Pediatric Tracheostomy and Use of the Passy Muir® Valve

Course Outline

- Pediatric Tracheostomy
- Clinical Complications of Tracheostomy
- Clinical Benefits
- Assessment Guidelines
- Treatment Principles
- Therapy Techniques- with video examples

Pediatric Tracheostomy

- Timing of Pediatric Tracheostomy
    - Majority are trached under 1 year of age
    - Average age 2-3 years old
    - Critical time for development
    - Practice and hear their own vocalizations
- Indications for Pediatric Tracheostomy
    - Long term ventilation
        - Neuromuscular
        - Ventilator dependency
    - Upper airway obstruction
        - Stenosis
        - Laryngomalacia, tracheomalacia, bronchomalacia
        - Craniofacial malformations and syndromes
        - Vocal cord paralysis
- Pediatric Airway Anatomy
    - Softer, larger palate
    - Lumen size is smaller
        - Larynx is higher
        - Close approximation of larynx and tongue
        - Less cartilage (softer)
- Normal Trachea
- Grade 3 Subglottic Stenosis
- Grade 4 Complete Obstruction
- Laryngomalacia
- Vocal Cord Paralysis

Clinical Complications of Tracheostomy

- Effects of Tracheostomy on Communication Development
    - Caregiver interaction
    - Voice quality
    - Speech
        - 61% have articulation error

        - Consonant and vowel errors
        - Excessive use of phonological processes (stridency and liquid deviation, cluster reduction, fronting)
    - Language
- Impact on Swallow
    - Laryngeal tethering
    - Decreased sensation in the oropharynx
    - Reduced airway closure
    - Reduced subglottic air pressure
- Pediatric Studies
    - Swallow Physiology
        - 91% of 36 trach infants had swallowing disorders; half attributed to underlying neurological or anatomic deficits
        - Higher incidence of enteral feeding
    - Trach effect (Abraham (2000))
        - Toddlers with trach
        - Reduced laryngeal elevation
        - Delayed swallow response penetration
- Decreased Secretion Control and PEEP
    - Removal of filtration & humidification
    - Decreased cough
    - Abraham (2009)
        - All 50 children in study had secretion management issues
            - 98% level of trachea
            - 40% level of larynx
            - 56% oral
- Restore Airflow to Upper Airway
- Clinical Benefits
- Improved Secretion Management
    - Abraham (2009)
    - 24/49 children wearing Passy Muir valve full time
    - Secretion management within normal limits in average of two weeks
- Cotreatment
- Expedites Decannulation and Weaning
    - Restoration of normal physiology
    - Utilization of expiratory muscles
    - Accustomed to more normal breathing pattern
    - Increased PEEP and oxygenation
    - Able to communicate
    - Less WOB, easier to tolerate
- Improved Quality of Life

Types of Passy Muir Valves

- PMV® 2000 (clear) & PMV 2001 (Purple Color™)
- PMV Secure It®
- PMA 2000 Oxygen Adapter
- PMV 007 (Aqua Color™)
- Patient Care Kit
- Team Approach
    - Multi-disciplinary
    - Patient centered
    - Policies and procedures
- General Differences
    - Psychological aspects
    - Habilitation
    - Behavioral considerations
- Patient Selection
    - Cognitive status- awake, responsive, attempting to communicate
    - Medically stable
    - Able to tolerate cuff deflation
    - Able to manage secretions
- Factors Affecting Upper Airway Patency
    - Size of tracheostomy tube
    - Presence and degree of obstruction
    - Edema
    - Secretions
- To Assess for Upper Airway Patency
    - Deflate cuff
    - Finger occlude and voice or cough on exhalation
    - Use mirrors, cotton, feathers, whistles or bubbles to assist with the oral exhalation process
- Placement Guidelines
    - Patient education
    - Patient position
    - Suctioning
    - Achieve complete cuff deflation
    - Use the warning label provided with packaging
- Baseline Measurements
    - Oxygenation
    - Vital Signs
    - Breath Sounds
    - Color
    - WOB
    - Patient Responsiveness
- Distress… Signs and Symptoms

    - Increased RR, HR
    - Anxiety and fear
    - Restlessness
    - Increased irritability
    - Stridor
    - Grunting (infants)
    - Retractions
    - Nasal flaring
    - Head bobbing
    - Sniffing position
    - Decreased BS during auscultation
    - Decreased chest movement
    - Decreased LOC
    - Decreased PaO_2 (SaO_2)
    - Increased $PaCO_2$
    - Paleness or cyanosis
    - Decreased perfusion/mottling
    - Bradycardia/hypotension (this is a late sign)
- Guidelines
    - Approach to Education
    - Higher incidence of airway obstruction
    - Normal baselines
    - Reaction time
    - Transitions may be gradual
- Children 0-6 months old
    - Evaluation:
        - Infant communication developmental scale
        - Oral-motor function and feeding skills
- Treatment:
    - Parent education
    - Early developmental milestones
    - Non-nutritive oral stimulation/sucking
    - Bottle feeding
- Children 6-24 months old
    - Evaluation:
        - Receptive and expressive language
        - Play and cognition
        - Oral feeding Skills
    - Treatment:
        - Parent education
        - Facilitate oral exhalation
        - Facilitate vocalization
        - Augment with alternative communication systems as necessary

        - Oral feeding
- Play, Play, Play!
- Goal #1 Increase Oral Exhalation
    - Techniques
        - Imitation
            - Blowing
            - Bubbles
            - Whistles
            - Horns, kazoos
            - Pinwheels
            - Straws
            - Cotton balls
- Toby Tracheasaurus™
- Goal #2 Increase Voicing
    - Activities
        - Planes, trains, and automobiles
        - Play dough
        - Rice and beans
        - Animals
        - Books
        - Songs
- Children 3 years old-School Age
    - Evaluation:
        - Receptive and expressive language
        - Oral feeding Skills
    - Treatment:
        - Parent education
        - Coordinate services with school, IEP
        - Elimination of negative behaviors
        - Intensive voice and speech therapy
- Additional Voice and Speech Goals
    - Improve voice quality
        - Weak
        - Harsh, hyper-functional
        - Pitch
    - Improve coordination of respiration and speech
    - Improve articulation and phonology
- Swallowing and Feeding Goals
    - Passy Muir valve for assessment (clinical & instrumental)
    - Passy Muir valve for oral feeding
        - Decrease sensitivity (facial/oral stimulation)
        - Tastes

        - Textures
        - Feeding Equipment
        - Positioning
- Care, Cleaning and Lifetime of the Passy Muir Speaking Valves
    - Average lifetime of two months

Educational Opportunities
WEBINARS or ***SELF STUDY COURSES***
Application of Passy Muir Swallowing and Speaking Valves Interdisciplinary
Tracheostomy Team: Where Do I Start?
Ventilator Basics for the Non-RT
Ventilator Application of the Passy Muir Valve
Pediatric Tracheostomy and Use of the Passy Muir Valve Pediatric Ventilator Application of Passy Muir Valve
Swallow Function: Passy Muir Valve Use for Evaluation & Rehabilitation

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