Nitrous oxide equipment training video

Topics to be covered

Verify safety equipment is at bedside and ready for use if needed

- Flow inflation or self inflating ambu bag with oxygen source
- Suction apparatus (separate from nitrous circuit) with large bore suction catheter
- Monitoring equipment

Porter nitrous circuit inspection

- Inspect rubber pieces (suction hose, reservoir bag) for any defect
- Inspect flow meter for cracks or damage

Set up Porter nitrous circuit for use

- Connect gas scavenging system
    - Connect grey waste gas hose to WAGD/suction outlet using elbow connector
- Remove circuit lock and turn system on
- Attach Sedation Systems tubing set
    - Important to stretch out the corrugated exhalation limb and check to ensure there is no kinking at the base of the green reservoir bag
    - If the exhalation limb kinks/twists where it connects to the green reservoir bag, exhalation flow will be interrupted, the grey reservoir bag will begin to overfill, and the patient will experience a feeling of pressure or resistance to exhaling with the mask in place
- Open oxygen (green) and nitrous oxide (blue) tanks
    - Because most of the nitrous oxide in the tank is in a liquid state, the pressure gauge on the cylinder is not proportional to the amount of available gas remaining
    - Nitrous oxide tank pressure reading will remain constant at approximately 750 psi until less than 20% of the cylinder contents remain, when the pressure reading will drop to zero and nitrous oxide may no longer be delivered
    - Because oxygen is in a gas state in the tank, pressure readings accurately reflect the quantity of gas available until the cylinder is empty
    - Because the circuit is driven by oxygen flow, if the oxygen tank becomes empty during the procedure, there will be no flow of either oxygen or nitrous oxide and the circuit will stop
    - Open only one oxygen and one nitrous oxide tank
        - If either of these tanks are empty, open the backup tank
        - Make sure the backup oxygen tank is nearly full (>1000 psi)
        - Consider replacing the empty nitrous oxide tank prior to starting the procedure if possible to avoid losing nitrous oxide supply if the second tank becomes empty during the procedure

- Once the oxygen tank is open, turn on oxygen flow at 5LPM and check vacuum gas scavenging system
    - Audible flow through the circuit requires gas flow and intact vacuum
        - If there is no audible flow, check to ensure there is oxygen in the tank and check the vacuum to wall connection
    - Ensure vacuum is set with the ball bobbing in the green zone of the float
    - Adjust vacuum as needed by turning the float knob located just below the float
- Check the fail safe mechanism
    - Circuits are designed to prevent nitrous oxide from flowing if there is any interruption in the oxygen source
    - To check, leave the oxygen flow at 5LPM and turn the nitrous oxide flow on to 50%
    - Check the fail safe by turning off the oxygen flow and observing that the nitrous oxide flow on the meter immediately drops to zero
    - Do not use the circuit if it does not perform as described!

Nitrous oxide sedation

- Choose appropriate size mask for child
- Either have child/parent hold the mask or gently hold the mask in place yourself
- Start with 100% oxygen at 5LPM
    - For cooperative child, allow them to get used to breathing with the mask in place
    - During that time, adjust oxygen flow as necessary to achieve some filling of grey reservoir bag
        - Younger children have smaller tidal volumes and will require lower flows
        - If the grey reservoir bag begins to bulge/overfill, decrease the oxygen flow rate by 1 LPM until bag is not overfilling
        - Older children/teens have larger tidal volumes and will require higher flows (usually closer to 6-7LPM total flow for teens)
        - If the grey reservoir bag is collapsed or nearly collapsed, gradually increase the flow as needed
    - For the uncooperative child, this initial period of 100% oxygen can be skipped
- Titrate in nitrous oxide up to 50%
    - For the younger cooperative child, start at 50% nitrous
        - Titrate down the oxygen flow as needed to achieve a total flow rate (nitrous oxide plus oxygen) equal to the previous flow rate needed for oxygen alone
        - Continue 50% nitrous oxide throughout the procedure unless the child develops signs of oversedation (see below), nausea/vomiting, or other concerns
    - For the younger uncooperative child, start at 5L oxygen flow and 50% nitrous oxide
        - Titrate the oxygen flow as needed for ideal filling of grey reservoir bag

        - Continue 50% nitrous oxide throughout the procedure unless the child develops signs of oversedation (see below), nausea/vomiting, or other concerns
    - For the older child (10 years or older)
        - 50% nitrous oxide is generally well tolerated
        - Consider starting at 30% nitrous and titrating up to 50% to allow older child/teen to acclimate to the sedation, to allow them to decide how much sedation feels "right" for them, and to minimize symptoms of oversedation (see below)
        - Many adults are comfortably sedated with 30-40% nitrous oxide
- Provide nitrous oxide/oxygen mixture for minimum of 2 to 3 minutes before starting procedure to allow development of adequate level of sedation
- Monitor adequacy of sedation
    - Review of symptoms/signs – giggling, glassy eyed, decreased eye movement (more noticeable in older kids), relaxed posture, dazed expression, feeling of warmth and tingling in extremities and around lips, feeling of heaviness in extremities
    - Monitor for oversedation
        - Much less likely in younger children
        - Asleep or very sluggish
        - Increasing sweating
        - Facial pallor
        - More distressed expression (when previously happier/more calm)
        - More agitated or combative (when previously happier/more calm)
        - Repeated swallowing
        - Nausea/vomiting
    - Vomiting may occur without true oversedation
        - Incidence approximately 5% in children
- Once procedure is complete, turn off nitrous oxide and administer 100% oxygen ideally for 3 minutes as tolerated

Post sedation

- Turn off oxygen flow
- Remove disposable circuit tubing/green bag and discard
- Turn off oxygen and nitrous oxide tanks
- Disconnect vacuum tubing from wall
- Clean equipment
- Return circuit to secure storage location