Review of Clinical Practice Guidelines
in Suction Therapy

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Learning Objectives:
Review of Clinical Practice Guidelines in Suction Therapy

1. Review Clinical Practice Guidelines from AARC as to standards of care for suction therapy.
2. Describe other issues including safety standards in the industry used to evaluate quality standards in suction therapy.

Suctioning the Patient in the Home
Types of Suction Therapy

• There are two types of Suction Therapies:
  • Oral suctioning usually requires higher flows and suction in order to clear thick secretions from the oral and nasal airways.
    • Includes airway in natural state including nasopharynx, oropharynx and trachea.
  • Tracheal suctioning require lower flows and suction (80 to 150 mm Hg depending on the age) in order to suction the upper airway without harming the patient.
    • Includes an artificial airway (tracheostomy) or surgically altered airway (laryngectomy)

**Suctioning the Patient in the Home**

**Patient Preparation**
- Patient should be encouraged to cough on own before suctioning is used.
- Preoxygenation and/or hyperinflation.
  - Not routinely needed for all patients.
  - Discharge summary from hospital should include notes on response to suctioning during stay.
  - Preoxygenation and/or hyperinflation may be indicated in:
    - Pediatric patients with decreased respiratory reserve.
    - Documented oxygen desaturation with suctioning.
    - Documented cardiac arrhythmias with suctioning.
    - Patients receiving continuous oxygen therapy.
- When preoxygenation and/or hyperinflation needed, suggest using resuscitation bag with supplemental oxygen.
  - ALL caregivers using this technique should include training of use of resuscitation bag with supplemental oxygen.
  - Normal saline NOT instilled routinely unless specifically indicated. (Stimulate cough)

**Suctioning Event**
- Use of “Clean” rather than “Sterile” technique acceptable in home environment.
- Clean (non-sterile) gloves acceptable for endotracheal suctioning.
- Oropharyngeal suctioning may not require any gloves.
- After suctioning, rinse catheter or Yankeur in boiled or sterile water.
  - Outside of catheter or Yankeur can be wiped with alcohol or hydrogen peroxide.
- Catheter may be reused.
  - Suggested to replace every 24 hours but no research to support.
  - Yankeur can be reused if cleaned and boiled OR high level disinfection until loss of function and then replaced.

**Follow-up Care**
- Monitor patient for adverse reactions.
- If use preoxygenation and hyperinflation previous to suctioning, use after suctioning procedure completed.

**Indications**
- Frequent congested sounding cough.
- Coarse rhonchi and expiratory wheeze audible even without stethoscope.
- Visible secretions
- Increased peak pressures during volume cycled ventilation.
- Decreased tidal volume during pressure cycled ventilation.
- Patient indicates need suctioning.
- Suspected aspiration of gastric or upper airway secretions.
- Unexplained increase in SOB, respiratory rate, or heart rate.
- Decrease in VC or oxygen saturation by pulse oximetry.
Suctioning the Patient in the Home

Contraindications

- No absolute contraindications.
- “Scheduled” suctioning with no indication of need is not recommended.

AARC Clinical Practice Guidelines, "Suctioning of Patient in the Home" Respiratory Care, January 1999 Vol 44 No 1, pg 100.

Suctioning the Patient in the Home

Hazards and Complications

- Bacteria introduced into lower airway by suctioning procedure or saline lavage are possible.
- Patient needs observed for:
  - Oxygen desaturation if pulse oximetry available.
  - Trauma to oral, tracheal or bronchial mucosa.
  - Cardiac and/or Respiratory Arrest.
  - Cardiac dysrhythmias.
  - Atelectasis
  - Airway infection.
  - Bleeding or hemmorhage.
  - Hypertension.
  - Hypotension.


Suctioning the Patient in the Home

Limitations of Procedure

- Take precautions to ensure patient safety.
- Good hydration and humidification to maintain good airway intergrity.


Suctioning the Patient in the Home

Assessment of Need

- If patient on mechanical ventilation, determine need to suction with regular ventilator checks.

Suctioning the Patient in the Home

Assessment of Outcomes

- Considered successful if:
  - Removal of secretions.
  - Improved breath sounds.
  - Decreased peak pressures with volume ventilation.
  - Increased tidal volume with pressure ventilation.
  - Clearing of cough.
  - Improved oxygen saturation when monitoring pulse oximetry.
  - Subjective improvement.
  - Decreased SOB, respiratory, and heart rate.


Suctioning the Patient in the Home

Resources

- Equipment and supplies needed for suctioning in the home:
  - AC and/or DC powered aspirator with:
    - Pressure regulator
    - Collection bottle with overflow protection
    - Battery capability for ambulation or frequent power failures.
  - Suction catheters properly sized.
    - Open system preferred. Closed system not demonstrated to be required except in immunosuppressed patients.
  - Tap water that has been boiled and stored no longer than 24 hours is acceptable.
  - Tap water not boiled may be source of possible contamination.
  - Clean or sterile gloves as indicated especially with active infection.
  - Manual resuscitator when medically necessary.
  - Oxygen source when preoxygenation medically necessary.
  - Sterile normal saline when medically necessary.
  - Yankee or tonsil tip when necessary.
  - Sterile distilled or recently boiled water or cleansing solution.


Suctioning the Patient in the Home

Personnel

- Patient trained in self care whenever possible.
- If not possible bedside caregivers (family members, bedside caregivers) thoroughly trained and DEMONSTRATE their ability to perform procedure, clean, and care for equipment.
- Trainers should include credentialed respiratory care practitioners and registered nurses.
- Trainers should observe on a regular basis performance of procedure and determine need for reinforcement and remediation is necessary.


Suctioning the Patient in the Home

Personnel as Patient and Caregiver Educator

- Ultimate goal is to provide education to the patient and/or caregiver that equips him/her with the knowledge, skills, and attitudes to better understand the patient's condition and to more fully participate in health care.
- Healthcare provider (HCP) should be assessed for training as education providers by:
  - Observation of HCP in patient education setting to determine if needed skills are present.
  - Verbal questioning by specialist as to knowledge of topics being taught (suctioning skills)
- Outcomes Assessment
  - Assessing the HCP's ability to train providers in the home includes:
    - Knowledge gained by patient or patient care provider
    - Skills mastered by patient or patient care provider
    - Positive change in patient outlook and/or attitude
    - Compliance of patient or caregiver in following the care plan.
  - Long term assessment through quality improvement indicators or other quality monitoring systems.

AARC Clinical Practice Guidelines, "Training the Health-Care Professional In the Role of Patient and Caregiver Educator" Respiratory Care, 1996 Vol 41, No 7, pg 654-657.
Suctioning the Patient in the Home

Caregiver Requirements

- Caregiver knowledge and competence includes:
  - Proper use and assembly of all equipment.
  - Indications for suctioning.
  - Assess effectiveness of procedure.
  - Ability to monitor vital signs, patient condition, adverse effects and corrective actions.
  - Good technique with least amount of risks.
  - Knowledge of Infection Control procedures including:
    - Good handwashing
    - Clean and disinfect equipment properly.

Suctioning the Patient in the Home

Caregiver Monitoring

- Caregiver should be able to monitor:
  - Breath sounds
  - Skin color (look for cyanosis)
  - Respiratory rate
  - Heart rate
  - Sputum characteristics (color, consistency, volume, odor)
  - Blood pressure if necessary.
  - Ventilator variables (tidal volume, peak pressures, respiratory rate, expiratory pressure)
  - Oxygen saturation if pulse oximetry available.

Suctioning the Patient in the Home

Frequency and Infection Control

- Frequency of Suctioning
  - Only when indications are clearly present. (See Indications section)
- Infection Control
  - Prevent patients from exposure to visitors with active viral or bacterial infections.
  - If patient or caregivers have known active diseases such as HIV or hepatitis or other blood borne infections, immunizations should be considered.
  - Infection control practices:
    - Handwashing before and after procedures.
    - Clean or sterile suction techniques.
    - Cleaning and disinfection of equipment and supplies including:
      - Mechanical cleaning with detergent and water and followed by ONE of the following.
      - 60 minutes soak in vinegar and water solution (>1.25%). Vinegar solution not reused.
      - Quaternary ammonium solution (follow manufacturers recommendations)
      - Glutaraldehyde
      - Boiling (See manufacturers recommendations with this technique)
    - Proper storage of equipment and supplies
    - Proper disposal of spent supplies and infectious waste.

Tracheobronchial Tree

A qualified clinical practitioner or caregiver that has been trained to perform proper suctioning technique should perform all procedures.
While suctioning, it is important to gently rotate the catheter to avoid damaging the respiratory mucosa. Suctioning should not be prolonged beyond 15 seconds, and may cause hypoxia due to oxygen being removed during the procedure.

### Bronchial Tube Cross Section

- **Bronchial Mucousa**
- **Smooth Muscle**
- **Necous**

### Clinical Goals of Suction Therapy

1. **Bronchial / Oral Hygiene** - when a patient is unable to properly clear secretions a suction procedure is necessary to promote a patent airway and basic hygiene.
2. **Airway Clearance** - in conditions when the upper airway is bypassed or rendered inefficient, the utilization of oral/tracheal suctioning is a necessary therapy to clear secretions from the throat and trachea. This therapy may promote a cough reflex and allows a path for air to pass through.
3. **Means to Control Infection** - The inability to naturally clear oral/tracheal secretions opens the opportunity for bacteria to thrive. This may develop into common respiratory disorders, such as pneumonia. Suction therapy is indicated for the treatment and prevention of respiratory infections.

### Tracheal Suctioning

- Tracheal suctioning is more often performed on a patient that has a tracheotomy. There are occasions that an oral-tracheal procedure is done, but this is uncommon in the home environment. A tracheal suction procedure is performed with a sterile suction kit that is disposed after a single use. The kit would contain a water basin, suction catheter, one sterile glove, and possibly sterile saline. The suction catheter comes in many sizes, but the most common adult size is 14 french. The vacuum should be set:
  - **ADULTS** between 100-150 mm Hg
  - **CHILDREN** between 100-120 mm Hg
  - **INFANTS** between 80-100 mm Hg


### Oral Suctioning

- Oral suctioning is performed to clear the upper airways or to stimulate a cough reflex. This technique requires a clean suction catheter or suction handle/yankauer. Since the procedure is clean, not sterile, the catheter or suction handle may be used more than once. There is no limit to the vacuum level, since the procedure is performed in the mouth and throat.
**Basic Suction Set-up**

- LED Vacuum Display
- On/Off Button
- Vacuum Regulator Knob
- Bacteria Filter & Vacuum Inlet Port (behind filter)
- Patient Tubing Connector Port
- Canister Elbow
- Friction-fit Canister Lid
- 725 ml Reusable Collection Canister

**VacuAide Parts**

- Catheter/Tubing Rest
- DC Power Input
- Battery Door Lock
- Battery Door

**Basic Battery Assembly**

- Use coin to rotate latch to unlocked position
- Remove door by pulling up on latch
- While battery is shipped in the unit, it is not connected

**Installing Battery Before Operation**

- Simply plug battery into the outlet, which is attached to the circuit board, place it back in position, and attach the cover

Bright orange sticker on battery compartment door indicates battery must be connected and fully charged before use and after long storage periods.
Using an External Power Source

DC Power Input—can then be connected to Car/RV power receptacle OR to AC power using furnished power supply.

Canister Assembly

To properly install the canister, first connect filter (clear side of filter labeled IN is inserted directly into canister elbow), then slide into port on unit. Then gently snap the canister into its support.

LED Display

Vacuum Display in mmHg

Note: half-bright lights indicate increment of 25mmHg between numbered levels.

Example: a high-bright light here indicates suction level of 175mmHg.

Low Battery—illuminates red when battery is discharged.

Battery Charging—illuminates in yellow while charging; no light means full charge.

External Power—AC or DC source; illuminates green when power is supplied.

Adjusting Vacuum

To adjust vacuum level, turn unit on, then occlude or block the patient end of the 6" tubing. Turn the vacuum regulator know clockwise to increase and counter-clockwise to decrease the vacuum. Release and occlude once more to confirm setting. The desired level can be viewed on the display. Patient then connects catheter or suction tip as appropriate.

Note: unit was designed to adjust to full range with one rotation.
Characteristics of Suction Devices

As such, best care practice demands Suction Equipment that will:
• Evacuate quickly, efficiently, and safely;
• Run off of several power sources in the event of power outages (e.g. brown outs, flooding, hurricanes, fires, etc.);
• Not interfere with other commonly needed medical equipment like ventilators;
• Provide optimal portability for improved quality of life;
• Perform at all times; and
• Perform consistently over time
• Provide Profitable Business Model for Providers

DeVilbiss VacuAide Compact

• Classified as a High Flow/High Vacuum Device
  • Flow of 27 LPM ensures that patients receive relief quickly
  • Vacuum ranges from 0-550mmHg means neonates and adults alike can be treated using the same device (Refer to AARC Guidelines for Suctioning)
• International Safety Standard for Suction Equipment
  • This rigorous 20+ Test Protocol means equipment providers can count on exceptional performance for patients;

ISO 10079-1: Safety Requirements for Electrically powered suction equipment

• Tests include, but are not limited to:
  • Identification, markings of components to allow appropriate action to detect any potential risk posed by device or components
  • Environmental conditions (high temperature, cold storage)
  • Protection against electric shock hazards
  • Protection against excessive temperatures and other safety hazards (overflow, ingress of liquids, collection canister & tubing collapsibility, battery exposure to water, leakage of collection canister, electrostatic charges, power supply interruption, etc.)
  • Protection against mechanical hazards
  • Protection against hazards from unwanted or excessive radiation—microwaves, electromagnetic compatibility
  • Protection against human errors & abnormal operation

Power Options and Power Outages

• Ensures Patients Receive Uninterrupted Aspiration—the 7305P-D Suction Unit runs off of:
  • AC Household Current—even when battery is fully discharged;
  • 12V DC Car/RV Receptacle Power—for patient who travel or in back-up, emergency situations;
  • 60-minute Battery—for maximum portability and to ensure alternate, back-up power is always at hand
DeVilbiss VacuAide Compact
Will Not Interfere With Other Equipment

- Certified for Electromagnetic Compatibility—
  - will not interfere with other medical equipment (e.g. ventilators), and
  - is not susceptible to interfere from such equipment
- ISO 10079-1 Safety Standard for Suction Devices

DeVilbiss VacuAide Compact
Portability

- Multitude of power options
- Lightweight, compact with carrying case provided at no additional cost
- One unit can accommodate travel to any country (simply insert alternate power cord)
- Certified to RTCA Aircraft Standard for environmental conditions and test procedures for airborne equipment
  - Will not interfere with plane’s navigation system
  - Can be used during take off and landing when needed
  - Certificate available online as proof for travel

DeVilbiss VacuAide Compact
Performance Characteristics

- Certified to Pass Rigorous Drop Test and Shock & Vibration Test (ensures that equipment that is dropped 1 meter onto a concrete floor will still perform as specified)
- Collection canisters and tubing certified to pass ISO 10079-1 Safety Standards for Suction Collection Canister & Tubing Collapsibility Test
  - Reusable & Disposable Canisters provide reliable, consistent performance and will not collapse under heavy vacuum load

Reusable Canister Business Model

<table>
<thead>
<tr>
<th>Optimized Business Efficiency</th>
<th>Disposable Canister</th>
<th>Reusable Canister</th>
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<tbody>
<tr>
<td>Reimbursement per canister</td>
<td>9.54</td>
<td>33.08</td>
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<tr>
<td>Cost of Canister</td>
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<td>Gross Profit Margin</td>
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The Reusable Collection Canister is reimbursable under HCPCS code A7001; VacuAide 7310PR-D Reimbursable under HCPCS code E0660 ($38-$63/month for 12 mos); tubing code A7002.
Take Home Message!
Suction Therapy in Home Care

- Know indications, outcomes, and hazards of suctioning a patient in the home environment and be able to instruct caregivers in these aspects.
- Know how agency standards affect safe and effective operation of suction equipment.

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