



Government of **Western Australia**
North Metropolitan Health Service
Sir Charles Gairdner Osborne Park Health Care Group

Stroke CoP – TRACS

Dysphagia Assessment in Stroke

Julie Varian

Senior Speech Pathologist

SCGH Neurosciences



Overview

- Stroke & Dysphagia
- Australian National Stroke Guidelines – 2017
- Clinical Bedside Swallow Evaluation
- Clinical adjuncts without instrumental swallow assessment
- Resources
- Questions?



Neural Control of Swallowing

- It's complex!!
- CN's V, VII, IX, X, XI & XII
- 25 muscles
- Brainstem – control centre
- Cortical & subcortical regions involved
 - sensory/motor cortex, prefrontal cortex, anterior cingulate, insular, opercular, parietooccipital, and temporal regions, basal ganglia, thalamus, and cerebellum

(Jean 2001; Ertekin & Aydogdu 2003)



Bamford Stroke Classification & Dysphagia



Bamford stroke classification



Total anterior circulation stroke (TACS)

Criteria

All three of the following:

- Unilateral weakness (and/or sensory deficit) of the face, arm and leg
- Homonymous hemianopia
- Higher cerebral dysfunction (dysphasia, visuospatial disorder)

Partial anterior circulation stroke (PACS)

Criteria

Two of the following:

- Unilateral weakness (and/or sensory deficit) of the face, arm and leg
- Homonymous hemianopia
- Higher cerebral dysfunction (dysphasia, visuospatial disorder)

Lacunar syndrome (LACS)

Criteria

One of the following:

- Pure sensory stroke
- Pure motor stroke
- Sensory-motor stroke
- Ataxic hemiparesis

Posterior circulation syndrome (POCS)

Criteria

One of the following:

- Cranial nerve palsy and a contralateral motor/sensory deficit
- Bilateral motor/sensory deficit
- Conjugate eye movement disorder (e.g. gaze palsy)
- Cerebellar dysfunction (e.g. ataxia, nystagmus, vertigo)
- Isolated homonymous hemianopia or cortical blindness

Bamford Stroke Classification & Dysphagia



Bamford stroke classification



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National Stroke Foundation

The screenshot displays a web browser window with the URL <https://informme.org.au/en/Guidelines/Clinical-Guidelines-for-Stroke-Management>. The page features a dark blue navigation bar with links for "Our websites", "InformMe", "EnableMe", and "Stroke Foundation". Below this is a white header area with the "Stroke FOUNDATION" logo, a "Me" profile icon, and buttons for "Sign up" and "Sign in". A secondary blue navigation bar contains links for "Guidelines", "Learning and resources", "Stroke data", "Improving care", and "News and Events", along with a search bar labeled "Search InformMe". The main content area shows a breadcrumb trail: "Where am I? Home / Guidelines / Clinical Guidelines for Stroke Management". The title "Clinical Guidelines for Stroke Management" is prominently displayed in large blue font. Below the title, a paragraph states: "The *Clinical Guidelines for Stroke Management* are evolving into [living guidelines](#), updated as new evidence emerges in accordance with the 2011 NHMRC Standard for clinical practice guidelines. They supersede the *Clinical Guidelines for Stroke Management 2017*." The browser's taskbar at the bottom shows two PDF files: "EAT 10 Tool.pdf" and "Crary et al 2005 - FOIS.pdf". The system tray indicates the date and time as "ENG INTL 8:47 PM 12/10/2020".



Swallow Screening

- **Practice consensus**

- “People with acute stroke should have their swallowing screened within four hours of arrival at hospital and before being given any oral food, fluid or medication.” (Bray et al. 2016)

(National Stroke Foundation – 2017)



Validated Swallow Screens

- Swallow screens
 - Oral Pharyngeal and Clinical Swallowing Examination (Daniels et al 1997)
 - Bedside Aspiration Test (Edminston et al 2014 & Leder et al 2015)
 - The Gugging Swallowing Screen (Trapl et al 2007)
 - TOR-BSST (Martino et al 2009)



Dysphagia Assessment by SP

- Weak recommendation
 - “All stroke patients who have failed swallow screening or who deteriorate should have a comprehensive assessment of swallowing performed by a speech pathologist.” (Kertscher et al. 2014; O'Horo et al. 2015)

(National Stroke Foundation – 2017)



Dysphagia Assessment by SP

- What should it include?
 - Oro-motor exam/Cranial nerve exam
 - Clinical bedside swallow assessment (CBSE)
 - Clinical adjuncts

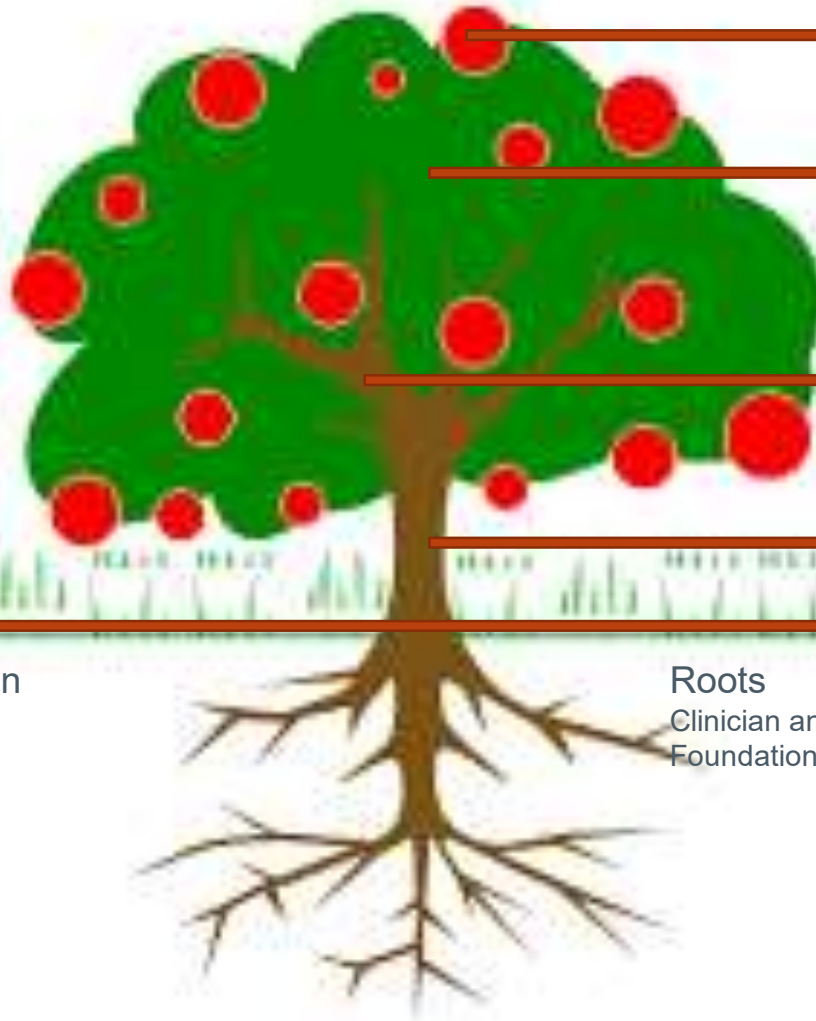


Critical thinking

- Clinical Decision Tree (courtesy of E.Plowman presentation at SPA National Conference, 2017)
 - Encourages use of strategy to support decisions
 - Encourages critical thinking
 - Involves collection of evidence
- Critical Thinking in Dysphagia Management
 - <https://www.hopeisinthescience.com/>
 - Emily Plowman and Ianessa Humbert



Most Relevant



Fruit

Therapy Plan and Execution
– variable relevant to swallow

Leaves

Instrumental Examination –
deeper investigation
Clinical Exam to guide same

Branches

Clinical Examination:
CNE, PO trials, Patient
Reports

Trunk

Medical Background and
knowledge

Patient

Clinician

Roots

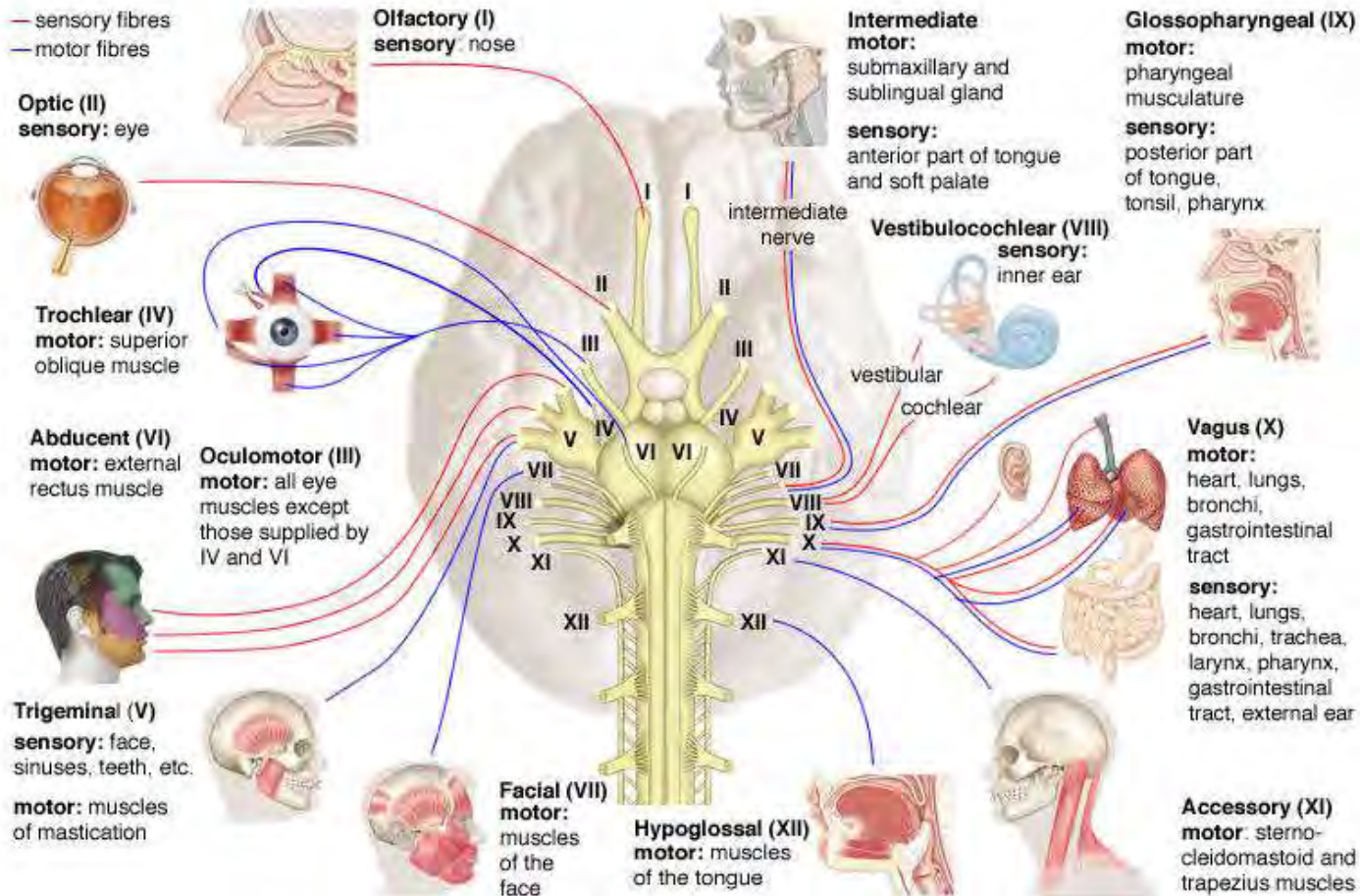
Clinician and Clinical
Foundation

Least Relevant



Cranial Nerve Assessment

(V, VII, IX, X, XI, XII)



Need a CN's in dysphagia refresher?

<https://swallowstudy.com/crazy-cranial-nerves-swallowing/>



Clinical Bedside Swallow Evaluation (CBSE)

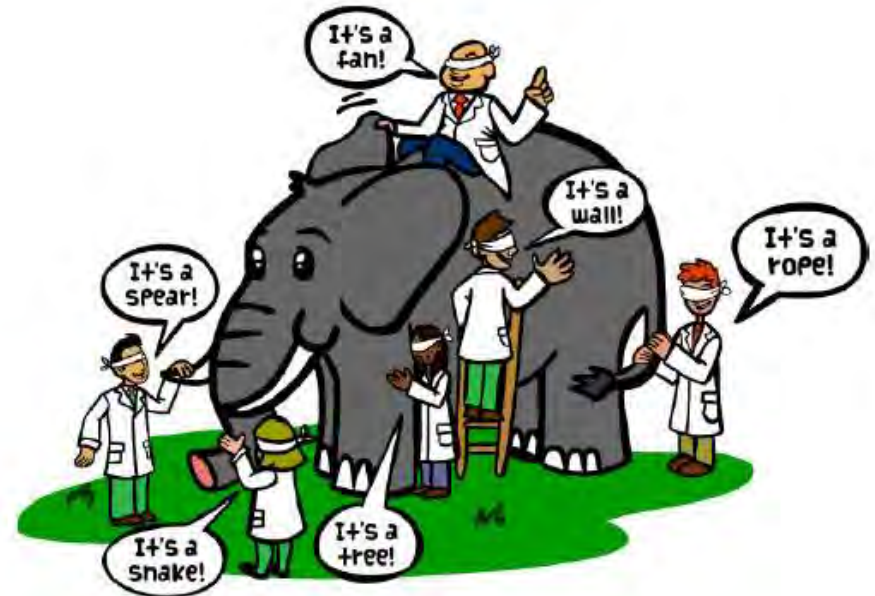
A thorough CBSE is valuable, necessary, and should be done prior to instrumental assessment...



Clinical Bedside Swallow Evaluation (CBSE)

A thorough CBSE is valuable, necessary, and should be done prior to instrumental assessment...

However, we need to be aware of its limitations



Clinical Bedside Swallow Evaluation (CBSE)

- A CBSE cannot evaluate:
 - Bolus flow characteristics
 - Pharyngeal/laryngeal anatomy
 - Hyolaryngeal excursion
 - Pharyngeal delay
 - Pre-swallow spillage
 - Post-swallow residue
 - Swallow physiology

Therefore, we cannot make therapy recommendations based on CBSE (eg. Masako, Shaker, chin tuck, etc.)



Clinical Bedside Swallow Evaluation (CBSE)

Can we diagnose dysphagia/ID aspiration during CBSE?

- Poor sensitivity and specificity of CBSE (Martino, 2013; McCullough, 2001 & 2005; Leder, 2002)
- What do we know?
 - Vocal changes... poor reliability
 - Absent gag, watery eyes, sneezing... not valid
 - Cough
 - Silent aspiration
 - False positive/false negative
 - Poor reliability of judgements of cough strength



Clinical Bedside Swallow Evaluation (CBSE)

- Two or more clinical signs more sensitive / specific than any single measure (Daniels et al., 1997)
 - Dysphonia
 - Dysarthria
 - Abnormal volitional cough
 - Cough after swallow
 - Voice changes after swallow
 - Abnormal gag



Clinical Bedside Swallow Evaluation (CBSE)

- A CBSE can:
 - Identify patients who **may have dysphagia** or be **at risk for aspiration**
 - Identify **risk factors** for pneumonia (Langmore et al., 1998)
 - Observe lip seal and mastication... although we are making inferences about bolus manipulation/control once mouth is closed
 - Oral residue
 - Observe respiration-swallowing coordination



CBSE Adjuncts

- Pulse oximetry
- Cervical auscultation
- Cough reflex testing



CBSE Adjuncts

- Pulse oximetry
 - Involves monitoring a patient's blood oxygen levels during oral intake
 - A drop in oxygen saturation of a specific amount has been proposed to signify aspiration
 - A recent systematic review found this is not valid for detecting aspiration (Britton et al., 2017)



CBSE Adjuncts

- Pulse
- Involve PO_2 and blood oxygen levels during oral
- A drop in PO_2 of a specific amount has been reported
- A PO_2 of 80 mmHg is not valid for CO_2 expiration (B... , 2017)



CBSE Adjuncts

- Cervical auscultation
 - Involves using a stethoscope to listen to the sounds of swallowing and swallowing-related respiration
 - Questionable validity / reliability
 - Systematic review found conflicting evidence re the validity of cervical auscultation.

“The reliability of cervical auscultation is insufficient when used as a stand-alone tool in the diagnosis of dysphagia in adults.” (Lagarde, 2016)



CBSE Adjuncts

- Cervical auscultation

- Involves using a stethoscope to listen to the sounds of swallowing and associated respiration
- Questionable validity
- Systematic review finding evidence re the validity of cervical auscultation

“The reliability of cervical auscultation is insufficient when used as a sole method in the diagnosis of dysphagia in adults.” (Lagarde, 2016)



CBSE Adjuncts

- Cough reflex testing
 - Involves introducing a tussive agent into the airway via nebuliser to assess laryngeal sensation
 - Believed to assess integrity of vagus nerve efferents
 - Difficulty determining exactly where in the airway is stimulated
 - Failed CRT associated with increased aspiration
 - However → no evidence that the use of CRT changes pneumonia rates



CBSE Adjuncts

- Cough reflex testing
 - Involves introduction of irritant into the airway via nebuliser to elicit cough reflex sensation
 - Believed to assess afferent vagus nerve efferents
 - Difficulty determining where in the airway is stimulated
 - Failed CRT assessment of increased aspiration
 - However → increased aspiration at the use of CRT changes pressure



The Bigger Picture

- Risk factors for pneumonia (Langmore et al., 1998)
 - Aspiration alone is ***not sufficient*** for the development of pneumonia...
 - ie. just because someone aspirates, does not mean they will get sick*
 - Other risk factors may hold stronger predictive value:
 - Mobility
 - Oral hygiene
 - Dependence for feeding
 - Dependence for oral care
 - Number of medications



Stroke Associated Pneumonia (SAP) – Eltringham et al 2020

- Factors associated with **higher SAP**
 - Measures of immunodepression in dysphagics
 - Use of PPI's (omeprazole)
 - Impaired mobility
- Factors associated with **lower SAP**
 - Use of a Histamine H2-Blocker (famotidine)
 - MDT approach and instrumental swallow assessment
- Not enough evidence/unsupported
 - Prophylactic antibiotics – no difference in pneumonia rates
 - Presence of aerobic Gram-negative bacteria
 - NGT placement - unclear



Strengthening the CBSE

- Probe the swallow mechanism: simple tests of physiologic capacity & swallow safety, efficiency & reserve
- Use validated screens (eg. Yale swallow protocol)
- Test / record over time to objectively monitor or track treatment progress



The Yale Swallow Protocol

Leder, S. B., & Suiter, D. M. (2014). *The Yale Swallow Protocol: An evidence-based approach to decision making*. Springer.

- Patients with the following are at an increased risk of aspiration
 - not oriented
 - cannot follow 1-step commands
 - who have decreased lingual ROM
- Yale Swallow Protocol
 - Brief cognitive evaluation (biographical questions, 3 x 1 stage commands)
 - OME
 - 3 oz water swallow test



Yale 3 oz Water Swallow Test

- Suiter & Leder, 2008
 - Pass: able to drink 3 oz (85mL) from cup/straw continuously without distress or stopping,
 - Very low risk of aspiration/ silent aspiration
 - Fail: unable to finish, interrupted drinking, coughing post
 - Patient deemed aspiration risk
 - Recommend either repeat protocol in 24 hours or refer for instrumental Ax



Yale 3 Oz Water Test

- Suiter & Leder, 2008 (mixed caseload of 3000 patients)
 - Sensitivity for predicting aspiration 96.5%
 - Negative predictive value 97.9%
 - False negative rate < 2%
- Suiter et al., 2014 (mixed caseload of 25 males)
 - 100% sensitivity
 - 64% specificity
 - 78% positive predictive value
 - 100% negative predictive value



Functional Outcome Measures

- **FOIS** (Crary, Carnaby-Mann & Groher, 2005)
 - Measure of functional oral intake status
 - 7-point ordinal scale
 - Normed in acute stroke population
 - Sensitive to change over time



FOIS

Functional Oral Intake Scale¹

TUBE DEPENDENT (levels 1-3)

- 1 No oral intake
- 2 Tube dependent with minimal/inconsistent oral intake
- 3 Tube supplements with consistent oral intake

TOTAL ORAL INTAKE (levels 4-7)

- 4 Total oral intake of a single consistency
- 5 Total oral intake of multiple consistencies requiring special preparation
- 6 Total oral intake with no special preparation, but must avoid specific foods or liquid items
- 7 Total oral intake with no restrictions



Patient Reported Measures

- EAT-10 (Belafsky et al., 2008)



EAT - 10

<i>To what degree to you experience the following problems?</i> Circle an answer between 0 and 4	0 = No problem 4 = Severe problem				
1. My swallowing problem has caused me to lose weight.	0	1	2	3	4
2. My swallowing problem interferes with my ability to go out for meals.	0	1	2	3	4
3. Swallowing liquids takes extra effort.	0	1	2	3	4
4. Swallowing solids takes extra effort.	0	1	2	3	4
5. Swallowing pills takes extra effort.	0	1	2	3	4
6. Swallowing is painful.	0	1	2	3	4
7. The pleasure of eating is affected by my swallowing.	0	1	2	3	4
8. When I swallow food sticks in my throat.	0	1	2	3	4
9. I cough when I eat.	0	1	2	3	4
10. Swallowing is stressful	0	1	2	3	4
Add up the sum of the numbers you circled for a TOTAL EAT-10 Score:					

If your score is greater than 3 you may have swallowing problems. We suggest that you share your EAT-10 results with your doctor.

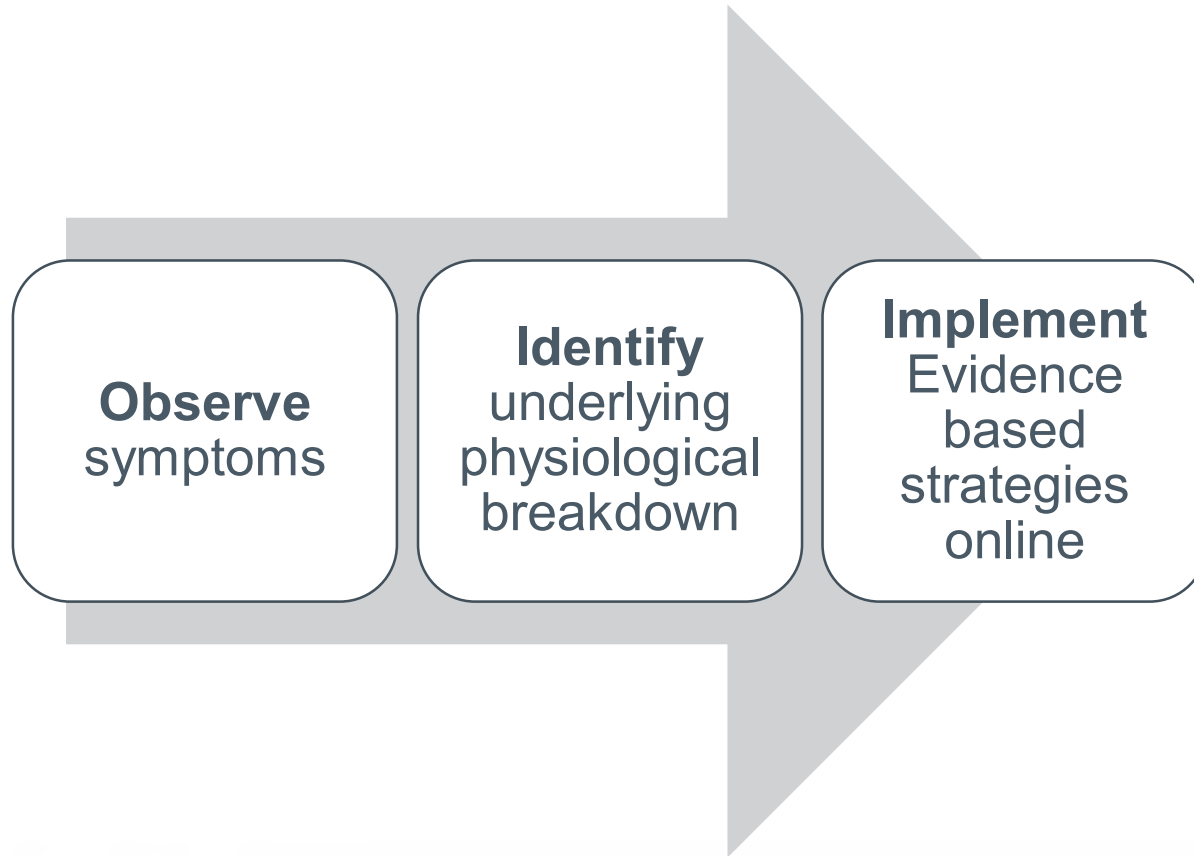


EAT -10

- Discriminant Ability of EAT10 scores:
 - OP setting (Cheney, 2014)
 - Score of 15: 71% sens, 53% spec. for penetration/aspiration (PAS >3) (OR 2.2)
 - MND (Plowman, 2015)
 - Score of 3: 88% sens., 57% spec. for penetration/aspiration (PAS >3) (OR 2.0)
 - Score of 8: 86% sens., 72% spec for PAS>6 (OR 3.1)
 - COPD (Regan, 2017)
 - Score of 9: 92% sens., 78% spec. for aspiration (PAS >5)



Online Implementation of Strategies



Resources and Training

- CPD (on-line)
 - Medbridge, SPA, ASHA, Hope is in the Science
- Blogs/Podcasts
 - Down the Hatch, Swallow Your Pride, Dysphagia Café, Swallowstudy.com
- Critical Appraisal of Literature
 - ASHA, Dysphagia, NSW Speech Pathology EBP Network, speechBITE



Questions?

