56. HIGH INTENSITY DAILY ACTIVITIES: Ventilator Support Policy and Procedure

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Purpose

The aim of this policy and procedure is to provide guidance on safe ventilator support, including ventilation support for participants who also have a tracheostomy for airway management, according to established standards and guidelines to reduce clinical risk and ensure each participant receives appropriate ventilator support and management, relevant and proportionate to their individual needs.

Scope

The procedures apply to all Australian Quality Care staff providing ventilator support, including to participants who may require support to use ventilation accessory equipment such as Bilevel Positive Airway Pressure (BiPAP) and Continuous Positive Airway Pressure (CPAP) machines, humidifiers, airway clearance devices, suctioning, manual ventilation devices, and oxygen. It meets relevant legislation, regulations and Standards as set out in *Schedule 1 Legislative References.*

Applicable NDIS Practice Standards and NDIS High Intensity Support Skills Descriptors

Outcome
Each participant requiring ventilator and / or tracheostomy support receives the appropriate support i.e., participants who require support to use ventilation and accessory equipment such as Bi-level Positive Airway Pressure (BiPAP) support, Continuous Positive Pressure Airways (CPAP) machines, humidifiers, airway clearance devices manual ventilation devices and oxygen relevant and proportionate to their individual needs.

Indicators (NDIS Practice Standards)

- Each participant is involved in the assessment and development of the support plan for their specific ventilator management. With their consent, the participant's health status is subject to regular and timely review by an appropriately qualified health practitioner. The support plan identifies how risks, incidents and emergencies will be managed, including required actions and escalation to ensure participant wellbeing.
- Appropriate policies and procedures are in place, including timely supervision, support resources and equipment and a training plan for workers, that relates to the support provided to each participant who is ventilator dependent and also may require tracheostomy support.
- All workers have completed training, relating specifically to each participant's ventilation needs, and /or their tracheostomy needs, appropriate use of equipment and troubleshooting managing a related incident and the high intensity support skills descriptor for ventilator management, delivered by an

appropriately qualified health practitioner or person who meets the high intensity support skills descriptor for ventilator and tracheotomy support.

Indicators (NDIS Skills Descriptors)

- All workers to maintain open communication, seek regular feedback and work closely with participants to understand their specific needs, when and how to best deliver supports that meets with their timing, frequency and type of support required.
- All workers to deliver supports in ways that are least intrusive or restrictive and that fits into the participants daily routines and preferences and actively involves the participant in their support as outlined in their support plan to the extent they choose.
- Annual competency assessment of workers by appropriate qualified health professionals to be undertaken to ensure currency of skills and knowledge, awareness and understanding of the relevant support plan.
- Refreshers / assessments of competency by appropriately qualified health practitioners to be undertaken and successfully completed by the worker when the participants support plan changes, best practice requirements change or when the worker has not provided the required support in the last 3 months. Timeframe for refreshers and re-assessments can vary on the nature of supports and workers experience.
- Audit records to be maintained.

Definitions

BIPAP – Bilevel Positive Airway Pressure.

CPAP – Continuous Positive Airway Pressure.

Invasive Ventilation – tube inserted into airway.

Non-Invasive Ventilation (NIV) – can be used at home for respiratory difficulties and for those who do not have a tracheostomy.

Ventilation – the movement of air between the environment / atmosphere and lungs. In simple terms, ventilation means breathing.

Ventilators – Machines that will assist breathing or take over breathing completely. Ventilators move air in and out of the lungs to deliver breath to those who are physically unable to breathe or breathing insufficiently.

Mode - The mode in which the ventilator is set (see ***S***, ***ST***, ***T***):

- **S** - spontaneous mode, the machine / device assists each spontaneous respiratory effort
- **ST** - spontaneous timed, where spontaneous breath assistance or a timed mandatory breath is delivered where no breath is delivered
- **T** - timed mode in which mandatory breaths are delivered according to a set rate.

Participants who require ventilators for breathing assistance tend to have the following conditions: chronic respiratory failure, spinal cord injury, COPD, Cystic Fibrosis, Pulmonary / Neuromuscular disease, Guillain Barre Syndrome, Lung Disease, or Bronchiectasis.

Tracheostomy – a surgical opening through the trachea below the larynx. An indwelling tube is placed in the opening to overcome upper airway obstruction. Primary reasons for tracheostomy are to:

- relieve upper airway obstruction
- allow access to the lower airway for suctioning and secretions removal and

- provide a stable airway for those who require prolonged mechanical ventilation or oxygenation support.

Where a participant has a tracheostomy and uses a ventilator, they will require support with invasive ventilation. If the participant does not have a tracheostomy, they may require either invasive or non-invasive ventilation.

Policy

Australian Quality Care will ensure that ventilator support, including ventilation support for participants who also have a tracheostomy, is carried out safely and competently, with correct methods and equipment used by workers.

Support workers who are skilled, experienced, and suitably trained by qualified health professionals on ventilator equipment use, assembly and operation can undertake the role of supporting participants requiring ventilator management. For participants who have a tracheostomy but do not use a ventilator, the support worker must be competent with stoma care. All staff are to work within their scope of practice, appropriate to their level of training and responsibility.

Risk Analysis

Identified Risks

Listed below are common risks associated with participants requiring ventilator support, and ventilation support with tracheostomy. Individual risks must be assessed at initial assessment and included in participants' individual *Ventilator Support Plans*:

- Ventilator Associated Pneumonia (VAP)
- nasal congestion or dry mouth
- facial sores from non-invasive ventilation (NIV) interface
- eye soreness from NIV interface caused by air leakage and
- lack of knowledge and understanding from support workers for safe and effective ventilation support and actions to take in an emergency.

Tracheotomy risks include:

- lack of knowledge or understanding from support workers regarding safe, effective, and timely suctioning, tracheostomy and ventilation care, and emergency management
- risk of accidental decannulation when replacing tracheostomy dressings / ties
- hemorrhage
- pneumothorax
- respiratory or cardiac arrest because of accidental tube obstruction / dislodgment and
- cuff leak.

Risk Management Strategies

Strategies to reduce risks for ventilator support include:

- bed elevation of 30 – 45 degrees
- assess ventilation need regularly (if possible)
- maintain good oral hygiene (mouth and lip care)
- encourage mobility (including sitting up to improve gas exchange)
- promote adequate nutrition
- maintain aseptic techniques
- use saline nasal spray for mild nasal congestion
- use a humidifier for dry mouth, nose or throat

- clean any secretions around mouth and nose areas
- use water-based lubrication only **- do not use petroleum jelly/Vaseline**
- staff to be provided with training and education by a health professional about proper ventilator use and how to recognise complications, and actions to be taken in managing participants who are ventilator dependent
- appropriate policies, procedures, and response plans in place and readily available to support workers for participants using a ventilator
- *Ventilator Support Plans* written by a health professional in consultation with other relevant health professionals involved in participants' care
- *Ventilator Support Plans* to be readily accessible and available where care is provided
- regular review of *Ventilator Support Plans* and when any abnormality is observed and
- support workers to be up to date with emergency First Aid training and complete on-going training and education on how to follow operating instructions and troubleshooting on any appliance used.

Risk Management Strategies

- support workers deployed have completed high level training on tracheostomy and ventilator support and emergency management, specifically relating to each participant's needs, delivered by an appropriately qualified Health Practitioner who meets the High Intensity Support Skills Descriptors for tracheostomy and ventilator support
- support workers receive training on how to manage related incidents such as tracheostomy obstructions or accidental dislodgement, which could progress to cardio-respiratory arrest
- staff training includes identification and strategies for management of risks including actions and escalation
- two people are present at all times when replacing tracheostomy dressing ties. Old ties remain in situ until new ties are secured, to prevent decannulation
- support workers have completed basic First Aid training and have knowledge on how to administer CPR and place the participant in a recovery position
- an emergency action plan is readily available and accessible to support workers and
- an information sheet that provides specific data regarding participants' tracheostomy and ventilation support and needs is placed at each participant's bedside for ease of access for support workers, health practitioners, and emergency workers.

Roles and Responsibilities

To ensure Australian Quality Care's standards and commitments are met and delivered, the following actions are taken, and responsibilities assigned for ventilator support, including ventilation support with tracheostomy:

1. A *Ventilator Support Plan* has been developed for each participant and is overseen by a relevant health practitioner, and each participant is involved in the assessment and development of their *Ventilator Support Plan*. Other professionals that may be involved as part of the participant's multi-disciplinary team include a Respiratory Physician, Physiotherapist, Pharmacist and Occupational Therapist.

2. *Ventilator Support Plans* are up-to-date, readily available, clear, and concise, and clearly identify and describe the support needs and preferences of participants. They also identify how risks, incidents and emergencies will be managed, including required actions and escalation to ensure participant well-being.

3. Participants are supported to seek regular and timely reviews of their health status by an appropriately qualified health practitioner.

4. Each participant's *Ventilator Support Plan* is communicated, where appropriate and with their consent, to their support network, other providers, and relevant government agencies. Copies of the *Ventilator Support Plans* are provided to the participant and readily available where care is provided.

5. Staff understand the support needs outlined in the *Ventilator Support Plan* such as:
    - initiation, set up, and operation of ventilation support and related equipment
    - what risks to look for and
    - action required to respond to risks, incidents, and emergencies.

6. Staff are provided with access to appropriate policies and procedures, timely supervision, support, equipment (which may include back up ventilator equipment), and consumables required to provide ventilation support.

7. Participants who require ventilation support, and also have a tracheostomy, have a *Tracheostomy Support Plan* that sets out ventilation supports, airway clearing devices, suction, manual ventilation devices, oxygen, what risks to look for, and actions required to respond to risks, incidents, and emergencies.

8. Policies, procedures, and plans are in place and easily accessible to staff, including a training plan for staff that relate to the specific support provided to each participant who requires ventilation support, including those who have a tracheostomy.

9. A holistic approach to ventilator and tracheostomy support is taken, consistent with current contemporary practice, and is aligned with the *Infection Control Policy and Procedure*.

10. Skilled, trained, and experienced staff are allocated to manage participants who need ventilation support, including those with tracheostomies, as support provided is high risk and complex and can be life threatening if not effectively managed.

11. Where supports are delivered by a competent worker who is not a qualified or allied health practitioner, the Registered Nurse ensures:
    - the worker is suitably trained and equipped with the skills and knowledge required for safe service delivery and maintains currency of skills and knowledge
    - competency of workers' skills and knowledge is assessed annually
    - refreshers are completed when participants' needs change, best practice requirements change, or when the worker has not provided the required support in the last three (3) months
    - supports are not provided until workers have successfully completed competency assessments and refresher training and
    - competency assessments are documented and regularly audited, with audit records and a Training and Development Register maintained.

12. Support workers who are deployed to provide ventilator support have the pre-requisite knowledge and have completed training delivered by an appropriately qualified health practitioner or person who meets the High Intensity Support Skills Descriptors for ventilator or tracheostomy support. They receive regular supervision, support, equipment, and consumables required to provide ventilator and tracheostomy supports.

    <u>Ventilator support training must include:</u>
    - basic anatomy of the respiratory system
    - musculoskeletal problems associated with respiration, and common conditions that can result in respiratory failure, including conditions specific for the participant
    - principles for infection control and hygiene, e.g., hand washing, use of gloves, disinfecting the environment, and safely handling ventilator equipment such as the mask
    - signs and symptoms of respiratory distress, for example, drowsiness, reduced alertness, breathing rate, nose flaring, colour changes, wheezing, bracing upper body, and large chest movements when breathing
    - indicators of deteriorating skin condition, and techniques to ensure breathing masks are fitted and positioned correctly to minimise discomfort and reduce the risk of pressure sores

- signs of a healthy stoma and how these can change over time
- indicators and action required to respond to common health problems at the stoma site, such as wetness, or signs of infection or inflammation
- common indicators to initiate emergency procedures, including the use of back up and manual ventilators (e.g., loss of electricity, or battery failure in the ventilator machine)
- causes of common alarms and action required to resolve them, e.g., a high airway pressure alarm
- when and how to involve or get advice from the appropriate health practitioner
- fitting and adjusting breathing masks and
- reporting responsibilities, including handover, recording observations, and incident reporting (handover may include observations on positioning, length of time on the ventilator, and the participant's preferred communication methods).

Tracheostomy support training must include:

- basic anatomy of the respiratory system
- indicators of common problems, including infection both at the tracheostomy stoma site and in the respiratory system
- common indicators of equipment malfunction, associated risks, and action required
- warning signs of a blocked tracheostomy tube, such as blood or phlegm in the tube, breathing difficulties, or an inability to pass a catheter through the tracheostomy tube
- techniques to respond to tube blockages, such as suctioning, humidification management, and awareness of when to escalate to emergency services or an appropriate health professional
- first aid techniques to check and clear airways, administer CPR, and place a person in a recovery position
- basic knowledge of stoma care and awareness of common risks, problems and signs of infection or deteriorating health, such as sore skin, leakage, ballooning, pancaking, bleeding, hernia, and prolapse
- when and how to involve or get advice from the appropriate health practitioner
- monitoring circuits and the need for cuff inflation or deflation
- trouble shooting for appliances
- personal hygiene and infection control procedures
- cleaning and maintaining suction equipment
- supporting routine tube tie changes (as per the Tracheostomy Support Plan with support of an appropriate Health Practitioner)
- maintaining appropriate charts and records
- emergency procedures when deteriorating health or infection is detected and
- reporting responsibilities including handover, recording observations, and incident reporting.

13. In addition to the above, staff must also complete all relevant eLearning modules available on the NDIS Commission's website, keep their first aid knowledge and CPR training up-to-date, and be trained on the specific needs of each participant, including the appropriate use of equipment.

14. The *Ventilator Support Plan* and/or Tracheostomy Support Plan is signed by the participant, their health practitioner, and the Registered Nurse, agreeing to the Plan and providing informed consent.

15. *Ventilator Support Plans and Tracheostomy Support Plans* are reviewed, evaluated, and updated regularly, and when changes occur.

16. Referrals are facilitated by the Registered Nurse to other relevant health professionals, where required, in consultation with the participant and their health practitioner, e.g., Respiratory Consultant.

17. Australian Quality Care accesses appropriate equipment for participants who require ventilator or tracheostomy support and provides staff with the required training on equipment use and maintenance. This includes training on types of ventilators used, main equipment components and functions, breathing masks and fitting techniques, as well as general maintenance procedures.

18. The Registered Nurse or a suitably qualified contractor performs formal equipment maintenance in accordance with the manufacturer's instructions, as scheduled.

19. Staff communicate with participants using their preferred communication method e.g., use of devices, aides, or language resources as needed, e.g., picture cards.

20. The Registered Nurse monitors compliance with the NDIS Practice Standards and High Intensity Support Skills Descriptors via an internal audit process and stakeholder feedback surveys, to ensure service provision is appropriate and effective.

21. Registered Nurse:
    - ensures all support workers undertake the necessary training
    - maintains training records and appropriate registrations and
    - monitors staff compliance.

22. All health professionals and consulting Health Practitioners are accountable for their own practice and are aware of their own legal and professional responsibilities of work within the Code of Practice of their professional body.

Precautions/Considerations

Check and ensure participant consent and *Support Plans* are current for ventilator tracheostomy support.

Replacing tracheostomy dressings or ties requires two workers to be present due to the high risk of accidental decannulation.

Support workers must be experienced and competent in supporting participants reliant on ventilation via tracheostomy tube and have the required First Aid skills and knowledge to administer CPR.

Support workers must have access to a working and always charged phone and / or mobile phone for emergency contact.

It is recommended that all participants requiring tracheostomy support have continuous pulse oximetry (Sp02) during all periods of sleep (day and night) and when out of line of sight of support workers.

For participants with a newly established tracheostomy, it is recommended that tracheal dilators are available at participants' bedsides until after the first successful tube change.

An information sheet is to be placed at each participant's bedside for ease of access to workers, Health Practitioners, and emergency workers that provides specific data regarding:

- date of last tracheostomy tube change
- type and size of tracheostomy tube (including inner diameter, outer diameter, length cuffed or uncuffed tube)
- cuff inflation
- suctioning distance and
- critical alerts.

If the participant has an NGT, Nasojejunal tubes (NJT) or Nasopharyngeal Airway (NPA) in situ, there is an increased risk of pressure area formation and leak.

Infection Control

Support workers must:

- change / clean circuit weekly or PRN
- clean mask daily or PRN and

- refresh humidifier water daily or wash and air-dry the humidifier (as applicable).

Support workers are to comply with the specific requirements for hand hygiene and Personal Protective Equipment (PPE), in line with Australian Quality Care's *Infection Control Policy and Procedure*.

Participant Safety Alerts

- Participants' ability to breathe (self-ventilate) in the event of power, device, circuit, or interface failure.

- Anti-asphyxiation valve on full and total face masks.

Home Circuits / Equipment

Participants who are managed on NIV at home can use reusable ventilation circuits, unless otherwise indicated.

If participants are discharged home, they should use the home (reusable) circuit for at least one or two nights prior to discharge in order for the compliance and efficacy to be assessed.

participants who are established on long term NIV and are re-admitted to hospital should use their home driver and equipment, unless otherwise clinically indicated.

Equipment Required

- Personal Protective Equipment (PPE) – gloves, masks etc.
- Other participant-specific equipment, where required. e.g., ventilator, humidifier, suction equipment, oxygen equipment, and relevant tracheostomy support equipment.

Procedures

As ventilator support and ventilation support with tracheostomy is highly personal in nature and high risk, workers need to maintain communication and work closely with participants to understand their specific needs, when and how to best deliver supports that meet the participant's preferences and daily routines.

Ventilator Support Procedures

1. Check and confirm consent is current for ventilator support and that the participant has received information related to any procedure to be performed and given appropriate consent.

2. Ensure the participant is registered with their energy provider so that they can prioritize a safe and reliable supply to their premises.

3. Understand emergency escalation requirements in the event of an emergency, specific to the participant's particular circumstances.

4. If the participant requires suctioning due to obstructed airways, refer to their *Ventilator Support Plan*, including specific equipment to be used at commencement of shift.

5. Read and understand the *Ventilator Support Plan* and perform duties / procedures only within scope of practice.

6. Read any Advanced Care Directive in place.

7. Ensure the participant's privacy and dignity, as well as a safe environment, prior to commencing support.

8. Check for any specific issues, or adjustments needed, at the time of support being provided.

9. Check the required equipment is available and ready for use.

10. Communicate with participant as per their preferred communication method e.g., use of devices, aides, or language resources as needed, e.g., picture cards.

11. Follow strict personal hygiene handwashing and infection control procedures before and after providing care.

12. Check ventilator settings correlate with documented *Ventilator Support Plan*. Document settings on participant records at commencement of each shift.

13. Undertake a complete respiratory assessment at least once at the commencement of each shift, where the participant's respiratory status changes, or where NIV settings are adjusted. Familiarise self with equipment checklist at the start of shift and undertake required actions (tick off checklist and then sign).

14. Undertake and record equipment checks on respiratory equipment in a logbook, including checks of backup ventilators, oxygen levels in spare tanks, and suction equipment.

15. Monitor the participant for, and document hourly on participant's records, the following:
    - level of consciousness
    - breath rate, pattern, and effort
    - heart rate
    - use of accessory muscles, i.e., laboured breathing
    - oxygen requirement
    - pulse oximetry
    - compliance and comfort with therapy and
    - respiratory synchronisation with bi-level ventilation

    <u>Ventilator Assessment / Observations</u>

    Ventilator settings:
    - mode
    - inspiratory / Expiratory Pressure
    - rate
    - inspiratory time (timing / timax)
    - trigger
    - ramp
    - cycle
    - alarm settings
    - synchronisation of device with participant respirations when on bi-level NIV, in S, T and ST mode
    - battery back-up (as required) and
    - secondary driver / device back up (as required).

    Oxygen Therapy:
    - oxygen supply appropriately connected
    - oxygen flow rate
    - nasal prong oxygen for participants receiving NPV
    - interface and circuit

- mask fit and leak
- collar fit and leak
- pressure areas from mask / strapping
- CO^2 exhalation port present and patent
- anti-asphyxiation port in situ and patent full face and total face mask and
- circuit patency.

Humidification:

- humidifier settings / alarms
- humidifier chamber water level and
- any excess condensation in circuit.

16. Undertake or organise for assessment and document on-going NIV requirements.

17. Liaise with the Registered Nurse or relevant health practitioner regarding any concerns with NIV issues (e.g., deteriorating airway condition), for support co-ordination and referrals.

18. Undertake regular oral hygiene (mouth/lip care).

19. Undertake pressure area assessment and attend to positioning and skin care during periods of NIV.

20. Nutrition – continue enteral feeds during periods of NIV. Consider and request mealtime management review where time spent on NIV may impinge on participant's ability and opportunity to take adequate nutrition and / or fluids orally. Alternate feeding methods may need to be used.

21. Observe and report:
    - potential clinical complications – pneumothorax, abdominal distension, mucus plugging, secretion build-up inside mask, oral and nasal dryness, eye irritation from air leak, nasal congestion, aspiration, pressure areas from mask, tubing, strapping and nasogastric tubing and
    - potential mechanical complications – inadequate ventilation, over-ventilation, mechanical failure of ventilation device, humidification of device, interface leak, damage and misfit, circuit leak and damage, inadequate humidification.

22. Ensure ventilation orders are medically reviewed daily in consultation with the Respiratory Physician.

23. Undertake ongoing care of ventilator equipment – check and ensure no visible damage, clean, and sanitise the unit including air and oxygen filters, check for any electrical damage, check masks and tubing (clean regularly, schedule change), and change any components per manufacturer's recommendations.

24. In the event of power failure, check auxiliary power (such as batteries), which can be used for short-term unplanned power outages. For longer term power outages use alternative batteries, surge suppressors, and backup ventilation equipment e.g., generator.

25. For any emergencies (machine malfunction, participant deterioration, obstructed airway) contact emergency services immediately (if documented in participant's *Ventilator Support Plan*). Report the incident as per Australian Quality Care's *Incident Management Policy and Procedure*.

26. Keep the participant's *Ventilator Support Plan* updated, reflecting current care and interventions required.

27. Actively involve the participant to the extend they choose, check any changes to ventilator support they are receiving, and any other aeras where the *Ventilator Support Plan* is not meeting participant needs.

28. Encourage feedback from the participant and request changes from attending health professionals to the *Ventilator Support Plan* as required.

29. Identify, document, and report information where *Ventilator Support Plans* are not meeting participants' needs.

30. Undertake on-going training and education and maintain up to date First Aid knowledge (especially relating to techniques for addressing ventilator and tracheostomy support), and participate in regular competency assessments to ensure practices are safe and up to date with current best-practice guidelines for supporting participants with ventilator and/or tracheostomy support.

Ventilator Alarm - Troubleshooting

- Check the circuit for leaks or disconnection.
- Tighten or re-connect the connections.
- Ensure ventilator settings and alarm are set according to the participant's sensitivity settings (Inspiration).
- Check water in the ventilator circuit caused by thick mucus or other secretions blocking the airway (caused by not enough humidity).
- Re-start the ventilator.

Out of Hospital Critical Care - Ventilator Support in the Community

1. Ventilation orders should be medically reviewed daily in consultation with the Respiratory Physician.

2. Alterations to the ventilator or ventilator settings must only occur exclusively upon doctors' orders and be carried out by an appropriately trained health professional (e.g., an RN).

3. A second ventilator and an external battery pack must be available if ventilation periods exceed 16 hours a day (ISO Standard 10651:2004).

4. Every non-invasively ventilated participant must have at least one reserve mask and every invasively ventilated participant must have one reserve cannula.

5. A humidifier must be used for invasive ventilation and can also be useful for non-invasive ventilation if typical symptoms present.

   Note: Research and evidence have shown that Ventilator Associated Pneumonia (VAP) is reduced when humidified air or humidified oxygen is delivered at 37 degrees Celsius. Active humidification is recommended for non-invasive ventilation, as it may improve comfort, tolerance, and adherence.

6. For participants with neuro muscular disease with cough insufficiency, use of a pulse oximeter is necessary.

7. Cardiac function parameters. e.g., pulse, blood pressure, and oxygen saturation / levels in the body (usually via pulse oximetry) are to be monitored continuously.

   Note: Pulse Oximetry is a non-invasive tool for monitoring pulmonary function of oxygen saturation only, and does not give indicators of blood pH, carbon dioxide, or bicarbonate concentrations).

8. Temperature should be monitored and recorded daily to detect any elevation, as it could be a sign of pulmonary infection (VAP).

9. Input and output should be monitored daily and recorded in participants' notes.

10. Central to effective monitoring of respiratory status during ventilation is the measurement of blood gases as directed by the attending respiratory physician. Blood taken from the arterial lines (usually radial artery) by pathology staff is analysed for oxygenation, pulmonary function, ventilatory control, and acid base balance.

    The results must be interpreted by the respiratory physician and a decision made on what the result implies - acidosis or alkalosis, metabolic or respiratory. The reason for any abnormality detected should lead to a plan to rectify the problem, e.g., ventilator adjustment as per the arterial gas results to achieve the required oxygenation and ventilation levels.

11. Out of hospital critical care in ventilator support in the community also entails:
    - ongoing clinical supervision (usually provided by respiratory physicians, anaesthetists, or neurologists) in co-operation with the Intensive Care at Home team, comprising highly skilled critical care trained staff, including family members
    - technical support from equipment providers for machines and accessories
    - a team of therapists (e.g., speech pathologists, occupational therapists, physios, and social therapists
    - a qualified care team member as well as a representative from the equipment provider being contactable 24/7 and
    - support workers having reliable phone access 24/7 for emergency contacts.

12. All workers and professionals must practice strict infection control procedures, especially hand hygiene, at all times, to prevent VAP, which is a lung infection due to germs entering through the tube into the lungs.

13. Semi-recumbent positioning with head of bed elevation between 30 and 45 degrees is recommended for the prevention of VAP associated with aspiration.

14. Frequent repositioning of ventilated participants must be undertaken to prevent atelectasis and maintain skin integrity.

15. Ventilator management monitored sedation ordered by the respiratory physician (to provide relief usually from pain), if administered, needs to be closely assessed and monitored for adequacy. The goal of sedation is to provide relief while minimising the development of drug dependency and over-sedation. Sedation must be recorded in participants' notes.

16. Ring 000 for hospital transfer if the participant is in any sort of respiratory distress that does not improve with care interventions. Report this to the attending medical practitioner and family.

17. Complications of invasive ventilator use to be aware of, and for prompt reporting and action, include:
    - Pneumothorax due to increased intrathoracic pressure – symptoms include increased difficulty breathing, acute chest pain, decreased blood pressure, decreased oxygen levels, and increased heart rate
    - Biotrauma - activation of systemic and local inflammatory mechanism (Ventilator Induced Lung Injury, or VILI) – symptoms include Acute Respiratory Distress Syndrome (ARDS), characterised by increased breathing rate, colour changes, e.g., bluish colour around mouth and lips, grunting when air is exhaled, and nose flaring
    - Hypotension - cardiac output due to intrathoracic pressure
    - decreased urine output due to glomerular filtration rate
    - fluid retention due to above renal factors
    - Pulmonary Emboli and Deep Venous Thrombosis (DVT) due to immobility
    - Gastrointestinal Haemorrhage, Gastritis, and Ulceration due to stress, anxiety, and critical illness, and
    - pain, anxiety, agitation, and delirium due to critical illness and associated interventions.

18. Complications of non-invasive ventilator use for prompt reporting and action include:
    - pressure injury, or ulceration of nose or above each tight-fitting mask or head gear
    - conjunctival irritation from air leaks
    - dry mucus membranes due to high flow of dry medical gas
    - Gastric Distention - insufflation of air associated with high flow
    - claustrophobia due to tight fitting mask and Dyspnoea
    - Aspiration Pneumonia due to emesis or decreased level of consciousness resulting in loss of airway reflexes
    - Haemodynamic Compromise because of increased intrathoracic pressure causing decreased venous return, and
    - Pneumothorax - Increased intrathoracic pressure – symptoms include increased difficulty breathing, acute chest pain, decreased blood pressure, decreased oxygen levels, and increased heart rate.

Non-Invasive Positive Pressure Ventilation (NPPV)

There are several forms of Non-Invasive Positive Pressure Ventilation including CPAP, BIPAP and APAP.

All three can be used to deliver pressurized oxygen through a mask, though they vary in their settings.

Positive Airway Pressure (PAP) machines, are typically associated with sleep apnoea treatment. The PAP machine prevents the throat muscles from collapsing and restricting air flow.

CPAP - Continuous Positive Airway Pressure used mainly for people who have obstructive sleep apnoea. CPAP is set at a single constant level of pressure for both inhalation and exhalation.

BIPAP - Bilevel Positive Airway Pressure has 2 settings - one for inhalation and one for exhalation. BIPAP is used more often for people with COPD since it is easier to exhale against a lower pressure which this system allows for. Calibration for optimal settings is usually set by a healthcare provider according to individual needs.

Levels of Pressure

Inspiratory Positive Airways Pressure (IPAP) – is the pressure applied during inspiration (IPAP Range between 10cm to 20cm H_20).

Expiratory Positive Airway Pressure (EPAP) – is the pressure applied during expiration (EPAP ranges between 5cm to 12cm H_20).

Note: Inspiration is an active process that needs more energy than expiration. Similarly expiration is a passive process that does not need much energy. The IPAP is always greater than EPAP).

APAP - Auto-Adjusting Positive Airway Pressure machines can calculate the necessary pressure for an individual's breathing comfort and automatically self-adjust. This 'smart' device can be helpful if the person has varied breathing patterns during the night e.g. different cycles of REM sleep or if they move around a lot while sleeping.

Procedure for Use of NPPV

1. Check participant's *Ventilator Support Plan* and Medical Practitioner orders.
2. Apply mask and make sure the mask is a good fit.
3. Adjust mask, tubing, headgear, as necessary.

4. Set oxygen flow to prescribed rate.
5. Ensure oxygen is flowing through.
6. Clean mask and change tubing, as required.
7. Replace mask / nasal prongs regularly.
8. Use a saline nasal spray to ease mild nasal congestion.
9. Use a humidifier or gel for dry mouth, throat, or nose.

Oxygen Nasal Cannula (Prongs)

A nasal cannula is disposable tubing that transfers supplemental oxygen from a concentrator or storage cylinder to people with a respiratory deficiency and low oxygen levels. There are two types of nasal cannulas: low and high flow. The device has 2 prongs and sits below the nose, delivering oxygen directly into the nostrils.

Nasal cannulas offer the advantage of being significantly less intrusive allowing the person to eat and speak during oxygen therapy.

The nasal cannula is the most common oxygen therapy approach and oxygen flow is usually set at a rate of 2 litres per minute for a standard adult nasal cannula.

Procedure for Use of Oxygen Nasal Prongs (Cannula)

1. Check participant's *Ventilator Support Plan* and Medical Practitioner orders for oxygen therapy.
2. Insert flow meter into oxygen unit.
3. Attach humidifier to flow meter.
4. Attach oxygen tubing to humidifier.
5. Set oxygen flow to prescribed rate.
6. Ensure oxygen is flowing through the tubing.
7. Change nasal prongs regularly.

Cough Machines

Cough Assist Machines provide a safe, non-invasive alternative to suctioning, to remove secretions from the lungs and significantly decrease the risk of developing chest infections. A person with retained secretions which they are unable to clear due to their weak ineffective cough, generally related to a neurological condition, muscle weakness, or pain, would benefit from using a cough assist machine.

The cough machine is connected to a face mask and must be positioned securely upon the face to ensure no leakage of air or pressure loss. The machine will assist by providing a positive pressure that will expand the lungs when the person breathes in.

When the person breathes out the machine will exert a negative pressure that will act like a suctioning force to pull air back and out of the lungs. The swift change of pressure between the stages of breathing elicits a strong effective cough.

A number of cycles, usually between 4 and 6, need to be completed before resting during which time the person can cough out any secretions which may have been loosened up.

A respiratory physiotherapist will usually set up the machine at the required pressures to achieve an optimal pressure to promote the best and most effective cough.

Refer to direction and instructions from the equipment supplier and respiratory physician directions for appropriate use and application to the participant.

Vest – Airway Clearance System

The Vest Airway Clearance System assists people suffering from airway clearance dysfunction e.g., cystic fibrosis, COPD, Bronchiectasis, secretion retention and/or ineffective cough or secretion clearance due to immobility, deconditioning or muscle weakness. The purpose of the Vest is to aid in the mobilisation of retained secretions that if not removed, may lead to increased rates of respiratory infection and reduced lung function.

The Vest System works through High Frequency Chest Wall Oscillations (HFCWO) technology which assists the person in moving retained secretions form smaller airways to larger airways.

The Vest delivers rapidly repeating pulses of air that gently squeeze and release the upper body causing the mucous to loosen, thin and propel towards major airways where it is easier to cough out, which then improves breathing.

Refer to direction and instructions from the equipment supplier and respiratory physician directions for appropriate use and application to the participant.

Tracheostomy Support Procedures

See the *Tracheostomy Support Policy and Procedure* for specific information on tracheostomy support procedures.

Supporting documents

Procedural guidelines for ventilator support are covered in the following documents for support workers and can be used for participants' reference where ventilation support is provided.

Documents relevant to this policy and procedure include:

- *Tracheostomy Support Policy and Procedure*
- *Management of Medication Policy and Procedure*
- *Infection Prevention and Control Policy and Procedure*
- *Management of Waste Policy and Procedure*
- *Reportable Incident, Accident and Emergency Policy and Procedure*
- *Complaints and Feedback Policy and Procedure*
- *Ventilator Support Plans*
- *Service Agreements*
- *Staff Training Plan*
- *Staff Training and Development Register*
- *Staff Performance Reviews*
- *Ventilator Support Competency Assessment*
- *Incident Forms*
- *Continuous Improvement Plan*

References

- *Non-invasive Ventilation Guidelines for Adult Patients with Acute Respiratory Failure: A Clinical Practice Guideline*, Sanchez, D., Smith, G., Piper, A., and Rolls, K., Agency for Clinical Innovation, NSW Government, 2014
- *NDIS Practice Standards: Quality Indicators: High Intensity Support Skills Descriptors December 2022,* NDIS Quality and Safeguards Commission, December 2022
- *NDIS Practice Standards: Skills Descriptors – Guidance for NDIS Providers and Auditors (Version 3)*, NDIS Quality and Safeguards Commission, November 2022

Monitoring and review

This Policy and Procedure will be reviewed by the Board annually, or sooner if changes in legislation occur or new best practice evidence becomes available. Reviews will incorporate staff, participant, and other stakeholder feedback, and identified continuous improvement as relevant.

Review of procedures will assess if the implementation is efficient, effective, and able to be actioned.

Australian Quality Care's *Continuous Improvement Plan* will be used to record improvements identified and monitor the progress of their implementation. Where relevant, this information will be considered as part of Australian Quality Care's future service planning and delivery processes.

Document Control

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