 2 nurses on the other side.
9. Staff on the turn side should pull the strap tight with one hand, and brace the patient with the other hand
10. Nurses on the on the other side pull the top slide sheet downwards (ensure the excess slide sheets are free)
    i. 1st Movement to Turn the patient through 90 degrees on their side
    ii. 2nd Movement Lower the patient to the prone position
11. Adjust the patient to ensure they will be positioned in the middle of the bed.
12. Slide the patient down the bed and turn the head to face the ventilator
13. Unclip and remove the straps and the prone sheet
14. Reattach ECG and any other monitoring 17. Adjust the pillows – ensure the pillows are under the chest, pelvis and knees) not under the abdomen
15. Brace the patient remove the slide sheets
16. Position the arms in the swimmers position (head facing arm up)
17. Place the Kerapro (sacral) under the cheek
18. Ensure there is no pressure on the globe of the eye and that the eyes are closed and protected
19. Check that all drains are unclamped and functioning
20. Check that limbs are not resting infusions/ monitoring lines
21. Reattach all any non- critical infusions disconnected for the turn
22. Return the oxygen to the original setting
23. Perform an Arterial Blood Gas 15 minutes after the turn

Prone to Supine:

NB: PLACE THE STRAPS AND EXCESS SLIDE SHEET ON THE SIDE THE PATIENT IS BEING TURNED TOWARD

1. Increase the FiO_2 to 100%
2. Decide in which direction to turn (Consider the position of Arterial & CVC lines) - **Do not roll the patient face into the bed.**
3. Brief the team and decide actions in the event of an adverse event during the procedure
4. Place the arms by their side palms facing thighs.
5. Roll the patient to
    i Insert the slide sheets (excess slide sheet on the side the patient is being turned towards (patients back)

ii Place the prone sheet (on top the of the slide sheets, the top edge level with the shoulders (Fig 1)
iii Roll the patient back
iv Brace the patient and unravel to slide sheets and prone sheet

6. Centre the patient on the prone sheet (adjust the patient's position if indicated).
7. Remove the ECG leads, stickers and any other monitoring.
8. Place a 3rd slide sheet folded in half, length ways over the patient's back (Fig 4.)
9. Position straps - Lock the loop of the straps (clip facing out) onto the handle of the prone sheet on the side the patient is turning towards and loop the straps through the handle on the opposite side and lay them over the patient (1 strap over chest, pelvis and knees).
10. Slide the patient so the head is off the bed, and slide to the opposite corner away from the direction of the turn
11. Position staff - 3 nurses at the on the side the patient is turning towards and 2 nurses on the other side.
12. Staff behind the patient should pull the strap tight with one hand and brace the patient with the other hand.
13. Nurses on the other side should pull the top slide sheet downwards
    i. 1st Movement to Turn the patient through 90 degrees on their side
    ii. 2nd Movement Lower the patient to the supine position
14. Adjust the position of the patient to ensure they will be positioned in the middle of the bed.
15. Slide the patient down so their head is on the bed 15. Unclip and remove the straps, prone sheet, and pillows.
16. Reattach ECG and other monitoring.
17. Brace the patient and remove the slide sheets (bracing the patient)
18. Refer to the aftercare checklist

Guide to position change when in prone:

- Reposition the head and arms 2 hourly:
  - Ensure the arms are placed in the swimmers position when flat **(Fig 5.)**
  - Check that the arms not > 90 degrees above the shoulder
  - Change the head and arm position 2 -4 hourly
  - Will require airway trained staff and 4 other staff to slide patient up the bed to allow head to be turned prior to sliding back down
- Reposition patient every 4-6 hours:
  - Roll patient ensuring appropriate head position
  - Insert addition pillow parallel to patient under the 3 existing pillows

Duration of prone:

- The expectation for patients being ventilated in the prone position would be for therapy to continue for 16 hours, before the team returning to turn the patient supine

- All patients must have ABG completed at 4-hours post turn – if evidence of increasing oxygen requirement, worsening hypoxaemia, or if no benefit seen with prone ventilation, the prone team must be contacted and consideration given for returning to supine.
- Additionally, the prone team must be contacted if patients are becoming cardiovascularly unstable (e.g. escalating vasoactive agents dose or life threatening dysrhythmias) – these patients must also have a consultant review prior to decision to remain in prone or to return to supine.

Cessation of Proning:

- Proning will be discontinued once the patient is able to maintain PaO2 > 8kPa on PEEP <10cmH_2O and FiO2 < 0.60 with P/F ratio >20kPa

Training:

- Training will be provided to all staff likely to be involved in either turning a patient from supine to prone or vice versa
- This training will be provided as a drop-in session available on a daily basis (Monday – Friday) to be delivered by appropriately trained and experienced nursing staff or physiotherapy staff
- Location of training TBC ? recovery or A2/B2 simulation centre
- Additional training will also be arranged for staff groups likely to be involved in assisting prone team
- The Cardiff and Vale UHB prone technique video will continue to be circulated with posters created with links to the YouTube site

QR Codes for videos:

Prone to supine:

Supine to prone: