Transcutaneous neuromuscular electrical stimulation for oropharyngeal dysphagia

Interventional procedures guidance
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Your responsibility

This guidance represents the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, healthcare professionals are expected to take this guidance fully into account. However, the guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

Commissioners and/or providers have a responsibility to implement the guidance, in their local context, in light of their duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity, and foster good relations. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

1 Recommendations

1.1 Current evidence on the efficacy of transcutaneous neuromuscular electrical stimulation (NMES) for oropharyngeal dysphagia is limited in quality. The evidence on safety is limited in both quality and quantity but there were no
major safety concerns. Therefore, this procedure should only be used with
special arrangements for clinical governance, consent and audit or research.

1.2 Clinicians wishing to undertake transcutaneous NMES for oropharyngeal
dysphagia should take the following actions.

- Inform the clinical governance leads in their NHS trusts.
- Ensure that patients understand the uncertainty about the procedure's safety and
efficacy and provide them with clear written information. In addition, the use of NICE's
information for the public is recommended.
- Audit and review clinical outcomes of all patients having transcutaneous NMES for
oropharyngeal dysphagia (see section 7.1).

1.3 NICE encourages further research into transcutaneous NMES for
oropharyngeal dysphagia, which should clearly document the indications for
treatment and the details of patient selection. Research should document the
timing of initiation of treatment after onset of symptoms, as well as precise
information about the procedure technique. Outcome measures should include
freedom from tube feeding, quality of life and duration of treatment effect.
NICE may review the procedure on publication of further evidence.

2 Indications and current treatments

2.1 Difficulty in swallowing (dysphagia) can result from neurological impairment
affecting the muscles of the oropharynx. It can occur as a result of stroke,
traumatic brain injury, disorders of cerebral development, neurodegenerative
conditions and major head and neck surgery, such as removing cancer.
Dysphagia may lead to malnutrition, dehydration and/or aspiration pneumonia.
This guidance only applies to adults with oropharyngeal dysphagia.

2.2 Treatment options depend on the cause and severity of the dysphagia.
Conservative options (traditional therapy) involve swallowing therapy to
help the patient relearn swallowing techniques and strengthen oropharyngeal
muscles. In severe cases nasogastric tubes or percutaneous endoscopic
gastrostomy tubes may be used to provide nutritional support.
3 The procedure

3.1 Transcutaneous neuromuscular electrical stimulation (NMES) is usually used as an adjunct to traditional swallowing therapy for treating oropharyngeal dysphagia. Swallowing therapy uses exercises to improve muscle function. The aim of NMES is to increase the effectiveness of swallowing therapy. Its mechanism of action is thought to include accelerating the development of muscle strength and promoting central or cortical recovery.

3.2 NMES is usually administered by a speech and language therapist after appropriate diagnosis and patient selection. Therapists need appropriate training to use the procedure. The speech and language therapist places electrodes in selected positions on the patient's neck, through which small electrical currents are then passed to stimulate the peripheral nerve supply of the pharyngeal and/or laryngeal muscles. Stimulus intensity may be at a low sensory level, or at a higher motor level to trigger muscle contractions. Under the supervision of the therapist, the patient exercises their swallowing muscles while receiving concurrent electrical stimulation. Treatment duration recommendations vary by device, but can be up to 1 hour. The mild electrical stimulation can produce feelings ranging from tingling and warmth to a 'grabbing' sensation.

3.3 The position of the electrodes and levels of current used vary from patient to patient. There is a range of NMES devices that use different electrode designs, positions and stimulus intensities. At an initial assessment, videofluoroscopy or clinical observation may be used to optimise the placement of treatment electrodes and to determine an appropriate stimulus intensity.

4 Efficacy

This section describes efficacy outcomes from the published literature that the Committee considered as part of the evidence about this procedure. For more detailed information on the evidence, see the interventional procedure overview.

4.1 A systematic review of 7 studies including 291 patients treated by neuromuscular electrical stimulation (NMES; n=175) or traditional swallowing therapy (n=116) reported an overall pooled standardised mean difference of 0.77 in favour of NMES (95% confidence interval 0.13–1.41, p=0.02). A
4.2 A randomised controlled trial of 120 patients treated by NMES alone (n=40), NMES plus traditional therapy (n=40) or traditional therapy-alone (n=40) reported that Dysphagia Outcome and Severity Scale (DOSS) scores (scores range from 1 to 7 with higher scores indicating decreasing dysphagia severity) improved from 2.7±1.6 to 5.6±1.6 in the NMES-alone group, 2.5±1.6 to 6.9±1.6 in the NMES plus traditional therapy group and from 2.7±1.6 to 5.3±1.4 in the traditional therapy-alone group at 4-week follow-up (p<0.01 for all comparisons). The NMES plus traditional therapy group had significantly greater improvements in DOSS scores than the NMES-alone and traditional therapy-alone groups (p<0.01). No statistically significant differences were observed in the improvements in DOSS scores between the NMES-alone and traditional therapy-alone groups.

4.3 A randomised controlled trial of 36 patients treated by NMES and thermal-tactile stimulation (n=16) or thermal-tactile stimulation alone (n=12), reported that Penetration and Aspiration Scale (PAS) scores (scores range from 1 to 8, with decreasing scores indicating less severe aspiration) for semi-solid boluses changed from 5.5 to 2.5 in the NMES plus thermal-tactile stimulation group (p<0.05) and from 3.5 to 4 in the thermal-tactile stimulation-alone group (not statistically significant) at 4-week follow-up. PAS scores for liquid boluses reduced from 7 to 5 in the NMES plus thermal-tactile stimulation group (p<0.05) and from 7 to 6.5 in the thermal-tactile stimulation-alone group (not statistically significant) at follow-up. The NMES plus thermal-tactile stimulation group had significantly greater improvements in PAS scores for all bolus types than the thermal-tactile stimulation-alone group (p<0.05).

4.4 A non-randomised comparative study of 110 patients treated by NMES (n=63) or thermal-tactile stimulation (n=36) reported that SFSS scores (scores range from 0 to 6 with higher scores indicating decreasing dysphagia severity) improved from 0.8±1.0 to 4.5±1.7 (p<0.0001) and from 0.8±1.2 to 1.3±1.1 (p=0.05) respectively at 3-year follow-up. The NMES group had significantly
greater improvements in SFSS scores than the thermal-tactile stimulation group (p<0.0001). The percentages of patients who had an SFSS score of 6 in the NMES and thermal-tactile stimulation groups were 35% and 0% respectively (numbers not reported) at follow-up assessment (p<0.0002).

4.5 A randomised controlled trial of 46 patients treated by NMES (n=14) or sham stimulation (n=12) reported that mean functional dysphagia scale scores (scores range from 0 to 100 with lower scores indicating a better ability to eat) decreased by 11.4±8.1 in the NMES group and 3.3±14.0 in the sham stimulation group (follow-up period was not reported; p=0.04 between groups).

4.6 The specialist advisers listed key efficacy outcomes as length of hospital stay, bedside swallowing scales, quality of life measures, changes in the consistency and/or texture of diets, the occurrence of chest infections and indices derived from X-ray studies of swallowing such as the penetration and aspiration scale.

5 Safety

This section describes safety outcomes from the published literature that the Committee considered as part of the evidence about this procedure. For more detailed information on the evidence, see the interventional procedure overview.

5.1 A burning sensation on increasing neuromuscular electrical stimulation (NMES) during treatment was reported in 3 patients in a case series of 6 patients. In the same study, 2 patients had skin irritation and 1 patient had soreness where the electrodes were placed.

5.2 Coughing and expectoration were observed in 22% of treatment sessions in the case series of 6 patients (total number of sessions was not reported).

5.3 Neck and jaw pain and headaches were the most commonly reported adverse events, after stimulation, in a randomised controlled trial of 11 patients treated by NMES (n=6) or traditional therapy (n=5). Rates and follow up were not reported.

5.4 The specialist advisers stated that theoretical adverse events include chemical burns due to electrode application, heat burn due to current intensity, electrical
shock, muscle soreness, laryngospasm, arrhythmia, hypotension and the initial worsening of dysphagia.

6 Committee comments

6.1 The Committee found interpretation of the evidence difficult because studies included different patient populations with different types of condition (notably stroke and degenerative neurological diseases) for which the natural history and prospects for recovery are dissimilar.

6.2 The Committee noted patient commentaries that described substantial improvements in quality of life for both the patients and their carers: these potential benefits underpinned the recommendation for further research (see section 1.3).

7 Further information

7.1 This guidance requires that clinicians undertaking the procedure make special arrangements for audit. NICE has identified relevant audit criteria and has developed an audit tool (which is for use at local discretion).

Information for patients

NICE has produced information on this procedure for patients and carers (Information for the public). It explains the nature of the procedure and the guidance issued by NICE, and has been written with patient consent in mind.

About this guidance

NICE interventional procedures guidance makes recommendations on the safety and efficacy of the procedure. It does not cover whether or not the NHS should fund a procedure. Funding decisions are taken by local NHS bodies after considering the clinical effectiveness of the procedure and whether it represents value for money for the NHS.

This guidance was developed using the NICE interventional procedures guidance process.

We have produced a summary of this guidance for patients and carers. Tools to help you put the guidance into practice and information about the evidence it is based on are also available.
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