

Implementing Cough Reflex Testing in a clinical pathway for acute stroke: A pragmatic randomised control trial

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Background – What we already know

- Impact of dysphagia
 - present in up to half of acute stroke patients [1]
 - associated with a 40% increase in hospital length of stay [2],
 - increased prevalence of pneumonia
 - associated mortality [3, 4].
- A major challenge speech pathologists face in dysphagia management is detecting **silent aspiration**:
 - occurs when there is aspiration with no cough response [3]
 - exists in 28-38% of stroke patients who experience dysphagia [5].





Background – our current problem

- Standard clinical bedside assessments **relatively poor predictor of silent aspiration** [6].
- Instrumental assessment (e.g., VFSS or FEES) gold standard to identify silent aspiration, however:
 - require expensive equipment
 - specialist training
 - not able to be readily performed at the bedside.





Emerging evidence – cough reflex testing

- Cough reflex testing (CRT) simple **bedside assessment using citric acid inhalation**, to **assess the sensory integrity** of a patient's cough
 - Response on CRT may be as an indicator of silent aspiration risk [7].
- A RCT by Miles et al. [8] showed that CRT as a simple tool to enhance detection of silent aspiration in acute stroke patients.
 - Did not reduce incidence of pneumonia or length of stay
 - Authors suggested a **more structured clinical pathway** may lead to a clearer reduction in pneumonia rates and subsequent hospital stays.
- Further research indicated to determine impact of CRT when it is embedded into a consistent clinical pathway in the acute stroke setting
- **Patient and clinician satisfaction** - important as healthcare providers when considering the feasibility of implementing a new procedure [9].





Aims

- Primary aim:
 - to determine the impact of **establishing a CRT clinical pathway** on:
 - **incidence of aspiration pneumonia**
 - **length of stay**for acute stroke patients in comparison to patients receiving standard care.

- Secondary aims:
 - evaluate the **clinical feasibility** of implementing CRT including:
 - patients' tolerance
 - clinician satisfaction
 - VFSS referral rates
 - clinician time.





Design

- Pragmatic randomised control trial
- Ethically approved by Gold Coast Health Human Research ethics Committee and put HREC number: HREC/14/QGC/152
- **Trial registered on ANZCTR (ACTRN12616000724471)**





Participants

■ Inclusion

- admitted to the Gold Coast University Hospital Acute Stroke Unit (ASU) with a stroke or transient ischemic attack (TIA).
- received their initial swallowing assessment during speech pathology working hours on week days.
- Participants with high intracranial pressure were discussed with the treating consultant prior to assessment

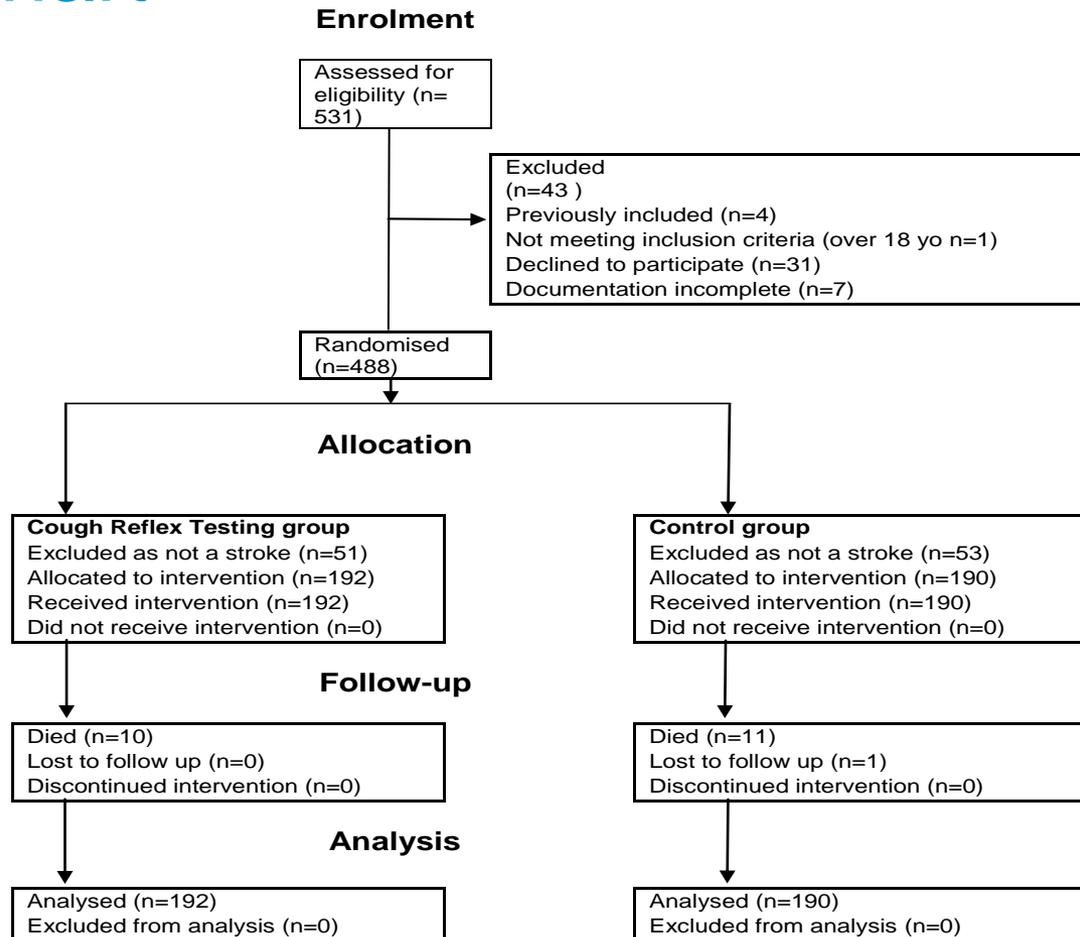
■ Exclusion

- under 18 years of age
- known to be pregnant
- being treated palliatively
- required an initial swallowing assessment on the weekend or public holiday or were
- unable to provide informed consent





Flowchart



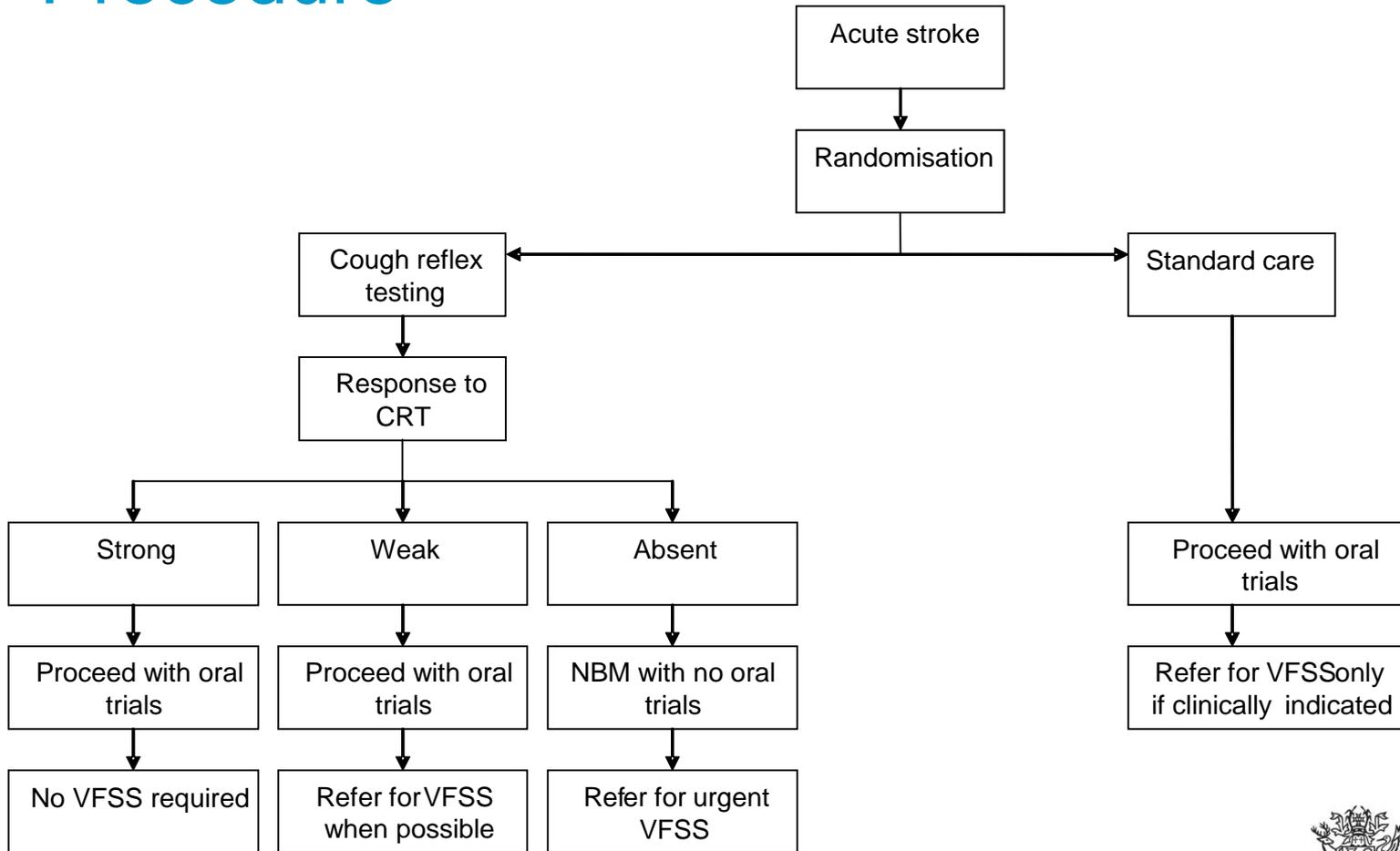


Demographics

	Patients (n=382)		Standard Care (N=190)		P value
	Cough Reflex Testing group (N=192)				
Age	Mean 69.1	(SD 15)	Mean 69.4	(SD 14)	0.839
Sex (female)	76	39.90%	75	39.5%	0.983
Comorbidities					
Previous stroke	50	25.8%	57	30.2%	0.371
Respiratory comorbidities	16	8.2%	19	10.1%	0.561
Cardiac comorbidities	70	36.1%	72	38.1%	0.741
Diagnosis					
Left cortical	41	21.4%	31	16.3%	0.558
Right cortical	45	23.4%	40	21.1%	0.673
Cerebellar	10	5.2%	5	2.6%	0.21
Right subcortical	17	8.9%	23	12.1%	0.29
Left subcortical	16	8.3%	20	10.5%	0.413
TIA	49	25.5%	55	28.9%	0.74
Other	14	7.3%	16	8.4%	0.626



Procedure





CRT Group



- Case history
- Oro-motor assessment
- All participants underwent testing adapted from the procedure that was developed by Miles et al (2013). Details of this procedure are as follows:
 - 3ml of citric acid (0.6mol/L) was administered via a nebuliser.
 - “I’m going to give you some air to breath, keep breathing normally”.
 - The test was repeated three times with a rest between each presentation.
- The speech pathologist rated each participant’s cough response across three trials as either strong, weak, or absent.



Standard care

- Case history
- Oro-motor assessment
- Trials of appropriate diet and fluids consistencies

- Requesting a referral to VFSS was left to the clinical judgement of the assessing speech pathologist.





Outcome measures

- Length of stay on acute ward (days)
- Confirmed aspiration pneumonia within 3 months
- Assessment time (mins)
- % of participants who required VFSS
- % of participants who received VFSS
- Time from initial assessment to referral to VFSS (days)
- Time from referral to completion of VFSS (days)

- Patient satisfaction
- Clinician questionnaire





Data analysis

- Statistical analyses were performed using SPSS (v22)
- To determine differences between groups
 - Continuous variables (e.g., time of assessment, LOS) independent t-tests and Mann Whitney-U tests dependant on normality upheld
 - Categorical data (e.g., presence of pneumonia) Chi square tests
 - *Post hoc sub-analyses were undertaken for the primary outcome measures according to stroke type: cortical, subcortical and TIA.*
- Satisfaction ratings reported descriptively
- Clinician questionnaires free form responses: Qualitative content analyses coded by two authors
- Results were analysed on a per protocol basis.





Results – Comparison Standard vs CRT

	Standard care n = 190	CRT				Standard care vs CRT comparison p value
		Overall n = 192	Strong n = 175	Weak n = 13	Absent n = 4	
Length of stay on acute ward (days)	5.5 (4.9)	6.2 (4.9)	5.8	10.3	12.5	0.195
Confirmed aspiration pneumonia within 3 months	4.3%	1.0%	0.0%	7.7%	25.0%	0.086
Assessment time (mins)	7.1 (4.3)	10.3 (4.8)	9.8	17.7	10.88	0.000
Participants who required VFSS	4.20%	10.90%	2.20%	100%	100%	0.013
Participants who received VFSS	3.68%	5.73%	1.71%	38.40%	75.00%	0.047
Time from initial assessment to referral to VFSS (days)	7.3 (7.7)	2.2 (2.9)	2.7	3.2	0	0.064
Time from referral to completion of VFSS (days)	2.5 (1.0)	2.7 (2.0)	5 days	2 days	3 days	0.78



Results – Stroke type impact on LOS and Aspiration

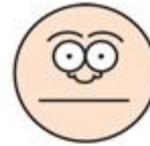
Stroke type	CRT n=	Standard care n=	CRT aspiration %	Standard aspiration %	Between group difference X= p=	CRT mean LOS (days) (SD)	Standard Mean LOS (days) (SD)	p=
Cortical stroke	86	71	0 n = 0	8.45 n = 6	5.432 0.020**	7.67 (5.65)	7.40 (6.65)	.787
Subcortical stroke	43	48	4.87 n=2	0 n=0	0.632 .437	6.86 (4.85)	5.56 (3.88)	.161
TIA stroke	49	55	0	0	n/a *	3.18 (1.24)	2.96 (1.22)	.363

CRT= cough reflex testing, LOS= length of stay, **= statistically significant, *= this test was unable to be performed as the dependant variable was a constant.



Results - Patient satisfaction

- The majority (95.2%) of would recommend that other patients receive CRT as part of the initial swallowing assessment post stroke.
- The mean level of comfort reported by the patients was 5 out of 10.





Results - Staff participants

8 Clinicians

Age	21-29	30-39		
	50%	50%		
Years of experience	0-2	2-3	3-5	5-10
	12.5%	12.5%	37.5%	37.5%





Results - Staff perceptions of perceived barriers

Service / access issues:

- Additional access to VFSS required
- Additional training and competency maintenance for staff
- Access to citric acid (locked in medication rooms)

Patient factors:

- **Perceptions of discomfort**
- Potential increase in time spent arranging instrumental assessments
- Communication difficulties hinder patients abilities to understand and follow instruction

Clinical Time:

- **Increase time to gather equipment (citric acid, air port, nebuliser mask and tubing)**
- Additional time required to provided education to patients and their family
- **Additional time to administer the test**

Other:

- Research process barriers (paperwork)



Results - Staff perceptions – Perceived Benefits

Knowledge and confidence:

- **Improved decision making in dysphagia management and referral for instrumental assessments**
- Increased knowledge of cough physiology and clinical implications
- Creates opportunities to provide education to the multi-disciplinary team on speech pathology interventions

Patient outcomes:

- **Increased ability to identify patients at risk of silent aspiration during a bedside assessment**
- Reduced rates and complications from aspiration pneumonia
- Shorted stay in hospital

Enhanced assessment of dysphagia:

- A more objective assessment of sensory information and cough physiology
- More reliable and comprehensive assessment

Other:

- **Pro-active / preventative intervention rather than reactive.**
- Non-invasive





Discussion

- **A new finding!** The finding of significantly reduced aspiration rates following a **cortical stroke has not been reported in previous CRT research [8]**.
- The finding that CRT **did not impact the overall** incidence of aspiration pneumonia may be related to multifactorial nature of aspiration pneumonia.





Limitations

- **Training** - While all clinicians were given **one on one training**, **written education**, and **ongoing supervision**, some clinicians deviated from the clinical pathway.
 - This suggests the ongoing training is required to maintain competency
- **Access to VFSS** - Onsite **access to VFSS 5** days per week, which meant that patients usually received a VFSS within 1-2 days of referral.
 - Other facilities may not have this same level of access





Implication for practice

- Implementing CRT as part of a clinical pathway may be useful in reducing rates of aspiration pneumonia for acute stroke patients, in **particular those who had a cortical stroke**.
- The use of CRT may also provide speech pathologists with **additional knowledge** and **confidence in making decision**, regarding dysphagia management.
- These factors, combined with **positive patient satisfaction** and **only minor increases in clinician time**, make implementating a CRT pathway a **potentially feasible** and useful **addition** for clinical bedside swallowing assessment for acute stroke patients.





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References

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Questions ???

