education

RESEARCH REVIEWS Fortnightly round up from the leading medical journals

Left without being seen

Latest NHS figures for England show that 4.9% of people attending emergency departments (EDs) last October left without being seen. A research letter in *JAMA* found that, across 1500 EDs in the US in 2023, only 1.1% of visitors left without being seen. Most didn't return, but 18.5% did return within seven days, typically at around the same time of day as their first visit.

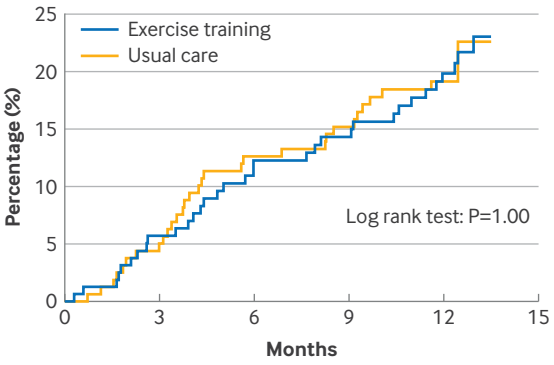
4.9% of people left EDs in England without being seen

JAMA doi:10.1001/jama.2024.26825

SGLT-2 inhibitors leave no stone unturned

An unexpected finding from trials of SGLT-2 inhibitors for diabetes was a reduction in incidence of kidney stones. A new phase 2 trial randomly allocated 53 people with a history of kidney stones to take empagliflozin and found reductions in a surrogate marker for stone recurrence in people with uric acid and calcium stones. The apparent stone-busting effects of SGLT-2 inhibitors may be due to an increase in urinary flow rate, anti-inflammatory effects, or their effect on urinary pH: interestingly this study found that empagliflozin increased urinary pH in patients with uric acid stones and lowered it in those with calcium stones.

Nat Med doi:10.1038/s41591-024-03330-x



Time to all-cause death or cardiovascular hospitalisations in the exercise training and usual care groups

NAT MED doi:10.1038/S41591-024-03342-7

Exercise training in heart failure

Exercise for 30 minutes three times a week on an exercise bike for a month; then make the sessions an hour long and add resistance training with two sets of 12-15 reps on seven different weight machines, and keep that up for a whole year.

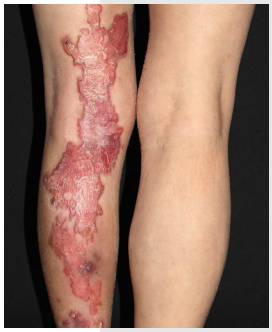
No, this isn't my overly ambitious new year's fitness regimen, but the intervention in a study of combined endurance and resistance exercise training in heart failure with preserved ejection fraction. Unsurprisingly, most of the 83 people randomised to exercise training weren't able to adhere to this (although 47.5% managed at least two sessions a week). At the end of the study there was no difference in modified Packer score, which incorporates mortality and heart failure morbidity, between the intervention and control groups.

Nat Med doi:10.1038/s41591-024-03342-7

Skin pigmentation and pulse oximeters

Pulse oximeters are more likely to overestimate oxygen levels in people with darker skin, and since 2013 the US Food and Drug Administration (FDA) has recommended that manufacturers test devices on people "with a range of skin pigmentations." This has happened in only 25% (67/268) of devices approved since then, according to a new study. Terminology used in documents submitted by device manufacturers for FDA approv was also incon often confusing skin tone, race, ethnicity, and national

CLINICAL PICTURE



Linear erythematous plaques

This middle aged woman presented with a 40 year history of a gradually expanding itchy rash on her left leg. She had no relevant personal or family history and took no regular medications. On examination, extensive well defined, erythematous, plaques with raised edges and overlying scales were observed on the flexural aspects of her leg (figure). The lesions followed Blaschko's lines in a linear distribution extending from the buttock to heel. A skin biopsy sample showed a cornoid lamella in the stratum corneum and dyskeratotic cells in the spinous layer, consistent with linear porokeratosis.

Porokeratosis refers to a group of genetic disorders of abnormal keratinisation, clinically presenting as well demarcated, scaly papules and plaques with elevated borders and central atrophy. Linear porokeratosis, a rare variant, carries a risk for malignant transformation.

origin—emphasising the need for more objective means of estimating and describing skin pigmentation.

JAMA doi:10.1001/jama.2024.26473

Gabapentin and falls risk

Gabapentin has been associated with increased risk of falls in older adults. However, a new observational study found that the risk of a fall in older adults with diabetic neuropathy, postherpetic neuralgia, or fibromyalgia was lower in people prescribed gabapentin compared with those prescribed duloxetine (hazard ratio for a fall within six months 0.52 (95% confidence interval 0.43 to 0.64)). Comparing people given gabapentin with those given duloxetine (rather than those not prescribed anything) helps reduce confounding, but the findings may still be affected by clinical decision making, namely that those with higher risk of falls may be less likely to be offered gabapentin.

Ann Intern Med doi:10.7326/ANNALS-24-00636

Bird flu symptoms catch the eye

A case series of all recorded human cases of highly pathogenic avian influenza A(H5N1) virus in the US in 2024 identified no human to human transmission. Of 46 cases, 20 were from exposure to infected poultry, 25 from cows, and one with no known source. There were no hospital admissions or deaths, although the first person in the US to die from A(H5N1) was reported a few days after this article was published. All had mild symptoms, with 93% having conjunctivitis and half had a fever.

N Engl J Med doi:10.1056/NEJMoa2414610

Tom Nolan, clinical editor, *The BMJ*; sessional GP, Surrey

Cite this as: *BMJ* 2025;388:r65

Differential diagnoses for linear porokeratosis include inflammatory linear verrucous epidermal naevus, linear psoriasis, and linear lichen planus. This patient was treated with acitretin, with a reduction in lesional thickness and relief from itchiness, and is under follow-up.

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Patient consent obtained.

Cite this as: *BMJ* 2025;388:e079567

MINERVA From the wider world of research

Maternal mental disorders and neonatal outcomes

Data on more than a million singletons born between 1997 and 2015 in Denmark show that maternal mental disorders carry an increased risk of multiple adverse neonatal outcomes including low birthweight, preterm birth, small for gestational age, low Apgar score, Caesarean delivery, and neonatal death. Risks were highest for the children of mothers with long term mental disorders (*Br J Psych* doi.org/10.1192/bjp.2024.164).

Sudden cardiac death

Another large investigation from Denmark, this time of 6000 cases of sudden cardiac death among people aged 18-90 years finds that the incidence is substantially higher in people with psychiatric disorders than in the general population. Schizophrenic disorders were associated with the highest risk (*Heart* doi.org/10.1136/heartjnl-2024-324092).

Regulating risky research

Since the pandemic, the danger of carrying out experiments on viruses to influence their virulence or make them more transmissible—gain of function experiments—has become a matter of public debate (undark.org/2024/12/11/unleashed-gain-of-function-regulation/). And it's not only research on pathogens. Artificial intelligence and solar geoengineering are two other areas where the risks of carrying out the research might outweigh any potential benefit (undark.org/2024/12/25/for-science-with-risks-key-question-who-decides). Mind you, calls for better regulation of these sorts of research miss the point that regulation can only be effective if properly policed.

Drinking more water

The government's Eatwell Guide advises that people drink six to eight glasses of water or sugar free liquids per day (www.gov.uk/government/publications/the-eatwell-guide). Given the wide individual variation in size, weight, activity, and health—not to mention the numerous physiological mechanisms that regulate fluid balance—a single recommendation on the optimal amount seems a doubtful idea. A systematic review, which identified 18 randomised trials of increased water intake, finds the supporting evidence is generally weak. Some trials suggested that a high water intake was beneficial for weight loss and nephrolithiasis (*JAMA Netw Open* doi:10.1001/jamanetworkopen.2024.47621).

Copper, zinc, and IBS

Could deficiencies of copper and zinc be contributing to irritable bowel syndrome? Analysis of UK biobank data hints they might be. Among 200 000 participants followed up over 13 years, more than 2000 were diagnosed with irritable bowel syndrome (*Am J Epidemiol* doi.org/10.1093/aje/kwae412). The incidence was lowest among those with a dietary copper intake of 1.25 mg/day and a dietary zinc intake of 10 mg/day. People with higher or lower intakes of these trace metals were at greater risk.

Cycle to work

The Scottish Longitudinal Study followed 80 000 adults using record linkage (*BMJ Pub Health*https://bmjpublichealth.bmj.com/content/2/1/e001295). It found, after controlling for pre-existing health conditions and socioeconomic status, mortality rates in people who cycled to work were half of those taking the car or bus. Cyclists also had lower risks of hospitalisation, cardiovascular disease, cancer, and mental health problems. Pedestrian commuting was also beneficial, but less so.

Cite this as: *BMJ* 2025;388:r35

10-MINUTE CONSULTATION

A change in voice

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CPD READING
0.5 HOURS

A 45 year old man presents to his general practitioner with a three month history of hoarse voice. The onset was over a short time and was predated by five days of coryzal symptoms. He has no past medical history, takes no regular medications, and smokes 10 cigarettes a day.

A change in voice, or dysphonia, describes a perceived alteration in vocal function and can include changes in voice clarity, pitch, loudness, and fatigability. This term is preferred to vocal hoarseness, which refers to a change in the clarity of the voice only. Dysphonia can have a substantial impact on social and professional quality of life leading to anxiety, depression, social isolation, and inability to work or attend education.[1]

Dysphonia is common, and in one large retrospective analysis of US insurance claims data, prevalence was 1% of people aged up to 65 years old, with a lifetime incidence of about 30%.[2] Clinical assessment of the dysphonic patient can be challenging for a clinician who is unable to visualise the larynx. Here, we aim to help healthcare practitioners working in primary care and the non-specialist setting to understand the clinical features of benign disease and features that warrant onward referral to ear, nose, throat specialists.

WHAT YOU NEED TO KNOW

- A patient's voice should facilitate participation in normal social and professional activities and not be impaired by hoarseness, weakness, fatigability, or pain
- The most common causes of voice change are benign (non-malignant), and include acute or chronic laryngitis, age related changes (presbyphonia), muscle tension dysphonia, and benign vocal fold lesions
- Red flag features for malignancy include duration of symptoms greater than three weeks, unexplained otalgia, and feeling of something in the throat with presence of blood
- Patients with a benign aetiology to their dysphonia may benefit from vocal hygiene measures.

What you should cover

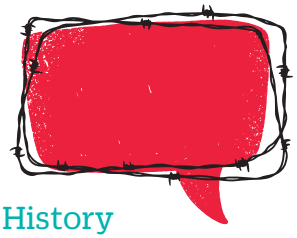
History

- *What is the nature of the voice change?* Document any patient-reported or physician-perceived changes in clarity, pitch, loudness, and fatigability, and how symptoms have progressed over time. Patients may find it difficult to describe the changes in their voice, and the exact nature of the change does not necessarily correlate with the underlying pathology.
- *When did the voice start to change?* Acute onset (over days) and short duration (under three weeks) suggests a self limiting pathology, such as acute laryngitis.[3] Symptoms that are progressive, especially longer than a month, should alert you to the possibility of a malignant aetiology, whereas stable and intermittent symptoms are more commonly associated with benign (non-malignant) vocal fold pathologies.[4]
- *Are there any associated symptoms?*
  - Throat symptoms, such as soreness, phlegm, irritation, and the sensation of a lump in the throat. These combinations of symptoms, sometimes referred to as "persistent throat symptoms" can be intermittent, and the underlying aetiology for these symptoms remains poorly understood.[5]
  - Laryngeal symptoms, such as changes to swallowing and breathing.
  - Chronic nasal inflammation, such as post-natal drip and nasal congestion, and gastric symptoms, such as gastro-oesophageal reflux or indigestion.
  - Constitutional symptoms, such as weight loss, should alert you to the possibility of an underlying malignancy. Fevers can indicate an acute infection.
  - Ask specifically about red flag features (box 1). If any are present, consider the differential of a head and neck cancer.
- *How is the change in voice affecting daily life or function?* Explore patient's daily vocal needs, including the level of voice use at work or school, and the impact of their voice problem on their quality of life. Those with a high vocal demand, such as singers and teachers, are a subgroup of patients at increased risk of benign vocal cord pathology, as well as professional, and therefore financial, difficulty as a result of dysphonia.[7]
- *Are there relevant morbidities?* There are multiple neurological, rheumatological, gastroenterological, and infective conditions that may lead to dysphonia, either due to dysfunction of the recurrent laryngeal nerve or via anatomical disruption of the laryngeal anatomy (see figure).
- *What medication is the patient taking?* Inhaled medication can have an irritant effect on the vocal cords, and inhaled corticosteroids can predispose a patient to fungal infections such as oropharyngeal thrush, which can affect vocal cord function and voice.[8] Other medications, such as antihypertensives and diuretics, can be associated with a change in voice, possibly through a drying effect on the vocal cords.[9]
- *What is the patient's alcohol, smoking, and smokeless tobacco use?* About 75% of head and neck cancers are attributable to a combination of cigarette smoking and alcohol consumption, with a dose-dependent relationship between levels of consumption and risk of cancer.[10]

thebmj Visual summary

A change in voice

Identifying cancer and differential diagnoses



A change in voice, or dysphonia, describes a perceived alteration in vocal function. It can have a substantial impact on social and professional quality of life. Clinical assessment of the dysphonic patient can be challenging for a clinician who is unable to visualize the larynx. This graphic aims to help healthcare practitioners working in primary care and the non-specialist setting to understand the clinical features of benign disease and features that warrant onward referral to ear, nose, throat specialists

History

When did it start to change?

Document any changes reported by patients or that you observe. Record how these changes progress over time at follow-up visits

- **Acute (days)**: Short duration (under 3 weeks)
- **Progressive**: Longer duration (3 weeks or more)
- **Intermittent**: Symptoms come and go

Associated symptoms

Throat symptoms

Can be intermittent, and aetiology remains poorly understood

- Sensation of a lump in the throat
- Phlegm
- Swallowing difficulty or pain
- Irritation

Sinonasal

- Post-nasal drip
- Chronic nasal inflammation

- Constitutional symptoms, such as weight loss
- Fevers
- Respiratory
- Rheumatological
- Neurological
- Gastric symptoms

Medications

Inhaled medication can have an irritant effect, or increase risk of fungal infections and oropharyngeal thrush

Antihypertensives and diuretics may have a drying effect on the vocal cords

Effects on daily life

Those with a high vocal demand, such as singers and teachers, are at increased risk of non-malignant vocal cord pathology

Older patients

Age related degeneration of laryngeal musculature and atrophy of the vocal folds accounts for a quarter of patients aged 65 or over presenting with dysphonia

Examination

Inspect oral cavity

- Masses
- Asymmetry of tonsils
- Mucosal lesions
- Erythema of pharyngeal mucosa
- Signs of infection

Palpate neck

- Lymphadenopathy

Chest, musculoskeletal, or neurological examination

If dysphonia is associated with any respiratory, rheumatological, or neurological symptoms

Red flags for cancer

Dysphonia associated with any red flag symptom should prompt an urgent referral for consideration of head and neck cancer

Persistent/unexplained symptoms (>3 weeks):

- Hoarseness
- Dysphagia
- Oral ulceration or mass
- Swelling in parotid or submandibular gland
- Neck mass
- Odynophagia

- Unexplained otalgia
- Otalgia + lump in throat sensation
- Lump in throat sensation + blood in mouth

Differential diagnoses

- **Laryngitis**: The most common aetiology of dysphonia is acute laryngitis, a benign, self limiting, usually viral, infection of the larynx
- **Lesions**: Non-malignant vocal fold lesions, such as nodules, cysts, polyps, or papillomas, are less common
- Rhinosinusitis, rhinitis
- Laryngopharyngeal reflux
- Presbyphonia

Contributing factors

Neurological

- Multiple sclerosis
- Parkinson's disease
- Amyotrophic lateral sclerosis
- Myasthenia gravis

Rheumatological

- Rheumatoid arthritis
- Systemic lupus erythematosus
- Granulomatosis with polyangiitis

- Chronic cough

What you should do

Examination

Listen to the patient's voice for altered voice quality, pitch, loudness, or increased vocal effort that impairs communication. Document these findings at the initial visit and during follow-up assessments, noting any progression or improvement of dysphonia. Also note any stridor or increased work of breathing.

Inspect the oral cavity and oropharynx for signs of infection or mucosal lesion. Any masses in the oral cavity or asymmetry of the tonsils should alert you to the possibility of a malignancy. Erythema of the pharyngeal mucosa may indicate acute or chronic pharyngitis.

Palpate the neck for lymphadenopathy, which should lead you to consider a head and neck malignancy in patients at increased risk, including those with red flag features, whether or not there is a change in voice. A chest, musculoskeletal, or neurological examination should take place if dysphonia is associated with any respiratory, rheumatological, or neurological symptoms—assessing for any signs consistent with chronic lung conditions, systemic arthropathy, or degenerative neurological conditions.

Diagnosis and referral

The most common aetiology of dysphonia is acute laryngitis, a self limiting, usually viral, infection of the larynx. Benign vocal fold lesions, such as nodules, cysts, polyps, or papillomas, are less common.[2] Consider the differential of malignancy in patients who present with red flag symptoms or worsening dysphonia. In the figure, we outline different aetiologies that contribute to the development of dysphonia.

Presbyphonia, the term used to describe an ageing voice, is an often overlooked condition. According to a retrospective cohort study assessing 6360 patients over six years, it accounts for a quarter of patients aged 65 or over presenting with dysphonia.[11] Presbyphonia occurs as a result of age related degeneration of both the laryngeal musculature and atrophy of the vocal folds themselves, which can lead to incomplete closure of the vocal folds on phonation. Consequently, it can have a substantial impact on quality of life in old age, leading to increased social isolation and communication difficulties.[12]

For patients in whom you suspect malignancy or who have risk factors for lung cancer, order an urgent chest radiograph.[13]

Management

A short (<3 weeks) history of dysphonia and/or aphonia, with or without sore throat, in a young patient is likely acute viral laryngitis and can be managed in primary care. Recommend self management with analgesia, voice rest, hydration, alcohol avoidance, and smoking cessation.[14] In our practice, we also recommend optimising vocal hygiene (box 2). A Cochrane systematic review has shown that antibiotics do not improve objective outcomes in treatment of acute laryngitis.[20]

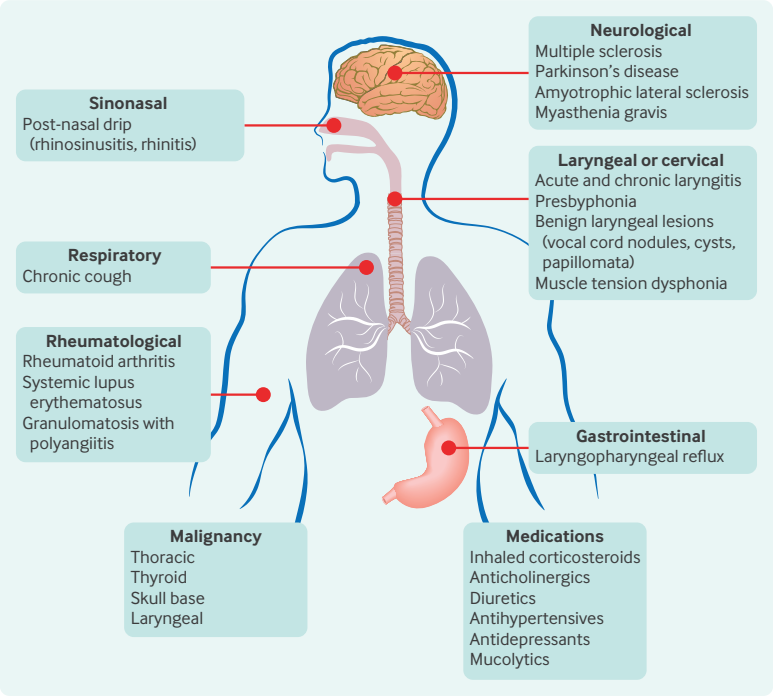
Intermittent voice change without risk factors or associated symptoms suggests a benign cause of dysphonia. This can be managed initially by treating any detectable underlying cause and optimising vocal hygiene. We recommend follow-up review of patients within six weeks after voice hygiene advice to assess for resolution of symptoms. In patients who do not respond to these conservative measures, and in the absence of any red flag symptoms, consider a routine referral to an ear, nose, and throat specialist.

If a patient presents with a chronic history (>3 weeks) of persistent symptoms, we recommend urgent referral to a head and neck specialist for consideration of malignancy (box 1).[6]

Box 1 | Red flag features necessitating referral to secondary care for suspected head and neck cancer

Presence of dysphonia associated with any red flag symptom should prompt an urgent referral for consideration of head and neck cancer. In the UK, 2024 national guidelines recommend referral to a head and neck specialist if any of the following are present[6]

- Persisting hoarseness for >3 weeks
- Unexplained oral ulceration or mass for >3 weeks
- Unexplained persistent swelling in parotid or submandibular gland for >3 weeks
- Unexplained neck mass for >3 weeks or recently appeared neck mass
- Dysphagia for >3 weeks
- Odynophagia for >3 weeks
- Unexplained otalgia with normal otoscopy
- Feeling of something in the throat with presence of blood in mouth
- Feeling of something in the throat with unexplained otalgia and normal otoscopy



Contributing factors that lead to development of, or exacerbate, symptoms of dysphonia

Box 2 | Vocal hygiene techniques

These are dietary and lifestyle modifications that can reduce the impact of factors that can lead to, or exacerbate, dysphonia. There is limited evidence to support individual recommendations (due to patient and pathological heterogeneity and difficulties of blinding interventions in studies), but we outline common recommendations in our practice.

- *Hydration*—Advise patients to drink two litres of water a day if medically appropriate and able, as supported by a 2019 systematic review, which found that systemic hydration is one of the easiest and most cost-effective solutions to improve voice quality[15]
- *Dietary advice and anti-reflux medications*—Patients with dysphonia who have symptoms of gastroesophageal reflux may benefit from dietary advice and alginate liquid, although there are no high quality data to demonstrate effectiveness of these interventions in resolving voice change
- *Caffeine-containing and carbonated drinks*—Advise reduction in these drinks on the premise they lead to dehydration secondary to diuresis and can promote laryngopharyngeal reflux.[16] However, a 2023 systematic review failed to demonstrate a link between caffeine use and voice change[17]
- *Smoking and alcohol use*—Advise patients to stop smoking and encourage reduction of alcohol use
- *Voice use*—Encourage patients to avoid vocally traumatic behaviours, such as shouting or whispering, which encourage a pattern of laryngeal muscle tension
- *Hot water steaming* may help hydrate the pharynx and larynx, which is believed to reduce inflammation.[18] Advise careful handling of boiling water and to allow boiling water to cool for 5 minutes before steaming
- *Vocal exercises*—If the patient is a professional voice user, vocal warm-up and cool-down programmes may be prescribed by a voice therapist and are thought to reduce vocal strain[19]

HOW PATIENTS WERE INVOLVED IN THE CREATION OF THIS ARTICLE

A patient from the Royal National ENT Voice Centre contributed to the creation of this article. From a patient's perspective, the term "professional voice user" indicates that one's voice is more important to some people than others based on their profession. The term "low, medium, or high vocal demand" was preferred as a way of describing the different vocal needs of different patients. This terminology was incorporated into the article.

EDUCATION INTO PRACTICE

- What do you ask a patient who has presented with a new voice change?
- Excluding suspected referrals for malignancy, how many patients with dysphonia in your practice do you refer to a specialist?
- Think about the last time you talked to a patient with a heavy vocal demand and dysphonia. Did you discuss the occupational impact of their voice disorder, and did you offer basic vocal hygiene techniques?

HOW THIS ARTICLE WAS MADE

We conducted a PubMed search using the terms "dysphonia" "hoarse voice" "vocal hygiene" "hoarseness" "laryngitis," and reviewed the Cochrane Library for the same search terms.

Specialist assessment

After referral to secondary care, most patients will be seen by an ear, nose, and throat specialist and, depending on local resources, may also be seen by a speech and language therapist. The voice evaluation will include a descriptive assessment of the quality, phonatory effort, projection, fatigability, pitch range, and tone. Vocal characteristics, including hoarseness, roughness, breathiness, asthenia, and strain, may be scored. Patients may be asked to fill out dysphonia-specific questionnaires, such as the Voice Handicap Index.[21]

Rigid or flexible laryngoscopy may be used to inspect the nasal cavity, nasopharynx, oropharynx, hypopharynx, and larynx. A strobe light, performed at the time of laryngoscopy, may be used to assess vocal fold vibration, and high speed digital imaging can further assess laryngeal physiology. Patients who present with signs of dysphagia or aspiration may be referred for a formal assessment of swallow by a speech and language therapist or for a barium swallow test.

Patients who have dysphonia with a clear history of nasal congestion and chronic nasal discharge are commonly treated with intranasal saline douches and intranasal corticosteroids.[22] Dysphonia in patients with a clear history of gastroesophageal reflux symptoms is commonly treated with proton pump inhibitors and/or sodium alginate liquid.[23] Vocal fold lesions or movement disorders are managed using a combination of voice therapy (see box 3) and interventional treatments such as botox injections into the muscles of the larynx, filler injections into the vocal folds, or lesion excision.

Box 3 | The role of voice therapists in managing voice disorders

- In the UK, voice therapists are speech and language therapists with specialist interest and training in ear, nose, and throat and voice disorders
- Voice therapists assess patients with aphonia or dysphonia, globus sensation, laryngeal hypersensitivity, chronic cough, and airway and swallowing disorders, as well as patients referred before or after laryngeal surgery to maximise the vocal outcome
- In the UK, voice therapy usually requires a referral from an ear, nose, and throat specialist[24]
- Treatment may include education on general vocal hygiene and voice care, with counselling and psychological approaches to support behaviour change. Direct therapy approaches may include laryngeal massage for muscle tension, breath support work, respiratory muscle strength training, and vocal exercises to work on either hyperfunction or hypofunction

Case revisited

This patient met the criteria for an urgent referral to a head and neck cancer centre to rule out malignancy. He received smoking cessation advice and information regarding vocal hygiene techniques. Laryngeal malignancy was ruled out via nasendoscopy in a specialist clinic.

Competing interests: None declared.

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Find the full version with references at doi: 10.1136/bmj-2024-079623

STATE OF THE ART REVIEW

Non-pharmaceutical treatments for irritable bowel syndrome

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State of the Art Reviews are commissioned on the basis of their relevance to academics and specialists in the US and internationally. This is a summary of the article *Non-pharmaceutical treatments for irritable bowel syndrome* for UK readers. The full version can be read here: https://www.bmj.com/content/387/bmj-2023-075777.

CPD READING
0.5 HOURS

Irritable bowel syndrome (IBS) is a chronic disorder of gut-brain interaction characterised by abdominal pain and change in the consistency and/or frequency of stools.

Despite several options for the treatment of IBS and consensus guidelines, high costs of pharmaceutical treatments and tolerability are problematic.[1] Patient interest in non-pharmaceutical options is wide ranging.[2 3]

Diet

Fibre, both dietary and supplementary is recommended to improve global symptoms of IBS (fig 1).[7] Restrictive or elimination diets range from specific restrictions (eg, gluten-free diets) to larger dietary shifts such as the FODMAP (low fermentable oligosaccharides, disaccharides, monosaccharides, and polyols) diet.

Of >1500 gastroenterologists surveyed, around 60% reported that patients link food with symptoms, and most adopted a trial and error approach or lactose-free or gluten-free diets. Fewer used the low FODMAP diet,[22] often because of the lack of registered dietitians with suitable expertise. Table 2 in the full article on bmj.com provides an overview of diet guidelines.

Fibre

Dietary fibres are non-digestible plant based carbohydrates that are not absorbed by the small intestine and differentially affect the digestive system depending on interaction with colonic microbiota.[24] Insoluble fibres found in the peel of fruit and vegetables, seeds, whole grains, and wheat bran increase stool bulk while stimulating colonic motility and mucus production, which can contribute to common IBS symptoms such as bloating and abdominal discomfort.[7] Soluble fibre found in psyllium (ispaghula husk), corn fibre, calcium polycarbophil, methylcellulose, oat bran, and the flesh of fruit and vegetables, holds water in the intestine. Short chained and highly fermentable fibres (eg, oligosaccharides) can trigger IBS symptoms through bacterial byproducts, but might also have beneficial effects as prebiotics.[7] Soluble fibre might contain sugar, artificial sweeteners, or fillers that can contribute to bloating and osmotic diarrhoea.

Psyllium is viscous and minimally fermentable and is the most often recommended soluble fibre for IBS. It holds water in the lumen of the intestine and improves colonic transit without worsening symptoms, especially in those with constipation. Psyllium could benefit patients with IBS and diarrhoea as its gel-forming nature might add bulk to stools and reduce urgency. A systematic review and meta-analysis of 14 randomised controlled trials (RCTs) involving 906 patients with IBS found a significant benefit of fibre for global symptoms, although benefit was only seen with soluble fibre and not bran (insoluble fibre).[25] A more recent network meta-analysis of psyllium, however, found no benefit of psyllium over placebo, although only one of the included studies was considered low risk of bias.[26]

Most international guidelines recommend soluble fibre for the treatment of global IBS symptoms. The American Gastroenterological Association (AGA) suggests a fibre intake of about 25-35 g/day[7] with slow increase to help prevent gas and bloating.

WHAT YOU NEED TO KNOW

- The pathophysiology of irritable bowel syndrome is complex and incompletely understood, reflected in the variety of pharmaceutical and non-pharmaceutical therapies used in its management
- Several non-pharmaceutical treatments, such as the low FODMAP diet and cognitive behavioural therapy, are now considered standard of care and are part of all major guidelines for the treatment of IBS. However, challenges with access and optimal implementation remain
- Complementary approaches and microbiome based therapies have a limited evidence base and mixed recommendations in guidelines

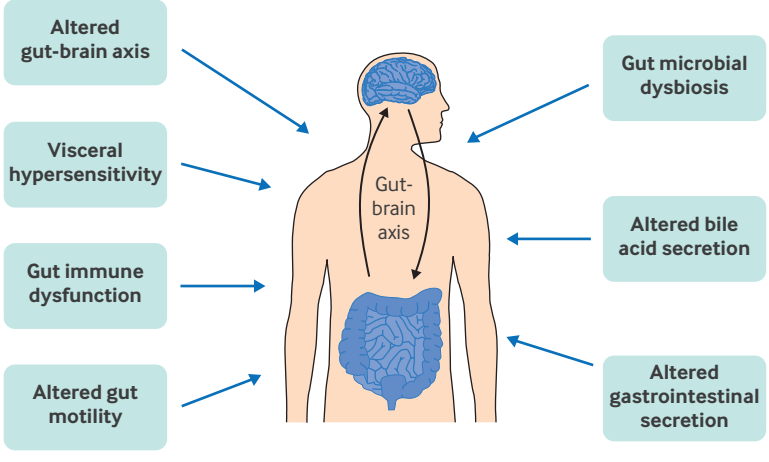

Fig 1 | Pathophysiology of IBS

Kiwi fruit

Interest in kiwi fruits arose from studies exploring their use to treat IBS with constipation. One RCT comparing the intake of two green kiwi fruits daily with placebo capsules in patients with IBS and constipation and healthy controls and found statistically significant decreases in colon transit time and increases in defecation frequency but no impact on pain.[28] A more recent RCT found that intake of two green kiwi fruits was associated with a significant increase in weekly bowel movements and reduced gastrointestinal discomfort.

Although evidence to support the use of kiwi fruit is limited, the intervention is relatively safe and accessible, although caution is warranted in those with birch tree pollen allergy.

NICE dietary guidance

The National Institute for Health and Care Excellence (NICE) dietary recommendations for treatment of IBS were updated in 2017, focusing on optimising diet and lifestyle changes.[29] In addition to dietary changes and restrictions, NICE guidance includes many suggestions for behaviours such as having regular meals, taking time to eat, avoiding missing meals, and getting adequate exercise and relaxation. NICE guidance recommends the low FODMAP diet if symptoms do not improve.

Mediterranean diet

The Mediterranean diet comprises minimally processed, plant based foods, nuts and healthy fats, and limited amounts of red meat and refined grains. Previous research has shown a reduced prevalence of disorder of gut-brain interaction in children and adolescents more adherent to a Mediterranean diet, although the effect on existing IBS symptoms was not studied.[30 31] A six week unblinded RCT of a Mediterranean diet (n=29) versus usual diet (n=30) found that a greater proportion in the Mediterranean diet group had reduced gastrointestinal symptoms, as well as improved depression scores. This diet has many overall benefits[23] but needs more evidence for use in IBS.

Low FODMAP diet

The low FODMAP diet was first reported in 2005, suggesting that reduction of certain fermentable short chain carbohydrates could improve symptoms of IBS by decreasing intestinal wall distension and reducing osmotically active compounds, thereby decreasing pain and diarrhoea, respectively.[34] Other research has highlighted the potential of high FODMAP foods, in susceptible individuals, to alter the microbiome, increase lipopolysaccharides that disrupt and cross the intestinal epithelial barrier, and subsequently activate mast cells, causing pain and diarrhoea.[35] The low FODMAP diet is delivered in three phases: elimination, reintroduction, and personalisation.

The low FODMAP diet has been studied extensively (see table 3 in full paper on bmj.com). An older RCT comparing the low FODMAP with the modified NICE (mNICE) diet in patients with IBS and diarrhoea found no statistically significant difference in primary outcomes of adequate relief or composite outcome of pain and bowel movement changes.[36] A 2022 systematic review of 13 RCTs showed superiority of low FODMAP diet to usual diet and all other dietary interventions.[38]

A 2022 systematic review of 13 RCTs showed superiority of low FODMAP diet to usual diet and all other dietary interventions

Restrictive diets carry risks of dietary deficiencies over time. In the low FODMAP diet, studies have shown fibre intake decreases during elimination but is normalised after re-introduction.[41] Post hoc analysis of RCT data found both the low FODMAP and the mNICE diet resulted in decreased calorie intake, fewer daily meals, and fewer daily carbohydrates consumed. Patients on the low FODMAP diet had a decline in several micronutrients, but only riboflavin remained significantly decreased after correcting for energy adjusted nutrient intake. Fewer patients on the low FODMAP diet met the recommended intakes for thiamine and iron, and fewer on the mNICE diet met recommended intakes for calcium and copper.[43] Micronutrient deficiencies are more likely with longer time in the elimination phase, emphasising the importance of a three-phase approach.

International guidelines generally support use of the low FODMAP diet with guidance from a registered dietitian (see table 1 online).

Dietary supplements

Glutamine

The essential amino acid L-glutamine, thought to help maintain intestinal integrity, has been studied in RCTs.

Glutamine requires further study but might have an adjunctive role in certain patients.

Vitamin D

Vitamin D is a fat soluble vitamin with a primary role in the regulation of intestinal calcium/phosphate absorption and bone remodelling.[49] Low vitamin D concentrations have been linked to increased intestinal permeability, alterations of the microbiome, inflammation, mood disorders, and reduced quality of life[49] and deficiency has been associated with more severe IBS symptoms.[50]

Excess vitamin D supplementation can cause acute hypercalciuria and hypercalcaemia, and chronic intoxication might lead to nephrocalcinosis, pain, and bone demineralisation.[55] Given the potential risks and conflicting results in trials, vitamin D supplementation can be considered for short term trial treatment with careful monitoring for toxicities.

Microbiome based therapeutics

Prebiotics and probiotics

As alterations in the microbiome became linked to IBS, studies of probiotics for treatment increased and use became more common.[57 58] IBS, like many conditions, has broad patterns of microbial changes rather than a single microbiome signature, making hopes for precise, sustained microbiome manipulation to treat IBS an ongoing, unmet challenge and an area of active research.[59 60]

Probiotics

Probiotics are live micro-organisms that, when administered in adequate amounts, confer a health benefit on the host.[61] A systematic review and meta-analysis of 53 RCTs (n=5545) found that probiotics had beneficial effects on global IBS symptoms and abdominal pain. The 2020 AGA guideline for probiotic use across gastrointestinal disorders[8] reviewed 76 RCTs with 44 different probiotic strains or combinations used to treat IBS. It found statistically significant heterogeneity in study design, outcome, and probiotics used, and evidence for publication bias, leading to no recommendation for clinical use of probiotics in children and adults with IBS outside of clinical trials.

Prebiotics

Prebiotics are substrates selectively used by host micro-organisms to confer health benefits. A systematic review and meta-analysis of 11 RCTs (n=729) found no differences in overall responders, severity of abdominal pain, bloating and flatulence, quality of life, or adverse events.[63]

Faecal microbiota transplant

Given its success in restoration of microbiome after infection with *Clostridium difficile*, faecal microbiota transplant (FMT) has been explored as a way of improving dysbiosis in patients with IBS. A systematic review and meta-analysis of eight RCTs (n=472) found no statistically significant difference between the FMT and control groups for IBS symptom severity at any time point and that positive effects wear off over time with low success rates with attempted re-administration.[64]

FMT has not shown statistically significant benefit in IBS and carries risk of serious adverse events including infection. Multiple international guidelines currently do not recommend FMT for IBS treatment.

Brain-gut behaviour interventions

Brain-gut behaviour therapies (BGBTs) include classes of therapeutic approaches that incorporate techniques that directly target modifiable psychosocial and physiological processes that dysregulate the brain-gut axis.[73,74] Cognitive behavioural therapy (CBT)[75] and gut directed hypnotherapy[76] are the most evidence based BGBTs for IBS, both with durable treatment response after therapy completion.[77-79] Other emerging approaches include self-management training, mindfulness based stress reduction, psychodynamic-interpersonal therapy, and emotional awareness and processing approaches.[74,80]

CBT is a skills based approach that aims to target cognitive, affective, and behavioural processes, which trigger or exacerbate IBS symptoms. Skills training can incorporate a combination of relaxation strategies, cognitive restructuring, problem solving/emotion focused coping skills, exposure, and behavioural changes.[4]

Self-management training programmes target self-efficacy[74] and have been shown to have a positive impact on IBS health outcomes. A systematic review and meta-analysis of 10 RCTs (n=886) demonstrated that, compared with controls, guided self-help interventions for IBS had a medium effect size for the decrease in IBS symptom severity (SMD=0.72; 95% CI 0.34 to 1.08) and a large effect size for the increase in patient's quality of life (SMD=0.84; 95% CI 0.46 to 1.22).[89]

Mindfulness has been shown to reduce IBS symptom severity and improve stress related outcomes

Mindfulness has been shown to reduce IBS symptom severity and improve stress related outcomes in an RCT.[91] Psychodynamic-interpersonal therapy approaches aim to improve interpersonal functioning through the development of a collaborative patient-provider relationship[92] and have been shown to be effective in improving IBS symptoms in an RCT.

Digital delivery of psychologically based therapies

Digital therapeutics, which allow self-administration of therapeutic tools have been developed to increase access for BGBTs. A multicentre RCT showed that two digital applications of CBT: telephone based CBT (TCBT) and web based Mahana IBS (an unguided web based CBT program that is no longer available) had statistically significant improvements in IBS symptom severity, quality of life, and mood, at 12 months. Compared with treatment as usual IBS symptoms were 61.6 (95% CI 33.8 to 89.5) points lower (P<0.001) in TCBT on the IBS symptom severity scale and 35.2 (95% CI 12.6 to 57.8) points lower (P=0.002) in WCBT.

A similar CBT based app, Zemedy, has also been shown to significantly reduce IBS symptom severity and improve quality of life in the treatment group compared with a waiting list control group in a crossover RCT.[102]

Digitally delivered gut directed hypnotherapy (GDH) has also been developed. A retrospective evaluation of n=190 patients with self-reported IBS who completed Nerva, a GDH app, showed 64% responded positively, defined as a >30% reduction in abdominal pain.[103] Although an RCT (n=20) showed that web based hypnotherapy was slightly less effective than face-to-face treatment on the primary outcome (65% of subjects had a 50 point or more reduction in the IBS symptom severity score versus 76%, respectively), access to care was improved.[105] Overall, these alternative delivery methods improve patient access and allow additional care options with similar patient outcomes but evidence quality is still low.

Other complementary and integrative health approaches

Peppermint oil (*Mentha piperita*)

Peppermint oil has antispasmodic properties that have been well studied for the treatment of IBS and is suggested for relief of global IBS symptoms as a conditional recommendation in the ACG9 as well as the BSG guidelines.[6] A recent systematic review and meta-analysis that included 10 RCTs (n=1030) found peppermint oil more efficacious than placebo for global IBS symptoms (RR of not improving=0.65; 95% CI 0.43 to 0.98, NNT=4) and abdominal pain (RR of not

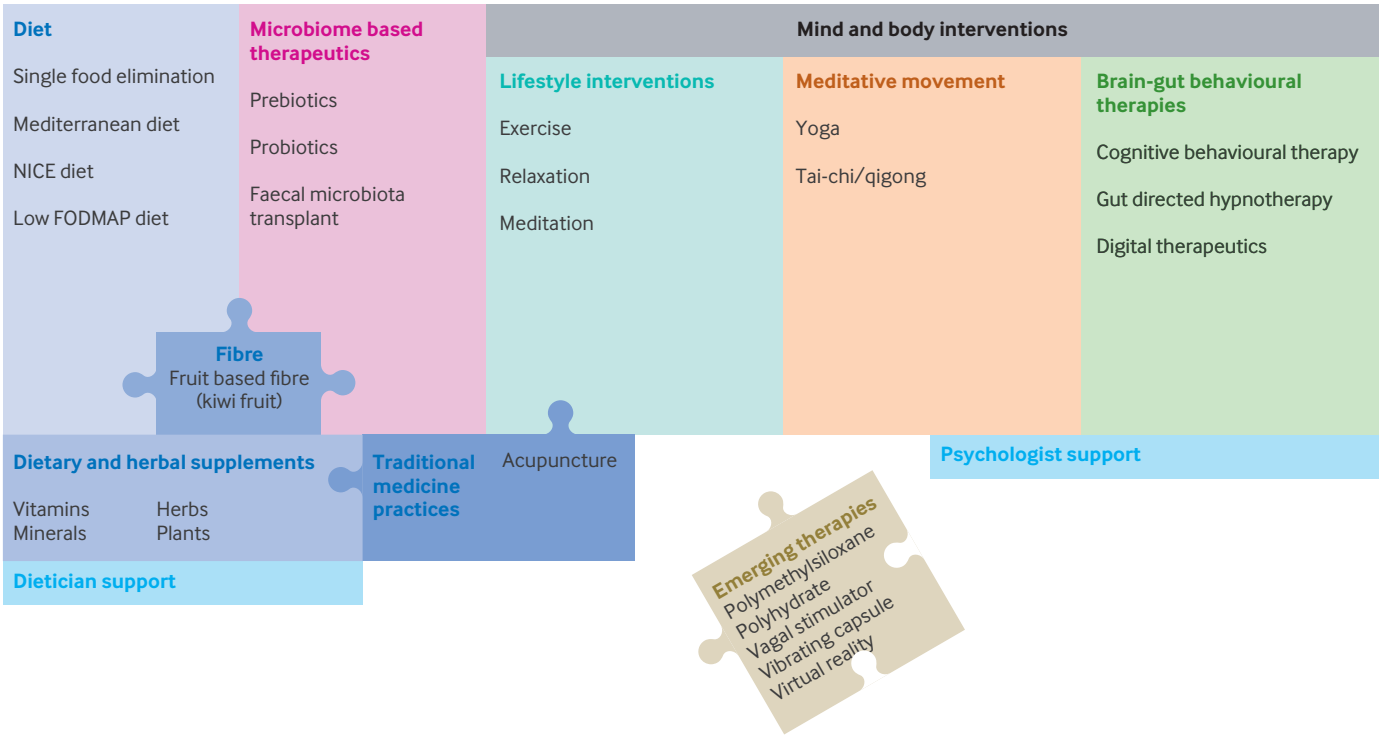

Fig 2 | **Irritable bowel syndrome is a multifactorial illness and should be approached in a multidisciplinary manner with a complement of therapeutic modalities to address the patient's individual symptom phenotype. Therapeutic options include pharmacological options, complementary products, diet based interventions, and those focused on mind-body interventions, spanning the spectrum of cognitively focused to more movement focused. Emerging therapies with devices and more invasive interventions can also have a role in treatment. Adapted from National Center for Complementary and Integrative Health. Complementary, Alternative, or Integrative Health: What's In a Name? www.nccih.nih.gov/health/complementary-alternative-or-integrative-health-whats-in-a-name**

improving=0.76; 95% CI 0.62 to 0.93, NNT=7).[106] The peppermint oil group experienced more adverse events, which were predominantly mild symptoms of reflux, dyspepsia, and flatulence (RR of adverse event 1.57; 95% CI 1.04 to 2.37, NNH=14.5).[106] Patients should be counselled about gastro-oesophageal reflux disease as a potential side effect.[6]

Traditional medicine practices

The Second Asian Consensus guidelines[12] suggest that traditional Chinese medicine could be helpful for some patients with moderate evidence based on a meta-analysis of 14 RCTs of traditional Chinese medicine in IBS-D patients with improvement of global IBS symptoms, abdominal pain, and diarrhoea.[116]

Other ancient herbal medicine practices with evidence in IBS include Ayurvedic medicine,[119] and Japanese Kampo agents.[120]

Other herbal formulations

The herbals and supplements used by patients for the treatment of IBS include curcumin, fennel,[121] turmeric,[122] caraway oil,[123] melatonin,[124] aloe,[125] ginger,[126] berberine hydrochloride.[127]

Acupuncture

A 2006 Cochrane review[136] comprising six individual trials found acupuncture was not superior to sham acupuncture, but was superior to herbal medications and as an addition to psychotherapy compared with psychotherapy alone. Overall, the quality of evidence supporting acupuncture remains low[142] with no statistically significant differentiation between true and sham acupuncture.[143]

One challenge of evaluating the utility of acupuncture is heterogeneity in acupoints selected, which can vary depending on individual patient symptoms or vary between studies in similar patient populations. In addition, sham acupuncture in trials is sometimes performed with blunt needling at the same acupoints as true acupuncture, effectively delivering acupressure, which has shown benefit on its own for symptom treatment,[145 146] bringing into question whether this is a true control.

Given this evidence, the utility of acupuncture remains unclear with a possible positive effect and low risk for adverse events. Studies suggest acupuncture might have a role as an adjunctive therapy to medications or psychotherapy with 12 month durability.[141]

Electroacupuncture

Electroacupuncture is an emerging therapy that involves the use of small electric currents applied to acupuncture needles with the aim of enhancing the therapeutic effect of acupuncture. The role of electroacupuncture in treatment of IBS remains unclear but may hold promise given improvement in other constipation subtypes.

Mind-body interventions

Mind-body intervention, a complementary and integrative health approach, targets "interactions among the brain, mind, body, and behavior, with the intent to use the mind to affect physical functioning and promote health."[149] Mind-body interventions used for IBS therapy include general exercise, yoga and tai-chi or qi-gong.

Exercise

Exercise has been shown to improve IBS symptoms through a variety of mechanisms with potential long term durability (>5 years).[150] Low to moderate intensity aerobic exercise was shown in an RCT of 109 women to attenuate inflammation and signs of oxidative stress correlating with improvements in IBS symptoms.[151] A Cochrane review (11 RCTs, n=622) of physical activity including yoga, treadmill exercise, or generalised support to increase physical activity for the treatment of IBS concluded that physical activity might improve symptoms but not quality of life or abdominal pain with very low quality of evidence.[154] The BSG guidelines strongly recommend regular exercise as a first line treatment for global IBS symptoms (weak quality evidence).[6]

Meditative movement (yoga/qi-gong)

Meditative movement practices, which combine postures/movements with meditation practice, can be used for stress sensitive disorders such as IBS. Yoga involves three main components: asanas (physical postures), pranayama (breathwork), and dyhana (meditation). Yoga is hypothesised to correct parasympathetic underactivity in stress related disorders,[155] and modulate stress induced immune responses,[156] which improve IBS symptoms. Other forms of meditative movement include qi-gong and its martial arts form, tai-chi. Both involve postures and gentle movements conducted with mental focus, meditation, and breathing strategies to promote relaxation.

A systematic review of six RCTs of yoga for IBS found yoga to be more beneficial than conventional care, with statistically significant decreases in bowel symptoms, IBS symptom severity, and anxiety with improvements in quality of life, global symptoms, and physical functioning. No statistically significant differences were found between yoga and exercise, suggesting yoga to be equally effective as other movement practices. Yoga was concluded to be safe and feasible, with no adverse events in studies that reported safety data.[157]

Physical/manual manipulations and biofeedback

Physical therapy, including manual manipulations, myofascial release, pelvic floor rehabilitation and biofeedback, have an important role in management of musculoskeletal and myofascial pain conditions, many of which are comorbid with IBS.

A 2014 systematic review evaluated five studies (n=204) utilising osteopathic manipulation for IBS, finding pronounced short term benefits in IBS symptoms compared with sham or standard of care.[160] Like acupuncture, studies of osteopathic manipulation use varied approaches, and lack standardised symptom severity or secondary outcome measures,[160] making findings difficult to generalise and interpret. A Cochrane Review of RCTs (n=300) assessed multiple biofeedback mechanisms including thermal (skin temperature, four trials), rectosigmoid (rectal manometry/barostat, one trial), heart rate variability (pulse oximetry, two trials), and electrocutaneous biofeedback (two trials). This review found high or unclear risk of bias in all studies with overall uncertain benefit of biofeedback for IBS symptoms.[163]

HOW PATIENTS WERE INVOLVED IN THE CREATION OF THIS ARTICLE

We used patient input from clinical practice to include complementary and alternative therapies that are frequently explored or utilised from a patient standpoint. After drafting the paper, we involved well known patient advocates within the IBS space to review the paper to ensure all relevant and evidence based therapies were covered within the review.

Patient advocates Johannah Ruddy, president of Gastro Consulting and Communications, director of patient advocacy for Ardelyx, co-founder of Tuesday Night IBS, author of multiple books on patient centred communication in IBS, former chief operating officer and executive director of the Rome Foundation, Ceciel Rooker, president and executive director of the International Foundation for Gastrointestinal Disorders, an IBS patient advocate group, and Jeffrey Roberts, founder of IBS Patient Support Group and cofounder of Tuesday Night IBS, reviewed the paper and gave feedback which was incorporated into the final manuscript.

Guidelines

Table 1 (online) contains a summary of international guidelines for non-pharmaceutical interventions in IBS.

Conclusion

Treatment of IBS has evolved over the past two decades with more options and evidence for non-pharmaceutical treatments (fig 2). International guidelines support the use of diet based interventions as front line therapy from increased soluble fibre to more general dietary changes. Guidelines overall support psychological and behaviour based interventions with caveats to patient selection and differing suggestions for where these should be positioned. Complementary and integrative health therapies including peppermint oil are gaining acceptance with mixed recommendations in guidelines. Microbiome based therapies are similar with overall limited evidence and mixed support from guidelines for probiotic use. There is consensus that FMT is not currently recommended for IBS treatment. IBS is a heterogeneous disorder and many of the non-pharmaceutical approaches aim to provide personalised therapy for patients within a standardised framework, leading to challenges in standardising and interpreting research for many of these interventions. Future research directions for many of these options should include identifying optimal protocols/dosages and treatment durations.

Competing interests: None declared.

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Find the full version with references at doi: 10.1136/bmj-2023-075777

How to make remote consultations safer

The study

Patient safety in remote primary care encounters: multimethod qualitative study combining Safety I and Safety II analysis

Payne R, Clarke A, Swann N, et al

BMJ Quality and Safety 2023;0:1–14

CPD READING

0.5 HOURS

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Why was the study needed?

Remote consultations allow people to consult clinicians without leaving home. Providing remote clinical care and triage (determining the urgency of a condition) can help staff meet rising demand, and be convenient for patients.

Media stories have linked avoidable deaths and missed cancers with remote consultations. Researchers investigated safety incidents associated with remote consultations, and made suggestions about how to improve safety.

What did the study do?

Safety incidents from remote primary care consultations are rare: 95 across the UK between 2015 and 2023. Researchers analysed these incidents via 100 formal interviews and numerous on-the-job interviews with practice staff, plus interviews with 10 general practitioner (GP) trainers, 10 GP trainees, and six clinical safety experts (from government, arm's length bodies, and health boards).

What did it find?

Safety incidents led to harm or serious risk of harm; examples included missed or delayed diagnoses, underestimation of severity or urgency, and incorrect or delayed treatment. Serious harm was most often caused by a combination of inappropriate consultation type, poor relationship building, limited information gathering, limited physical assessment, wrong choice of clinical pathway, and failure to consider social circumstances.

The researchers suggested that remote consultations are not appropriate:

- For conditions that require physical examination or tests (including breast lump, breathing difficulties, sudden chest or stomach pain)
- When conditions have not resolved as expected (including increased parental concern about a child)
- For people who might struggle with telephone or video communication (including those with limited English or learning difficulties, or people with multiple conditions and complex needs).

Practical suggestions for primary care could be to:

- Use video calls instead of audio calls if a clinician has a hunch that the patient is unwell and arrange for a physical examination if indicated
- Provide effective safety-netting verbally and in writing (this could be through a text or email), including next steps for the patient if their condition worsens or doesn't resolve as expected
- Adopt organisation and system level measures (adequate staffing, staff training, and improved continuity of care for vulnerable people with complex needs).

Patients and carers could:

- Think about how to clearly describe symptoms before the appointment, even if they have previously described them to a clinician
- Consider having someone else present for the appointment to help them explain the problem
- Ask what happens after the appointment and what to do if symptoms do not improve.

Why is this important?

These findings could improve patient safety and support clinicians in remote consultations. Staff could benefit from training on effective use of the telephone. Creative and flexible actions by staff (adapting standard procedures to take account of patients' unique needs) can help reduce safety incidents, the researchers say.

The safety incidents analysed in this study included deaths and serious harm. The researchers had limited data on less serious incidents, which were less likely to be reported.

The findings do not directly compare the safety of different consultation types. It is not possible to say that a remote consultation caused harm, because in some cases a face-to-face consultation could have led to the same outcome.

What's next?

Since the findings were published, the researchers have worked with members of the public to develop resources detailing the steps people can take to get the safest care. They have delivered national training sessions and produced guidance with NHS Resolution in England and GP education events in Northern Ireland. With research partner the Nuffield Trust, they have produced a policy brief which includes advice on making remote consultations safer. The researchers are working with the Royal College of General Practitioners Wales and Scotland to create resources for the parliaments of the devolved nations.

Competing interests: *The BMJ* has judged that there are no disqualifying financial ties to commercial companies. Further details of other interests, disclaimers, and permissions can be found on bmj.com

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WHAT YOUR PATIENT IS THINKING

The pressure and shame of a high risk pregnancy

CPD READING
0.5 HOURS

Sue Fletcher-Watson describes the pressures of constant monitoring in a pregnancy deemed high risk

ALISSA THALER

Earlier this year I gave birth to a bouncing baby girl, an 8 lb 4 oz bundle of joy. The euphoric moment was made even more special by its contrast with a gruelling pregnancy. This was my third pregnancy but my first experience of following a high risk care pathway. Although I've rarely had a body mass index (BMI) below 35, my first two pregnancies managed to slide under the medical radar. This time I was much older, and somewhat fatter, with a BMI of 41. I was referred to a consultant led clinic and assigned to the high risk category.

We know that risk operates on a continuum, but my categorisation as high risk during this pregnancy was entirely binary. It defined me for those nine life changing months. I felt helpless. Even if I had wanted to take action to reduce my weight, no one recommends dieting or a blistering new exercise regimen during pregnancy, with good reason. I was condemned to feel shame, and often anger and resentment, with no way out.

Communicating risk

I started dieting as a pre-teen, but gave up a decade ago because I didn't want my daughters growing up in a household where dieting was present. I learnt to focus on being healthy in other ways, and to accept my body. But on the high risk pregnancy pathway, this "fat and fit" self image was undermined. I was prescribed a vast array of medications, all with preventive functions. You might think I would have been glad to have these, but in the absence of any symptoms that needed resolving, they served only as a reminder of my unhealthy, at-risk status.

At risk for what, I wondered. The specific negative outcomes were unclear to me, and numerical likelihoods were rarely if ever communicated. Certainly, the risk of me having a big baby was closely scrutinised, but having had two babies already I knew that life with a chunky newborn is significantly easier than with a teeny one. I realised that having a large baby can lead to problems during delivery, but as a 5'11" woman who delivered her first 9 lb 3 oz baby at home, I wasn't worried. There was talk of percentiles too, but our hospital delivers 600 babies per month. Even being on the 99th centile means six babies that month are similarly sized. We can't all be average.

Constant monitoring

Doctors never actually told me that if I were thinner, I wouldn't need to worry about the baby, but they didn't need to. Society is convinced that weight is under an individual's control and so the powerful sense that I had brought this on myself—and on to the developing baby—was overwhelming. The health professionals I met never asked about or recognised these feelings. I thought they did not see the heavy stigma that comes with being fat.

It was months later that I came across the acronym BRAIN (Benefits Risks Alternatives Intuition Nothing), a tool to help patients make informed choices. I was struck by my total lack of choice when embarking on the intensive scrutiny which was the defining hallmark of the high risk pregnancy pathway. Fitting an additional 19 appointments into as many weeks simply added to my stress and worry. Overall, the mental health effects of being monitored, measured, and judged were devastating.

Patient author

Cite this as: *BMJ* 2025;388:q2784

WHAT YOU NEED TO KNOW

- Overweight and obese pregnant women can feel a heavy burden of stigma, pressure, and shame
- Pregnant women of all sizes need to be reassured and given choices about their care
- The experience of a high risk pregnancy care pathway can increase mental health burden, which can also carry negative consequences for mother and baby

EDUCATION IN PRACTICE

- How might you ensure that you are helping support someone facing stigma or shame during pregnancy?
- What support could you give someone in a high risk pregnancy to help manage the mental burden of additional appointments and monitoring?

CASE REVIEW **Skin puckering of the upper arm**

A teenage boy presented to the emergency department three hours after he injured his left shoulder when he fell while running. He had persistent pain and was unable to move his left shoulder. There was noticeable skin puckering at the proximal end of the humerus near the shoulder, accompanied by subcutaneous bruising (fig 1). On examination there was tenderness in the shoulder joint, limited shoulder movement, weakness in forearm flexion, normal distal arterial pulse, and no sensory abnormalities. No emptiness in the shoulder socket was detected on palpation, and the humeral head could not be felt beneath the anterior-inferior aspect of the coracoid process. The patient's temperature and other vital signs were normal, as was sensation in other areas. A radiograph of the left shoulder joint was taken on initial examination (fig 2).

1 **What does the radiograph show?**

2 **What is the diagnosis?**

3 **What is the management?**

Submitted by Jiahao Meng, Pan Liu, and Shuguang Gao

Parental consent obtained.

Cite this as: *BMJ* 2025;388:e082028

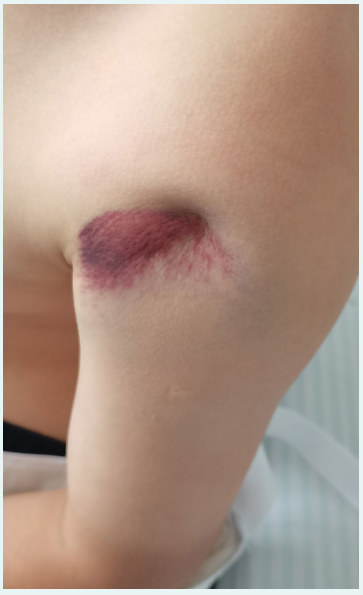

Fig 1 | General appearance of left shoulder

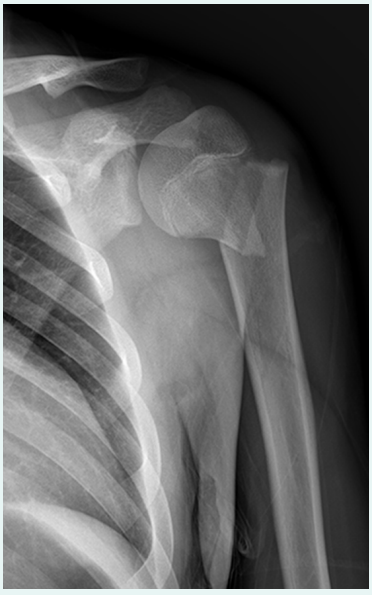

Fig 2 | Anteroposterior radiograph of left shoulder

answers

CASE REVIEW **Skin puckering of the upper arm**

1 What does the radiograph show?

The cortical bone of the proximal humerus is broken, extending from the upper outer side to the lower inner side, with displacement forming a distinct angle, indicating a displaced proximal humeral fracture. The shape and contour of the skin and soft tissue puckering on the lateral side of the fracture site suggest soft tissue entrapment.

2 What is the diagnosis?

Left proximal humeral fracture with soft tissue entrapment (likely long head of the biceps tendon).

Proximal humeral fractures can result in injury to several key neurovascular structures, including the axillary nerve, axillary artery, suprascapular nerve, and subscapular nerve. A proximal humeral fracture leading to entrapment of the long head of the biceps tendon is uncommon. Skin puckering typically indicates irreducibility of a shoulder dislocation and possible neurovascular injury.

Changes in the shape of the acromion can also lead to puckering in the skin over the shoulder. If puckering is observed after excluding shoulder dislocation, it might be because of bone fragment displacement or soft tissue damage resulting from a fracture. Acute trauma can cause localised swelling and bleeding, which further exacerbate the appearance of the puckering. Muscle spasm and inflammatory responses in soft tissues might also contribute to local puckering.

In addition to the puckering closer to the proximal end of the humerus, weakness in forearm flexion and failure of closed reduction are also important findings. Further scans, such as MRI (magnetic resonance imaging) and ultrasound, can aid in more precise diagnosis.

3 What is the management?

For proximal humeral fractures with associated entrapment of the long head of the biceps tendon, proceed with open reduction after one or two failed attempts at closed reduction to avoid exacerbating tendon damage. Paediatric proximal humeral fractures show good outcomes with both surgical and non-surgical treatments. The specific surgical approach should be chosen based on the extent of tendon damage and the characteristics of the fracture. If the tendon damage is severe or the fracture affects the stability of the subsequent tendon structures, tenodesis or a tenotomy could be considered.

LEARNING POINTS

- Skin puckering in shoulder injuries could indicate dislocation, neurovascular injury, or soft tissue entrapment.
- Consider entrapment of soft tissue when a proximal humeral fracture is accompanied by skin puckering.
- When entrapment of the long head of the biceps tendon is suspected in a proximal humeral fracture, avoid repeated attempts (more than two) at closed reduction, and perform timely open reduction instead.

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