Worcestershire Acute Hospitals NHS Trust

Respiratory Muscle Strength Training (RMST) Guideline

This guidance does not override the individual responsibility of health professionals to make appropriate decision according to the circumstances of the individual patient in consultation with the patient and /or carer. Health care professionals must be prepared to justify any deviation from this guidance.

Introduction

Respiratory Muscle Strength Training (RMST) refers to both Expiratory and Inspiratory Muscle Strength Training (EMST and IMST) which is an evidenced based exercise programme for patients with weakened respiratory systems, dysphagia and dysphonia.

This guideline is aimed at outpatients who have swallowing and/or voice difficulties. These patients will have been referred from ENT and/or who have completed head and neck cancer treatment.

This guideline is for use by the following staff groups:

Speech and Language Therapists

Lead Clinician(s)

Mirjana Rasovic	Professional Lead Speech and Language Therapist
Helen Griffiths	Dysphagia Lead Speech and Language Therapist
Approved by *Therapies Clinical Governance* on:	24th March 2023
Review Date: This is the most current document and should be used until a revised version is in place	24th March 2026

Key amendments to this guideline

Date	Amendment	Approved by:
24th March 23	New document approved	Therapies Clinical Governance

Background

What is Respiratory muscle strength training (RMST)?

RMST refers to a rehabilitation approach which aims to improve the function of the respiratory muscles through specific exercises. RMST has historically focussed on promoting the strengthening of respiratory muscles with athletes, before then exploring its benefits on lung function in healthy adults. More recently RMST has been researched in people who have respiratory complications with its wider benefits relating to swallowing and communication having been cited.

RMST is the overarching term used which encompasses expiratory muscle strength training (EMST) and inspiratory muscle strength training (IMST).

EMST increases the maximal pressure of the expiratory muscles (abdominal and internal intercostal muscles). EMST is an exercise therapy using a simple device, where patients are required to forcefully expire into a spring-loaded one-way valve. The valve is designed so that it can block the airflow produced by the user until the desired pressure has been achieved (Hegland et al., 2008). The valve can be incrementally tightened to increase resistance with the aim of strengthening the employed muscles over time (Hutcheson et al., 2018). The EMST150 is the only device that has proven clinical effectiveness in improving swallow function.

IMST exercise the inspiratory muscles (the diaphragm and external intercostal muscles).

We are focusing on the use of EMST within our clinical setting as it has a broader clinical application.

Speech and Language Therapy role in EMST:

Speech and language therapists are involved with people who have swallowing difficulties (dysphagia), voice difficulties (dysphonia), breathing difficulties such as induced laryngeal obstruction (ILO) and managing chronic cough.

The goal of swallow rehabilitation is to facilitate neuromuscular plasticity for achieving long-term improvement in function by integrating exercise and neural plasticity principles. Although EMST is a “non-swallow” exercise, evidence of transference has been shown in which respiratory strength training facilitated improvements in deglutition. EMST particularly incorporates intensity, repetition, overload, specificity, saliency and transference. (Taken from:Take my breath away: Expiratory muscle strength training to improve deglutition and cough functions - Dysphagia Cafe)

EMST is a novel exercising program that is gaining traction within the speech and language therapy discipline as it has been found to be beneficial in reducing the complications of aspiration, improving cough strength and improving quality of life in a range of aetiologies (Sapienza, 2008; Burkhead et al., 2007). EMST can assist in dysphagia management in two possible ways: by strengthening the forces which generate subglottic expiratory pressure, which should yield a stronger cough and improve ability to clear aspirate from the airway, and/or by improving airway closure by exercising the key muscles involved in swallowing (Wheeler-Hegland et al 2008; Hutcheson et al., 2018). A study by Wheeler-Hegland et al (2008) identified improved hyoid movement when using the EMST device compared to the swallow as shown during videoflouroscopy. These findings led to research of EMST for swallow rehabilitation in several different aetiologies. Patient groups include Parkinson’s disease (Byeon 2016; Darling-White & Huber 2017,) COPD (Patchett et al 2017), head and

neck cancer (Hutcheson et al 2018), stroke (Hegland et al 2016) cervical or spine injury (Nordqvist 2017, Darling-White & Huber 2017). Patients in the acute or sub-acute phase post stroke i.e. first 3 months' post stroke, have not been included in EMST trials, so currently there is limited evidence and guidance regarding implementation in the early post stroke phase.

Tsai et al., (2016) found increased phonation times were achieved for people with voice difficulties after a 5 week course of EMST exercise. Wingate et al. (2007) found a combined approach of traditional voice therapy exercises and EMST resulted in improved vocal loudness, quality, phonation and respiratory drive for voice production, reduced laryngeal symptoms (shown by VRS) and VHI score. This was for patients with both functional and organic changes (benign) to the laryngeal anatomy.

Scope of practice:
To provide EMST to our outpatient population including patients referred via ENT for dysphagia, voice and head & neck cancer, including those patients with late effects from head and neck radiotherapy.

Therapists will have completed EMST training via external course.

Considerations:

- Patient centred goal identified for swallow rehabilitation
- Reduced hyolaryngeal movement &/or aspiration identified on videofluoroscopy
- Able to maintain lip seal
- Able to follow and recall instructions and report concerns
- Patient commitment to daily independent therapy
- Identified aspiration on instrumental assessment
- History of recurrent chest infections
- Impact on quality of life
- Voice problems excluding those arising from active cancer.

Precautions and Contraindications:

EMST Contraindications D

NB Abdominal hernia types: inguinal, femoral, incisional, umbilical.

Additional precautions (not in Aspire list)

- Mild-moderate COPD - keep resistance at 50% (Sapioza presentation 2021).
- Hiatus hernia
-

Additional contraindications (not in Aspire list)

- Severe COPD
- Recent stroke
- Significant cognitive impairment
- Extensive cardiac history
- Recent head and neck surgery
- Active cancer

If in doubt, seek opinion of the Specialist or GP.

Methodology:

Equipment: EMST150 device will be purchased on an individual patient basis via IPROC.

Patients will initially be given a training protocol followed by a maintenance protocol. A maintenance protocol is required as atrophy is known to occur (40% in 4-6 weeks) as a component of normal aging) (Christine Sapienza: Respiratory Muscle Strength training presentation 2021)

The initial protocol consists of:

- 5 sets of 5 breaths
- 5 days a week
- for 5 weeks

This will then change during the maintenance phase to:

- 2-3 days per week,
- 2 sets of 5 breaths per day

This will occur once the speech and language therapist has reviewed progress. For further details, please see the link and leaflets below for further details:
Demonstration link: https://www.youtube.com/watch?v=0qHfliQjlf8

Patients will be provided with a EMST 150 and patient leaflet outlining the therapy plan:


What is Expiratory Muscle Strength Tra

The device also comes with a general advice leaflet:


EMST handout page 1.pdf


EMST handout page 2.pdf

Monitoring:
This document shall be monitored by the speech and language therapy team on a two yearly basis.

References

Tsai YC, Huang S, Che WC, Huang YC, Liou TH, Kuo YC. The Effects of Expiratory Muscle Strength Training on Voice and Associated Factors in Medical Professionals With Voice Disorders. *Journal of Voice*. 2016 Nov;30(6):759.e21-759.e27. doi 10.1016/j.jvoice.2015.09.012. Epub 2015Nov 10.

Vocal Cord Paralysis Doctor Philadelphia Treatment Options. Retrieved April 14, 2018, from https://www.bergerhenryent.com/vocal-cord-paralysis/

Hegland KW, Davenport PW, Brandimore AE, Singletary FF, Troche MS. Rehabilitation of Swallowing and Cough Functions Following Stroke: An Expiratory Muscle Strength Training Trial. *Archives of Physical Medicine and Rehabilitation*. 2016 Aug;97(8):1345-51. doi:10.1016/j.apmr.2016.03.027. Epub 2016 Apr26.

Darling-White, M. & Huber, J. E. (2017).The Impact of Expiratory Muscle Strength Training on Speech Breathing in Individuals With Parkinson's Disease: A Preliminary Study.

American Journal of Speech Language Pathology, 26(4), 1159-1166. doi: 10.1044/2017_AJSLP-16-0132.

Nordqvist, C. (2017,December 21). Dysphagia: Symptoms, diagnosis, and treatment. Retrieved March 30, 2018, from https://www.medicalnewstoday.com/articles/177473.php

Byeon, H. (2016). Effect of simultaneous application of postural techniques and expiratory muscle strength training on the enhancement of the swallowing function of patients with dysphagia caused by parkinson's disease. *Journal of Physical Therapy Science*, *28*(6), 1840–1843.http://doi.org/10.1589/jpts.28.1840

Wheeler-Hegland KM, Rosenbek JC, Sapienza C.M.(2008). Submental sEMG and hyoid movement during Mendelsohn maneuver, effortful swallow, and expiratory muscle strength training. *Journal of Speech Language and Hearing Research*. Oct;51(5):1072-87. doi: 10.1044/1092-4388(2008/07-0016). Epub 2008 Aug 26.

Bupa. Abdominal Hernia. https://www.bupa.co.uk/health-information/digestive-gut-health/abdominal-hernia#:~:text=An%20abdominal%20hernia%20is%20when,can%20sometimes%20cause%20serious%20complications.. Accessed 21/6/23.

Aspire. Precautions and Contraindications. https://emst150.com/wp-content/uploads/2021/03/Contraindications-11-2019.pdf. Accessed 21/6/23.

Monitoring

Page/ Section of Key Document	Key control:	Checks to be carried out to confirm compliance with the Policy:	How often the check will be carried out:	Responsible for carrying out the check:	Results of check reported to: *(Responsible for also ensuring actions are developed to address any areas of non-compliance)*	Frequency of reporting:
	WHAT?	**HOW?**	**WHEN?**	**WHO?**	**WHERE?**	**WHEN?**
	These are the 'key' parts of the process that we are relying on to manage risk. We may not be able to monitor every part of the process, but we MUST monitor the key elements, otherwise we won't know whether we are keeping patients, visitors and/or staff safe.	What are we going to do to make sure the key parts of the process we have identified are being followed? (Some techniques to consider are; audits, spot-checks, analysis of incident trends, monitoring of attendance at training.)	Be realistic. Set achievable frequencies. Use terms such as '10 times a year' instead of 'monthly'.	Who is responsible for the check? Is it listed in the 'duties' section of the Policy? Is it in the job description?	Who will receive the monitoring results? Where this is a committee the committee's specific responsibility for monitoring the process must be described within its terms of reference.	Use terms such as '10 times a year' instead of 'monthly'.
	Completing contraindications checklist.	Spot checks, audit, spreadsheets.	6 monthly	All EMST trained SLTs	Professional Clinical SLT Lead and Departmental Manager	6 montly

Contribution List

Contribution List

This key document has been circulated to the following individuals for consultation;

Designation
Staff in the Acute Speech and Language Therapy team

This key document has been circulated to the chair(s) of the following committees / groups for comments;

Committee
Therapies Clinical Governance Approval Group

Supporting Document 1 - Equality Impact Assessment Tool

To be completed by the key document author and included as an appendix to key document when submitted to the appropriate committee for consideration and approval.

Please complete assessment form on next page;

Worcestershire Acute Hospitals NHS Trust

Worcestershire Acute Hospitals NHS Trust

Herefordshire & Worcestershire STP - Equality Impact Assessment (EIA) Form
Please read EIA guidelines when completing this form

Section 1 - Name of Organisation (please tick)

Herefordshire & Worcestershire STP		Herefordshire Council		Herefordshire CCG	
Worcestershire Acute Hospitals NHS Trust	x	Worcestershire County Council		Worcestershire CCGs	
Worcestershire Health and Care NHS Trust		Wye Valley NHS Trust		Other (please state)	

Name of Lead for Activity	

Details of individuals completing this assessment	**Name**	**Job title**	**e-mail contact**
	Helen Griffiths	Speech and Language Therapy Dysphagia Lead	Helen.griffiths4@nhs.net
Date assessment completed	05.06.2023		

Section 2

Activity being assessed (e.g. policy/procedure, document, service redesign, policy, strategy etc.)	**Title:** Expiratory Muscle Strength Training guideline			
What is the aim, purpose and/or intended outcomes of this Activity?	Provide up to date information and guidance on the practice of using EMST with specifically identified patient groups delivered by speech and language therapists within WAHT.			
Who will be affected by the development & implementation of this activity?	x x x ❑	Service User Patient Carers Visitors	x ❑ ❑ ❑	Staff – speech and language therapists Communities Other _____
Is this:	❑ Review of an existing activity x New activity			

	❑ Planning to withdraw or reduce a service, activity or presence?
What information and evidence have you reviewed to help inform this assessment? (Please name sources, eg demographic information for patients / services / staff groups affected, complaints etc.	Research papers – see reference list. Clinical consensus nationwide. Consent from Addenbrookes to use their resources as a template.
Summary of engagement or consultation undertaken (e.g. who and how have you engaged with, or why do you believe this is not required)	Engaged with key stakeholders – WAHT acute speech and language therapy team and wider therapy leads through clinical governance panel.
Summary of relevant findings	All in agreement following above consultation and research.

Section 3

Please consider the potential impact of this activity (during development & implementation) on each of the equality groups outlined below. **Please tick one or more impact box below for each Equality Group and explain your rationale**. Please note it is possible for the potential impact to be both positive and negative within the same equality group and this should be recorded. Remember to consider the impact on e.g. staff, public, patients, carers etc. in these equality groups.

Equality Group	Potential positive impact	Potential neutral impact	Potential negative impact	Please explain your reasons for any potential positive, neutral or negative impact identified
Age	x			
Disability	x			
Gender Reassignment		x		
Marriage & Civil Partnerships		x		
Pregnancy & Maternity		x		
Race including Traveling Communities		x		
Religion & Belief		x		
Sex		x		
Sexual Orientation		x		

Equality Group	Potential positive impact	Potential neutral impact	Potential negative impact	Please explain your reasons for any potential positive, neutral or negative impact identified
Other Vulnerable and Disadvantaged Groups (e.g. carers; care leavers; homeless; Social/Economic deprivation, travelling communities etc.)	X			
Health Inequalities (any preventable, unfair & unjust differences in health status between groups, populations or individuals that arise from the unequal distribution of social, environmental & economic conditions within societies)	X			

Section 4

What actions will you take to mitigate any potential negative impacts?	Risk identified	Actions required to reduce / eliminate negative impact	Who will lead on the action?	Timeframe
	Inappropriate patient selection	SLT to complete contraindication checklist as per guideline	Mirjana Rasovic/Helen Griffiths	Ongoing
	Staffing capacity	Releasing SLT time to provide this service so patients can be seen in timely way	Mirjana Rasovic/Helen Griffiths	Ongoing
	Equipment availability	Confirmation of supplier to ensure sufficient supply of EMST devices so they are provided on the NHS within ENT budget	Mirjana Rasovic/Helen Griffiths	Ongoing
How will you monitor these actions?	6 monthly review in meeting with EMST Trained SLTs			
When will you review this EIA? (e.g in a service redesign, this EIA should be revisited regularly throughout the design & implementation)	2 years			

Section 5 - Please read and agree to the following Equality Statement

1. Equality Statement

1.1. All public bodies have a statutory duty under the Equality Act 2010 to set out arrangements to assess and consult on how their policies and functions impact on the 9 protected characteristics: Age; Disability; Gender Reassignment; Marriage & Civil Partnership; Pregnancy & Maternity; Race; Religion & Belief; Sex; Sexual Orientation

1.2. Our Organisations will challenge discrimination, promote equality, respect human rights, and aims to design and implement services, policies and measures that meet the diverse needs of our service, and population, ensuring that none are placed at a disadvantage over others.

1.3. All staff are expected to deliver services and provide services and care in a manner which respects the individuality of service users, patients, carer's etc, and as such treat them and members of the workforce respectfully, paying due regard to the 9 protected characteristics.

Signature of person completing EIA	H Griffiths
Date signed	2.8.23
Comments:	
Signature of person the Leader Person for this activity	M Rasovic
Date signed	2.8.23
Comments:	

Supporting Document 2 – Financial Impact Assessment

To be completed by the key document author and attached to key document when submitted to the appropriate committee for consideration and approval.

	Title of document:	Yes/No
1.	Does the implementation of this document require any additional Capital resources	Yes – buying the device?
2.	Does the implementation of this document require additional revenue	No
3.	Does the implementation of this document require additional manpower	No
4.	Does the implementation of this document release any manpower costs through a change in practice	No
5.	Are there additional staff training costs associated with implementing this document which cannot be delivered through current training programmes or allocated training times for staff	No
	Other comments:	N/A

If the response to any of the above is yes, please complete a business case and which is signed by your Finance Manager and Directorate Manager for consideration by the Accountable Director before progressing to the relevant committee for approval.