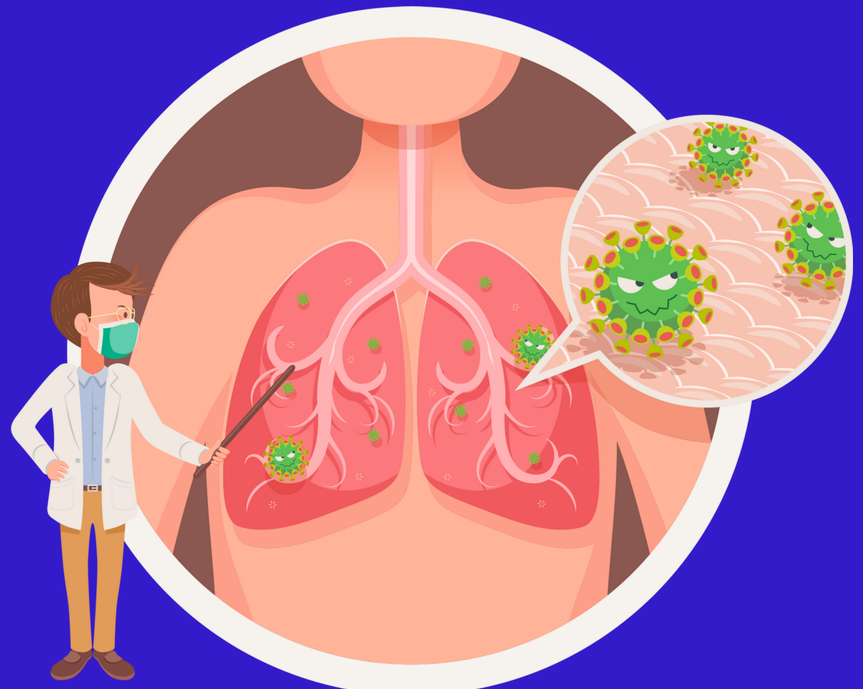
Aspiration Pneumonia
How can we help?



Improve outcomes for tough clinical decisions.

George Barnes MS, CCC-SLP, BCS-S

Agenda

- The Problem
  - Why are we so bad at making decisions?
  - Biases and heuristics
  - Pneumonia vs aspiration pneumonia
- The Solution
  - Make better decisions
  - Assessment
  - Treatment
- The Practical
  - Case study
  - Q&A

Today's Discussion

WHAT I DO

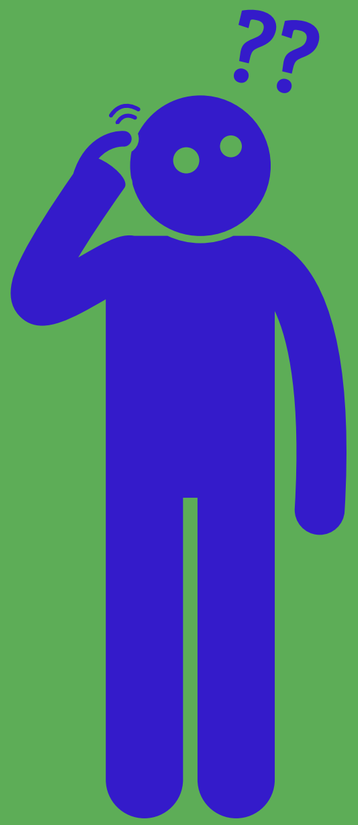
CIRH and Acute care
Mobile FEES
FEESibleSwallowSolutions.com

WHY I DO IT

With a passion for cooking (and eating) I gravitated towards a career dedicated to helping others enjoy the same pleasures

WHEN I'M NOT DOING IT

I’m spending time with my family, cooking, or reading

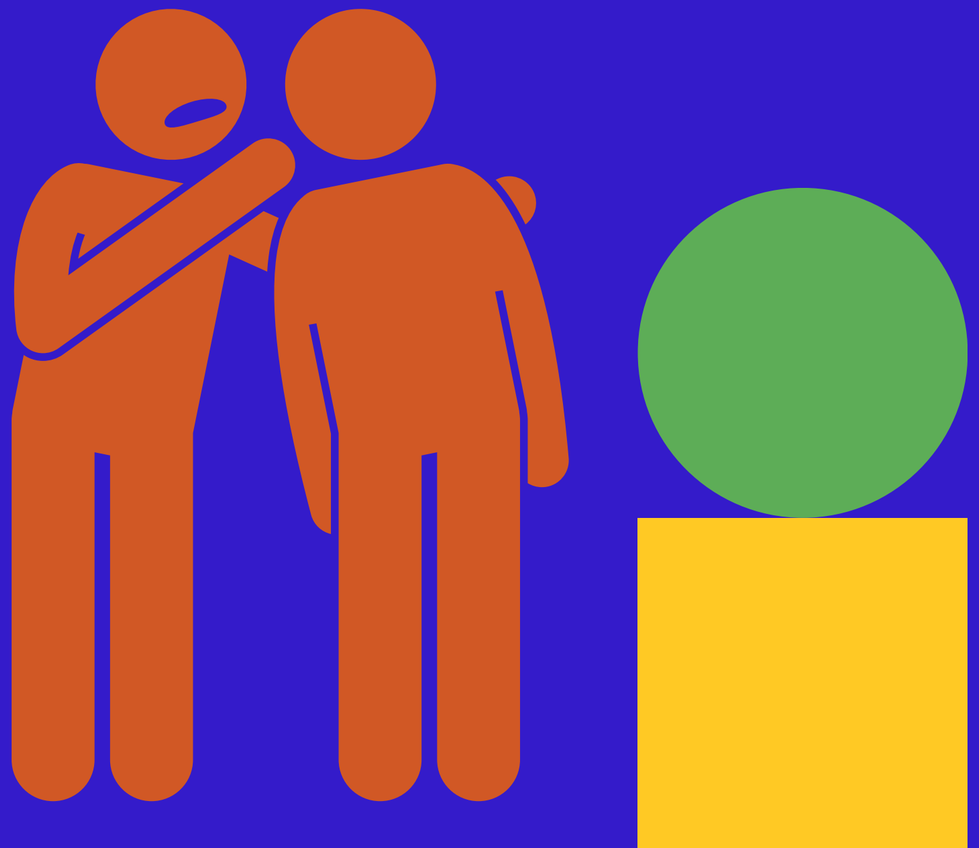


WHY ARE YOU LISTENING TO ME?

- Years of:
  - Making decisions
  - Studying decisions
  - Improving decisions

After watching this presentation, the participant will be able to…

- List the different types of pneumonia and explain its pathophysiology.
- Identify the salient features of aspiration pneumonia.
- Summarize how the lungs protect themselves against aspiration and infection
- Describe how we can best assess aspiration pneumonia risk.
- Summarize how our interventions may (or may not) reduce risk.
- Choose the interventions that have the biggest bang for your buck.
- Identify the most important risk factors and describe how to manage them.



Disclosures

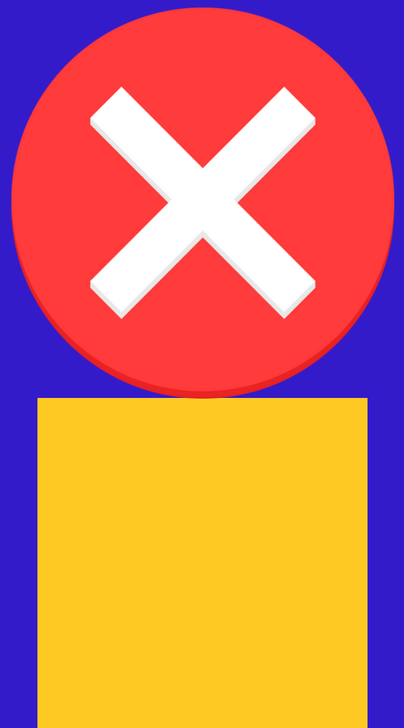
Financial — Receiving an honorarium for this presentation
Non-financial — Volunteer for a research project aimed to objectively calculate aspiration pneumonia risk

All images contained in this presentation have been provided with a paid subscription to Canva

The Problem

Why are we so bad at making decisions?

Nobody is immune…

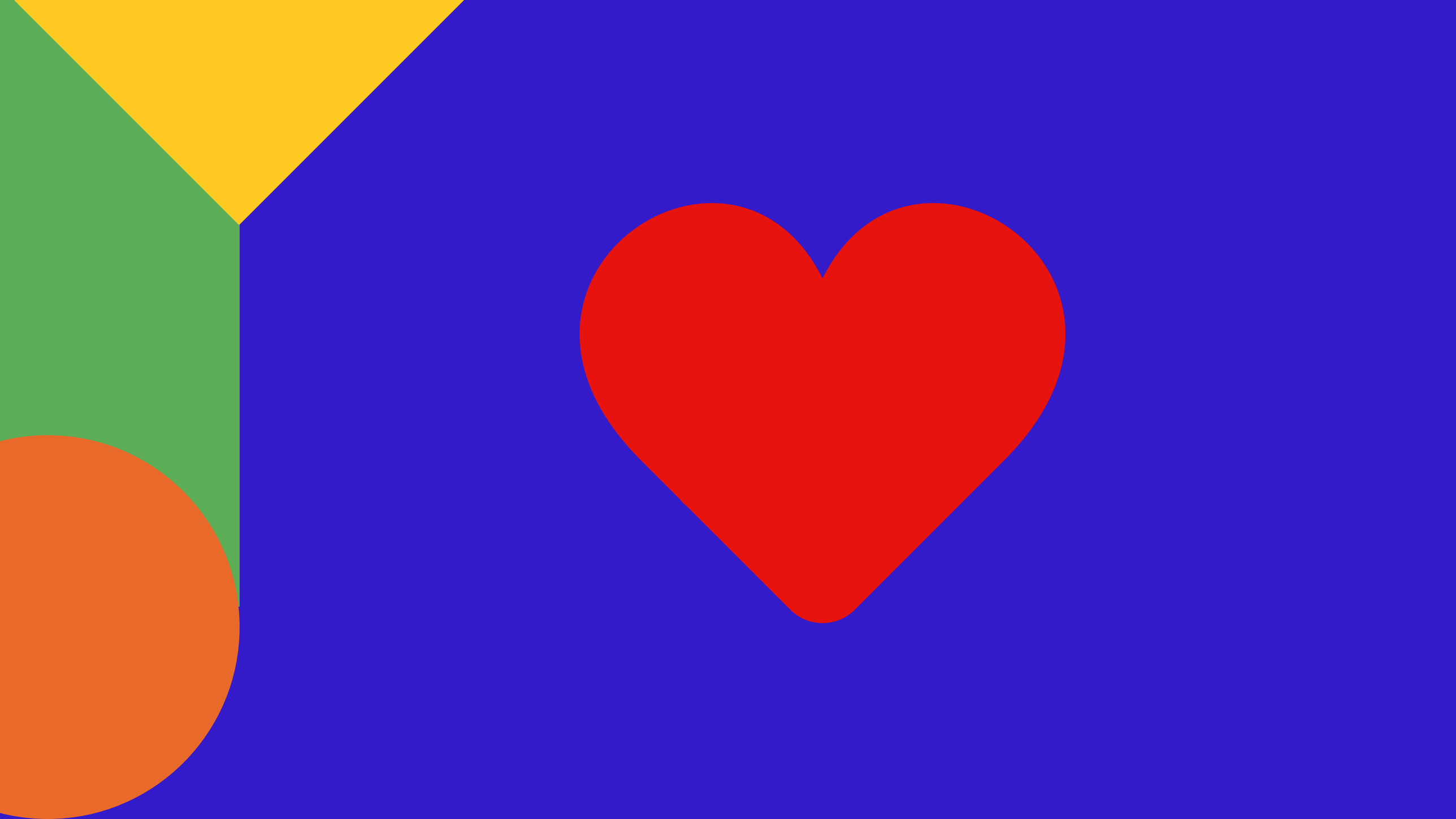


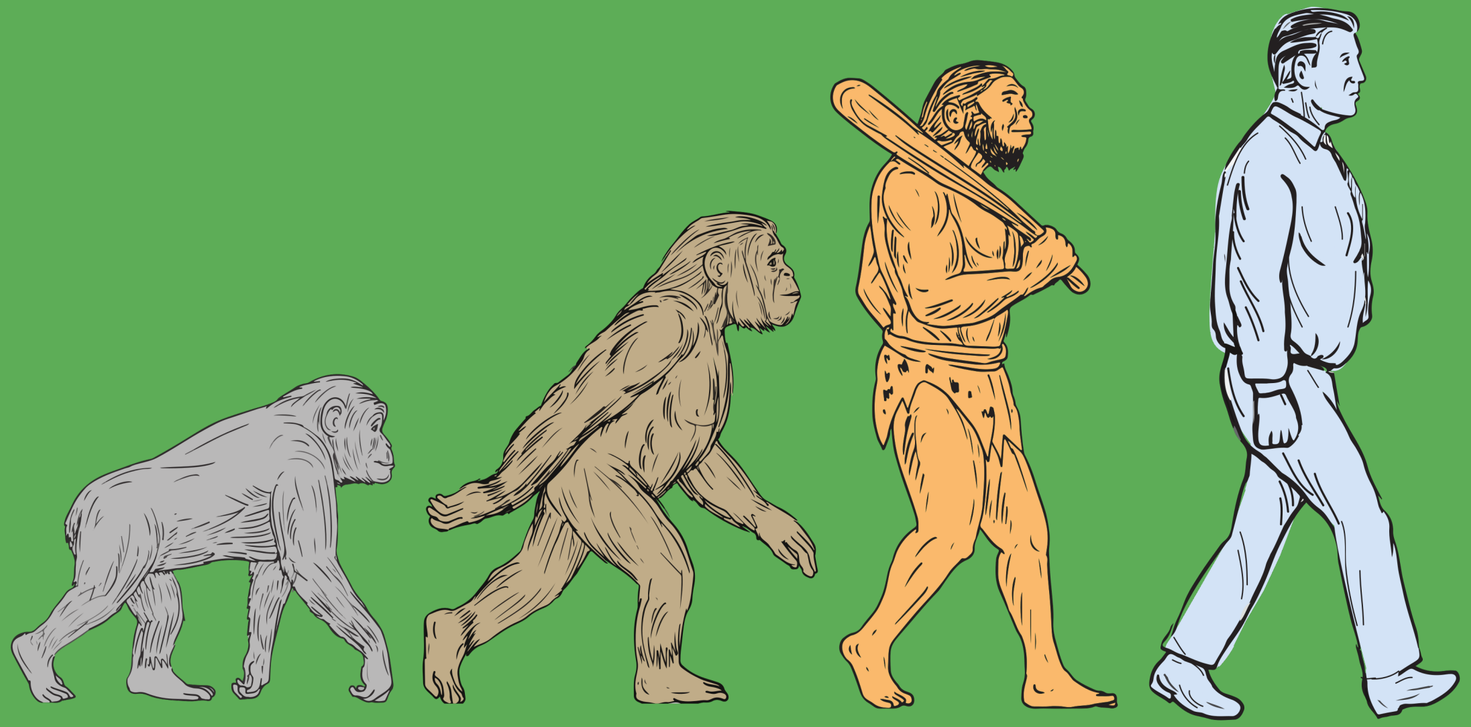
The Stakes are High

Cognitive biases exist in healthcare (Featherston et al., 2020)

They may cause healthcare professionals to make errors up to 77% of the time (Saposnik et al., 2016)

Medical errors account for close to 100,000 deaths each year (Kohn et al., 2009).

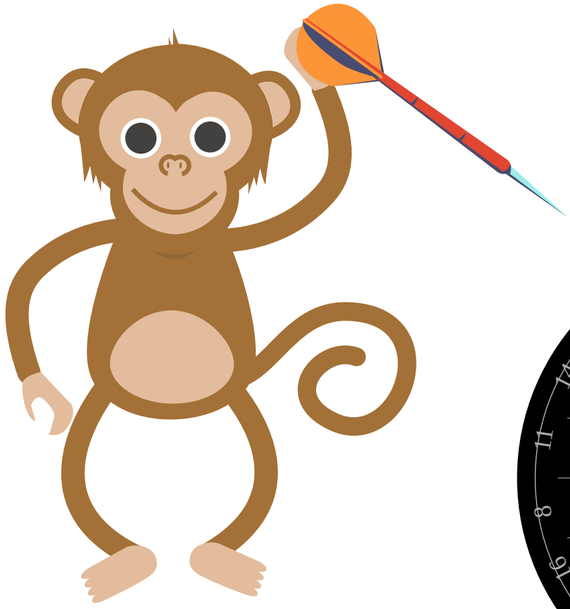


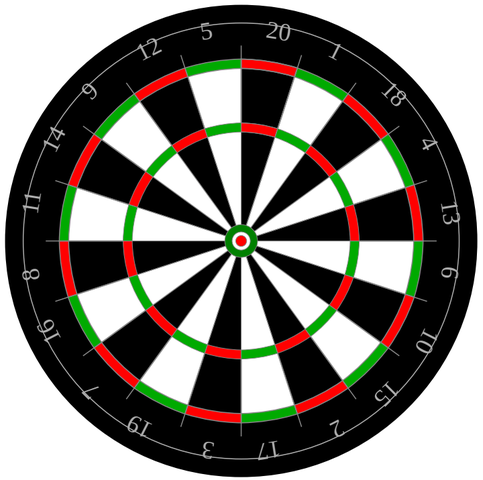


How Effective Are We?

Expert predictions are no better than a dart-throwing monkey (Tetlock & Gardner, 2016).

When we are 90% sure we are right, we are wrong 50% of the time (Sibony, 2020).





Shit Happens

BUT WHEN?

During unfamiliar circumstances or when short on time and feeling rushed.

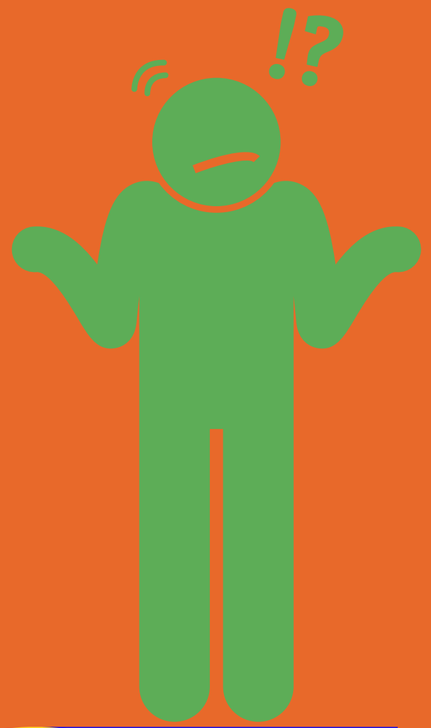
(Groopman,, 2008)

Biases and Heuristics

You can’t correct a mistake you don’t know you make

You don't know what you don't know

We are even biased about our own biases (Pinker, 2021)



AVAILABILITY HEURISTIC

Speaking of dysphagia...

ANCHORING

Dysphagia must be the cause of everything

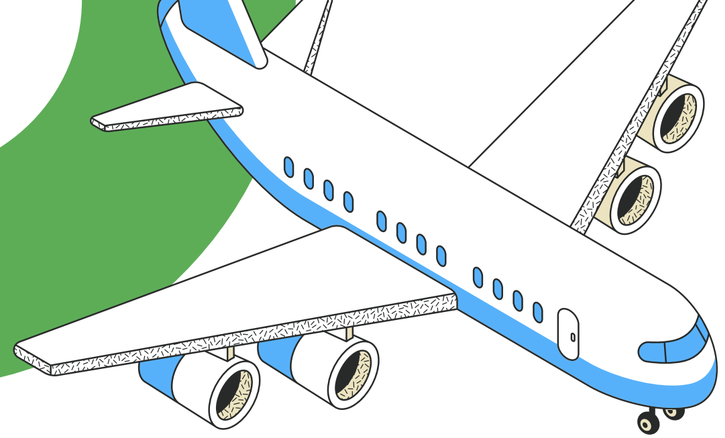
CONFIRMATION BIAS

I won't stop looking for dysphagia until I find it.

BASE RATE NEGLECT

Isn't every pneumonia aspiration-related?

(Saposnik et al., 2016)



Availability Heuristic

Memorable events have a greater impact on our decisions than unmemorable events.

Example: How important is an aspiration event?

Anchoring

Hanging onto the first piece of information we get.

Example: Coughing on first trial vs last trial.

Confirmation bias

Only pay attention to the results that support our theories.

Example: Right lower lobe pneumonia.

Base-Rate Neglect

We over-emphasize individual characteristics and under-emphasize statistical base rates.

Example: Is this really aspiration pneumonia?

Quick Recap

Nobody's perfect. Including you.

- The human body is complex. Errors are bound to happen.
- Medical errors have a huge impact on the outcomes and health of our patients.
- Recognizing the frequency and significance of our mistakes will help us develop a system that minimizes those errors.

Pneumonia vs Aspiration Pneumonia

First step to improving our decisions

Pneumonia stats

Number one cause of infection in hospital admissions

Over 10 million people diagnosed per year

$10 billion in healthcare costs per year

(Lindenauer et al., 2018)

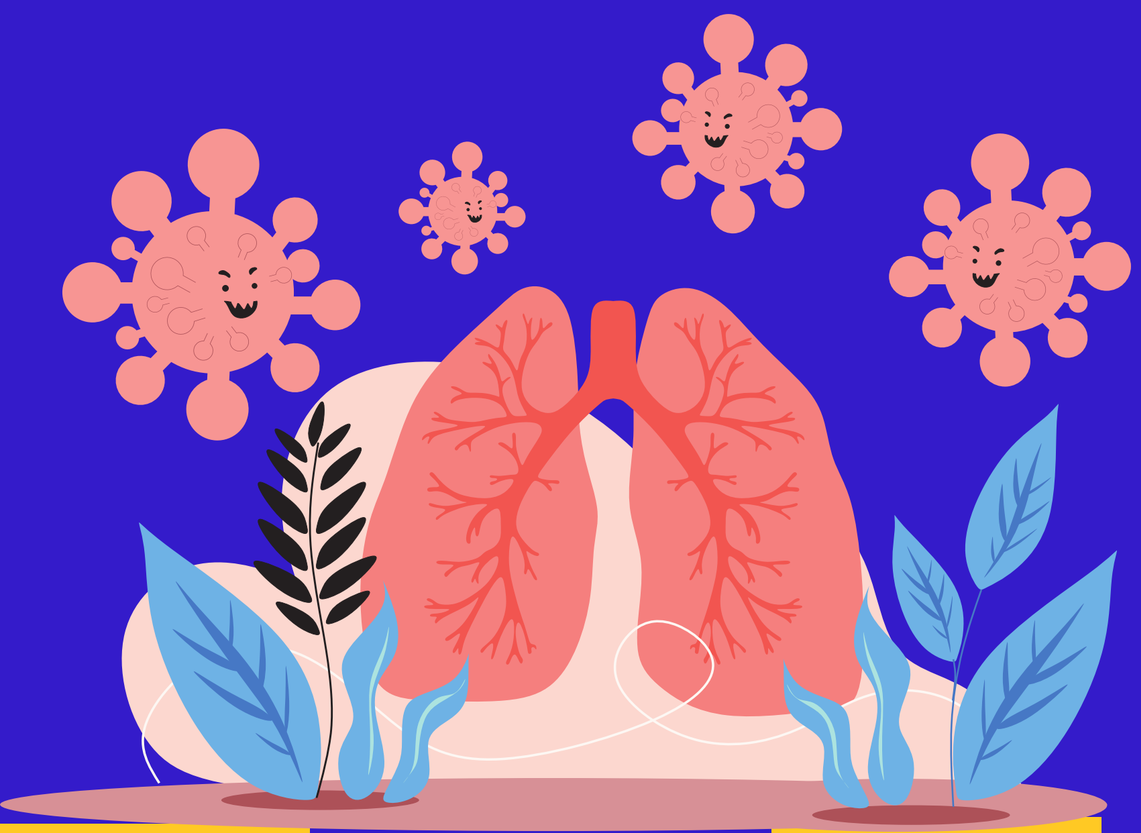
Pathogenesis of Pneumonia

Infectious material enters the lungs

Unable to clear or fight infection

=

PNEUMONIA



Are Lungs Sterile?

MUCUS

Catch and protect

CILIA

Mucociliary escalator

COUGH

To remove

MACROPHAGES

Seek and destroy

(Matthay et al., 2019, West, 2015)

Muciliary Transit

CILIA

Most of our respiratory system is lined with cilia (other than the alveoli). These are tiny hairs that mobilize foreign materials up and out (i.e., secretions, food, liquid, bacteria, dust, etc.)

MUCUS

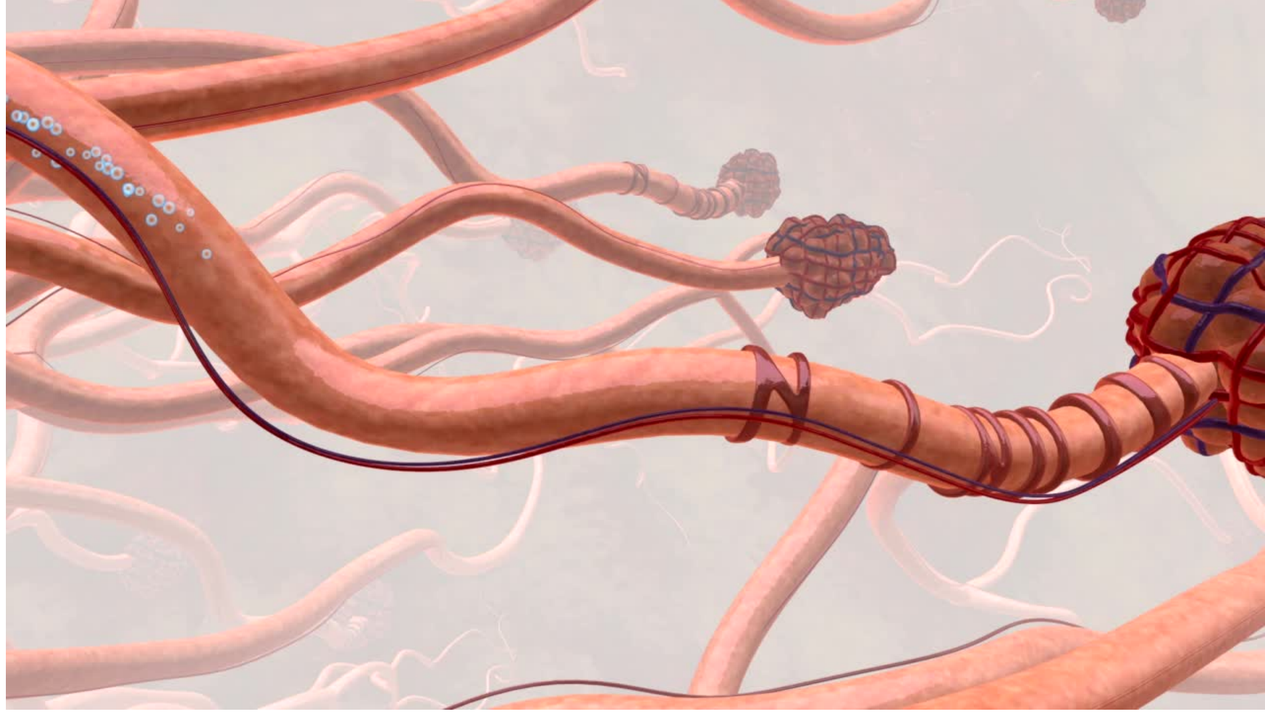
Mucus covers the cilia to catch those materials and to improve the mobility of the cilia so it can push the materials up to the throat

THE ESCALATOR

Once the foreign contents makes its way up the escalator and near or in the upper airway where they are either coughed out or swallowed

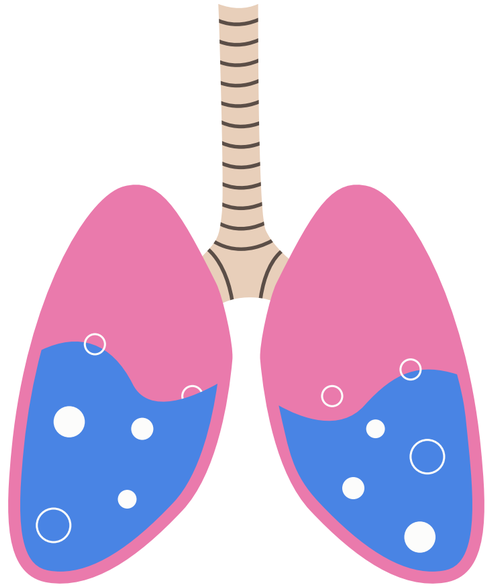
AQUAPORINS

The lungs can absorb particles and bring them into the bloodstream to be safely broken down by the body.



WHAT IS BEING ASPIRATED

We have to know more than simply *if* the patient is aspirating. We also have to know *what* they are aspirating.



DESCRIBE IT

Phase?
Acidity?
Volume?

(West, 2015)

Macrophages

FOR THOSE MATERIALS THAT ARE TOO LARGE OR TOO VISCOUS TO BE ABSORBED.

(West, 2015)

(Laursen et al., 2013;
U.S. Department of Health and
Human Services, 2022)

Diagnosis

RESPIRATORY CHANGES

Desaturation
Dyspnea and increased work of breathing
Supplemental oxygen needs

ABNORMAL IMAGING

Chest X-ray (CXR) (69% accurate)
CT scan of the chest

SIGNS OF INFECTION

Fever
Leukocytosis
Sputum culture
Bronchoscopy
Thoracentesis

Microbes

INFECTION

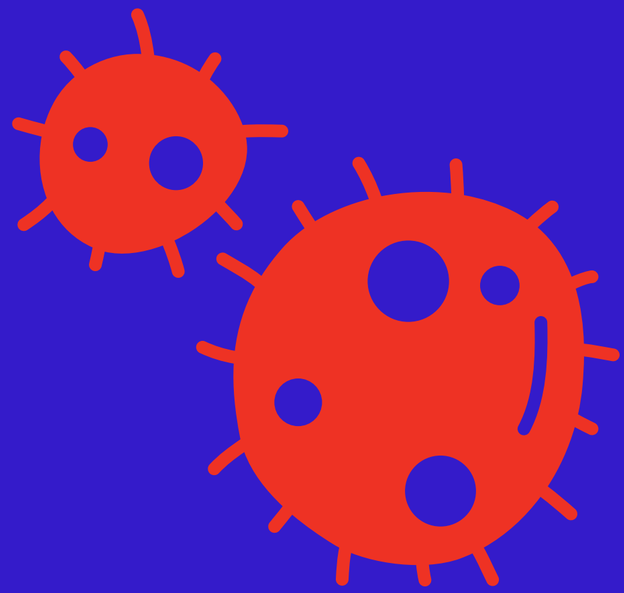
Not all microbes are created equal

WHAT IS IT AND WHERE DID IT COME FROM?

- Breathed in or aspirated
  - Virus
  - Bacteria
  - Fungi

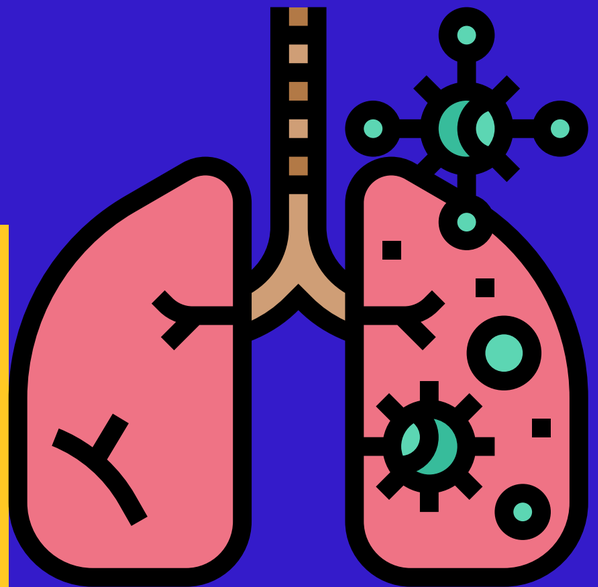
REPLICATION

Microbes love a party



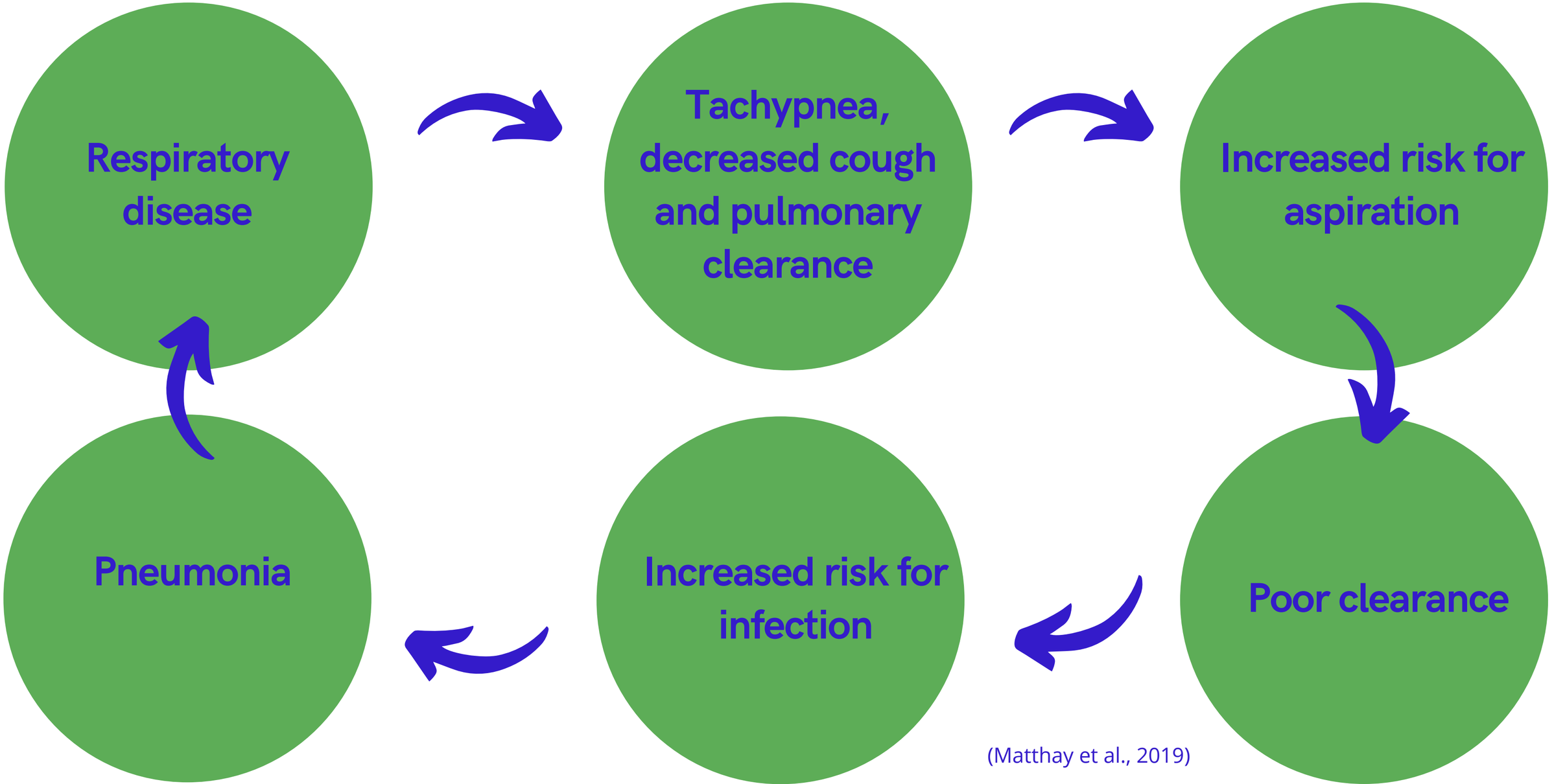
What happens to the lungs?

- Microbes replicating in the airways and spread to tissue
- Symptoms are not due solely to the microbe. It's also due to how the body responds to that microbe.
- Inflammatory immune response
  - White blood cells
  - Proteins
  - Fluid
  - Red blood cells (if a capillary is damaged)
- Underlining respiratory disease alters the ability to fight off and clear out potentially harmful pathogens



(Mandell, 2019)

Respiratory disease and AP



(Matthay et al., 2019)

Community

ACQUIRED

- The person acquired the infection in the community
- Most common
- Not as deadly
- Twice as likely to be viral vs bacterial

Hospital

ACQUIRED

- The person acquired the infection in the hospital
- Microbes may be resistant to common antibiotics
- Higher risk for aspiration
- Higher medical complexity with impaired pulmonary and immune system health
- More likely to be bacterial and aspiration-related

(Chalmers et al., 2011; Kalil et al., 2016; Ong, 2020; Sethi, 2022; Taylor, 2013)

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- The person acquired the infection in the hospital
- Microbes may be resistant to common antibiotics
- Higher risk for aspiration
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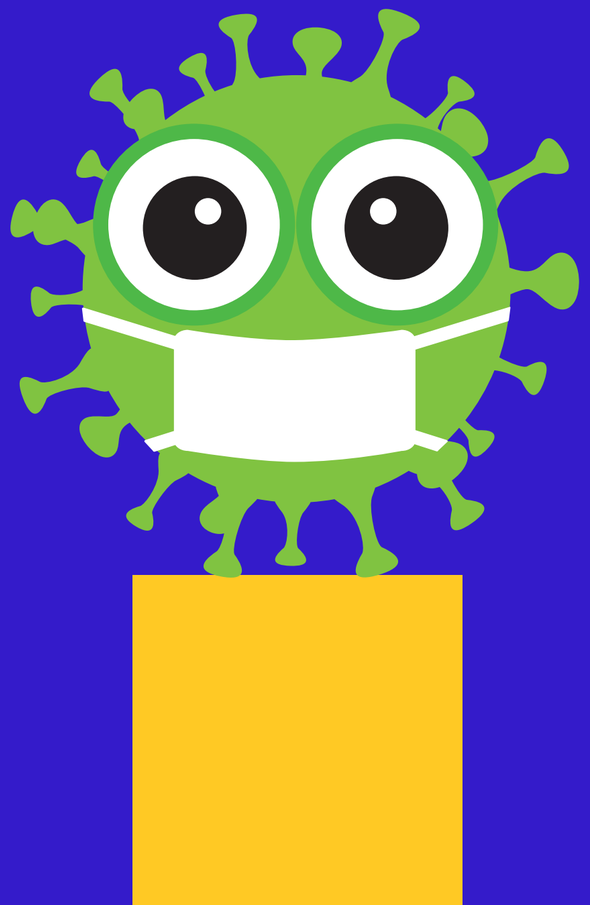
(Chalmers et al., 2011; Kalil et al., 2016; Ong, 2020; Sethi, 2022; Taylor, 2013)



Hospital bugs

Strong offense (virulent) and a strong defense (drug resistant)

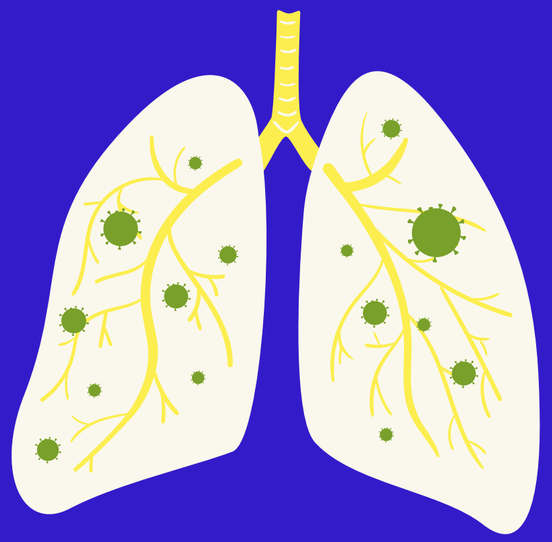
Swap genes to improve resistance and evolve quickly

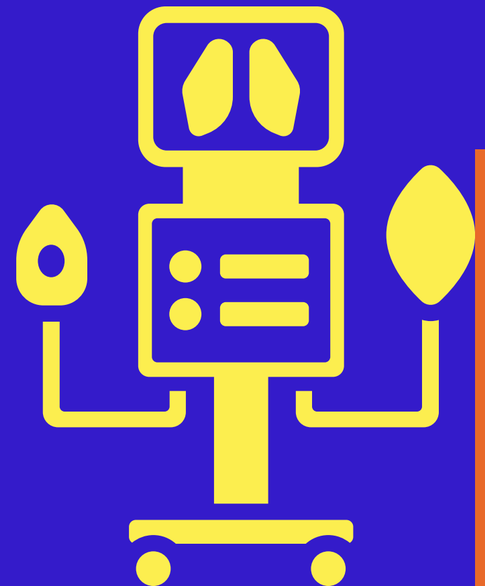
e.g., Methicillin-resistant Staphylococcus aureus (MRSA)

Ventilator-Associated Pneumonia (VAP)

PNEUMONIA ON THE VENT

- 48h after vent placement
- Bio-film may form on endotracheal tube
- Impaired cough (similar bacteria as found in the mouth)
- People on ventilators have many risk factors





(Chi et al., 2012; Koenig & Truwit, 2006; Mandell, 2019)

Aspiration Pneumonitis

Inflammation (typically without infection) resulting from the aspiration of acidic, sterile, contents (i.e. gastric contents, chemicals, medicine, etc.).

Restriction of the bronchioles, atelectasis, and edema. Indistinguishable from AP by imaging.

Be mindful of GI conditions that may increase the risk of reflux and/or vomiting.

May turn into pneumonia if antacids are used or if dysphagia is also present
(Dysphagia and GERD commonly co-occur).
*Bacterial pneumonia may occur in 25% of cases.

(Cho et al., 2015; Mandell, 2019; Sethi, 2022)

Jesus 47 YOM

Pt wakes up in the middle of the night gasping for air and two days later has dyspnea and cough. There are concerns of aspiration pneumonia given the chest x-ray and symptoms. You find out that there is a history of an esophageal stricture with worsening globus sensation upon your evaluation.

WHICH SIDE?

Right or left?

SPECIFIC LOBE

e.g. Right lower lobe pneumonia

INTERSTITIAL PNEUMONIA

Just outside the alveoli

BRONCHOPNEUMONIA

Throughout the lungs (bronchioles and alveoli)

Stages of Pneumonia

1. CONGESTION

- Days 1-2
- Alveoli and blood vessels fill up with fluid

2. RED HEPATIZATION

- Days 3-4
- Exudate fill the air space
- RBC, WBC, Proteins

3. GRAY HEPATIZATION

- Days 5-7
- RBC break down

RESOLUTION

- Day 8 - 3 weeks
- Exudate is processed by enzymes, macrophages, or coughed out

Symptoms

DIFFICULTY BREATHING

Dyspnea, increased work of breathing (WOB), tachypnea

CHEST PAIN

Due to the inflammation

PRODUCTIVE COUGH

Sputum or blood

ABNORMAL CXR

Or breath sounds

Treatment

ANTIBIOTICS

Depending on the type

COUGH SUPRESSANTS

Only enough to decrease the cough

PAIN MEDICATION

For comfort and sleep

RESPIRATORY

Manage the respiratory condition

(Mandell, 2019)

Aspiration pneumonia

Up to 70% mortality and 2.3-3x more deadly than other types of pneumonia

Carrying in Microbes with saliva, food, liquid, or vomit

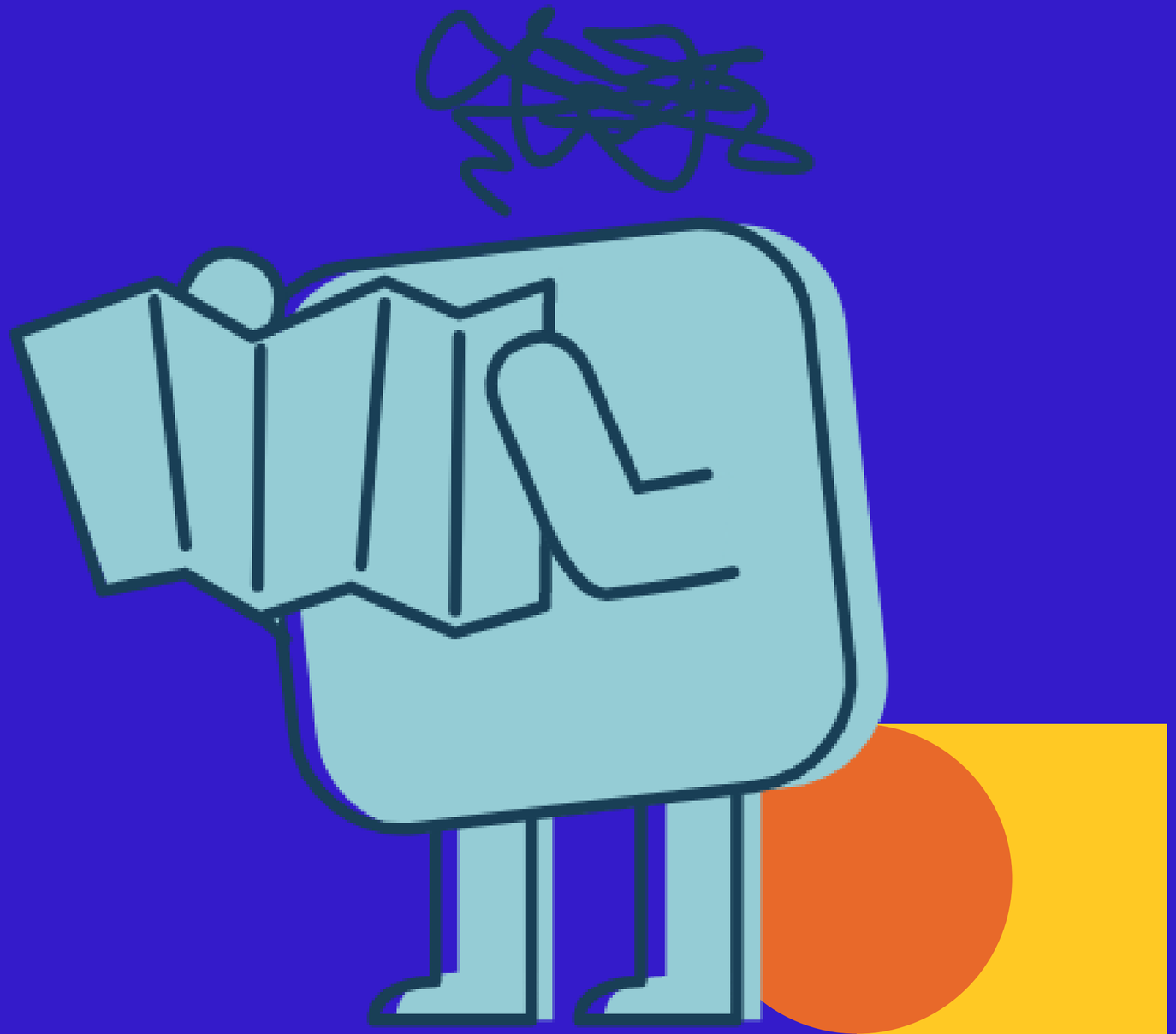
Healthy people aspirate, but rarely get pneumonia

(Mandell, 2019; Marik, 2001; Sanivarapu & Gibson, 2022)

Aspiration

Pneumonia

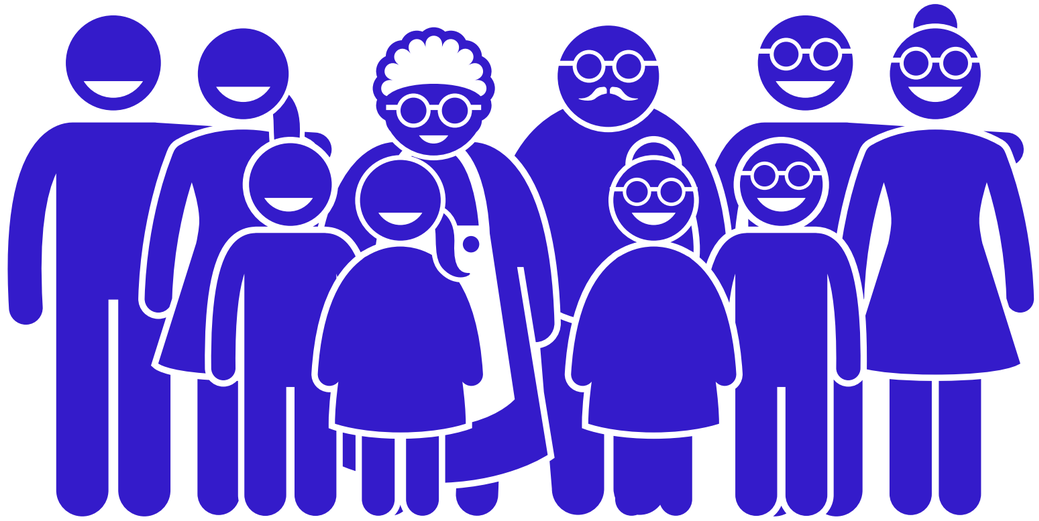
That simple?



Does aspiration cause aspiration pneumonia?

Confirmed aspiration on an instrumental study is not a significant risk factor for aspiration pneumonia by itself.

(Langmore, 1998)



Everyone Aspirates

Micro aspiration may occasionally occur in healthy individuals (even silently) and is common during sleep. What's more important is:

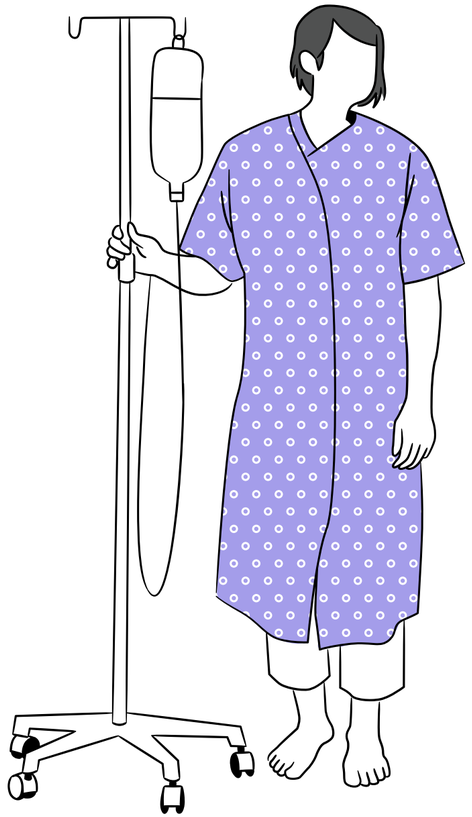
- How much is being aspirated?
- What is being aspirated?
- Who is doing the aspirating?

(Butler et al., 2017; Coyle & Matthew, 2010; Mandell, 2019)

Diagnosing AP

As an SLP, you are charged with helping differentiate a diagnosis of pneumonia by confirming or ruling out certain factors (i.e. dysphagia severity and type).

If a diagnosis is incorrect, we are missing the cause of the condition. If we miss the cause, we miss an opportunity to protect the patient from acquiring the condition again.



AP Diagnosis

PNEUMONIA

All the same criteria mentioned for a general pneumonia diagnosis will apply.

Sputum sample via bronchoscopy may show bacteria originated from the oral cavity: pneumococcus, Haemophilus influenzae, staphylococcus aureus, and anaerobes.

ABNORMAL IMAGING

Generally in the gravity dependent areas of the lung
(Think about positioning).

Typically not symmetrical bilaterally.

PRESENCE OF DYSPHAGIA

This seems obvious, but may not always be the case in, say, non-dysphaiga-related aspiration pneumonia.

(Mandell, 2019; Sethi, 2022; The Japanese Respiratory Society, 2009)

(Laursen et al., 2013;
U.S. Department of Health and
Human Services, 2022)

General Diagnosis

RESPIRATORY CHANGES

Desaturation
Dyspnea and increased work of breathing
Supplemental oxygen needs

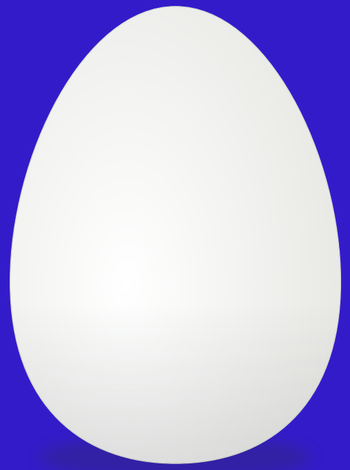
ABNORMAL IMAGING

Chest X-ray (CXR) (69% accurate)
CT scan of the chest

SIGNS OF INFECTION

Fever
Leukocytosis
Sputum culture
Bronchoscopy
Thoracentesis

The patient aspirates and pneumonia occurs from an acute, subacute, or chronic dysphagia.



The patient gets pneumonia and aspiration occurs from deconditioning and reduced functional reserve. This may be from an acute, **reversible** condition after weakness, lethargy, delirium, and bed-bound status.

(Coyle & Matthews, 2010)
A Dilemma in Dysphagia Management:
Is Aspiration Pneumonia the Chicken or the Egg?

Dysphagia-related AP

Dysphagia
Infection
Oral bacteria

Non-dysphagia-related AP

Aspiration pneumonitis vs AP
VAP vs AP
Temporarily altered mentation

AMANI 34 YOF S/P ETOH WITHDRAWAL

Temporary nausea/vomiting and altered mentation with bacteremia/sepsis and seizures.

Right, lower lobe opacity on CXR.

Dysphagia-related aspiration pneumonia?

(Mandell, 2019)

FRANCISCO 79 YOM ON VENT

History of "aspiration pneumonia"

You're concerned about beginning PO trials after pt is successfully extubated.
What's the risk?

Gertrude 82 YOF admitted with pneumonia

Pt remains confused and variably responsive and begins to cough on all PO trials.

Who gets aspiration pna?

LIKELINESS INCREASES WITH GROSS ASPIRATION (OFTEN SILENT)

Drug overdose, impaired consciousness, neurological disease, head and neck CA, GI abnormalities, and respiratory compromise.

Patients with advanced age are at a particularly high risk given a 10-33% incidence of dysphagia at baseline and higher susceptibility to medical complexity, severe illness, and infection.

(Kollmeier & Keenaghan, 2022; Mandell, 2019; Thiyagalingam, 2021)

AP is a continuum

AP OVERLAPS WITH OTHER PNAS

In other types of pneumonia, aspiration may play a part or be the sole cause of the infection.

Oropharyngeal dysphagia increases odds of pneumonia by 11.9x in the elderly and found in 70% of elderly patients with pneumonia.

(Mandell, 2019)

Where can you find AP?

COMMUNITY-ACQUIRED

5-15%

(Mandell, 2019)

HOSPITAL-ACQUIRED

1.5-50.4%

(Komiya et al., 2016)

NURSING HOME-ACQUIRED

18%

(Sanivarapu & Gibson, 2022)

VENTILATOR-ASSOCIATED

Over 90%

(Akbiyik et al., 2021)

(Langmore, 1998)

NURSING HOME

44%

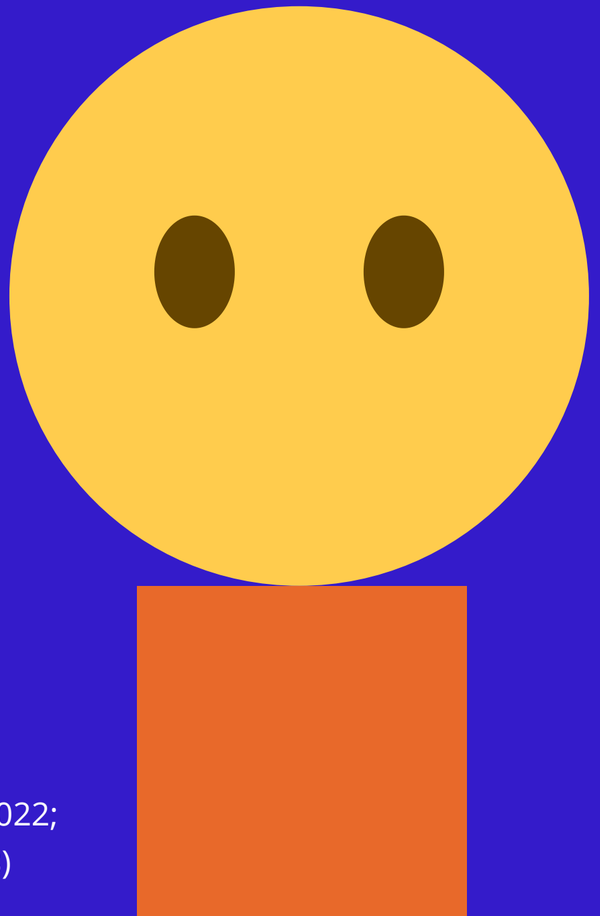
INPATIENT

19%

OUTPATIENT

9%

Silent aspiration



Most episodes of AP are silent or unwitnessed.

There is a high incidence of silent aspiration in patients with community-acquired pneumonia.

Patients who are older and/or deconditioned are more likely to aspirate at night and more likely to have unwitnessed and/or silent aspiration.

(Sanivarapu & Gibson, 2022; Teramoto et al., 2008)

Right lower lobe

IS IT SIGNIFICANT?

Yes and no. The right mainstem bronchus is more vertically angled making it more likely that an aspiration event will slide down to the right side. "However, based on the patient's position at the time of aspiration, any lobe may be affected, or all of them given a sufficiently large volume"

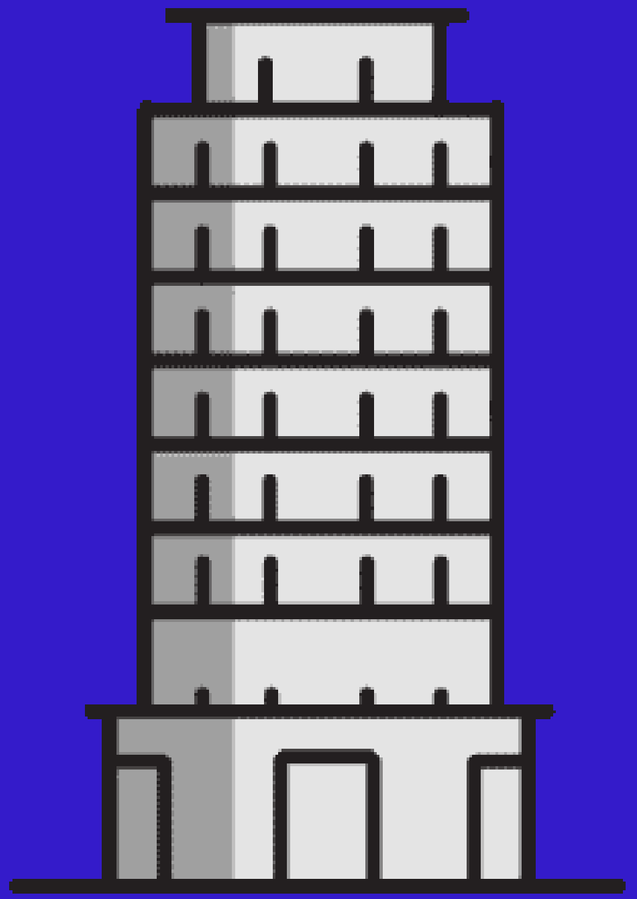
Large volume? 1 oz or more. Chronic, trace, aspiration should also be a concern.

Be mindful of your patient's positioning.

(Kollmeier & Keenaghan, 2022; Mandell, 2019)

HECTOR 76 YOM: RIGHT CVA

Patient appears to be coughing at bedside with PO intake, but the CXR reads left, lower lobe infiltrate. Medical team was expecting right sided involvement, but YOU know that the patient had a right hemisphere CVA and tends to be left leaning.



NPO Status

IS IT HELPFUL?

We certainly don't want our patients aspirating gross amounts when their condition is acute and temporary. In these cases, NPO may be warranted. However...

- NPO will NOT prevent aspiration
- Tube feeding will NOT prevent aspiration
- Life saving medications may be needed

(Coyle & Matthew, 2010; Finucane & Bynum, 1996; Mandell, 2019; Sampson, 2009)

DEREK 89 YOM WITH DEMENTIA

Complex medical history including late stage dementia. Bed-bound and very poor oral intake. Enjoys ice cream and pudding, but confirmed aspiration on all consistencies.

In patients with advanced dementia, feeding tubes DO NOT extend life, prevent aspiration pneumonia, prevent malnutrition, improve pressure injuries, provide comfort, or improve overall function.

Instead they may INCREASE issues with tube complications, discomfort, and restraints.

(Sampson et al., 2009)

When do symptoms occur?

Patients typically show clinical features within a few hours or a few days after the aspiration event.

Often times there is no aspiration event in the case of silent aspiration or unwitnessed aspiration and further investigation is warranted.

(Mandell, 2019)

Questions to Ask

- What is the patient's baseline?
- What was the initial pneumonia diagnosis?
- Are all criteria for a pneumonia diagnosis met?
- What risk factors for AP are present?
- Is there dysphagia? What's the cause?
- What are the signs/symptoms?
- How long have the symptoms been occurring?
- Is this from an acute, subacute or long term illness?
- Was the patient recently on a vent?
- Is this a recurring diagnosis of pneumonia?
- Was there a reflux/vomiting episode?
- Do we have access to an instrumental study?

Risk Factors

Pulmonary clearance/ Immune response

Volume & frequency of aspiration

Increased likelihood of pneumonia

Micro-biologic contents of aspirate

(De jager, 2012; Langmore, 1998; Lo, 2019; Manabe, 2015; Terpenning, 2001)

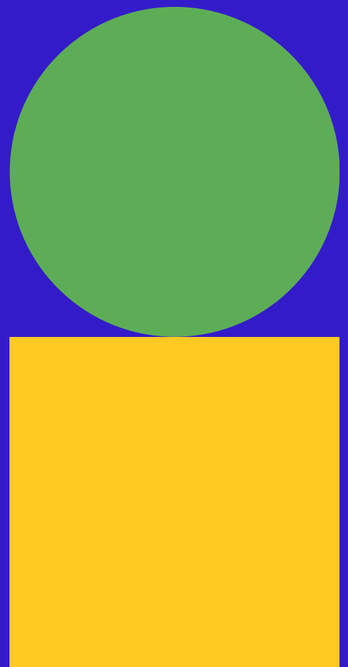
Volume & Frequency

Anterograde

- Aspiration of secretions
- Aspiration or pharyngeal residue on VFSS
- Need for suction
- Reduced laryngeal sensation
- Hx CVA
- Lethargic
- Tube feeding
- Dependent for feeding

Retrograde
- GERD
- Tube feeding
- Peptic ulcer disease

(Kaneoka, 2017; Langmore, 1998; Manabe, 2015; Miyata, 2017; Terpenning, 2001)



Bacteriologic Contents

Anterograde

- Oral hygiene (including dry mouth)
- Dependent for oral care
- Regular professional dental care
- Status of natural dentition
- Diabetes

(Langmore, 1998; Terpenning, 2001; Terpenning, 2005)

Retrograde

- Acid Suppression Therapy
  - PPI
  - H2 Blockers

(De Jager, 2010; Laheji, 2004)

(De Jager, 2012; Langmore, 1998; Lo, 2019; Manabe, 2015; Terpenning, 2001)

Pulmonary Clearance

MEDICAL CONDITIONS

- COPD
- CHF
- Asthma

REDUCED FUNCTION

A reduction in functional mobility as well as an increased dependence on activities of daily living

PULMONARY HEALTH

- History of smoking
- Need for supplemental O2
- Need for inhaled medications

Immune Response

CAN THE BODY FIGHT OFF
AN IMPENDING INFECTION?

Nutritional Status

Presence of other infections

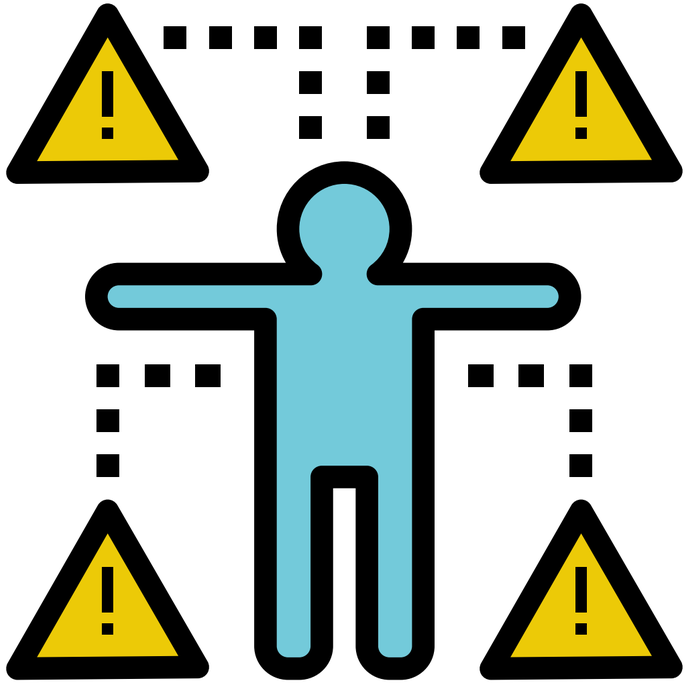
Comorbidities

(Langmore, 1998; Lo, 2019; Manabe, 2015; Miyata, 2017; Terpenning, 2001)

What's the Risk?

Looking at one risk factor will not tell you the overall risk.

We need a comprehensive approach examining and managing multiple risk factors together.



(Santos et al., 2021; Steele et al., 2011)

ASPIRATION

- Cognitive deficits
- Dysphagia
- GI complications (PPI)
- Will require feeder
- Tube feeding
- Poor oral health/Xerostomia
- Requires suctioning
- Poor positioning
- Meds impacting alertness

CLEARANCE

- Weak cough
- Supplemental O2
- Mechanical ventilation
- Pulmonary disease

IMMUNE RESPONSE

- Medically compromised
- Weakness/decreased mobility/dependence
- Age
- Polypharmacy (5 or more)
- Nutrition risk
- Current infection

(Feinberg et al., 1996; Fukuba et al., 2020; Herzig et al., 2009; Kaneoka et al., 2017; Kollmeier & Keenaghan, 2022; Laheij, 2004; Langmore, et al., 1998; Langmore et al., 2002; Leder et al., 2013; Manabe et al., 2015; Marik, 2001; Nativ-Zeltzer et al., 2021; Palmer & Padilla, 2021; Taylor et al., 2013)

ASPIRATION

- Cognitive deficits
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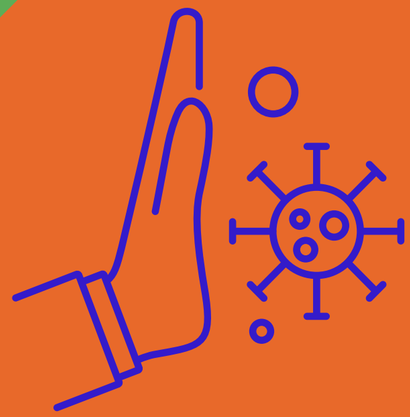
- Poor positioning

CLEARANCE

- Weak cough
- Supplemental O2
- Pulmonary disease



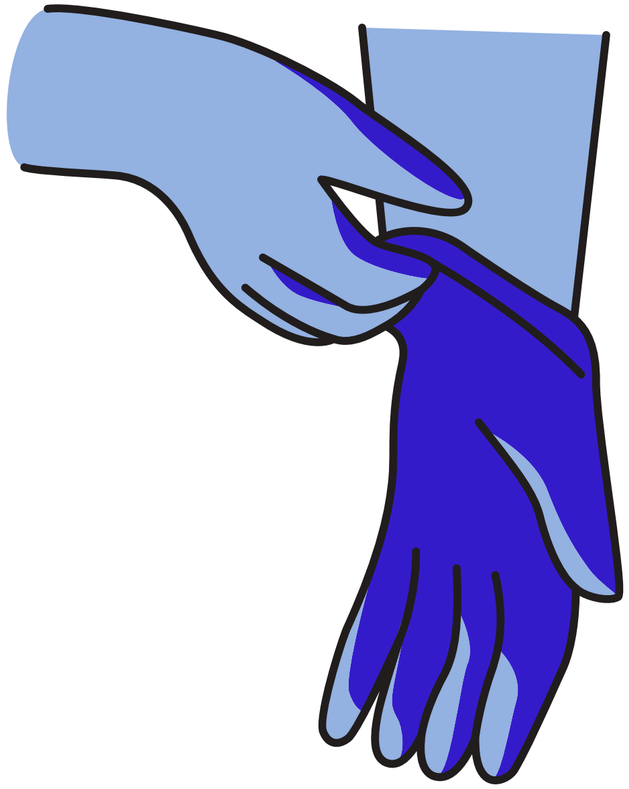
IMMUNE RESPONSE

- ~~Medically compromised~~
- Weakness/decreased mobility
- ~~Age~~
- Polypharmacy (5 or more)
- Nutrition risk
- Current infection

Quick Recap

Aspiration Pneumonia

- Aspiration ≠ Pneumonia
- Aspiration pneumonia is more likely to impact older, more fragile patients
- Understanding the diagnosis is the first step towards finding the right solution.



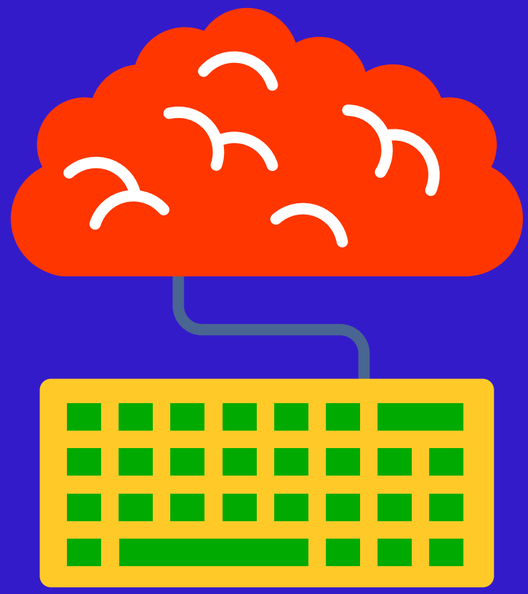
The Solution

Make Better Decisions

Change your mind

System 1

AUTOMATIC



System 2

CALCULATED

(Kahneman, 2013)

GOOD DECISIONS AND TRUSTED INTUITION

EXPERIENCE

How much experience do you have making this kind of decision?

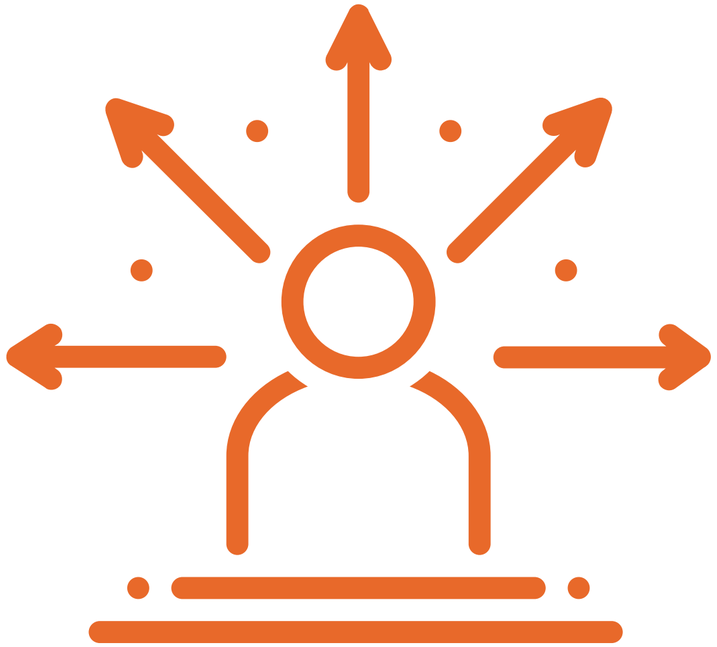
FEEDBACK

Can you receive accurate and timely feedback on the outcome of your decision?

HUMILITY

Do you have the humility to know your limitations and adjust as needed?

(Kahneman, 2013; Sibony, 2020; Tetlock & Gardner, 2016)



Decision Making Process

Makes the way we make decisions more transparent
for ourselves (and others) to critique and improve

Decision Making

IN 6 STEPS

1

Identify the Problem

What questions are you trying to answer?
Gather info, hypothesize, test, reflect and make a diagnosis.

2

Identify the Factors

What are the research-based risk factors?
What are the patient factors? (e.g. preferences, goals, etc.).

3

Assess the Factors

Learn as much as you can about each factor and discuss with the team (Including the patient!)
Be objective.

4

Generate an Approach

What will have the best chance to help the patient reach their goal based on the factors?
Weigh the pros/cons.

5

Consider Alternatives

What didn't you choose and why?
Can you combine approaches?
Is doing nothing an option?

6

Adjust as Needed

Don't get too attached to your plan.
Use new information to adjust course and stay on target.

1 Identify The Problem

DATA GATHERING

Initial chart review, interviews, and CSE

HYPOTHESIS GENERATION

Avoid bias

HYPOTHESIS TESTING

FEES, MBSS, standardized measurements

DIAGNOSIS

Lead us to a good vs accurate decision

2 Identify The Factors

Risk factors

Medical stability
Risk for aspiration of harmful contents
Pulmonary clearance
Immune response

Patient factors

Preferences, goals, and expectations
Risk tolerance

3

Assess The Factors

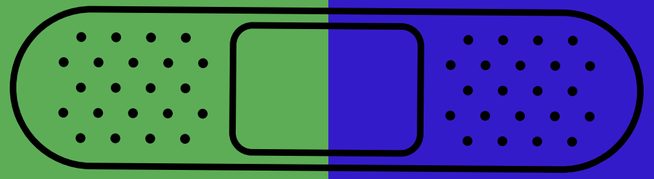
Risk (1-5)

Medical stability
Risk for aspiration of harmful contents
Pulmonary clearance
Immune response

Patient (1-10)

Preferences, goals, and expectations
Risk tolerance

4 Generate an Approach



Costs (1-10)

- Increased risk for aspiration pneumonia?
- Increased risk for cardiopulmonary decline?

Benefits (1-5)

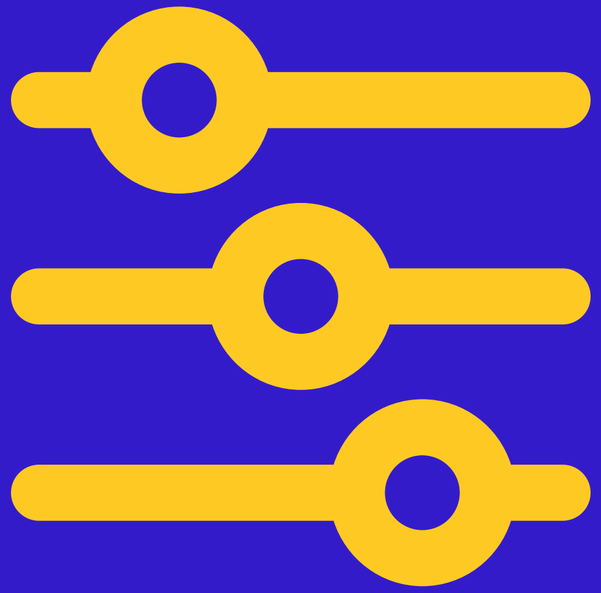
- Quality of life
- Improved secretion management
- Improved oral health
- Pharyngeal strengthening

5 Alternatives

DON'T LEAVE ANY STONE UNTURNED

People typically get stuck on one intervention, but there can be an endless combination of potential options.

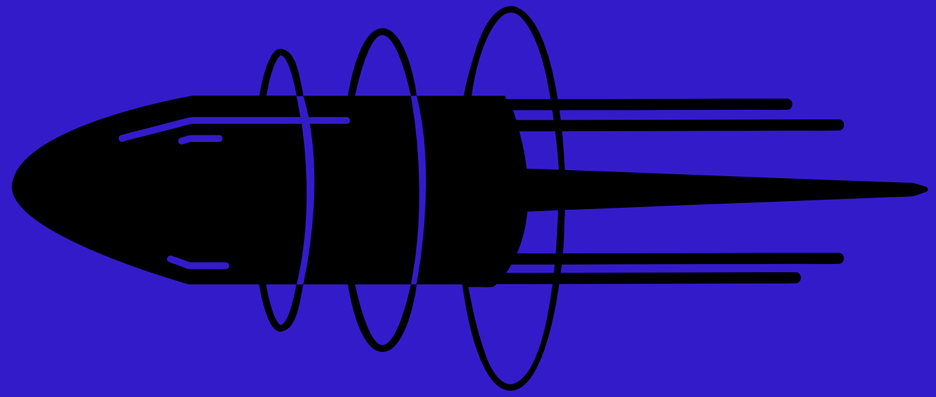
6 Adjust



CHANGE COURSE AS NEEDED

Use new information to stay on target.

Try, fail, analyze, adjust, try again.

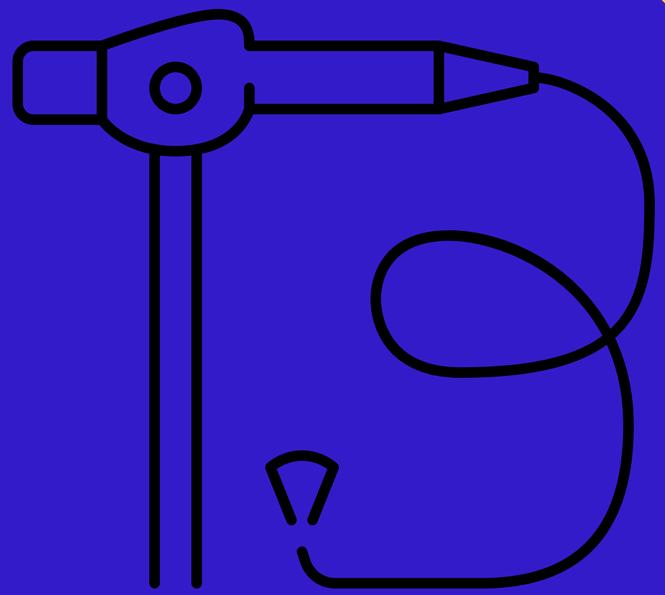


(Parrish, 2023)

Assessment

Understanding the problem

Instrumental study



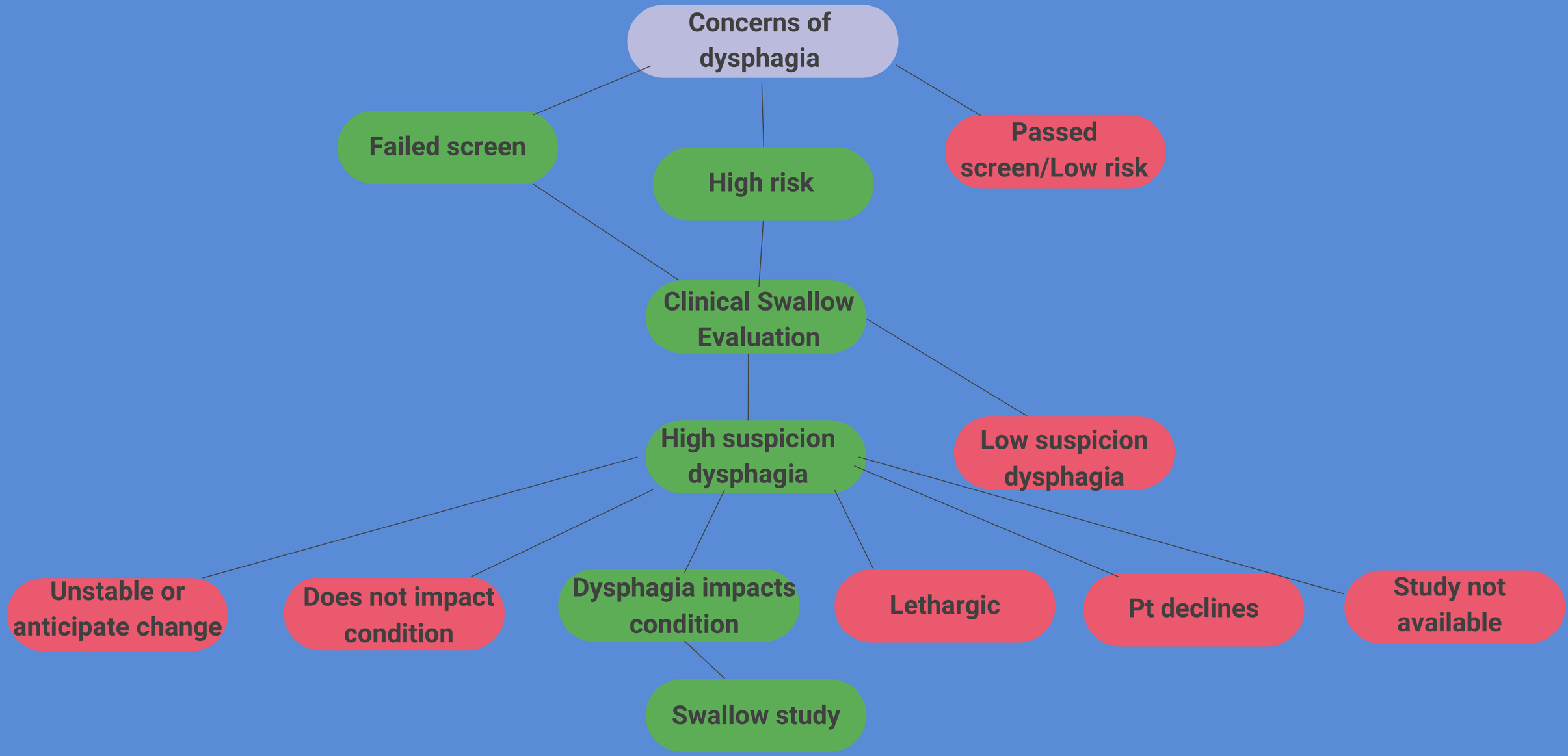
MBSS OR FEES

Direct imaging of the anatomy and physiology is the best way to evaluate a patient's risk of aspirating.

But remember, aspiration is not a significant, independent risk factor for aspiration pneumonia.

(Langmore, 1998)

When should I recommend an instrumental study?



Clinical Evaluation

WHAT IF I DON'T HAVE ACCESS TO AN INSTRUMENTAL STUDY?

Being conservative and making a patient NPO might be the way to go if you can do an swallow study in the next 24 hours, but what if this isn't a reality for you?

One of the best indicators of aspiration is a cough or throat clear after the swallow. Consider a comprehensive clinical evaluation with a 3 oz, consecutive water swallow test to assess risk.

(O'Horo et al., 2015; Suiter & Leder, 2008)

CRANIAL NERVE ASSESSMENT

Lingual range of motion

(Leder et al., 2013

ABNORMAL VOCAL QUALITY

Dual axis accelerometry
(Moss et al., 2020; O'Horo et al., 2015)

COGNITION

Orientation and direction following

(Leder et al., 2009)

SECRETION MANAGEMENT

Swallow frequency (.98 vs .21)
and oral pooling

(Brady et al., 2016; Bulmer et al., 2021;
Langmore, 1998; Murray et al., 1996)

Flying blind

Knowing what we know is great.
So is knowing what we DON'T know.
What CAN'T we see at bedside?

- Pharyngeal dysphagia (O'Horo et al., 2015)
- Oropharyngeal physiology and timeliness
- Hyolaryngeal elevation/excursion (Brates et al., 2019; Davidson et al., 2020)
- Aspiration with signs, symptoms, or use of a pulse oximeter

  (Britton et al., 2018; O'Horo et al., 2015)
- Tolerance of thickened liquids (Miles et al., 2018)
- Determining wet vocal quality

  (Oonuma et al., 2022; dos Santos et al., 2022; Groves-Wright & Kelchner, 2010)

Interview the patient

- Complaints (dysphagia, odynophagia, globus sensation, etc.)
- Self assessment: How does this impact their life?
- Consider a questionnaire for diagnosis, severity, monitoring outcomes, and improving decision making
- Limited in projecting specific outcomes (Zhang et al., 2022)

MARIE 88 YOF ADMITTED WITH WEIEGHT LOSS

Clinical swallow evaluation showed no issues.

In-depth interview revealed globus sensation below the thyroid cartilage.

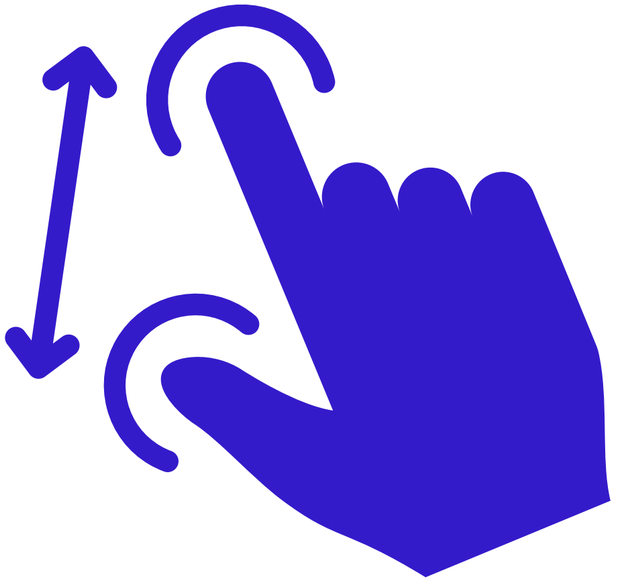
Referral to GI found achalasia signficantly improved with LES stretching.

SYDNEY SWALLOW QUESTIONNAIRE (SSQ)

MD ANDERSON DYSPHAGIA INVENTORY (MDADI)

EATING ASSESSMENT TOOL (EAT-10)

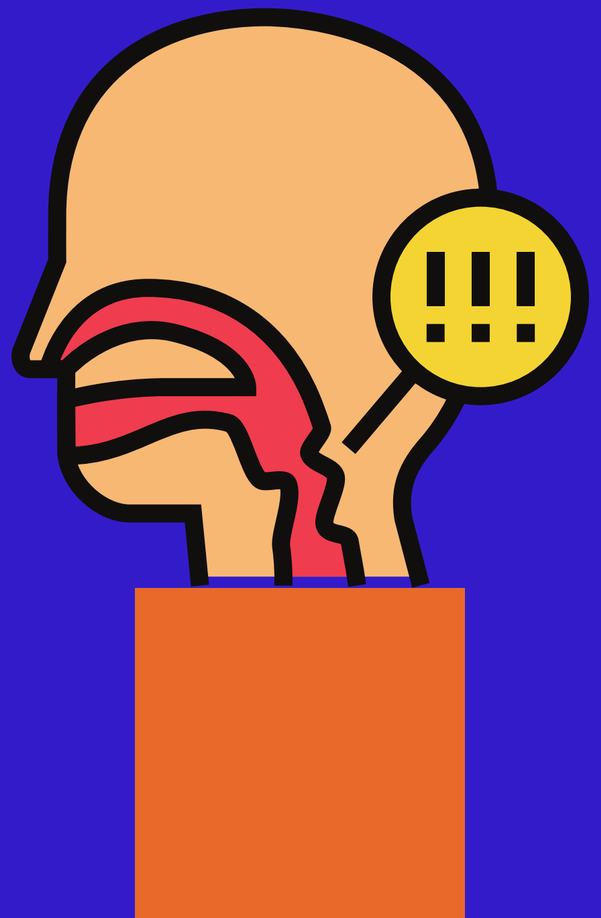
SWALLOWING QUALITY OF LIFE QUESTIONNAIRE (SWAL-QOL)



Zoom Out

Don't get caught stuck on any one risk factor. A comprehensive assessment of all relevant risk factors should be considered together with the interdisciplinary team (IDT) in order to take in the full picture. The more information you get, the clearer the picture.

(Steele et al., 2011)



Where does dysphagia fit?

Use the IDT to fill in your gaps in the knowledge and help them fill in their gaps. It's not only about if there is dysphagia or even what the severity is, but is more about what the dysphagia means for the patient. Some things to consider:

- Etiology
- Prognosis
- Comfort, pleasure, and quality of life

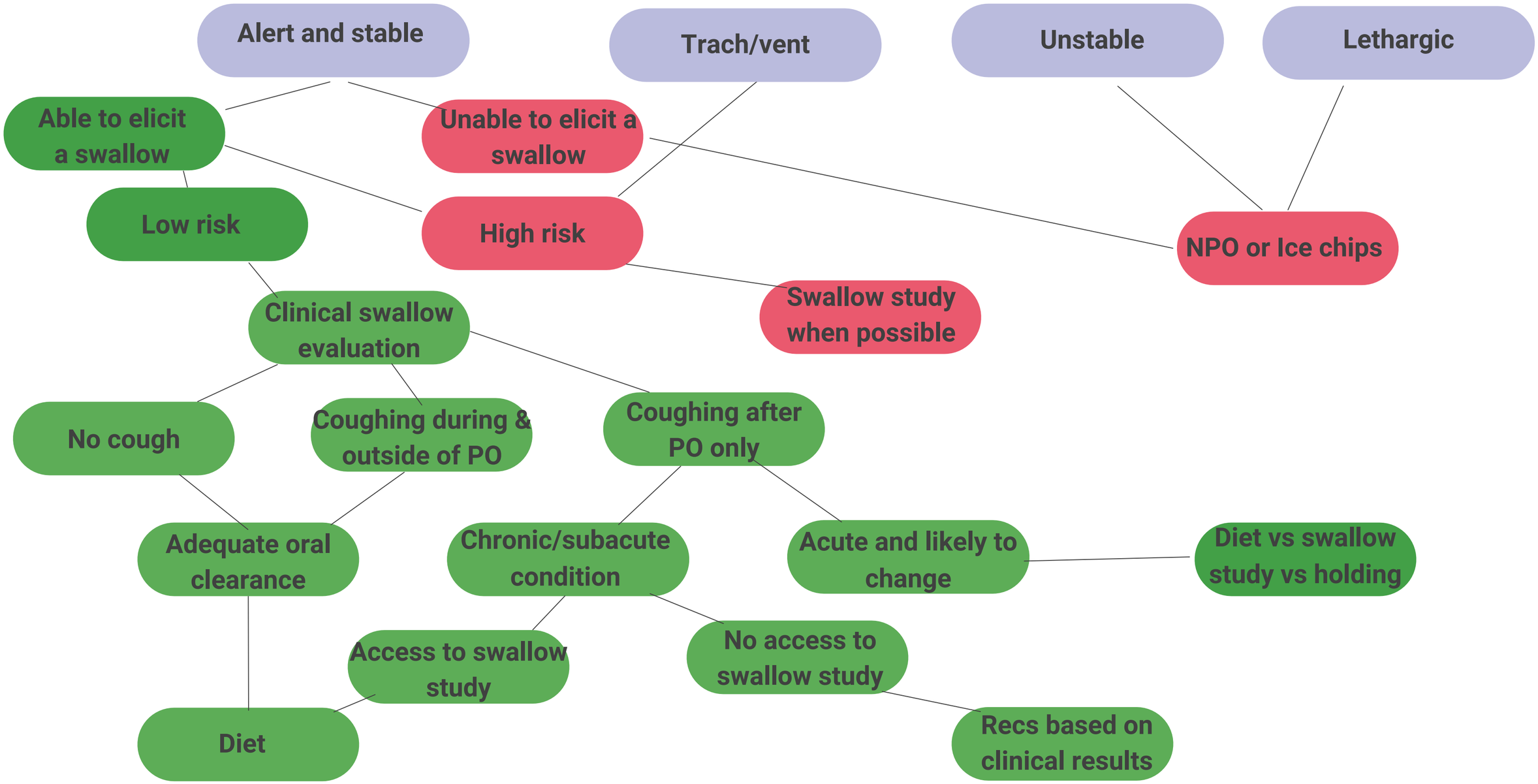
ALIDA 92 YOF COUGHING ON LIQUIDS

Patient reports that she has been coughing on liquids for as long as she can remember. Family confirms at least 10 years.

FEES reveals trace, aspiration with thin on 1/6 trials increased with larger volumes.

No history of pneumonia and declining thickened liquids.

What should I recommend at bedside?



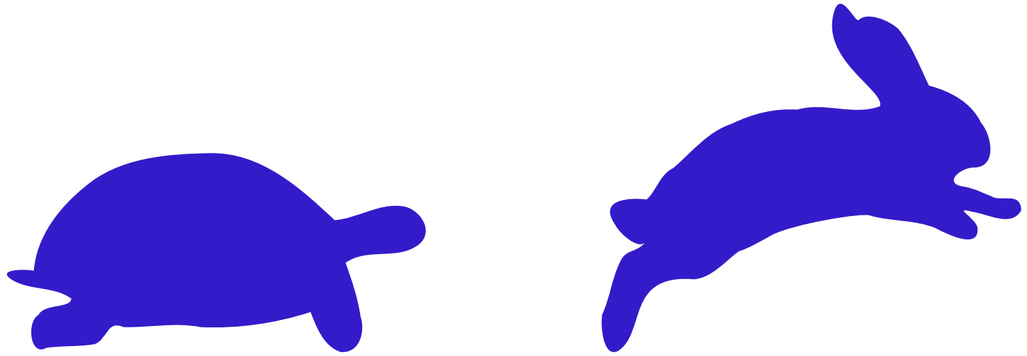
Interventions

How can we help?

Managing risk

- Determine what can realistically be managed
- Every decision carries risk. Figure out how it can be mitigated
- What is most meaningful to the patient?
- Always use the team to weigh all factors

(Kao & Couzin, 2014)



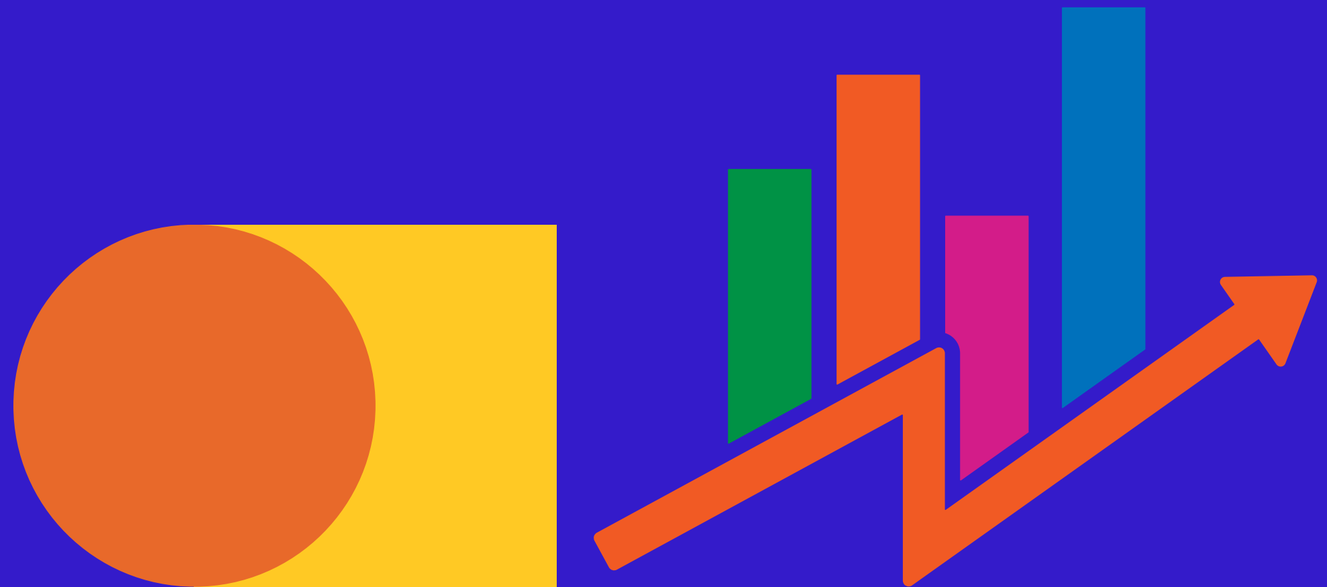
Slow and steady

With high risk, we want to ooch forward.

A conservative approach allows us time to continue to assess for stability.

Tracking the trends

The best way to tell the path of your patient's trajectory is by tracking the data. Knowing how the patient is doing in key criteria will help you determine where they are, how they've been, and in which direction they're heading.



(Laursen et al., 2013;
U.S. Department of Health and
Human Services, 2022)

Diagnosis

RESPIRATORY CHANGES

Desaturation
Dyspnea and increased work of breathing
Supplemental oxygen needs

ABNORMAL IMAGING

CXR (69% accurate)
CT scan of the chest

SIGNS OF INFECTION

Fever
Leukocytosis
Sputum culture
Bronchoscopy
Thoracentesis

Medical stability

VITALS

Are their vital signs stable?

- Temperature
- Blood pressure
- Heart rate
- Respiratory rate
- Pain

TRAJECTORY

Is the patient getting better, worse, or staying the same?

VARIABILITY

Is your patient's status changing daily?

MEDICAL COMPLEXITY

To know where we are going we have to know where we've been.

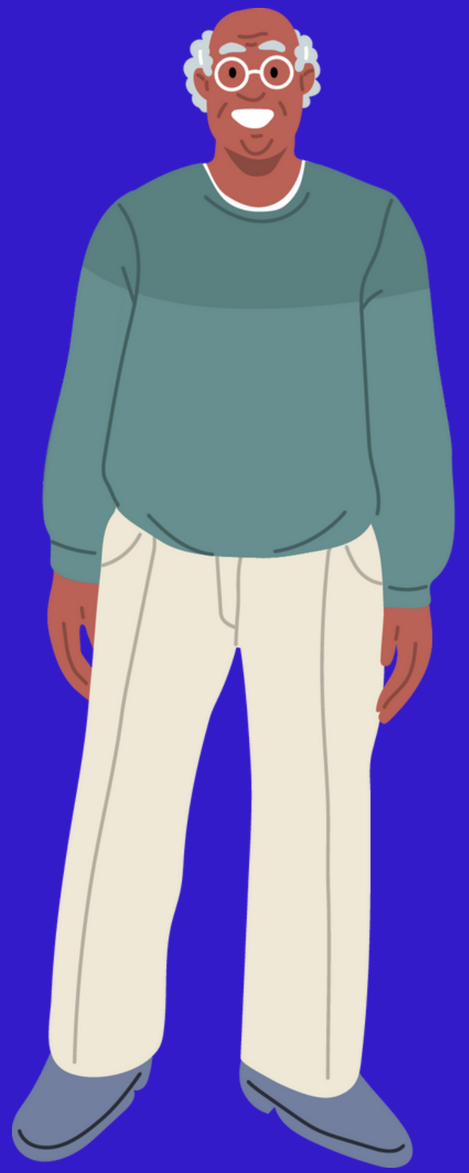
What's the medical history and baseline status?

KEVIN 63 YOM ON HIGH-FLOW NASAL CANNULA

Instrumental study shows deep penetration of thin liquids with concerns of inhalation after the swallow given tachypnea worsening throughout meals.

Trained on compensatory strategies: Supraglottic swallow. Began with ice chips then water then pleasure puree with mildly thick liquids then gradually advanced to soft and then regular/thin all while tracking the patients trends in lab work, imaging, and vitals.

Observe changes? Discuss with the team, reassess, and adjust as needed.

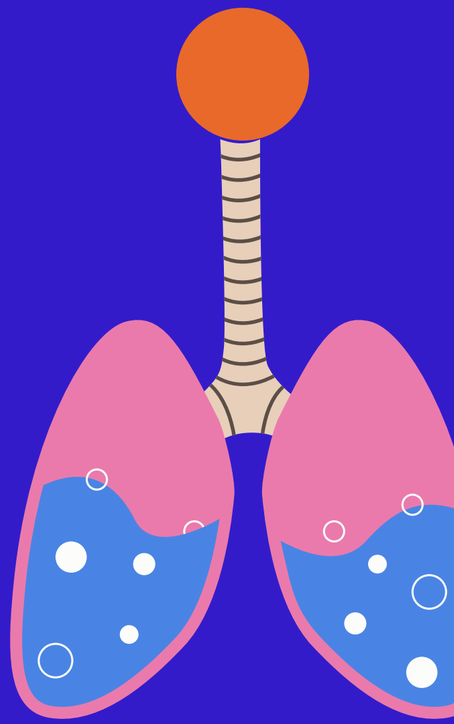


Start with water

- Neutral pH
- Cannot obstruct airway
- Aquaporins
- We are mostly water!

Water may help with:

- Hydration
- Secretion management
- Quality of life
- Compliance



It's considered low risk for mobile patients with good oral care and intact cognition.

Bronson-Lowe et al., 2008; Carlaw et al., 2012; Gillman et al., 2017; Panther, 2005; Pearson & Hutton, 2002; West, 2015)

Water Protocol

MOBILE

Patients who can engage in at least 3h of therapy are at lower risk

INTACT COGNITION

Or have adequate assistance to follow guidelines

ADEQUATE ORAL HEALTH

At least 3x/day with oral moisurizer

TIMING

Before and at least 30 min after meals

Disclaimer: Water protocols are not well-researched in high-risk patient populations

Bronson-Lowe et al., 2008; Carlaw et al., 2012; Gillman et al., 2017; Panther, 2005; Pearson & Hutton, 2002; West, 2015)

Ice Ice Baby

MANAGING SECRETIONS

SMALL, COMPACT, AND EASY TO MANIPULATE

STIMULATES THE NEURORECEPTORS AND FACILITATES OROPHARYNGEAL MOBILITY

COMFORT, PLEASURE, AND QUALITY OF LIFE

(Panther, 2005; Pisegna & Langmore, 2018)

Ice Chip Protocol

Uses the same theory as the water protocol.

Consider for patients who are bedbound with higher risk.

Must be alert with upright posture.

Protocol: 3 ice chip trials assessed via FEES

9/9 NPO patients showed no adverse reactions and 7 showed improved secretion management.

(Pisegna & Langmore, 2018)

(Pisegna & Langmore, 2018)

GOOD

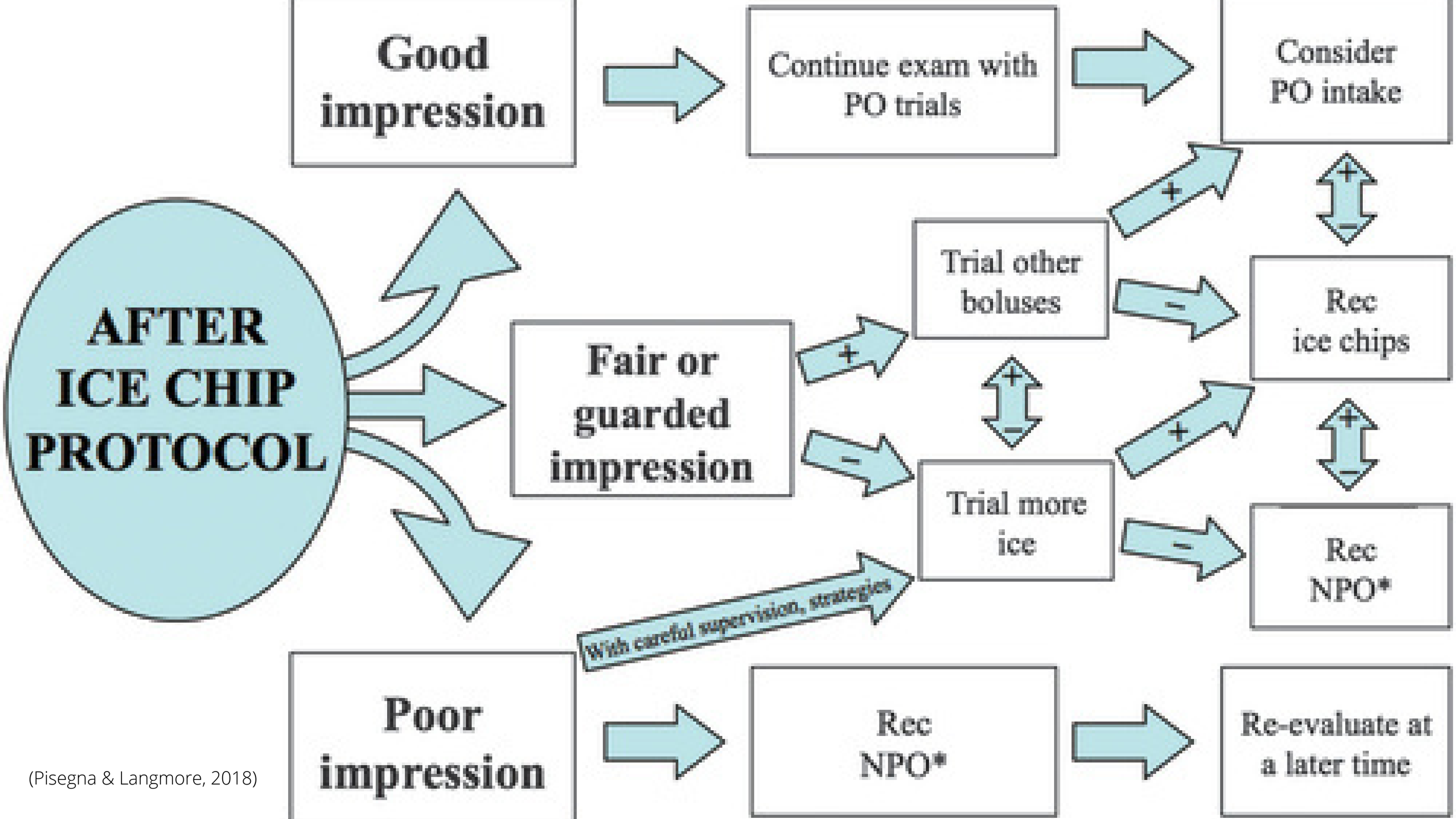
- Complete or adequate oral control and manipulation
- No lengthy spillage anteriorly/posteriorly
- Quick and timely initiation of the swallow
- If aspiration occurred, a spontaneous cough/throat clear was successful at clearing the aspirate
- Secretions reduced, if they were present
- The patient became more awake and alert

FAIR

- Reduced oral control
- Mild to moderate spillage anteriorly/posteriorly
- Delayed initiation of the swallow
- If aspiration occurs, a spontaneous or cued cough/throat clear is inconsistently successful
- Same or reduced secretions and/or secretions are mobilized to be suctioned, coughed up, or swallowed
- Each trial of ice chips seemed slightly better than the prior

POOR

- No initiation of the swallow (two to three times)
- Consistent spillage of whole ice chips into the larynx
- Aspiration with no spontaneous response for more than three times OR cued cough/throat clear was unsuccessful OR silent aspiration occurred more than three times
- Excessive coughing resulting in shortness of breath
- Significant change in vitals to outside of normal limits
- Increase in amount of secretions, which are not cleared despite cueing
- An excessively gurgly voice with no success at spontaneous or cued clearing



(Pisegna & Langmore, 2018)

Oral care

Reduces the risk of aspiration pneumonia.

Up to a billion bacteria may reside on a clean tooth!

Brush (not swab) 2-3x/day with moisturizer and suction excess secretions. Chlorohyxedine as needed.

Dentures: Remove at least twice/day, brush, rinse, and use solution overnight.

Azarpazhooh & Leake, 2006; Gupta, 2016; Leder et al., 2013; Pearson & Hutton, 2002; Sarangi et al., 2021; Yoneyama et al., 2002

THICKENED LIQUIDS

Thickening fluids is our most widely used intervention to reduce the risk of aspiration.

May reduce the risk of aspiration (i.e. improve timing and control), but also may increase residue (thicker = heavier).

(Clavé et al., 2006; Logemann et al., 2008;)

There is a higher risk for silently aspirating thickened liquids vs thin liquids. Therefore, it should only be used after a swallow study proves its efficacy.

(Miles et al., 2018)

No significant increase in aspiration pneumonia for thin liquids with safety strategies vs thickened liquids in those with low risk of pneumonia.

(Kaneoka et al., 2016)

If a tree falls in the forest…

Would anybody hear it? Similarly, if your patient won't follow your plan of care, is it worth making it?

People dislike thickened liquids and are unlikely to drink them. Compliance may improve if used short-term and patients understand why they are recommended.

(Matta et al., 2006; McCurtin et al., 2017)

Xantham-Gum

- More stable
- Safer

Starch-Based

- Thicken over time
- Causes more harm when aspirated

(Vilardell et al., 2015; Matta et al., 2006)

(Logemann et al., 2008; Robbins et al., 2008)

11% pna in PD and dementia

CHIN DOWN WITH THIN

- Highest aspiration risk
- Most preferred by patients
- No increase in aspiration pneumonia

NECTAR

- Middle ground in aspiration risk and preference
- Increased risk of dehydration, UTI, and fever
- Less likely to develop aspiration pneumonia than honey thick

HONEY

- Lowest aspiration risk
- Least preferred
- Increased risk of dehydration, UTI, and fever
- Most likely to cause aspiration pneumonia

Thick vs Thin Liquid in Rabbit and Rat Studies

HARMFUL

Inflammation, interstitial congestion, and alveolar edema

FATAL

Aspirating large amounts of thickener may be fatal

RECOVERY

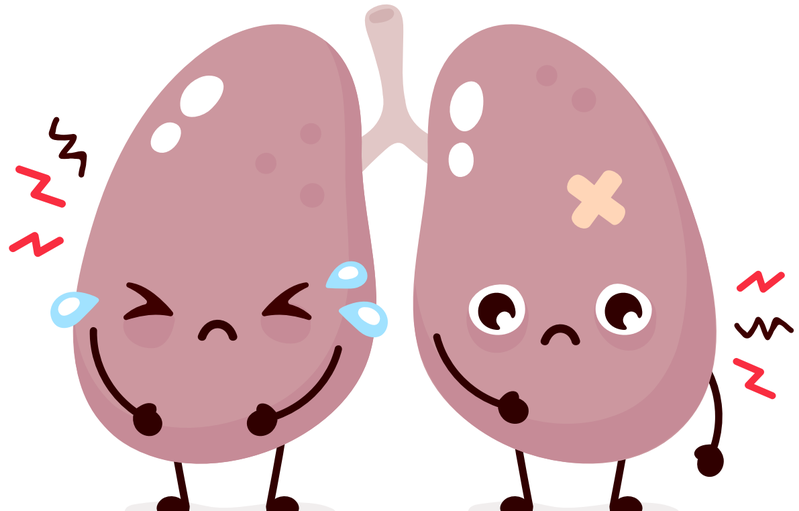
Inflammation may last for at least 10 days after aspiration event

QUANTITY

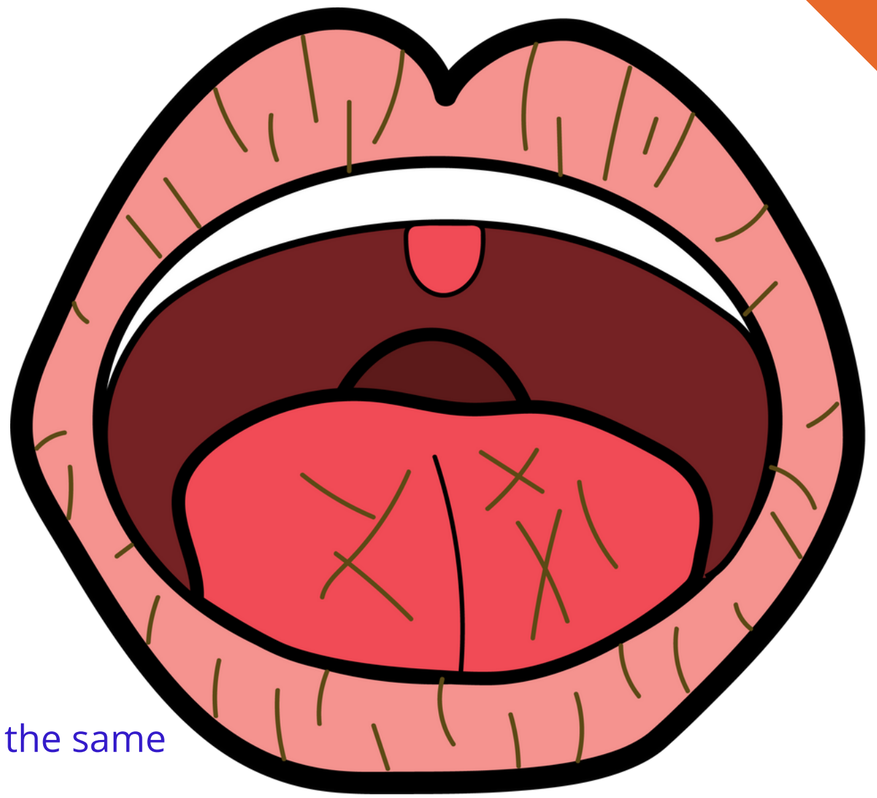
Recurrent micro-aspiration may also result in significant inflammation

TYPE

Increased damage from cornstarch vs xantham gum including alveolar hemorrhaging and death



Nativ-Zeltzer et al., 2018; Nativ-Zeltzer et al., 2021)



Dehydration

The bioavailability of thickened liquids is about the same as thin liquids. However, they...

- Don't taste good
- Make you fuller, faster
- People don't understand why they're drinking them

Therefore, people don't drink as much of them. However, this depends highly on symptoms of dysphagia and patient preferences.

(Cichero, 2013; Matta et al., 2006)

MEDICATION BIOAVAILABILITY

Thickened liquids may actually slow down the breakdown of the chemical compounds in certain medications. This means, time-released medications may be compromised as they take longer than anticipated to enter the bloodstream.

A discussion with the IDT including the pharmacist will tell you which medications may be impacted.

(Manrique et al., 2016)

But can they help?

Thickened benefits?

REDUCES RISK OF ASPIRATION

Improved timing and control

(Clavé et al., 2006; Logemann et al., 2008)

MAY REDUCE ANXIETY

If it significantly improves dysphagia symptoms

(Verdonschot et al., 2013)

MAY IMPROVE COMFORT

Decreased coughing due to improved airway protection

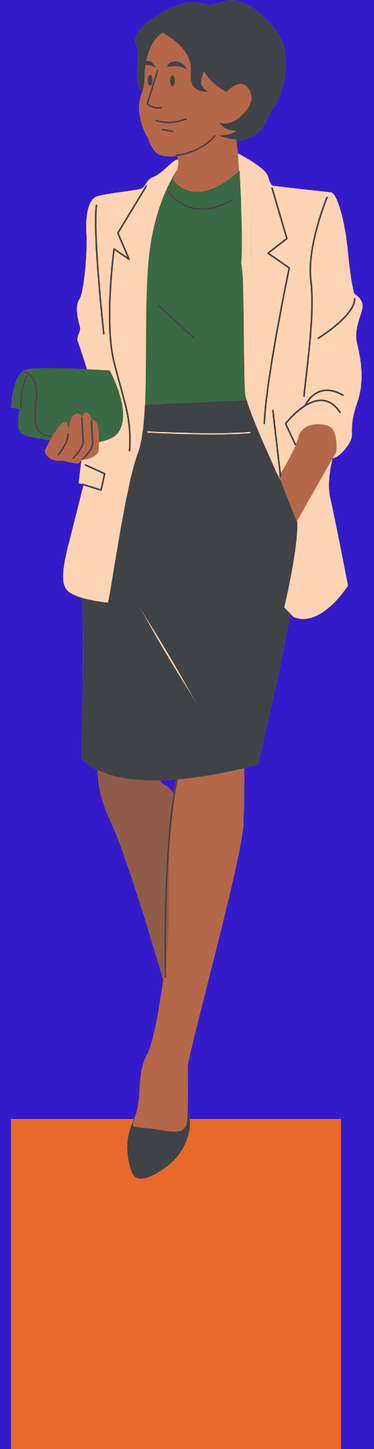
SHORT-TERM USE

May have improved compliance and may decrease the risk of aspiration in the short-term when the stakes are high

UMA 71 YOF WITH MEDICAL COMPLEXITY

Confirmed aspiration on thin liquids. Tolerating nectar thick, but declines secondary to quality of life issues.

Pt placed on a soft diet with water in between meals after oral care as long as she participates with therapy and goes for walks at least 3x/day.



CAROL 67 YOF S/P DEHYDRATION AND UTI

Coughing immediately following thin liquids on 3/12 trials.

No access to instrumental study.

No respiratory compromise and no change in mentation. Preference to continue thin liquids with small sips.

Thickend liquids

Silent aspiration
Pharyngeal residue
Inflammation/fibrosis
Pneumonia
Dehydration
UTI
Bioavailability of medication
Decreased quality of life

Thin liquids

Aspiration and associated respiratory conditions
Possible discomfort if coughing

Thick or Thin

CLINICAL ASSESSMENT

Is there significantly more coughing on thin liquids? Is there a risk of silent aspiration?

DURATION AND PROGNOSIS

How long has this been going on for and how long is it anticipated to last? What are the stakes of aspiration?

ACCESS TO MBSS/FEES

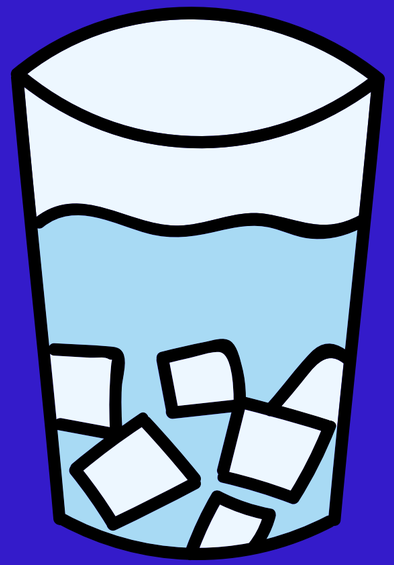
When can a swallow study be conducted?

PATIENT PREFERENCES

Does the patient understand and agree with the recommendation?

ALTERNATIVES

WATER/ICE



STRATEGIES & EXERCISES

THICKENER TYPE

Do No Harm

(Hallett, 2005)

Quick Recap

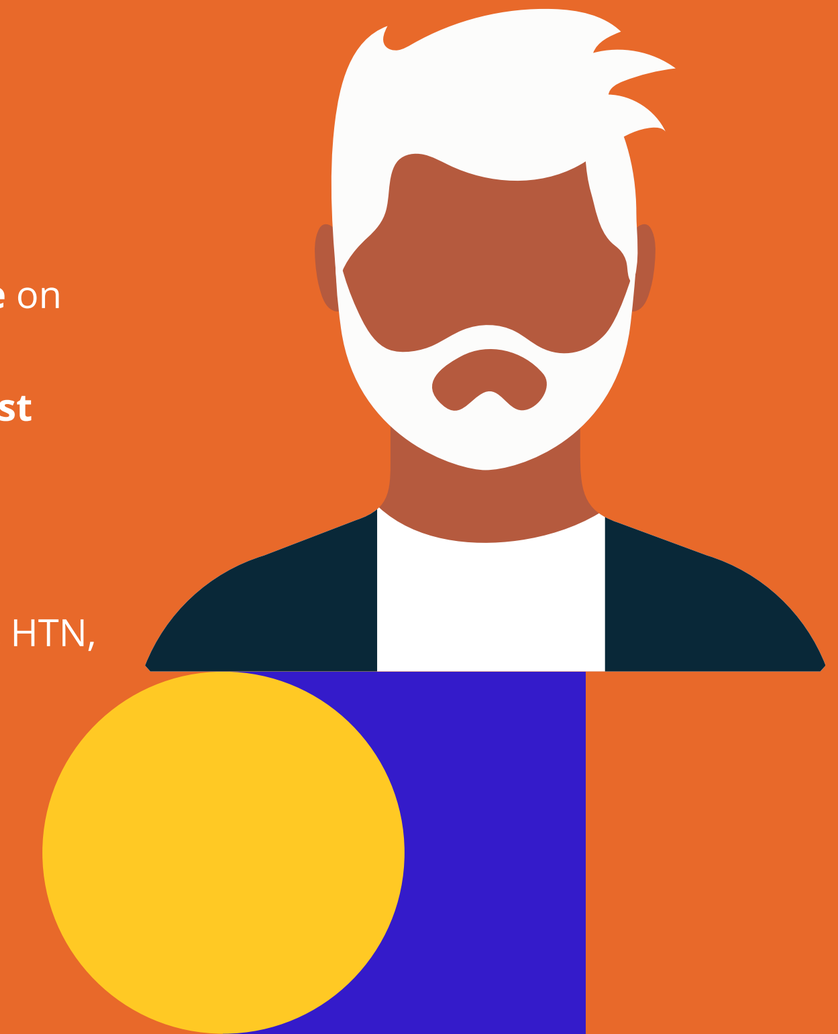
What works?

- If a swallow study is not available, use a comprehensive, structured, measurable clinical assessment.
- Water/ice may be a good option if risk is high and pt not a good candidate for thickened.
- Modifying consistencies should be the last resort.

The Practical

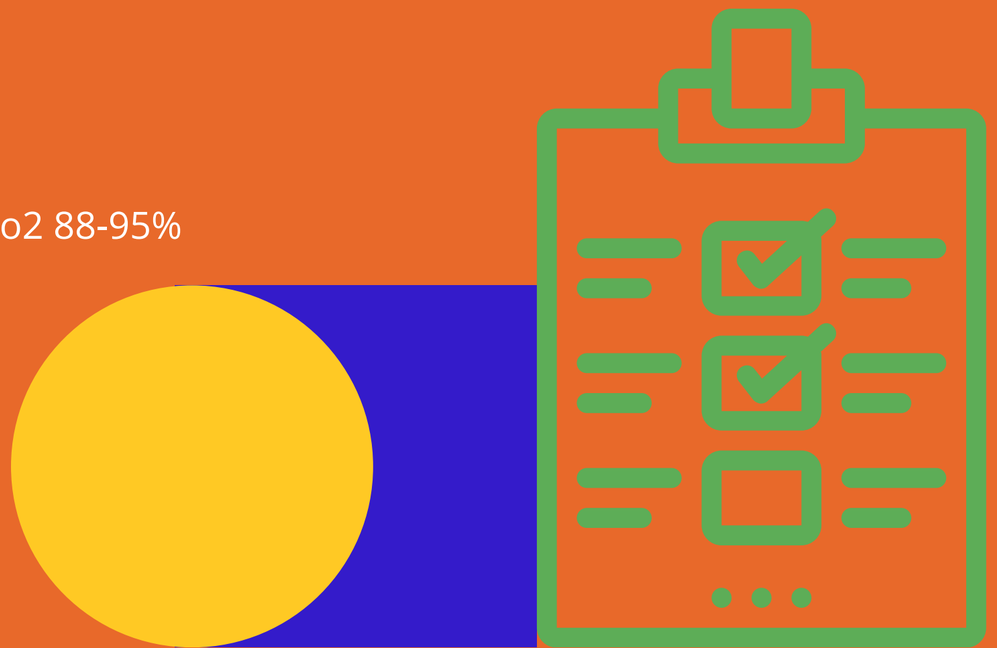
Derek admitted (Day 1)

- 67 YOM with hypercarbic/hypoxic **respiratory failure** on 5/2/23 secondary to **COPD** exacerbation
- Developed **ARDS** and respiratory driven **cardiac arrest**
- Complications: L hemothorax, CHF exacerbation and necrotizing **pneumonia**
- Intubated **x11 days** and **trach/vent** placed
- History: OSA on CPAP at night, **CVA**, COPD, CHF, DMII, HTN, HLD, BPH



Initial assessments

- Day 1
  - **A/C** vent support
  - Glasgow Coma Scale = 15
  - Oral Health Assessment Tool = 0
- Day 2
  - Trach collar (SpO2 **88-92%**)
  - Tolerates speaking valve x1 hour
- Day 3
  - Tolerates speaking valve x5m
  - Arterial Blood Gas within normal range
- Day 4
  - Tolerating speaking valve for 3 hours with spo2 88-95%



(Chalmers et al., 2005; Jain & Iverson, 2023)

Base Rates

INTUBATION

Dysphagia is 50% likely

TRACH STATUS

81% likely to silently aspirate

(Brodsky et al., 2017; Marvin & Thibeault, 2021)

ASPIRATION

- Cognitive deficits
- Dysphagia
- GI complications (PPI)
- Will require feeder
- Tube feeding
- Poor oral health/Xerostomia
- Requires suctioning
- Poor positioning
- Meds impacting alertness

CLEARANCE

- Weak cough
- Supplemental O2
- Mechanical ventilation
- Pulmonary disease

IMMUNE RESPONSE

- Medically compromised
- Weakness/decreased mobility/dependence
- Age
- Polypharmacy (5 or more)
- Nutrition risk
- Current infection

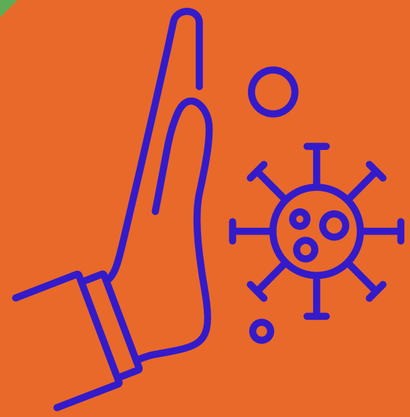
Derek

ASPIRATION

- Dysphagia
- Tube feeding
- Requires suctioning

CLEARANCE

- Weak cough
- Supplemental O2 (35%)
- Pulmonary disease



IMMUNE RESPONSE

- Medically compromised
- Age
- Polypharmacy (5 or more)
- Nutrition risk (12% loss)

Questions

WHAT QUESTIONS ARE WE TRYING TO ANSWER?

- Is he stable enough for a swallow evaluation?
- How should we evaluate the swallowing?
- How is he trending, medically?
- Can he maintain adequate SpO2?
- What are the risks involved with PO intake at this time?

Hypothesis

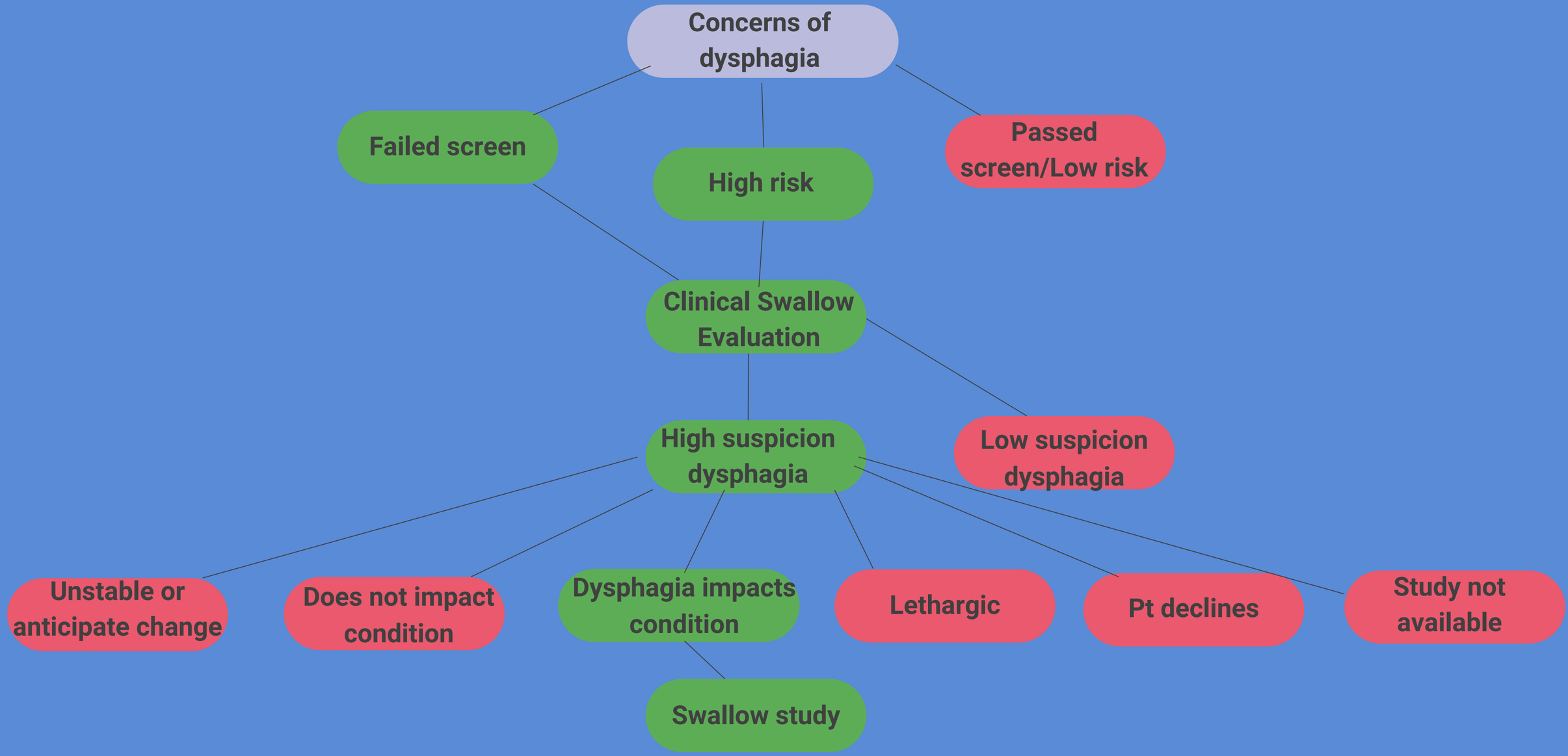
Moderate to severe dysphagia with high risk for dysphagia-related aspiration pneumonia

Hypothesis Testing Day 4

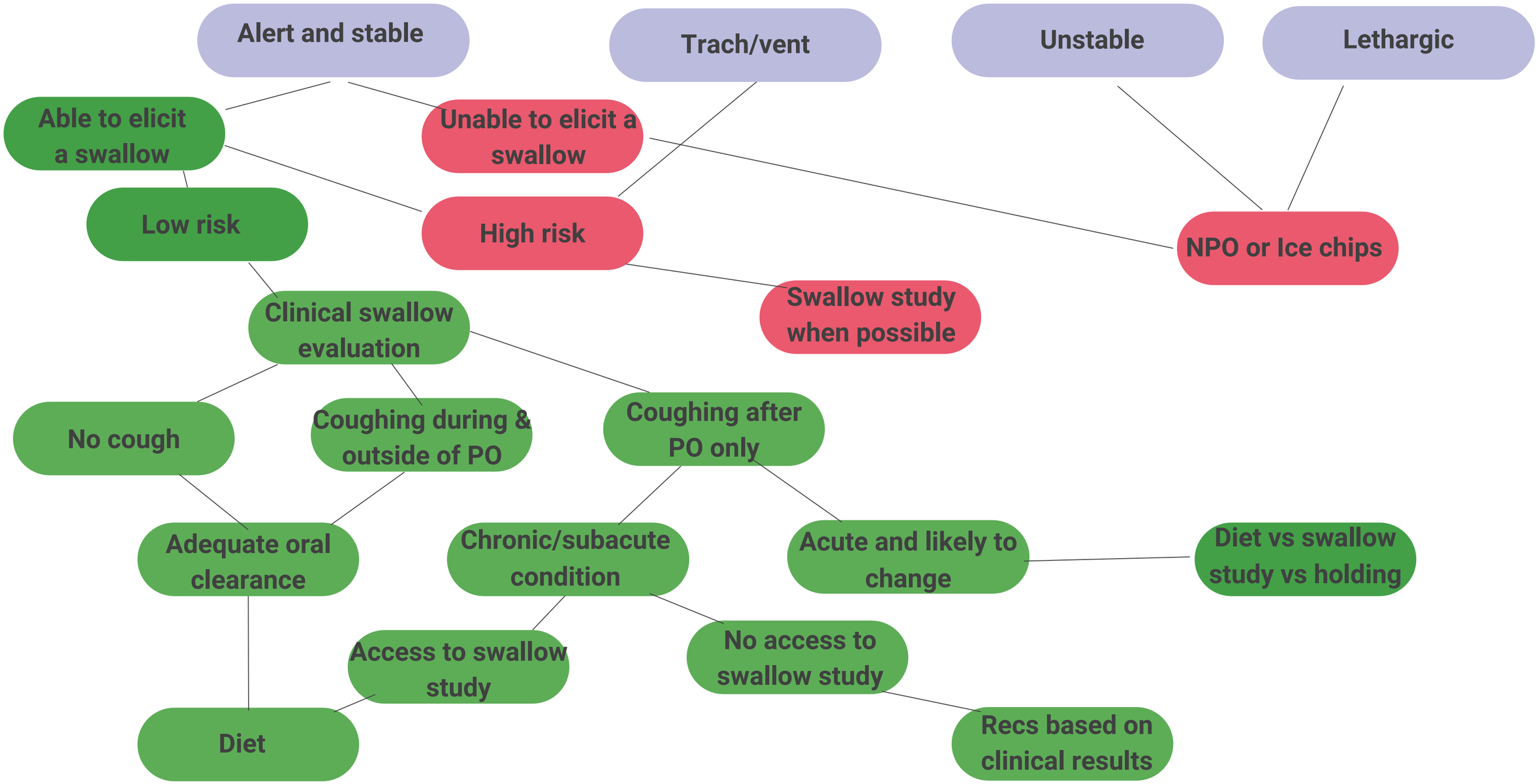
Cranial nerve assessment is grossly within normal limits.

What’s the best next step?

When should I recommend an instrumental study?



What should I recommend at bedside?



FEES #1
Day 5

EDEMA

Moderate laryngeal **edema**
(Epiglottis, arytenoids, vocal folds, aryepiglottic folds)

EFFICIENCY

Mastication: Functional
Yale Residue Scale: Moderate in the valleculae and mild in the pyriform sinuses
Murray Secretion Scale: 3 (Improves with PO)

SAFETY

PAS 5: Timely closure, but suspect minimally incomplete probably secondary to incomplete epiglottic retroflexion.

Dysphagia Outcome and Severity Scale (DOSS): 3

(Kuo et al., 2017; Neubauer et al. 2015; O'Neil et al., 1999; Rosenbek et al., 1996) ,

Summary

- Incomplete airway **closure**, decreased bolus **propulsion**, increased **secretions** resulting in moderate pharyngeal **residue** and trace, deep **penetration** on large volumes of thin liquid after the swallow. Improved tolerance with **compensatory** strategies: small sips, hard/fast swallow, alternate solids/liquids, and multiple swallows.

Weaknesses:

- Decreased base of tongue retraction, posterior pharyngeal wall stripping wave, cricopharyngeal segment opening, and incomplete epiglottic retroflexion
- Possible decrease in hyolaryngeal elevation/excursion
- Decreased **sensation and weak cough**

Strengths:

- Motivated, able to follow directions, and great support from his wife
- Improved clearance and protection with strategies

ICE CHIPS

No more than 3 oz TID, 1-3 per spoon as tolerated with a speaking valve

STRATEGIES

Small bites/sips, hard/fast swallow, and multiple swallows

MONITOR

Monitor for aspiration and discontinue diet as needed

ORAL CARE

Prior to PO with moisturizer

EXERCISES

Effortful swallows and EMST

1 The Problem

WHAT'S THE DIAGNOSIS?

Moderate pharyngeal dysphagia

Increased risk of decline.

2 Identify The Factors

Risk factors

Medical stability
Risk for aspiration of harmful contents
Pulmonary clearance
Immune response

Patient factors

Preferences, goals, and expectations
Risk tolerance

3

Assess The Factors

Risk factors (16)

Medical stability (4)
Risk for aspiration of harmful contents (4)
Pulmonary clearance (4)
Immune response (4)

Patient factors (15)

Preferences, goals, and expectations (8)
Risk tolerance (7)

4 Ice chips

Costs (10)

- Increased risk for aspiration pneumonia (5)
- Increased risk for cardiopulmonary decline (5)

Benefits (18)

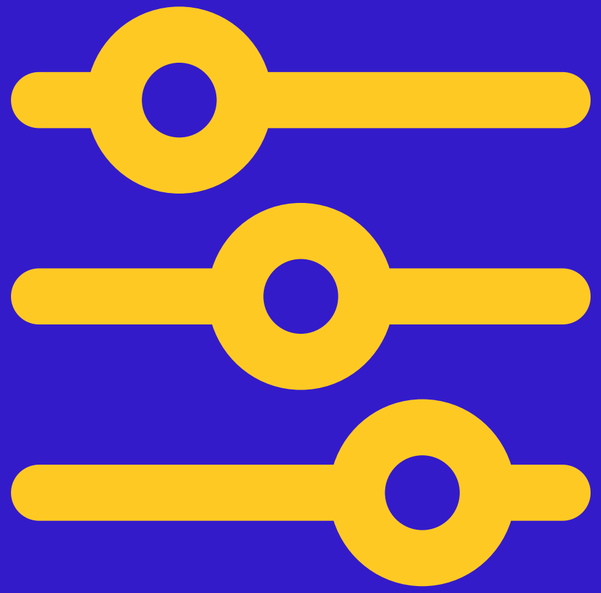
- Quality of life (5)
- Improved secretion management (5)
- Improved oral health (3)
- Pharyngeal strengthening (5)

5 Alternatives

DON'T LEAVE ANY STONE UNTURNED

- Fewer/more ice chips
- NPO
- Pleasure puree and nectar thick liquids
- Alternative exercises

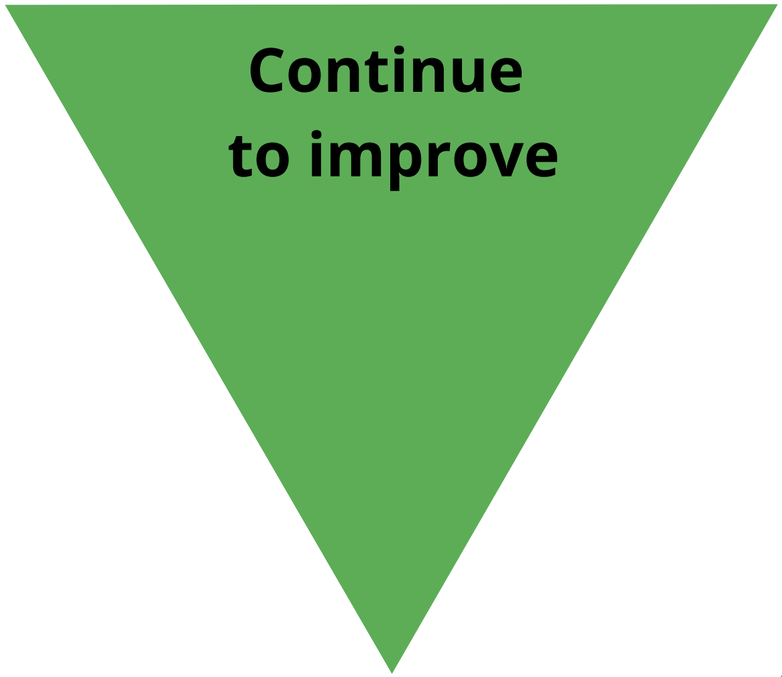
6 Adjust

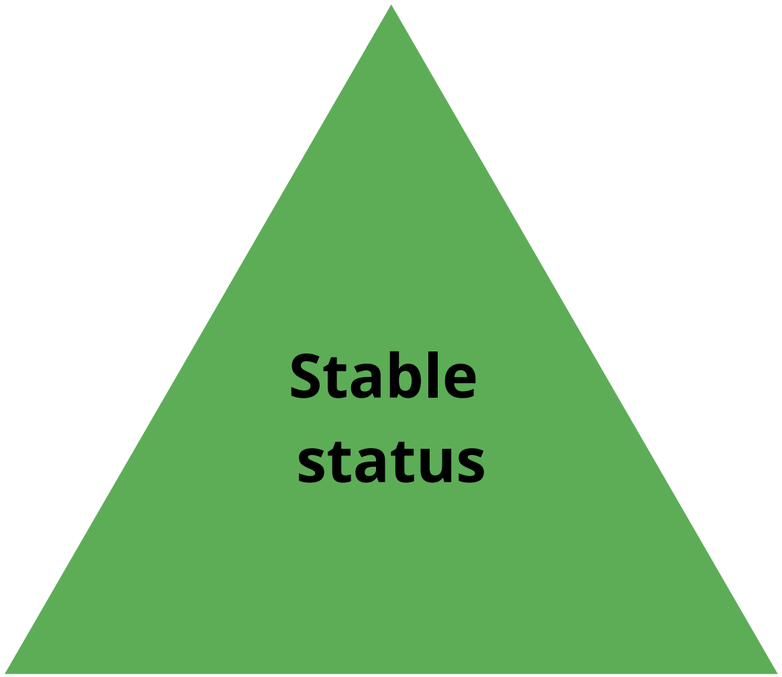


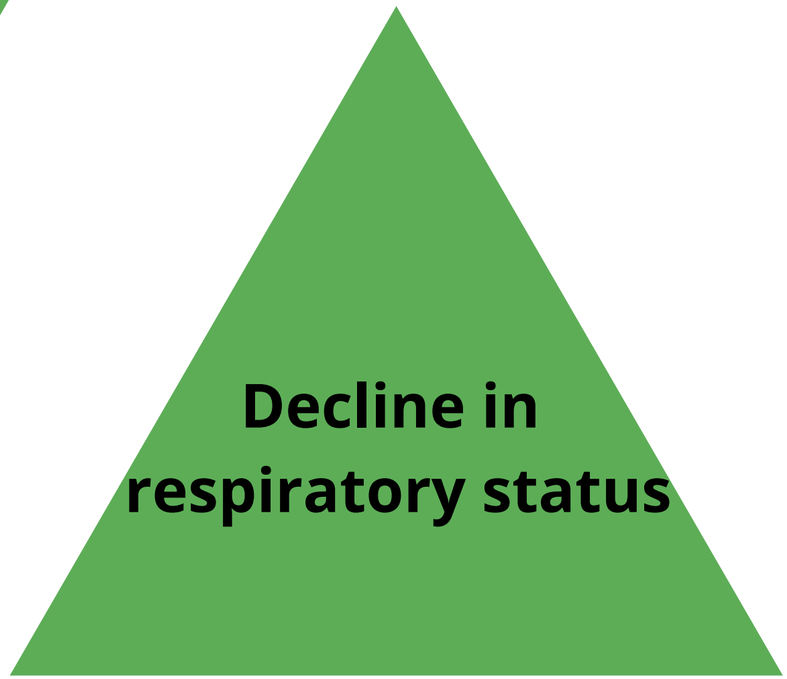
CHANGE COURSE AS NEEDED

Use new information to adjust course and stay on target.

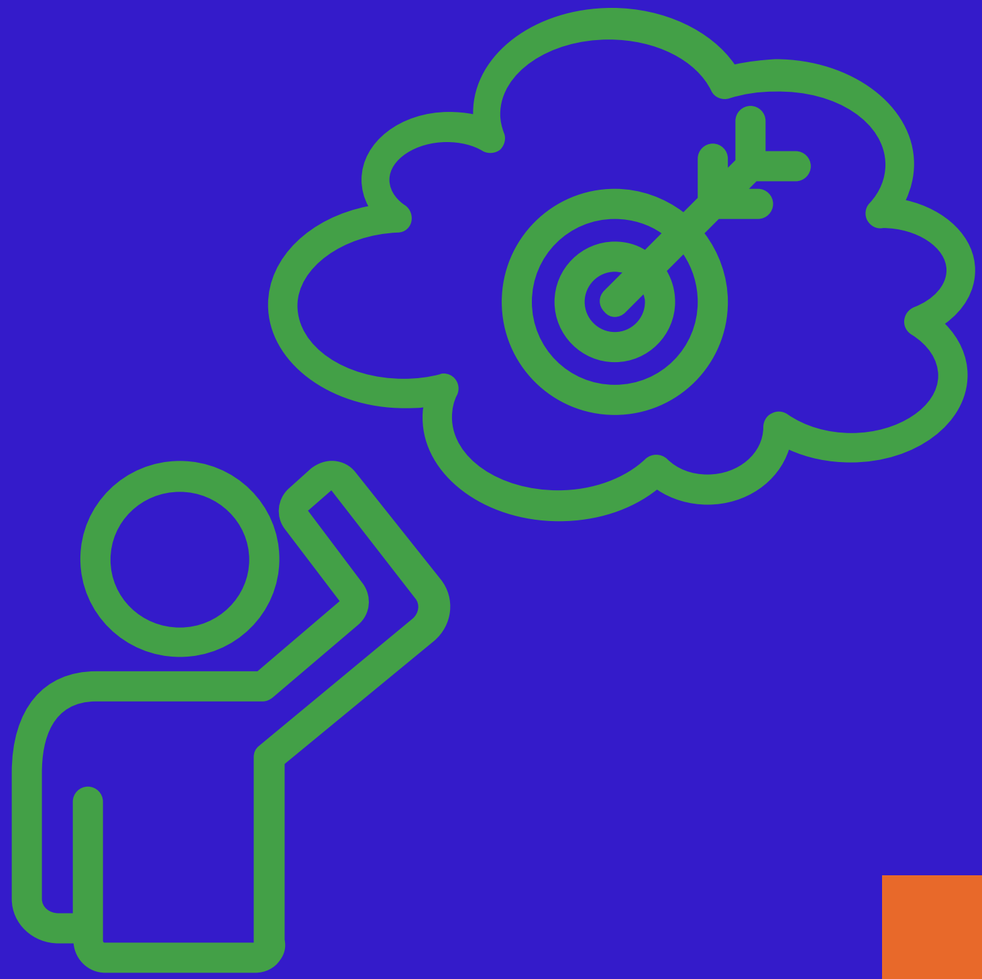
Outcome range







Expectations



Will tolerate well and continue to improve.

Measure the uncertainty (20%)

(Tetlock & Gardner, 2016)

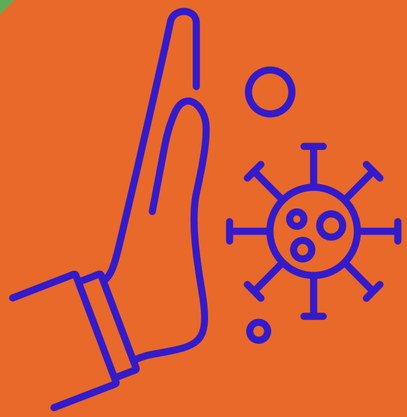
Derek

ASPIRATION

- Dysphagia (Exercises and strategies)
- Edema (Steroids)
- Tube feeding (Continue as tolerated)
- Requires suctioning (Speaking valve)

CLEARANCE

- Weak cough (EMST)
- Supplemental O2 (35%)
- Pulmonary disease



IMMUNE RESPONSE

- Medically compromised
- Age
- Polypharmacy (5 or more)
- Nutrition risk (12% loss)

(Repeat FEES and advance as tolerated)

FEES #2
Day 11

EDEMA

Mild laryngeal edema

EFFICIENCY

Yale Residue Scale: No change
Murray Secretion Scale: No change

SAFETY

PAS 2: Significant improvement

Dysphagia Outcome and Severity Scale (DOSS): 4

(Kuo et al., 2017; Neubauer et al. 2015; O'Neil et al., 1999; Rosenbek et al., 1996)

Summary

Improved airway closure, decreased bolus propulsion, increased secretions resulting in moderate pharyngeal residue and trace, deep transient penetration secondary to residue at the level of the posterior commissure. Residue/penetration improved by alternating solids/liquids and eliciting multiple swallows.

Weaknesses:

- Similar to last assessment with less edema and possible improvement in hyolaryngeal elevation/excursion
- Minimal improvement in sensation and cough

Strengths:

- Same

DIET

Pleasure puree and thin liquids as tolerated with speaking valve.

STRATEGIES

Hard/fast swallow, alt solids/liquids, and multiple swallows

MONITOR

Monitor for aspiration and discontinue diet as needed

ORAL CARE

Prior to PO with moisturizer

EXERCISES

Effortful swallows and EMST

1 The Problem

WHAT'S THE DIAGNOSIS?

Mild oropharyngeal swallow

What does this say about the level of risk?

2 Identify The Factors

Risk factors

Medical stability
Risk for aspiration of harmful contents
Pulmonary clearance
Immune response

Patient factors

Preferences, goals, and expectations
Risk tolerance

3

Assess The Factors

Risk factors (14)

Medical stability (4)
Risk for aspiration of harmful contents (**2**)
Pulmonary clearance (4)
Immune response (4)

Patient factors (15)

Preferences, goals, and expectations (8)
Risk tolerance (7)

4 Diet

Costs (10)

- Increased risk for aspiration pneumonia (5)
- Increased risk for cardiopulmonary decline (5)

Benefits (18)

- Quality of life (5)
- Improved secretion management (5)
- Improved oral health (3)
- Pharyngeal strengthening (5)

5 Alternatives

DON'T LEAVE ANY STONE UNTURNED

- Continue ice chips only
- Mech soft
- Thickened liquids
- Alternative exercises

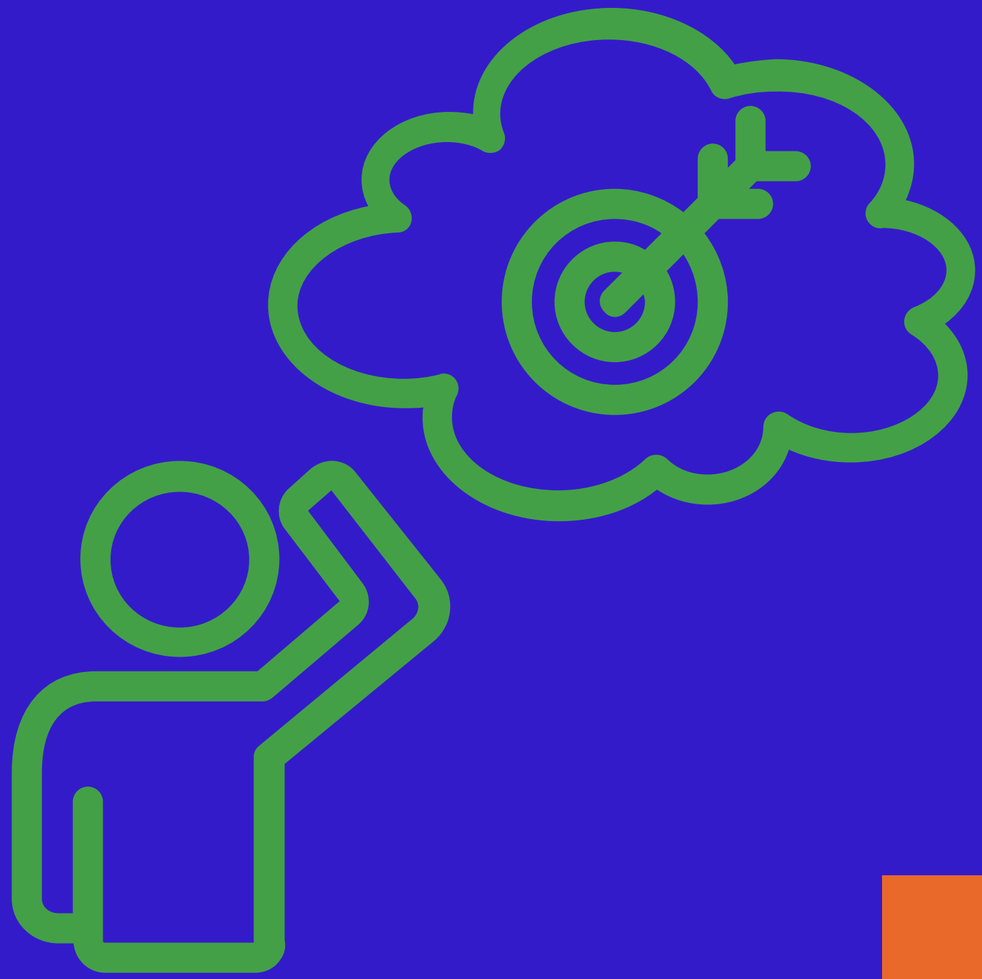
Outcome range

Continue to improve

Stable status

Decline in respiratory status

Expectations

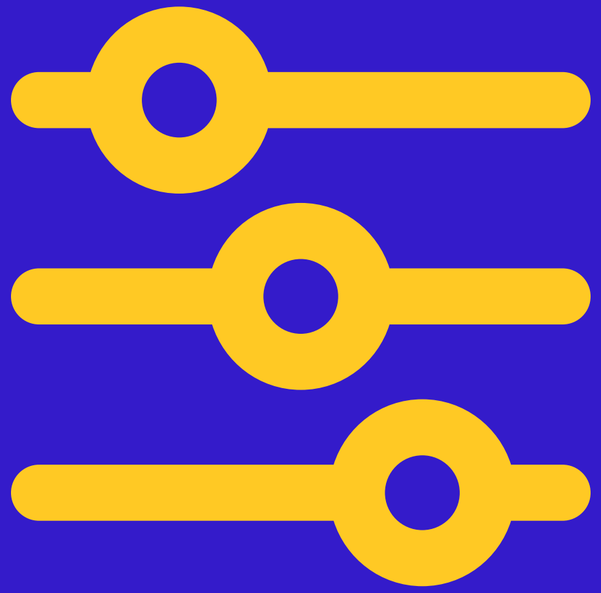


Will tolerate well and continue to improve.

Measure the uncertainty (15%)

(Tetlock & Gardner, 2016)

6 Adjust



Day 14: Increased CO2, change in mentation, impulsive eating, and witness coughing on pudding with PO suspected in patient’s tracheal secretions.

1 The Problem

HYPERCAPNIC RESPIRATORY FAILURE

Returned to mechanical ventilation.

2 Identify The Factors

Risk factors

Medical stability
Risk for aspiration of harmful contents
Pulmonary clearance
Immune response

Patient factors

Preferences, goals, and expectations
Risk tolerance

3

Assess The Factors

Risk factors (19)

Medical stability (5)
Risk for aspiration of harmful contents (5)
Pulmonary clearance (5)
Immune response (4)

Patient factors (2)

Preferences, goals, and expectations (1)
Risk tolerance (1)

4 Diet?

Costs (20)

- Increased risk for aspiration pneumonia (10)
- Increased risk for cardiopulmonary decline (10)

Benefits (8)

- Quality of life (1)
- Improved secretion management (1)
- Improved oral health (1)
- Pharyngeal strengthening (5)

The Decision

ICE CHIPS: STRICT NPO

Expectations: Will take a few days to stabilize. Advance further once stable and monitor closely.

Measure the uncertainty (25%).

(Tetlock & Gardner, 2016)

5 Alternatives

DON'T LEAVE ANY STONE UNTURNED

- Ice chips
- Continue pleasure puree/thin
- Keep NPO and don’t reassess

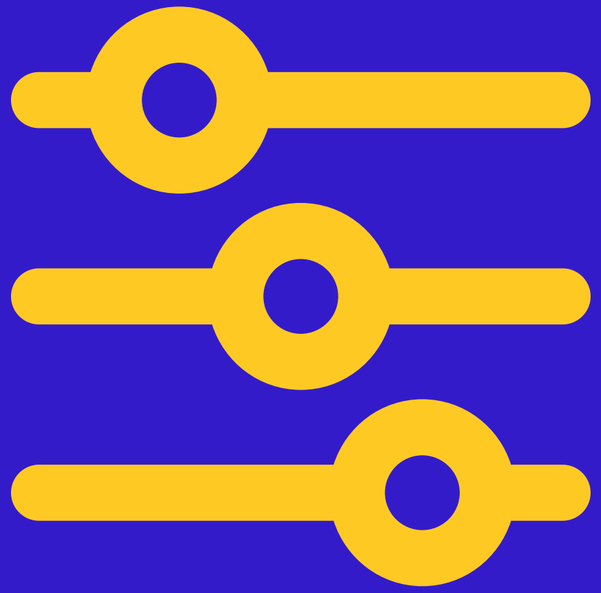
Outcome range

Stay on the vent

Progress off the vent

Continue to decline

6 Adjust



CHANGE COURSE AS NEEDED

Day 18: **Liberated** from vent and **capping** trials begin. ABG stays within acceptable range.

Road to Recovery

Ongoing assessment

Continues to tolerate at bedside without significant difficulty.

PO advancement

- Pleasure puree (Day 19)
- Full trays of puree (Day 25)
- Regular (Day 28).

PEG weaning

Good appetite. Bolus feeds then weaned from PEG and PPI.

Vent at night

Maintain vent at night and capped trach during the day.

What was learned?

Take the long road.

Objective information helped guide a path forward.

Could I have just been unlucky when he declined?

Would I have done anything differently knowing what I know now?

Takeaways...

- We all make mistakes. But we can be better.
- Understanding aspiration pneumonia pathogenesis allows us to help the IDT make a differential diagnosis.
- Using decision guidelines and quantifiable measurements is valuable when addressing complex problems.
- Knowing the risk factors for aspiration pneumonia and associated conditions helps us make accurate predictions.

What it's all about

A clinician can only be judged by the quality of the decisions they make.

Better decisions. Better outcomes.

THANKYOU

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BLOG

FEESibleSwallowSolutions.com/blog

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