

REHAB SUMMIT

**308: Aspiration & Aspiration
Pneumonia: Strategies to Reduce Risk**

Angela Mansolillo, MA/CCC-SLP, BCS-S

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308: Aspiration & Aspiration Pneumonia: Strategies to Reduce Risk

Angela Mansolillo, MA/CCC-SLP, BCS-S

Financial: Angela Mansolillo has an employment relationship with Cooley Dickinson Hospital. She receives a speaking honorarium from PESI, Inc.
Non-financial: Angela Mansolillo is board certified specialist, Swallowing and Swallowing Disorders of the American-Speech-Language-Hearing Association.

Aspiration and Aspiration
Pneumonia:
Strategies to Reduce Risk

ANGELA MANSOLILLO, MA/CCC-SLP, BCS-S

Objectives

- Define and describe aspiration pneumonia
- Identify risk factors for development of aspiration pneumonia
- Describe the role of oral hygiene in prevention of aspiration pneumonia
- Identify strategies for improving nutrition and hydration
- Discuss the advantages and disadvantages of free water
- Describe exercises and activities to improve cough

Pneumonia Statistics

Medicare beneficiaries; 2005-2007

- Cost for those with pneumonia during episode and 1 year after **\$15,682** higher than age matched peers without pneumonia
- >87 billion dollars** cost to Medicare annually
- 30 day **mortality**: 6.2% for CAP; 13.4% for HCAP; increases with age

Parks Thomas et al, 2012.

Pneumonia Statistics

Aspiration Pneumonia US Nationwide Inpatient Sample database 2002-2012

- Disproportionately impacts elderly (79% >65 years of age)
- Overall incidence decreased during this period
- In-house mortality also *decreased*

BUT....

Pneumonia Statistics

Median total hospitalization charge *increased*

In patients <65 years of age: increased from \$16,173 to \$30,280

In patients >65 years of age: increased from \$17,517 to \$30,526

Wu, et al, 2017

What is pneumonia?

A lung infection, typically caused by viral, bacterial, or (less commonly) fungal agents

Symptoms include

- Productive cough
- Fever (with chills at times)
- Difficulty breathing
- Chest pain
- Fatigue
- Reduced level of consciousness (in severe cases)

Pneumonia

Alveoli become inflamed

Epithelium thickens; reduced surfactant; reduced inflation, increased RR

Infectious material accumulates in air spaces – as infiltrate grows, surface area diminishes



Pneumonia

Diagnosed via

- Review of history
- Clinical signs/symptoms
- Chest X-Ray
- Chest CT

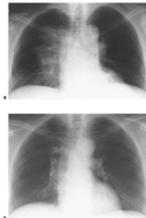


Pneumonia

Pneumonia

- Community Acquired
- Nosocomial
- Aspiration

Figure 2a. High and low dose antibiotic after antibiotic exposure in 32-year-old man with upper gastrointestinal bleeding. B. Because of rapid clearing of infection over next 2 days, antibiotic treatment was discontinued.



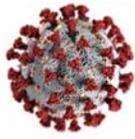
Pneumonia

Community Acquired

- Recent viral illness
- Viral, strep, H.influenza
- CXR: focal infiltrate
- Underlying lung disease, smoking are risk factors
- PPI use also risk factor (increased colonization of stomach, esophagus)
- Risk increases with aging (as does mortality rate)

COVID Pneumonia

More likely to be bilateral
Significant ground glass opacities on CT
“Silent hypoxia”



COVID Pneumonia Characteristics

Fever (30.7%)
Oxygen requirement at triage (27.8%)
RR>24 bpm (17.3%)
HR >100 bpm (43.1%)
Oxygen saturation <90% (20.4%)
Required invasive ventilation (12.2%)
Required ICU level care (14.2%)
Acute Kidney Injury (22.2%)
Death (21% overall; 88.1% of those requiring invasive ventilation)

Richardson, et al, 2020

Pneumonia

Nosocomial

(Health care associated pneumonia, Hospital associated pneumonia)

Contracted while in hospital, nursing facility

Bacterial – often staph

Recent intubation, ventilation

Weakness, debility, change in mental status
increase risk

Includes Ventilator Associated Pneumonias (VAPs)

“Stroke Associated Pneumonia”

High incidence of pneumonia in stroke patients...generally thought to be aspiration related. But...

Higher incidence of pneumonia in dysphagic stroke patients than in dysphagic patients overall

Most pneumonias occur in **acute stroke phase** in presence of maximum neurological deficit

Is there another mechanism involved?

“Stroke Associated Pneumonia”

Stroke associated **immunodepression**

Infection (particularly fever) leads to neuronal **excitotoxicity** and electrolyte imbalances which worsen stroke

Also...

Oral flora is altered after stroke – increased colonization overall; changes in bacteria type

Increases in oral bacteria counts after CVA associated with respiratory events

Hannawi, et al, 2013; Perry et al, 2019

Aspiration Pneumonia

Can be either Community Acquired or Nosocomial

Aspiration of colonized oropharyngeal material (food, gastric contents, secretions)

Risk Factors:

- Dysphagia
- Gastric dysmotility
- Impaired consciousness
- Enteral feeding

Chest X-ray

Chest X-Ray Terminology

1. Density/Opacity
2. Consolidation – more diffuse opacity
3. Infiltrates (has been generally replaced by opacity)

All refer to filling of airspaces with....??

Fluid, pus, proteins, WBC's, bacteria...

May be associated with pneumonia

Chest X-ray

Chest X-Ray Terminology

Atelectasis – Collapse of alveoli with loss of lung volume

May be associated with pneumonia...but basilar atelectasis sometimes related to insufficient inspiratory effort

Chest X-ray

Edema – Fluid in alveolar or interstitial spaces; often CHF

Effusion – Fluid in pleural cavity; often CHF, PE, CA

Typically, NOT associated with pneumonia

And...

CXR often negative at very early stages of pneumonia...

CT Scan Terminology

Parenchymal bands – Fibrotic tissue

Bronchiolectasis – Abnormal enlargement of small airways (bronchioles)

Bronchiectasis - Abnormal enlargement of larger airways (Bronchi)

Bronchial wall thickening – Thickening of bronchi/bronchioles typically associated with inflammation

CT Scan Terminology

Atelectasis – Lung collapse

Tree-in-bud pattern – Nodules in a branching pattern; typically associated with infection

Ground-glass opacities – Fluid in airspaces and thickening of tissue around alveoli; can be associated with a variety of pathologies including infection

Lung CT

Lung CTs of 53 patients hospitalized with pneumonia and fluoroscopically confirmed dysphagia:

- Bronchopneumonia more common than lobar pneumonia
- Lower lungs more likely to be involved (47%)
- Posterior infiltrates more common (92%)

Komiya et al, 2013

Something Else to Consider...

25 patients with occult aspiration as diagnosed *via lung biopsy*

- 96% had GERD
- 40% had esophageal dysfunction
- 40% had oropharyngeal/laryngeal dysfunction
- 32% had HH
- 32% Obstructive sleep apnea



Radiological presentation = multilobar/centrilobular nodularity, tree in bud, airway thickening, and fibrosis (less commonly)

Cardasis, et al, 2014

Pneumonia

Treated with...

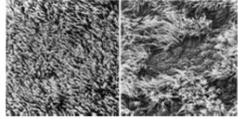
- Antibiotics
- Oxygen therapy
- Respiratory therapy treatments
- Fluids
- Proning (COVID pna)



Pulmonary Clearance

Clearance Mechanisms

- Cough
- Muco-ciliary escalator
- Cellular defenses

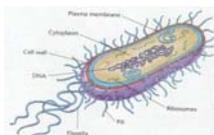


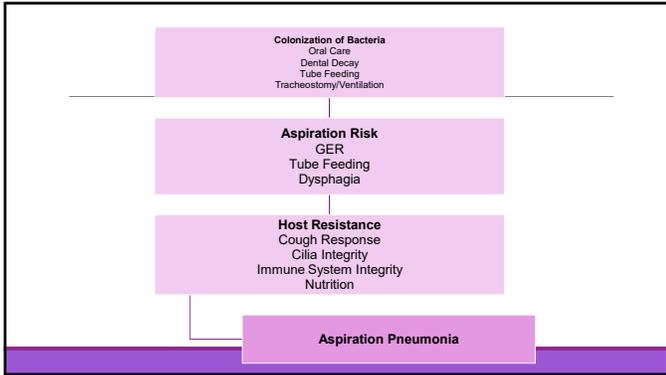
Everybody Aspirates...
So how much aspiration
is too much aspiration?

Aspiration

What was aspirated?

- Acidity
- Fat molecules vs. Water molecules
- Weight
- Bacteria





So Here's What We Know...

| NON-MODIFIABLE RISK FACTORS | MODIFIABLE RISK FACTORS |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> ▪ Medical condition, co-morbidities ▪ Presence of infection; Immune system integrity ▪ Respiratory status; Cilia integrity | <ul style="list-style-type: none"> ▪ Hydration Status ▪ Oral Hygiene ▪ Nutrition Status ▪ Degree of disability? ▪ Cough |

Aspiration Pneumonia and Oral Hygiene

High concentrations of pathogens in the oral cavity with close proximity to the bloodstream

With normal dental care, only small amts of bacteria reach the bloodstream; increases with poor care

Li, X., et al, 2000

AND...

Higher oral bacteria counts and OHAT scores found in aspiration pneumonia group (as compared to community acquired pneumonia and lung cancer groups)

Nishizawa et al, 2019

Oral Infection Associated With...

| | |
|----------------------------|---------------------------------------------|
| Endocarditis | MI |
| Myocarditis | Abnormal pregnancy outcome – prematurity |
| Brain abscess | Idiopathic trigeminal neuralgia |
| Thrombosis | Toxic shock syndrome |
| Sinusitis | Meningitis |
| Lung abscess/infection | Inflammatory bowel disease |
| Skin ulcer | Crohn's disease |
| osteomyelitis | DM |
| Prosthetic joint infection | |
| CVA | |

Why?

Links:

- Oral bacteria induce platelet aggregation which leads to thrombus formation
- Inflammatory response associated with oral infection spreads, proliferates
- Tooth loss, pain results in nutritional deficits which compromise immune system
- Bacteria infect lower respiratory tracts via aspiration, inhalation, spread from infected sites

Oral Health in the Elderly

- Reduced salivary flow
- Medication effects – xerostomia, gingival overgrowth
- Functional dependence
- Cognitive impairment
- Environmental factors: limited staff knowledge, limited staffing, limited supplies, inadequate supervision
- Care-resistant behaviors – refusing, biting, agitation, etc
- Financial access – lack of dental insurance

Oral Health Assessments

Brief Oral Health Status Examination

https://www.researchgate.net/publication/26284068_The_Kayser-Jones_Brief_Oral_Health_Status_Examination_BOHSE

Oral Health Assessment Tool

<https://siphidaho.org/comhealth/ship/KM05-Oral-Health-Assessment-Tool-for-Primary-Care.pdf>

Oral Hygiene Intervention

An Oral Hygiene Program Should:

- Include assessment of oral cavity
- Include staff education
- Provide a specific protocol for staff to follow
- Provide access to an "expert" resource
- Encourage patient independence with self care; include written instructions
- Provide for sufficient tools, time

Harris, et al, 2008; Sweeney, et al, 2005; Cohn and Fulton, 2006

Oral Hygiene Intervention

Tools

- Toothpaste – cleansing, protective against dental caries
- Consider pedi toothbrush – smaller, softer
- Avoid lemon glycerol and hydrogen peroxide – linked with decreased saliva production and mucosal abnormalities
- Glycerin promotes bacteria growth
- Foam brush with water is *least* effective



Oral Hygiene Intervention

Tools (cont)

- Tap water, saline when toothpaste not available/appropriate
- Chlorhexidine (Peridex/Periogard): not appropriate for regular use; consider short term use for those patients with immune compromise and/or extremely poor oral hygiene
- Mouthwash – choose alcohol free



Oral Hygiene Interventions

Adaptations

- Built-up handles for toothbrush
- Flexible handle
- Power brushes
- Non-foaming toothpaste
- Floss holder



Oral Hygiene Interventions

Suction toothbrushes

Sage Q-4 suction brush

Vac U Brush



Plak Vac



Oral Hygiene Intervention

Frequency:

Disagreement in the literature: 2-6x/day

But...

Should increase with patients with severe *mucositis, oral infections*, and patients with *altered level of consciousness*

And...

Intubated and/or Trached patients: **Every 2-4 hrs.**

Oral Hygiene Intervention

Duration:

1-2 minutes; include teeth and tongue (CDC)

Again, disagreement in the literature but minimal acceptable would be 90 seconds (Harris, et al, 2008)



Oral Hygiene Intervention

Dentures

- Ultrasonic cleaners
- Label appropriately
- Brush morning/evening; rinse
- Routine disinfection (minimum = we
- Brush gums of edentulous patients
- Clean the denture cup too!



We Know it Works...But We Can't Get it Done... Why Not?

- Lack of training
- Fear
- Distaste
- Lack of time
- Low priority on own oral health
- Lack of accountability
- Grooming, rather than a medical intervention
- Lack of appropriate tools
- Lack of pt/resident cooperation

Behavioral Strategies

- Calm approach
- Avoid standing over the patient, resident
- Give resident something to hold (bridging)
- Mirroring
- Rescuing

Chalmers, JM 2000

Pre-recorded videos of family members encouraging participation

O'Connor, et al, 2011

Behavioral Strategies

Grabbing/Hitting

- Pain?
- Fearful?
- Startled?

Won't open mouth

- Gentle touch to hands, then cheek
- Toothpaste on lips

Biting toothbrush

- Stop; don't pull on brush
- Distract with touch to arm, head



Strategies for Patients with Dementia

- Soft toothbrush
- Brightly colored brush
- Short, clear directions
- Anti-bacterial spray
- Wipe toothpaste on teeth



Environmental Strategies

- Quiet, familiar environment** (e.g. patient's personal bathroom) to trigger procedural memory, calm patient
- Establish **routine** in re: place, time
- As **few people** present as possible
- Smile** on approach
- Establish **rapport** before beginning oral care



Improving Staff Participation

- Training
- Tools
- Time

Remember, this is a medical intervention!

Establish oral care "experts"

- Have primary responsibility for oral care in facility
- Serve as resource to staff, residents
- Consult with nursing, medical staff as needed
- Documentation

Wardh, et al, 2003

Strategies for Xerostomia

- Water, water, water
- Lip moisturizer
- Reduce alcohol, caffeine
- Saliva substitutes
- Medication review



OK, But What About the Cost?

- Staff time
- Toothbrushes, toothpaste
- Adaptive equipment
- Rinses, etc



What's the Cost of NOT Doing Good Oral Care?

- Remember?
Pneumonia = **>87 billion dollars** cost to Medicare annually



Oral Care and Cost Reduction

Elderly in SNFs

Compared those receiving professional oral/dental care to those who did not

Those not receiving care...

- Higher incidence of fatal aspiration pneumonia
- Higher likelihood of fever
- Higher numbers of respiratory pathogens
- Higher incidence of aspiration pneumonia over a 24 mo period
- Higher incidence of influenza

Adachi et al, 2002; Adachi et al, 2007

Oral Care and Cost Reduction

SNF Residents

Oral care group received oral care after meals and demonstrated...

- Lower pneumonia incidence
- Fewer deaths from pneumonia
- Improvement in ADL's
- Improvement in cognitive function

Yoneyama, et al, 2002

Our Experience...

Estimated cost of **\$28,000 to \$40,000** per Healthcare Acquired Pneumonia (HAP)

The Intervention:

On pilot units (CCU, W-4, W-3)

Suction oral care for those critically ill patients who cannot expectorate/swallow

Regular tooth-brushing for all other patients

The Cost

24-HOUR NON-VENTILATED KIT
ANTISEPTIC ORAL RINSE
SODIUM BICARBONATE MOUTHPASTE
TOOTHBRUSH ULTRSOFT

\$569/month

The Results

Baseline: July-Sept previous year:
Test units (CCU, W4, W3) - 14 pneumonias/2281 days =
06.14%

Compared to...

July – Sept current year:
Test units (CCU, W4, W3) - 6 pneumonias/2217 days =
02.7%

Return on Investment

Cost of oral care products over trial period = **\$1707**

Reduction of 8 HAP's = **\$224,000** in savings
(\$28,000 x 8 pneumonias)

Improving Nutrition

Texture modification often leads to reduced intake and potential nutritional compromise



Modified Texture Diets

Potential for Nutritional Compromise

Require addition of fluids which dilute caloric and protein density

Pureed diets often do not provide adequate amounts of protein (Dahl, et al, 2007; Vucea et al, 2017)

Texture modified meals and snacks often fail to provide adequate calories, protein (Bannerman and McDermott, 2011; Painter et al, 2017)

Associated with low quality of life (Swan, et al, 2015); caregiver stress (Smith et al, 2015)

Modified Texture Diets

And...When they're hospitalized:

Patients with pre-hospitalization texture modified diets

- Have more nutritional compromise
- Have longer LOS
- Have higher mortality rates

Maeda et al, 2019

Modified Texture Diets

Palatability

Interviews with clients eating texture modified diets:

Lack of sensory appeal

Food items indistinguishable from each other

Percent reporting enjoyment of eating = 0%

Keller and Duizer, 2014

Modified Texture Diets

Most common reason stated for lack of adherence?

“dissatisfaction with diet modifications”



King and Ligman, 2011

Nutrition and the Elderly

Complicated by...

- Reduction in density of taste buds
- Limited mobility/decreased access to food/meal prep
- Weight loss and dehydration lead to constipation and other GI issues which further limit appetite
- Polypharmacy

Sarcopenia

Age associated loss of muscle mass and function

- Prevalence = 6-15% of elderly
- Predictor of falls, fractures
- Not necessarily associated with weight loss

Sarcopenia

Impacts oral motor function (Kobuchi et al, 2020)

Results in enlargement of the pharynx and reduced laryngeal elevation (Miyashita et al, 2020)

And to Complicate Things...

Aspiration pneumonia results in muscle atrophy, including diaphragmatic atrophy

Komatsu et al, 2018

Malnutrition may induce sarcopenia in the tongue

Tamura et al, 2012

Functional Reserve

Most ADL's require +/- 30% of normal capacity; the remaining 70% = functional reserve

Normal aging results in decrease in functional reserve

Frailty

What is Frailty?

No agreed upon definition.....

- Accumulation of abnormalities
- Reduced potential for compensation

Eventually a critical point is met which negatively impacts the entire system

May manifest as shrinking/weight loss, weakness, fatigue/exhaustion, reduced mobility, reduced physical activity...

Frailty

Results in....

- Increased fall risk
- Immune compromise
- Low reserve
- Higher degree of disability
- Increased morbidity and mortality

Frailty

Hip Fracture and Dysphagia

High incidence of dysphagia in hip fracture populations

Low grip strength and lower skeletal mass index can predict dysphagia

Risk factors = pre-existing neurological and respiratory co-morbidities, delirium, age, living in a residential facility prior to admission

Love et al, 2013; Nagano et al, 2020

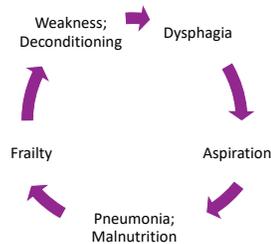
Frailty and Dysphagia

Growing evidence to suggest that frailty associated with

- Dysphagia
- Aspiration
- Malnutrition

Wakabayashi, et al, 2014; Hathaway, et al 2014; Takeuchi, et al, 2014; Bahat et al, 2019

Frailty and Dysphagia



Endurance Issues

Dining requires >400 swallows of various textures, sizes, consistencies...

Potential for fatigue



Endurance Issues

Muscle Fatigue: reduced ability to exert force; typically associated with a perception of increased effort

Oral/pharyngeal musculature generally fatigue resistant but with disease, disability, lack of reserve, fatigue does occur

Endurance Issues

Dining and Fatigue

Healthy (young and old) subjects demonstrated tongue muscle fatigue after dining but...

Older subjects demonstrated longer meal durations and some signs of dysphagia at end of meal

Kays, et al, 2010

Endurance Issues

Assessment:

- Assess high effort tasks (serial swallows, higher texture boluses)
- Assess before, during, after eating
- Include patient's self-assessment of fatigue



What about Supplements?

May help to maintain or even improve weight
But...

- Can reduce appetite for meals
- Add cost to care
- Potential GI issues

Supplementation (My Favorite Study Ever!)

121 SNF residents; 11 week RCT

Traditional supplements vs. homemade supplements
(that included chocolate), group exercise, and oral
care

Individuals in experimental group improved *nutrition*
and *overall function*

Beck, et al, 2008

Supplementation -Snacks

Snacks:

Frequent dietary behavior in older adults
Provide 25% of energy intake; 14% of protein intake
Zizza, et al, 2007

So...

Can we increase food availability in residential facilities?
Making food available 24 hours per day can help to prevent and treat malnutrition and dehydration in nursing home residents
Burger, et al, 2000.

Managing Endurance Issues

Energy conservation for mealtimes
Choose foods, liquids with high caloric, protein density
Consider easy-to-chew foods
Between meal snacks (high protein)
Different recommendations for different times of day



What About Non-Oral Feeding?

Not without complications...

High mortality in neurological, dementia, and cancer populations
Increased medical intervention, support
Potential for complications (reflux, pain, bleeding, infection, to name a few)
Caregiver burden
Effect on quality of life?

Tube Feeding

Cochrane Review - Dementia Patients

No evidence that tube feeding

- Improves nutrition
- Increases life expectancy
- Reduces risk of pneumonia
- Improves functional status

Sampson, et al, 2009

Tube Feeding

Aspiration Pneumonia

Increased likelihood of aspiration pneumonia associated with tube feeding, particularly when combined with the poor oral care that often accompanies non-oral feeding of institutionalized patients

Tube Feeding

Suggestions for Practice

Consider other options:

- Hand feeding when patient is awake, alert
- Pleasure feeds
- Oral care to improve comfort
- Pain control
- Specific guidelines re: cessation (e.g. agitation, lethargy)
- Think *comfort*, not *nutrition*
- See Palacek, 2011 for guidelines

Hydration

Liquid modification (thickening) can lead to increased risk of dehydration



Hydration

Why dehydration with thick liquids?

- Palatability
- Over-thickening
- Access
- Satiety

Dehydration and the Elderly

Decreased total body water (due to lean muscle loss)



Decreased ability to concentrate urine to conserve water



Increased risk of dehydration

Dehydration and the Elderly

Complicated by

Decreased sensation of thirst
Immobility; Dependence for fluid intake
Renal disease (fluid restriction)
Dysphagia
Frailty, somnolence
Difficulty communicating
Fear of incontinence
Medications - Laxatives, diuretics, etc

Dehydration and the Elderly

Signs/Symptoms

Xerostomia
Constipation
Lack of urine output
Lethargy
Fever
Increased HR, RR
Thirst (inconsistently)

Consequences of Dehydration

Urinary tract infection
Renal failure
Confusion
Lethargy, weakness
Slowed wound healing
Constipation
Reduced cilia movement
Increased viscosity of mucus

Dehydration and the Elderly

Can We Prevent Dehydration?

- Regular reminders to drink
- Offer fluids more frequently; particularly those the patient particularly likes
- Keep water within reach
- Limit fasting time for procedures
- Beverage carts/Happy Hour
- Appropriate positioning
- Use family to encourage drinking
- Cups appropriate to dexterity

Simmons, S, et al, 2010; Mentis, J., 2006

Dehydration and the Elderly

What's the cause?

"Can Drink" (inadequate intake; forget to drink)
Education, cues, reminders

"Can't Drink" (need physical assist; dysphagia)
Swallow interventions; adapted cups; physical assist

"Won't Drink" (incontinence fear; "sippers")
More frequent offers; education; Kegels

Mentes, 2006



So...What's Your Plan for Hydration?

Offer liquids more frequently

Choose foods with higher fluid content (fruits, vegetables, yogurt, e.g)

Consider carbonation

Try different temperatures, flavors of liquids with different thickening products

Consider water

But what about aspiration of water?



1 inferior border of the thymus 2 trachea

Frazier Water Protocol

Frazier Water Protocol

Rehab patients who are NPO or on a dysphagic diet

- Water is unrestricted prior to meals and 30 minutes after a meal
- Medications given in puree, or with thickened liquid, not with water
- Manner of presentation of free water may be restricted – e.g. by teaspoon only
- “Aggressive oral care”
- Outcomes = increased pt. satisfaction, increased hydration, no increase in pneumonia rate

Water Protocols – What’s the Evidence?

- **Increased fluid intake** (Garon, et al, 1997; Karagiannis, et al, 2011; Carlaw, et al, 2012; Karagiannis, et al, 2014)
- **Improved QOL** (Karagiannis, et al, 2011; Carlaw, et al, 2012; Karagiannis, et al, 2014)
- **Reduced UTI’s as compared to control group** (Murray, et al, 2016)

Water Protocols – What’s the Evidence?

All but one study reported **no increase** in pneumonia rates
Karagiannis et al, 2011 reported 14.3% pneumonia rate in protocol users with risk attributed to patients with degenerative conditions and reduced mobility/bedbound

Water Protocols

Possible Exclusion Criteria

- Impulsivity; Significantly impaired cognition
- Severe coughing
- Active pneumonia, oral infection
- Poor oral hygiene despite interventions
- Reduced mobility
- Degenerative condition
- Lung disease

Frey, et al, 2011; Carlaw et al, 2012; Karagiannis, et al, 2011; Karagiannis, et al, 2014; Murray, et al, 2016; Pooyania, et al, 2015; Kennedy et al, 2019

Cough

Effective cough requires:

- ❖ Laryngeal sensation
- ❖ Vocal fold adduction
- ❖ Respiratory muscle strength
- ❖ Respiratory capacity



Which of these can we impact?

Impaired Cough Predicts Impaired Swallow



Reductions in Peak Expiratory Flow Rate (PEFR) have been demonstrated to predict aspiration

Pitts et al, 2008; Pitts et al, 2010; Hegland et al, 2014

<200 lpm likely to be ineffective

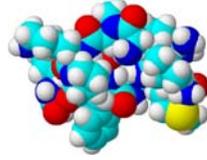
Bianchi et al, 2012; Silverman et al, 2014; Sakai, et al, 2019

Improving Cough Sensitivity

Hydration, hydration,
hydration

And...

Substance P?



Substance P

Peptide that transmits signals from sensory nerves to CNS
Important for pain transmission, emotional responses, *cough and swallow*

Reduced in patients with dysphagia

Kishida, et al, 2013

Low Substance P in stroke patients correlated with low frequency of spontaneous swallowing

Niimi, et al, 2018

Ace Inhibitors, Beta blockers may increase Substance P levels and protect against dysphagia

Marik, 2003; Miarons, et al, 2018

Assessing Cough Sensitivity

"Urge to Cough"

Perception of cough stimuli and need to cough

UTC distinguished between PD patients with mild and severe dysphagia (Troche, et al, 2016)

Patient rating may be useful.

EMST by Population

MS – increased cough effectiveness in patients with moderate levels of disability; no research in re: swallow efficiency

Elderly – improved cough pressures, effectiveness

PD – improved swallow safety (changes in PAS scores); improved hyolaryngeal movement; improved cough effectiveness

COPD – decreased dyspnea; reduced WOB

CVA – improved urge to cough; cough effectiveness for reflexive but not voluntary cough

Troche, 2015; Hegland et al, 2016

EMST Contra-indications

Untreated hypertension

Untreated GERD

Hiatal hernia

COPD/ALS – Lower resistance than other populations (recommendation is generally 50% of load)

Case Review

75 year old patient with new CVA, dysarthria, dysphagia

History includes GERD, kidney disease, cigarette smoking

Assessment reveals aspiration of thin and thick liquids; pharyngeal stasis with thick liquids, puree

1. What are risk factors for pneumonia?
2. Would you consider free water for this patient?
3. Which interventions would be appropriate?

Case Review

55 year old male with diagnosis of pharyngeal cancer; s/p resection of portion of posterior pharyngeal wall and tongue base; currently undergoing concurrent chemotherapy and radiation therapy

Swallow eval: reduced pharyngeal clearance across consistencies; aspiration of thin liquids

History includes cigarette smoking; no other significant history

1. What are the risk factors for pneumonia?
2. Is this patient a candidate for free water?
3. Which interventions would you consider?

Case Review

89 year old female with middle to end stage dementia and new diagnosis of breast CA

Swallow evaluation reveals aspiration of thin/thick liquids

Patient also dependent for feeding; requires constant cues to swallow

1. What are risk factors for pneumonia?
2. What are the pros/cons of non-oral feeding for this patient?
3. Is this patient a candidate for free water?

To Conclude...

Reducing Pneumonia Risk...

What are **modifiable** risk factors?

- Oral hygiene
- Hydration
- Nutritional status
- Cough

And...

Weigh risks vs benefits

Modified texture diets
Thickened liquids
NPO





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