



# The use of expiratory muscle strength training (EMST) in the management of dysphagia and aspiration in the head and neck (H&N) cancer population – experiences from Prince of Wales Hospital

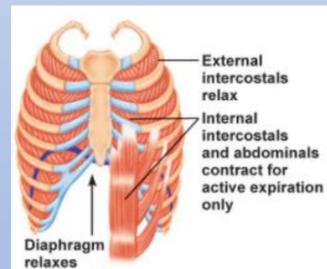


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## Introduction

Dysphagia is associated with an increased health-care cost burden due to aspiration pneumonia, dehydration and malnutrition and is shown to correlate strongly with poor quality of life<sup>1</sup>. Radiation induced dysphagia is a well-documented and difficult to manage sequela of treatment for H&N cancer.

Traditional swallowing therapies have had sub-optimal compliance and limited long-term benefits<sup>2</sup>. EMST focuses on training the muscles of forced expiration which appears to impact a range of critical swallowing parameters including hyoid movement, airway closure and cough strength.<sup>3, 4</sup>



Picture:1 Muscles of forced expiration



Picture:2 Device use

EMST uses a hand-held device with a variable tension spring and a valve which opens when enough pressure is generated (through forced expiration) when blowing into the device (pictures 1 & 2). Tension is adjustable to allow increased resistance over time following the principals of muscle strength training.

An earlier feasibility study at POWH in 2019 supported research evidence suggesting EMST has a role to play in the management of dysphagia in the H&N population. Adjustments were made to therapy protocol after this study.

## Objectives

- Deliver an 8 week EMST therapy program to H&N cancer patients presenting with dysphagia and aspiration.
- Evaluate swallowing and quality of life outcomes and patient adherence to the therapy program.

## Methods

Therapy protocol was covered by HREC 10/131 & NRA 15/2020 with patients meeting the following criteria:

- Treated for H&N cancer with definitive or adjuvant radiotherapy.
- Dysphagia with aspiration confirmed on MBS.
- > six months post treatment.
- Medically cleared to participate.
- Able to follow commands and complete home tasks.

Therapy was delivered face to face or via telehealth with and 8 week treatment phase followed by home-based maintenance phase.

## Study Cohort

Twenty participants were recruited presenting with a range of treatment histories and tumour sub-sites (figures 1 & 2). Time since treatment ranged from one to eighteen years. Sixteen participants were males and four were female.

Figure: 1 Tumour sub sites



Figure: 2 Treatment type



## Outcome Measures

- Maximum expiratory pressure using spirometry (MEP)
- Functional Oral Intake Score (FOIS)
- Penetration Aspiration Scale (PAS)
- SWAL-QoL - modified
- Dysphagia Outcome Severity Scale (DOSS)
- Pre and post instrumental swallow assessment – modified barium swallow

## Therapy Protocol

- Initial session with Speech Pathologist (SP).
- Baseline outcome measures and instrumental assessment - modified barium swallow (MBS).
- Determine device resistance @ 75% of patient's maximum expiratory effort.
- Complete 1 set of therapy 5 x 5 forced exhalations with specific rest breaks.
- Therapy = 1 set forced exhalations.
- Complete 5 sessions over a 7 day period
- Weekly follow up with SP - monitor progress, trouble shoot, re-set device.
- Face to face or via telehealth.
- Complete a total of 8 weeks of therapy monitoring adherence.
- Post-treatment MBS and repeat validated outcome measures.

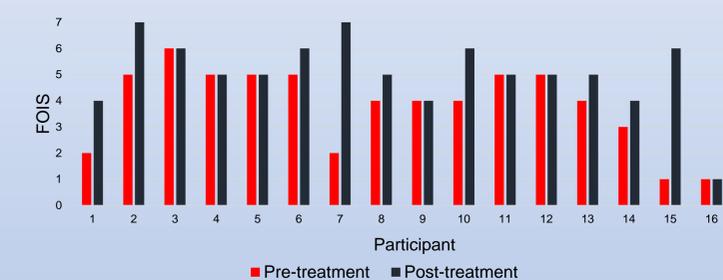
## Results

- Due to COVID-19 collection of MEP values using spirometry ceased. EMST device was used to determine expiratory effort and set resistance since this approach had been used in the previous feasibility study.
- Two patients failed to complete the program - multiple factors impacted including difficulty opening valve at lowest setting, unable to complete home program and periods of hospitalisation. Two patients were unable to progress in line with the therapy protocol due to the impact of COVID-19. The remaining sixteen completed the program and were included in analysis.
- Positive changes were reported across a range of domains in quality of life scores (QoL) on the SWAL-QoL including social aspects of eating and drinking as well as reduced episodes of coughing with oral intake. QoL scores showed improvements of between 11% - 25%. No scores declined in this domain.
- Some of measures lacked sensitivity. PAS scores did not reflect changes to volumes of aspiration nor changes to aspiration with the use of a swallow strategy.

## Treatment outcomes

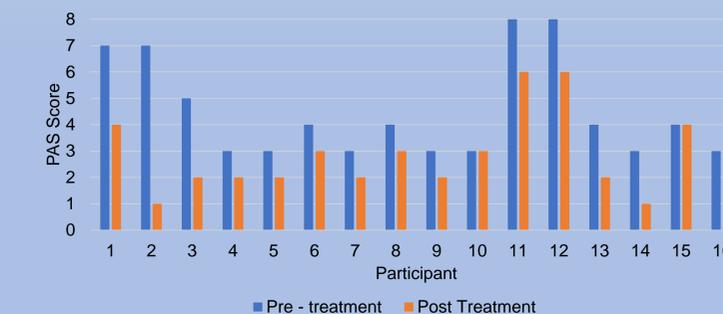
FOIS scores showed small changes suggesting therapy did not necessarily impact on range of textures tolerated (figure 3).

Figure: 3 Pre and Post Treatment FOIS Scores



Penetration and aspiration scores however were stable or improved. This may have both QoL and health care costs implications (figure 4).

Figure: 4 Pre and Post Treatment PAS Scores



## Conclusion

- Easily deliverable therapy - face to face or via telehealth.
- Swallow efficiency appears to be less impacted which reflected by stable or slight changes to FOIS values.
- Swallow safety appears to improve with reduced (indicating less aspiration) PAS scores post treatment.
- Good patient adherence and engagement in therapy supported by findings of improved QoL scores.
- A new low pressure EMST device is available which may assist those who have difficulty generating enough pressure to open the valve.
- Preliminary results support evidence that EMST may be effective in addressing aspiration in the H&N cancer population. A larger study cohort with more sensitive outcome measures would allow more robust analysis and there is ongoing recruitment to this study group.

## References:

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