

Expiratory Muscle Strength Training (EMST) and Dysphagia

2015 Adult Swallowing Group
NSW Speech Pathology
Evidence Based Practice
Network

Christian Wiley and Kylie Draper

Hans Bogaardt - Academic Member

Clinical Question

In patients with dysphagia, does EMST improve airway protection during swallowing?

Why this question?

- ▶ Emerging form of swallow rehabilitation topic
- ▶ Several sites interested in evidence for devices
- ▶ Potential in advocating for purchasing devices

What is EMST

- ▶ Calibrated one way, spring loaded valve to mechanically overload the expiratory and submental muscles.
- ▶ Results in resistance for breathing into device.
- ▶ The load and effort can be adjusted. Usually set to 75% of Maximum expiratory pressure - which is different for each individual.
- ▶ Clean every time you use, optional mouth piece for poor oral control. Can use it with a nose peg if required.
- ▶ Regimes vary - 5 breaths/5 sets/5 times per day/5 days per week. Rule often cited in the literature, benefits in tailoring to patient.
- ▶ Need to be careful with untreated GERD, COPD, HTN and pregnancy (can cause dizziness or reflux).
- ▶ Can also be used in dysarthria and dysphonia
- ▶ Cost \$85 plus \$9 for mouth piece

Calibrated markings for
valve adjustment
(0-150 cmH₂O)

Pressure relief valve

Mouthpiece





Instructions for use

- ▶ take a deep breath
- ▶ hold cheeks with hands (to reduce labial leakage)
- ▶ blow as hard as you can into the device
- ▶ Once air was flows freely through the device, threshold pressure has been reached.
- ▶ Once threshold pressure is reached - expiration is ceased.

The Evidence: Searching

- ▶ Initial searching by the group found 33 articles. Additional 4 articles provided by clinician with experience with using in EMST in clinical practice.
 - ▶ A majority of the articles did appear that they would be suitable to CAP however upon further analysis the studies commonly did not assess swallow function or were not clinical relevant to the question
- ▶ 3 CAPS were included
- ▶ Exclusion criteria:
 - ▶ No study conducted ie systematic reviews, opinion piece
 - ▶ The study was not conducted on patients with dysphagia ie healthy adults
 - ▶ The study did not measure swallowing of food/fluids
- ▶ All studies that were suitable for capping included author who holds patent for EMST device - potential conflict of interest.

The Evidence: Research Design

- ▶ Research designs
 - ▶ Randomised controlled trial
 - ▶ Case series

- ▶ Levels of evidence
 - ▶ 1 = level 2
 - ▶ 2 = Level 4

The Evidence: Participants

▶ Participants

- ▶ All studies were conducted on patients with Parkinson's disease
- ▶ Age ranges for all studies conducted were 55-82
- ▶ Number of participants in studies was 70, 40 of these used EMST



Pitts et al (2009)

- ▶ Pre and post test case series
- ▶ Ten male participants
- ▶ 4 week EMST program
- ▶ Used device 5 days a week, completing 5 sequential sets of 5 breaths per day (total 25 breaths/day).
- ▶ Pre and post MBS. 30mls thin fluids.
- ▶ No control group
- ▶ Measured Penetration/Aspiration scale, airway measurements and cough.
- ▶ Blinding

Results

- ▶ Significant decrease in penetration/aspiration scores - 7/10 reduced scores
- ▶ Significantly improved cough

Troche et al (2010)

- ▶ Administration of assessment
 - ▶ Random allocation
 - ▶ inter/intra-rater reliability
 - ▶ Blinding subjects and assessors
 - ▶ Control group (with sham treatment)
 - ▶ Penetration and aspiration scale, swallow physiology measures and quality of life.

Methodology

- ▶ Control group with sham treatment.
- ▶ Pre and post MBS conducted.
- ▶ Penetration/aspiration scale measured pre and post treatment
- ▶ Swallow physiology measures (hyoid movement, UES opening)
- ▶ Respiratory measures (Maximum expiratory pressure)
- ▶ Quality of life

Results

- ▶ Mean scores improved in the EMST group but not the sham group
- ▶ Moderate effect size (Cohen $d = 0.55$)
- ▶ Number needed to treat to gain one additional improvement is 5.3
- ▶ Number needed to treat to gain benefit is 1.8.
- ▶ EMST group showed statistically significant improvements in UES opening, UES widest, UES closure
- ▶ No improvement in Hyoid elevation duration. However sham group decreased
- ▶ Both groups reported improved quality of life

Troche et al (2014)

- ▶ Follow on study from Troche et al (2010)
- ▶ The study explored changes in MEP and penetration aspiration scale 3 months of EMST detraining (ie no usage/training using device)
- ▶ Same protocol as the RCT was completed for MEP and swallowing safety data collection and analysis

Methodology

- ▶ Not a great study
- ▶ Methodology and selection of participants was not clearly outlined, as was follow on project from Troche et al (2010)
- ▶ States “10 consecutive participants were offered enrolment in a detraining phase of study”.
 - ▶ The 10 participants selected from the original study were from the experimental (active) arm of the Troche et al (2010) RCT. There were 30 original participants within this group.

Results

- ▶ No significant difference in MEP or PAS 3 months post completion of EMST regime.
- ▶ The patients did not deteriorate
- ▶ Reported “the detraining effects on swallow safety were less clear and this appears to be because baseline swallow function across the individual participants was quite varied”

Clinical bottom line

- ▶ EMST may be an effective treatment to maintain or improve swallow function in patients with Parkinson's disease when compared to no treatment.
- ▶ However studies investigating benefits via swallow assessments in patients with dysphagia are limited and any benefits of EMST in improving airway protection in swallowing are suggestive.
- ▶ Findings from the literature, including articles on healthy participants indicate that EMST may improve, expiratory muscle function, cough function, UES opening and hyolaryngeal elevation. These improvements may increase airway protection during swallowing in a variety of dysphagia cohorts and prevent aspiration-related pulmonary complications.

Applying results to clinical practice

- ▶ Relatively new intervention
- ▶ No members of the adult swallowing EBP group currently use EMST for dysphagia
- ▶ Despite one good randomised control trial the current research does not justify any change to clinical practice.
- ▶ Unknown how it compares to other swallow rehab - which are more cost effective.
- ▶ EMST may have useful applications for specific physiological dysphagia impairments, the research is not present.
- ▶ EMST may be applicable in other areas of speech pathology e.g. dysarthria and dysphonia.

Considerations for the future

- ▶ Further research in patient populations other than Parkinson's disease
- ▶ Investigating benefit in specific breakdown in swallow/airway protection e.g. patients with aspiration risk due to reduced cough or hyoid movement.
- ▶ Comparison between other swallow rehabilitation
- ▶ Comparison of treatment regimes for EMST ie guidelines for administration given inconsistent reports in research and within clinical practice

Plans for 2016

- ▶ Brainstorming new ideas and topics for 2016
- ▶ Leadership team

Kylie Draper

Christian Wiley

Questions???

