New Medicine Assessment

IQoro® for treatment of hiatus hernia *and* IQoro® for treatment of stroke related dysphagia

IQoro is not recommended for prescribing in Lancashire and South Cumbria ICB for treatment of hiatus hernia.

IQoro is recommended RAG rating RED for prescribing in Lancashire and South Cumbria ICB for treatment of stroke related dysphagia

Additional clinical trials are required to assess the safety and efficacy of IQoro and to define its potential place in therapy.

Summary of supporting evidence:

- The evidence base is in a small number of patients and experts advising NICE Medtech innovation briefings in both indications agreed that further studies are necessary.
- Studies are predominantly observational studies rather than randomised controlled trials (RCT). Only one RCT for the device appears to have been published to date (in the stroke related dysphagia indication).
- There was a lack of comparators used to compare IQoro with existing standard care treatments.
- In hiatus hernia management, the comparator in 2 studies (the palatal plate) is not typically used in the UK as part of standard care. It is also unclear whether IQoro is a replacement or adjuvant treatment.

Date: January 2023

Background and context

IQoro is a neuromuscular training device and exercise regime designed to strengthen the muscles in the face, mouth, throat, oesophagus and diaphragm. The resultant strengthening of these muscles is intended to reduce and relieve the symptoms of dysphagia. [1]

The device is made of acrylic and consists of a crescent-shaped panel that sits between the teeth and lips and a handle for pulling. The panel, or screen, is gripped between closed lips and the teeth and the handle is pulled outwards with the hand. To exercise, the user presses their lips together and pulls forward strongly for 5 to 10 seconds, repeating the exercise 3 times with 3 seconds of rest between repetitions. Training should be done 3 times each day, preferably before meals. People who cannot grip the device between their lips can use a 'jaw grip' technique. This involves the user using their fingers to pinch their lips closed while pulling with the other hand. People who cannot use the jaw grip technique can be helped by a carer. The device can be washed using soap and water, with toothpaste or in the dishwasher. [2]

The product is marketed for use in people with dysphagia and in people with a hiatus hernia and reflux symptoms. IQoro was added to the drug tariff in May 2022 and is available in either adult or child (8-10 years) size. Both sizes of device are priced are £121 in the drug tariff (priced at £145 if purchased by patients privately). [2]

The National Institute of Clinical Excellence (NICE) has identified IQoro as a unique mode of treatment for symptoms associated with hiatus hernia and for stroke-related dysphagia. [3] [4]

Summary of evidence

Summary of efficacy data in proposed use:

In March 2019, NICE published two Medtech innovation briefings which summarise the evidence for using IQoro in hiatus hernia (MIB176) [2] and stroke-related dysphagia (MIB175). [4]

Hiatus hernia

A hiatus hernia, or hiatal hernia, is when part of the stomach squeezes up into the chest through an opening ("hiatus") in the diaphragm. Hiatus hernia itself rarely has any noticeable symptoms. However, it can lead to gastro-oesophageal reflux disease (GORD) which require long term treatment with proton pump inhibitors and/or alginates to manage the symptoms of GORD. [5]

Laparoscopic fundoplication should be considered for people who have a confirmed diagnosis of acid reflux and enough symptom control with acid suppression therapy but who do not wish to continue with this therapy long term. It should also be considered in people who have a confirmed diagnosis of acid reflux and symptoms that are responding to a PPI, but who cannot tolerate acid suppression therapy. [2]

IQoro would be used to improve symptoms by attempting to address the underlying cause of hiatus hernia. This could potentially remove the need to take PPIs or to have surgery. [2]

People with severe oesophagitis (reflux disease) stay on a course of full-dose PPIs mainly prescribed by GPs in primary care in the long term. This would result in an approximated cost of between £18 and £100 per person per year. [2] [3]

Laparoscopic fundoplication can provide better long-term outcomes and although the initial cost is £2,281-£4,137, it can also provide cost savings compared with PPI maintenance. This is because people who have had surgery will no longer need PPIs and there will be a decrease in visits to GPs and hospital attendances. [2] [6]

A NICE Medtech innovation briefing identified three studies including 148 adults (21 patients were included in two of the studies) [7] [8] [9]. All of the studies are observational, before and after studies carried out in Sweden.

No power calculations were reported to assess for adequate sample size. Inclusion criteria varied between studies. All included patients had experienced symptoms for more than 1 year. **Hägg et al.** [8] included 21 hiatus hernia patients and 22 patients without a confirmed diagnosis, all of whom had been taking proton pump inhibitors (PPIs) for at least 1 year. These inclusion criteria should capture a population representative of the NHS. The total number of patients with a confirmed hiatus hernia in the 3 studies was 126. [2]

No control group having standard care was present in the studies. It is possible that any effect seen in an uncontrolled design could be overestimated. All studies included long-term hiatus hernia sufferers. Each study compared subjective, self-reported measurements of symptoms related to hiatus hernia before and after a treatment period of 6 to 8 months training with IQoro. Self-reported outcomes can be subject to bias and while necessary, particularly in symptom-based conditions, may need to be supported by more detailed measures. The company confirmed that these assessments were blinded from the researchers. Objective measurements were also taken to rule out the presence of a central nervous lesion. Phone calls and interim swallowing capacity tests were made during the training period to attempt to ensure compliance to the regime. The **Hägg et al**. studies [7] [8] reported the results of pressure measurements in the hiatus canal and upper oesophageal sphincter for the same 12 patients, to investigate the physical effect of training. Patients were not followed up longer than the training period, so there is no confirmation of long-term benefit. The company confirmed that all patients were advised to continue with their PPI medication during the training period. No information was published on patient's adherence to PPI medication, but the company have stated "all patients continued with their PPI medication as advised. As symptoms reduced, patients ceased to medicate. Use or cessation of PPIs was under the control of the patients' doctors. At end-of-training in the 3 studies quoted 93%, 58% and 61% ceased all PPI medication, the remainder mostly reduced dose and intake frequency. [2]

No further studies published after the NICE Medtech innovation briefing could be located.

Stroke-related dysphagia

Dysphagia (swallowing difficulty associated with foods, fluids and saliva) is common after acute stroke with an incidence between 40 and 78%. There is a link between dysphagia and poor outcomes including a higher risk of longer hospital stay, chest infection, disability and death. Evidence from national audit shows that delays in the screening and assessment of dysphagia are associated with an increased risk of stroke-associated pneumonia. Prompt detection of dysphagia in patients with acute stroke is therefore essential. In patients with dysphagia on initial screening, a specialist swallowing assessment is indicated that includes consideration of function and cognition and a broader range of food and fluids of varying texture. [10]

NICE's guideline on stroke rehabilitation in adults (CG162) recommends offering swallowing therapy at least 3 times a week to people with dysphagia, after stroke, who are able to take part, for as long as they continue to make functional gains. Swallowing therapy could include compensatory strategies, exercises and postural advice. [11]

The standard alternative treatment for dysphagia is speech and language therapy to learn new swallowing techniques. NICE's guideline on stroke rehabilitation in adults recommends swallowing therapy at least 3 times a week. If a band 6 speech and language therapist provides a 30-minute session (£43 per working hour), it would cost about £65 per week.

While 20% of patients after a stroke may need enteral tube feeding during the acute phase, 8% will need long-term enteral tube feeding for more than 6 months. The cost of enteral tube feeding

in the home setting is about £95 per week.

A NICE Medtech innovation briefing identified four observational studies (2 before-and-after, 2 comparative) including 113 patients with stroke-related dysphagia. [12] [13] [14] [15]

Clinically relevant outcomes reported include results of oropharyngeal motor function testing (function of the lips, jaw, tongue, and velum; lip force; velopharyngeal closure ability), swallowing capacity testing and facial activity testing for facial dysfunction. [4]

All studies were done in Sweden in either a home setting or centre for speech and swallowing rehabilitation. The study populations were relatively small and no power calculations were reported to assess for adequate sample size. The inclusion criteria were clear (people with clinically diagnosed dysphagia after a stroke, who were referred to a centre for swallowing and speech rehabilitation). There was, however, significant individual variability within the study populations for time between stroke and start of training (between 2 days and 10 years over all groups). Most patients with dysphagia after a stroke recover spontaneously over time, though 11% to 50% still have dysphagia at 6 months therefore spontaneous improvement may have been a confounding factor. [4]

No statistical analysis was done in the 2 comparative studies on whether the groups were adequately matched. In both comparative studies, the study groups were recruited during different periods and were not assessed at the same time which may add sources of bias, but the clinical teams and standard care pathways were consistent. No information is given about the type, severity or location of stroke, which may affect the likelihood and speed of recovery.

None of the studies included a standard care group or a group with no intervention as a control. This would help compare the effect of IQoro with spontaneous improvement. The comparator in 2 studies (the palatal plate) is not typically used in the UK as part of standard care. However, **Hägg and Tibbling** (2016) [15] found similar improvements in oropharyngeal motor function and mean swallowing capacity regardless of whether the patient group had early or late intervention. The authors noted that if spontaneous improvement was a factor, it would be more prevalent in the early-intervention groups, therefore improvement is likely an effect of IQoro training.

Outcomes were assessed using objective, relevant measures and subjective patient-reported measures. The study authors were blinded from all end-of-treatment assessments. The lip force testing was blinded from all investigators. Outcomes at follow-up were reported on both a shorter-term (for example, 3 months after training began) and a longer-term basis (for example, year after the end of training).

Since the publication of the NICE Medtech briefing, one additional trial has been published. [16] The prospective, cluster randomised, controlled trial investigated the effect of oral neuromuscular training among older people in intermediate care with impaired swallowing. 385 participants who had been in one of 36 intermediate care units for at least 3 days were screened, and 116 participants were randomly assigned to IQoro neuromuscular training or usual care. No other selection criteria were applied. The cohort included residents with neurological disabilities, Parkinsons, stroke, Acquired Brain Injury (ABI), Traumatic Brain Injury (TBI), dementia, Chronic Obstructive Pulmonary Disease (COPD), cardiovascular diseases, and musculoskeletal disorders. At the end of treatment, the geometric mean of the swallowing rate in the intervention group had significantly improved 60 % more than that of controls (P = 0.007). At 6 months post-treatment, the swallowing rate of the intervention group remained significantly better (P = 0.031). Signs of aspiration also significantly reduced in the intervention group compared with controls (P = 0.01). However, no significant between-group difference in signs of aspiration was found at 6 months post-treatment compared with baseline (OR 0.63 CI 0.14–2.36; P = 0.46).

Summary of safety data:

According to the manufacturers website, training with IQoro is not recommended with any of the following:

- Achalasia.
- Trigeminal neuralgia.
- Paraesophageal hernias.

Treatment should also be started with caution in patients with tinnitus and Peripheral Facial Paralysis-Bell's Palsy.

The manufacturer currently lists the secondary effects of IQoro as:

- Temporary changes/worsening to symptoms (reflux, taste of blood, tinnitus symptoms).
- Muscle soreness in the mouth, tongue and throat. [17]

Strengths and limitations of the evidence:

Strengths

- IQoro is unique in treating hiatus hernia through an exercise regime with an oral device.
- The exercise regime is designed to permanently strengthen the musculature of the hiatus, addressing the underlying cause of hiatus hernia without needing surgery or long courses of medication.
- Swallowing exercises are typically used for treating dysphagia. The company claims exercises can be more accurately and effectively done using IQoro.
- IQoro was CE marked as a class I device in April 2018 and appears to cause no major safety issues.

Limitations

- The evidence base is in a small number of patients and experts advising both NICE Medtech innovation briefings agreed that further studies are necessary.
- Studies are predominantly observational studies rather than randomised controlled trials (RCT). Only one RCT appears to have been published to date.
- There was a lack of comparators used to compare IQoro with existing standard care treatments.
- In hiatus hernia management, the comparator in 2 studies (the palatal plate) is not typically used in the UK as part of standard care. It is also unclear whether IQoro is a replacement or adjuvant treatment.

Prescribing and risk management issues:

Withdrawal of other treatments for dysphagia following initiation of IQoro neuromuscular training may result in initial worsening of symptoms.

Innovation, need and equity implications of the intervention:
The National Institute of Clinical Excellence (NICE) has identified IQoro as a unique mode of treatment for symptoms associated with hiatus hernia and for stroke-related dysphagia.
Financial implications of the intervention:

In stroke, experts advising the NICE Medtech innovation briefing estimated that approximately 50 to 100 stroke patients per year may be eligible for speech and language therapy per 180,000 population. This would equate to approximately 500-1000 patients per year in Lancashire and South Cumbria. If treated with IQoro this would result in a cost of £58,000-£116,000 per year. Local discussion has since placed that estimate at 10% of patients, resulting in estimated annual cost pressures in LSC of £5800-£11600. For hiatus hernia, estimates are more difficult to make. Approximately 10-20% of the adult population has gastro-oesophageal reflux disease (13,500 – 27,000 in Lancashire and South Cumbria). Assuming half of those had a hiatus hernia and 10% of those with hiatus hernia required surgery this would result in an eligible population of approximately 675-1,350 eligible patients [18]. If treated with IQoro this would result in a cost of £78,000-£156,000 per year. NB. Associated savings due to improvements in symptoms and subsequent reductions in clinician appointments and/or medicines prescribed have not been subtracted from the overall costs.
Service Impact Issues Identified:
No additional service impact is anticipated.
Equality and Inclusion Issues Identified:
See attached.
Cross Border Issues Identified:
Neither Pan Mersey APC or GMMMG have a commissioning position for IQoro.
Legal Issues Identified:
N/A
Media/ Public Interest:
N/A

References

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Grading of evidence (based on SORT criteria):

Levels	Criteria	Notes
Level 1	Patient-oriented evidence from: • high quality randomised controlled trials (RCTs) with low risk of bias • systematic reviews or meta-analyses of RCTs with consistent findings	High quality individual RCT= allocation concealed, blinding if possible, intention-to-treat analysis, adequate statistical power, adequate follow-up (greater than 80%)
Level 2	Patient-oriented evidence from: • clinical trials at moderate or high risk of bias • systematic reviews or meta-analyses of such clinical trials or with inconsistent findings • cohort studies • case-control studies	
Level 3	Disease-oriented evidence, or evidence from: • consensus guidelines • expert opinion • case series	Any trial with disease-oriented evidence is Level 3, irrespective of quality