

## UNCERTAINTIES PAGE

# Are persistent throat symptoms atypical features of gastric reflux and should they be treated with proton pump inhibitors?

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This is one of a series of occasional articles that highlight areas of practice where management lacks convincing supporting evidence. The series adviser is David Tovey, editor in chief, the *Cochrane Library*. This paper is based on a research priority identified and commissioned by the National Institute for Health Research's Health Technology Assessment programme on an important clinical uncertainty. To suggest a topic for this series, please email us at [uncertainties@thebmj.com](mailto:uncertainties@thebmj.com)

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Previous articles in this series

- ▶ Does intensive medical treatment improve outcomes in aortic dissection? (*BMJ* 2014;349:g5288)
- ▶ What is the optimal pharmacological management of retained placenta? (*BMJ* 2014;349:g4778)
- ▶ Should we advise patients with sutures not to swim? (*BMJ* 2014;348:g3171)
- ▶ Whom should we "test and treat" for *Helicobacter pylori*? (*BMJ* 2014;348:g3320)
- ▶ Should doctors prescribe cannabinoids? (*BMJ* 2014;348:g2737)

Persistent throat symptoms are common in adults. Globus pharyngeus (a feeling of a lump in the throat), dysphonia, throat clearing, cough, excessive phlegm, throat pain, and postnasal secretions are present in up to 25% of primary care attenders, and more than 60 000 people are referred to secondary otolaryngological care annually.<sup>1</sup> Treating persistent throat symptoms with gastric acid suppression has been in vogue for more than a decade, on the basis that they represent "atypical" manifestations of gastro-oesophageal reflux disease (GORD).<sup>2</sup> So called extraoesophageal reflux or laryngopharyngeal reflux is internationally acknowledged as a separate GORD subcategory from "typical" oesophageal reflux disease.<sup>3</sup> However, the relation between gastric reflux and persistent throat symptoms, and the role of proton pump inhibitor (PPI) treatment remains controversial.<sup>4-5</sup> More than half of UK otolaryngologists prescribe PPIs for persistent throat symptoms.<sup>6</sup> The message has also filtered through to primary care that PPIs are a reasonable "empirical" treatment. PPI treatment is a substantial expense for healthcare systems and increasingly treatment of persistent throat symptoms is adding to this. The cost of PPI treatment to the National Health Service in England for all conditions, including persistent throat symptoms, was £425m (€540m; \$694m) in 2006 and the global bill was £7bn.<sup>7</sup>

### What is the evidence of uncertainty?

On 25 June 2014 we searched Medline and Embase databases and the Cochrane Library for studies dealing with persistent throat symptoms, gastric reflux, and treatment with PPIs. We used the search terms "throat symptoms" or "laryngopharyngeal reflux" or "extra-oesophageal reflux" or "extra-esophageal reflux" or "gastro-oesophageal reflux disease" or "gastro-oesophageal reflux disease" or "proton pump inhibitors".

### Are persistent throat symptoms atypical features of gastric reflux?

The pathogenesis of persistent throat symptoms in gastric reflux is hypothesised to be through retrograde flow of gastric contents (particularly acid, bile, and pepsin) that affect the laryngopharynx by direct mucosal contact, or by a secondary mechanism.<sup>8</sup> Persistent throat symptoms,<sup>1</sup> and endoscopic evidence of gastro-oesophageal reflux,<sup>9</sup> are common in the population. This implies that they will coexist in a considerable proportion of people, however, a causal link between the two has not been convincingly shown.

Some evidence shows that gastric contents enter the laryngopharynx. Using 24 hour ambulatory pH monitoring, significantly more reflux events and greater pharyngeal acid exposure times were recorded in the laryngopharynx of people with throat symptoms compared with asymptomatic controls in a meta-analysis (n=793).<sup>10</sup> In

vivo experiments have demonstrated tissue damage and cellular changes in response to individual and combination components of gastric juice on laryngopharyngeal cells,<sup>11</sup> with genetic changes, immunohistochemical effects, and changes in molecular regulator activity.<sup>12</sup> Some of these cellular changes have also been shown in laryngeal samples taken from patients with persistent throat symptoms.<sup>12</sup>

### Should we treat persistent throat symptoms with PPIs?

We identified three systematic reviews investigating the role of PPIs in treating multiple persistent throat symptoms. These reviews found significant heterogeneity in patient selection. They also overlapped in several studies cited. The largest meta-analysis (n=344) found a non-significant reduction in symptoms with PPIs compared with placebo in eight randomised controlled trials.<sup>13</sup> A meta-analysis of five randomised controlled trials also concluded that high dose PPIs were no more effective than placebo for treating throat symptoms.<sup>14</sup> A systematic review identified 14 uncontrolled case series that demonstrated an improvement in throat symptoms with PPI treatment (4-24 weeks' duration, variable doses), but these studies in addition to not having a control group, had issues with selection bias and variable outcome measures. It also identified five placebo controlled randomised controlled trials that showed no significant improvements in symptoms after PPI treatment.<sup>15</sup> A significant placebo effect was also noted: both treatment and placebo groups showed improvement in symptoms over time. This placebo effect has also been shown in a large meta-analysis investigating the treatment of oesophageal GORD symptoms with PPIs.<sup>16</sup> We also identified two Cochrane reviews of the effect of PPIs on individual throat symptoms—cough<sup>17</sup> and hoarseness<sup>18</sup>—neither of which reached significant conclusions.

Although PPIs are considered to be generally efficacious and to have low toxicity,<sup>7</sup> rebound—symptomatic hypersecretion of gastric acid on withdrawal—is a real phenomenon.<sup>4</sup> Other possible side effects of PPIs shown by large scale meta-analyses include pneumonia (increased 27-39% with short term use) and *Clostridium difficile* infection (odds ratio: 2.15; 95% CI: 1.81–2.55; p < 0.00001).<sup>19</sup>

### Is ongoing research likely to provide relevant evidence?

We carried out a search of the Current Controlled Trials Register, the *metaRegister* of Controlled Trials, and the US Government Clinical Trials Register on 18 February 2014, using the search terms "throat symptoms", "laryngopharyngeal reflux", "extra-oesophageal reflux", and "proton pump inhibitors". No large scale, quality, studies were identified that would sufficiently deal with the questions posed in the article. Several small (enrolling fewer than 140 participants), heterogeneous studies were identified. Four trials of newly developed PPIs in the

Summary of evidence for various treatment interventions in patients with persistent throat symptoms

| Intervention                              | Regimen  | Who may benefit?   | Who will likely not benefit?                                   | Evidence base for use in persistent throat symptoms   |
|---|--|--|--|---|
| Referral to secondary care                | Two week wait cancer pathway   | High risk of malignancy patient  | Low risk of malignancy patient                                 | National guidelines   |
|   | Specialist throat symptom clinic (or local equivalent)   | Refractory symptoms<br>Unresponsive to other treatment<br>High symptom burden<br>Motivated patient | Unmotivated patient  | Expert opinion  |
| Alginate                                  | Standard dose (as per preparation), four times a day, for at least two months  | Possibly many patients with both GORD and extraoesophageal throat symptoms                         | Undefined subgroup   | Improvement in one randomised controlled trial  |
| Lifestyle modifications                   | Avoid acidic food and drink<br>Avoid eating in three hours before sleep, overnight snacking, excessive alcohol intake, smoking, lack of exercise, and eating quickly | Motivated patient<br>Identifiable possible contributing factors                                    | Unmotivated patient  | Improvement in uncontrolled series<br>Expert opinion  |
| Speech and language therapy interventions | Personalised regimen   | Patients with primary problem of: globus, cough, dysphonia   | Unmotivated patients   | Up to randomised controlled trial level evidence for improvement with individual symptoms<br>No current evidence in multiple persistent throat symptoms |
| Proton pump inhibitors                    | Normal regimen for GORD  | Patients with associated GORD symptoms—for example, heartburn, indigestion                         | Patients with only persistent extraoesophageal throat symptoms | No effect in meta-analysis and systematic reviews<br>Improvement in most uncontrolled series  |
| Histamine H2 receptor antagonists         | Normal regimen for GORD  | Patients with associated GORD symptoms—for example, heartburn, indigestion                         | Patients with only persistent extraoesophageal throat symptoms | No improvement in one randomised controlled trial<br>Improvement in single observational study  |
| Nissen fundoplication                     | Standard operation   | Patients with associated GORD symptoms—for example, heartburn, indigestion                         | Patients with only persistent extraoesophageal throat symptoms | No improvement in one randomised controlled trial<br>Improvement in several observational studies   |

GORD=gastro-oesophageal reflux disease.

treatment of throat symptoms (two recruiting, one not yet recruiting, one completed with no results yet released) were found. One further small, ongoing trial of throat symptoms is evaluating a new alginate oral suspension. Given the current uncertainties about the efficacy of established PPIs and the limited studies of established alginates, a trial of newer preparations might be premature. A further study not registered at the time of searching, the Trial of Proton Pump Inhibitors in Throat Symptoms (TOPPITS) is under way (UKCRN ID 16317). It is a multicentre, randomised, double blind, placebo controlled trial of lansoprazole in patients with persistent throat symptoms, using three patient reported outcome measures for throat symptoms.

**What should we do in the light of the uncertainty?**

**Primary care**

We identified several studies looking at other treatment approaches for persistent throat symptoms. These include non-PPI anti-reflux drugs such as alginates that form a raft over gastric contents, absorbing pepsin and bile salts from the refluxate. Only one small, randomised study (n=49) compared Gaviscon Advance (Reckitt Benckiser; 10 ml four times a day) with “no treatment,” apart from high quality speech therapy, for throat symptoms. Both groups showed improvement in symptoms; however, there was a significantly greater benefit in throat symptoms overall (including heartburn) in the treatment group than in the control group at two and six months.<sup>20</sup>

**RECOMMENDATIONS FOR FURTHER RESEARCH**

- Population: Patients with persistent throat symptoms of an unidentifiable cause
- Intervention and comparator: Large scale study of persistent throat symptoms and the correlation with prolonged recording of reflux episodes by pH/impedance measures
- Outcome: Correlation between symptoms and reflux events

A single, small (n=20), double blinded randomised controlled trial found no difference between the histamine H2 receptor antagonist cimetidine and placebo in improvement of throat systems.<sup>21</sup> However, a single observational study showed a complete resolution of persistent throat symptoms with famotidine in 48 out of 89 patients.<sup>22</sup>

We identified only one study that specifically investigated the role of lifestyle modification in persistent throat symptoms. In a small (n=20), uncontrolled series, participants consumed a diet that excluded food and drinks of less than pH 5. This demonstrated an overall significant improvement in persistent throat symptoms after two weeks.<sup>23</sup> It would also seem sensible to offer patients relevant advice to avoid factors that provoke GORD: eating in the three hours before sleep, overnight snacking, excessive alcohol intake, smoking, lack of exercise, and eating quickly.<sup>24</sup>

**Secondary care**

Referral to secondary care should usually be made for exclusion of malignancy (because of medical concern or patient concern), or further investigation or treatment of refractory symptoms causing a substantial burden to patients.<sup>25</sup> The two week rule pathway for exclusion of malignancy is essential to provide urgent referral to specialist care in those at high risk of malignancy (particularly smokers) with convincing “red flag” symptoms, such as a persistent sore or painful throat, unilateral head and neck pain with associated otalgia (normal otoscopy), and persistent hoarseness. Dysphagia or pain on swallowing, persistent cough, or haemoptysis would also require referral to the appropriate secondary care specialty. Any patients with clinical signs such as neck lumps, oral ulcerations, or salivary swelling should also be referred urgently.<sup>25</sup> This referral route can also provide quick reassurance for some worried patients, but at the expense of inducing healthcare related anxiety in others, potentially with exacerbation of symptoms.<sup>26</sup> In some cases a referral

to an urgent voice clinic (or local equivalent) might be more appropriate. As opposed to the two week pathway, the emphasis of which is on speed of access and exclusion of cancer—and which may leave patients lacking appropriate interventions for their benign disease, these urgent voice clinics, or local equivalent clinics, have the structure and support to provide ongoing management of these patients' symptoms.

Tests available in secondary care include flexible laryngoscopy, transnasal oesophagoscopy, and oesophago-gastro-duodenoscopy. However, several small case series show that laryngopharyngeal mucosal signs of reflux correlate poorly with throat symptoms.<sup>27</sup> Some centres offer increasingly advanced measurement of acidic and non-acidic reflux events in to the pharynx and oesophagus using pH-metry and impedance manometry. These tests can be used to identify patients who are refluxing and possibly to guide doctors on the need for anti-reflux treatments. However, the tests have several limitations and their practical day to day use in patient care has not been clearly demonstrated.<sup>10 28</sup> Future tests include pepsin breath tests that might result in completely non-invasive investigations of extraoesophageal reflux.<sup>29</sup>

Although some small randomised controlled trials show the benefit of speech and language therapy in certain voice disorders—for example, to treat globus<sup>30-32</sup>—we found no studies that assessed its effect on multiple, heterogeneous persistent throat symptoms. Surgery, specifically Nissen fundoplication, has been suggested by some as a treatment for persistent throat symptoms. A narrative review pooling

the results of five heterogeneous studies concluded that there was insufficient evidence to demonstrate a benefit from surgery for this purpose (155 patients, with four uncontrolled studies showing variable improvement, and the only controlled study found no significant improvement over anti-reflux treatment).<sup>33</sup> Studies involving such procedures might also be biased by expectations of surgery.

**Recommendations**

Within those patients with persistent throat symptoms there is almost certainly a subgroup whose symptoms are primarily caused by reflux disease. Identification of this group is challenging and should be a priority for future research. In those with a low risk of malignancy, a trial of an alginate for at least eight weeks would seem reasonable as a low cost and low risk intervention. Patients with co-existent GORD symptoms, such as heartburn, may gain additional benefit from an alginate with a PPI. Little evidence exists for lifestyle modification with these symptoms; in some patients, however, changes to lifestyle could be an inexpensive, low risk adjunct to other treatments. Failing this, referral to secondary care would be recommended for further investigation and management.

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References are in the version on thebmj.com.

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**ALL THINGS CONSIDERED**

Isn't the NHS brilliant?

"Isn't the NHS brilliant," he said to me in a strong Welsh accent. On my first night on call as a foundation level doctor, I was called to see a 98 year old man with abdominal pain. As I started to examine him, he proceeded to tell me his story. He had grown up in Tredegar, and had known Aneurin Bevan as a young man.

He told me about the Tredegar Medical Aid Society, where every miner in the town paid one penny a week, and in return was guaranteed free medical care from the community doctor when he needed it. The scheme grew and the cottage hospital was funded. Eventually 95% of the residents of Tredegar were covered by the scheme and enjoyed free healthcare at the point of delivery.

Aneurin Bevan had seen first hand how free healthcare could make a difference to the lives of a community. He had childhood friends who had died of preventable diseases, and treatable injuries, through lack of access to affordable healthcare. He took forward the idea of universal access to healthcare, and the National Health Service was born.

I was shown just how far we have come in the past 65 years. I realised that I sometimes take for granted how those in need are able to access the medical



treatment they require without pecuniary concern. While dancing (albeit with two left feet) in the NHS section of the London Olympics opening ceremony, I felt the cheers of the crowd in support of the NHS, a beloved national institution.

We are at a time of uncertainty, and insecurity for the future of the NHS. We are guardians of the profession, and gatekeepers to our patients. Through my patient's story, I was reminded that we have a duty to keep access to healthcare universal.

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## GUIDELINES

## Diagnosing and managing acute heart failure in adults: summary of NICE guidance

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This is one of a series of *The BMJ* summaries of new guidelines based on the best available evidence; they highlight important recommendations for clinical practice, especially where uncertainty or controversy exists. Further information about the guidance, a list of members of the guideline development group, and the supporting evidence statements are in the full version on [thebmj.com](http://thebmj.com).

Acute heart failure may present de novo in people without known cardiac dysfunction, or as an acute decompensation of known chronic heart failure. Acute heart failure is a common cause of admission to hospital (more than 67 000 admissions in England and Wales each year) and is the leading cause of hospital admission in people aged 65 years or more in the United Kingdom.<sup>1</sup> European registry data show that nearly 50% of people admitted to hospital with acute heart failure are re-admitted within 12 months,<sup>2</sup> and a third of people with acute heart failure die within a year of their first hospital admission.<sup>1</sup> The diagnosis of heart failure can be challenging because of non-specific symptoms and clinical signs, and there is evidence of wide variation in the way people with acute heart failure are managed.<sup>1</sup> This article summarises the most recent recommendations from the National Institute for Health and Care Excellence (NICE) on acute heart failure.<sup>3</sup>

### Recommendations

NICE recommendations are based on systematic reviews of the best available evidence and explicit consideration of cost effectiveness. When minimal evidence is available, recommendations can be based on the Guideline Development Group's experience and opinion of what constitutes good practice. Evidence levels for the recommendations are given in the full version on [thebmj.com](http://thebmj.com).

### Organisation of care

- All hospitals that admit people with suspected acute heart failure should have a specialist heart failure team that is based on a cardiology ward and provides outreach services.
- All people being admitted to hospital with suspected acute heart failure should have early and continuing input from a dedicated specialist heart failure team.
- In line with guidelines for chronic heart failure (NICE Clinical Guideline 108<sup>4</sup>), plan the following with people with acute heart failure:
  - Discharge from hospital after the acute phase, and
  - Subsequent management in primary care, including ongoing monitoring and care provided by the multidisciplinary team, and
  - Information and communication about their condition, its treatment, and the prognosis.
- A follow-up clinical assessment should be undertaken by a member of the specialist heart failure team within two weeks of the person being discharged from hospital.

### Diagnosis and assessment

- In people presenting with new suspected acute heart failure, use a single measurement of serum natriuretic

peptides (B type natriuretic peptide or N-terminal pro-B-type natriuretic peptide) to rule out the diagnosis of heart failure. Use the following thresholds to rule out heart failure:

- B type natriuretic peptide less than 100 ng/L
- N-terminal pro-B-type natriuretic peptide less than 300 ng/L.

- In people presenting with new suspected acute heart failure and raised natriuretic peptide levels, perform transthoracic Doppler two dimensional echocardiography to establish the presence or absence of cardiac abnormalities. Consider performing this within 48 hours of admission to guide early specialist management.

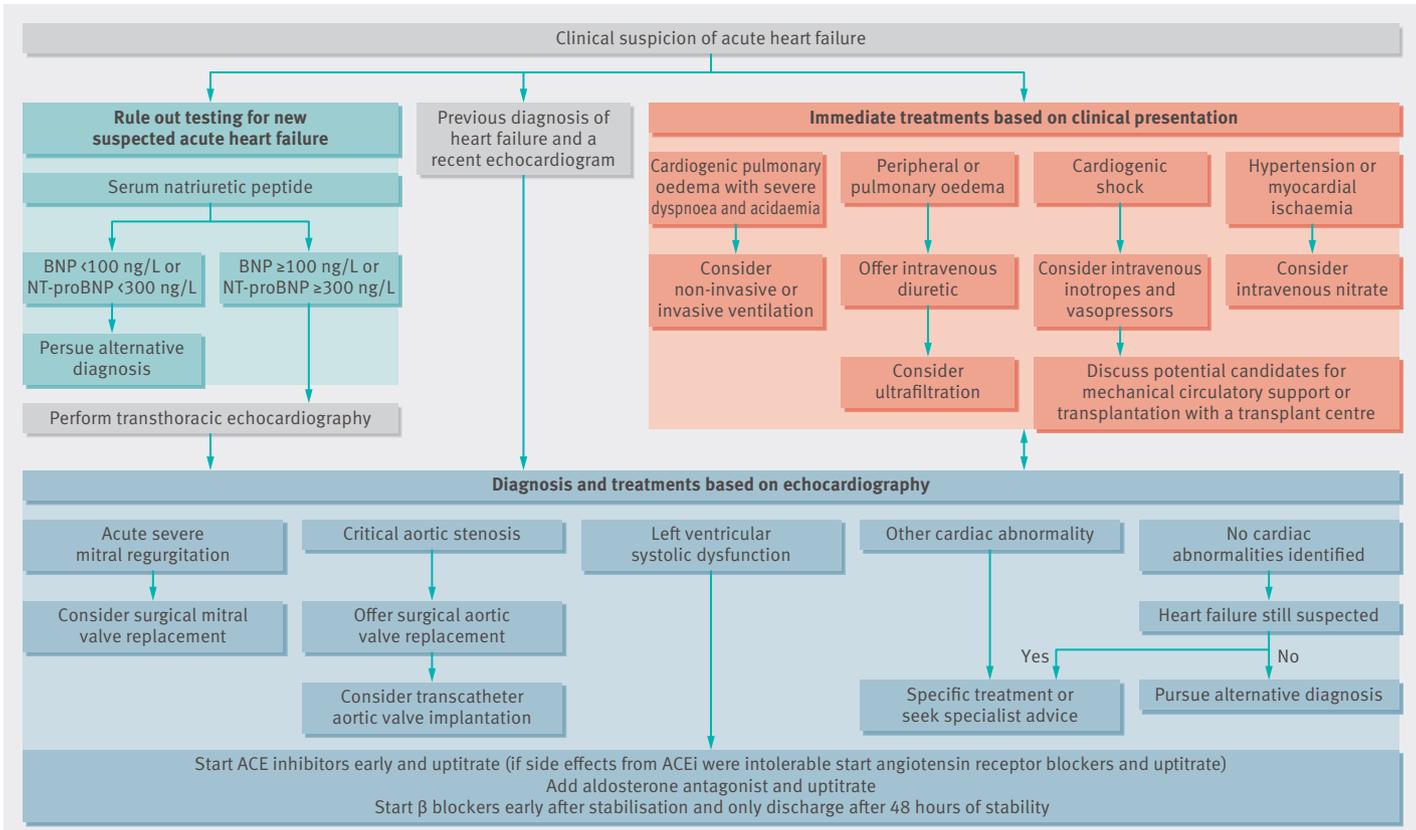
The figure outlines the diagnosis and treatment algorithm for patients with clinically suspected acute heart failure.

### Drug treatment

- Do not routinely offer opiates to people with acute heart failure.
- Do not routinely offer nitrates to people with acute heart failure.
- If intravenous nitrates are used in specific circumstances—for example, in people with concomitant myocardial ischaemia, severe hypertension, or regurgitant aortic or mitral valve disease—monitor blood pressure closely in a setting where at least level 2 care can be provided. (Level 2 care is for people who need more detailed observation or intervention, including support for a single failing organ system or postoperative care, and for those stepping down from higher levels of care.<sup>5</sup>)
- Do not routinely offer inotropes or vasopressors to people with acute heart failure.
- Consider inotropes or vasopressors in people with acute heart failure with potentially reversible cardiogenic shock. Administer these treatments in a cardiac care unit, high dependency unit, or an alternative setting where at least level 2 care can be provided.

### Diuretics

- Offer intravenous diuretics to people with acute heart failure. Start treatment using either a bolus or infusion strategy.
- For people already taking a diuretic, consider increasing the dose unless there are serious concerns with patient adherence to diuretic treatment before admission.
- Closely monitor the person's renal function, weight, and urine output during treatment with diuretics.



**Diagnostic and treatment algorithm for clinical suspicion of acute heart failure. ACE=angiotensin converting enzyme; BNP=B type natriuretic peptide; NT-proBNP=N-terminal pro-B-type natriuretic peptide**

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- ▶ Assessment and management of bipolar disorder (*BMJ* 2014;349:g5673)
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- ▶ Early identification and management of chronic kidney disease in adults (*BMJ* 2014;349:g4507)
- ▶ Lipid modification and cardiovascular risk assessment for the primary and secondary prevention of cardiovascular disease (*BMJ* 2014;349:g4356)
- ▶ The management of atrial fibrillation (*BMJ* 2014;348:g3655)

**β blockers**

- In people presenting with acute heart failure who are already taking β blockers, continue the treatment unless they have a heart rate less than 50 beats/min, second or third degree atrioventricular block, or shock.
- Start or restart β blockers during hospital admission in people with acute heart failure as a result of left ventricular systolic dysfunction once their condition has been stabilized—for example, when intravenous diuretics are no longer needed.
- Ensure that the person's condition is stable for typically 48 hours after starting or restarting β blockers and before discharging from hospital.

**Angiotensin converting enzyme inhibitors and aldosterone antagonists**

- Offer an angiotensin converting enzyme inhibitor (or angiotensin receptor blocker if there are intolerable side effects) and an aldosterone antagonist during hospital admission to people with acute heart failure and reduced left ventricular ejection fraction. If the angiotensin converting enzyme inhibitor (or angiotensin receptor blocker) is not tolerated an aldosterone antagonist should still be offered.

**Non-drug based treatment**

- Do not routinely use non-invasive ventilation (continuous positive airways pressure or non-invasive positive pressure ventilation) in people with acute heart failure and cardiogenic pulmonary oedema.

- If a person has cardiogenic pulmonary oedema with severe dyspnoea and acidaemia consider starting non-invasive ventilation without delay:
  - At acute presentation or
  - As an adjunct to medical treatment if the person has not responded to initial treatment.
- Consider invasive ventilation in people with acute heart failure that, despite treatment, is leading to or is complicated by:
  - Respiratory failure or
  - Reduced consciousness or physical exhaustion.
- Consider ultrafiltration for people with confirmed diuretic resistance. (Diuretic resistance is defined as dose escalation beyond a person's previously recognised dose ceiling or a dose approaching the maximum recommended daily dose without incremental improvement in diuresis.<sup>6</sup>)

**Mechanical assist devices**

In some patients with severe acute heart failure associated with severe haemodynamic compromise, drugs alone are inadequate to support life and mechanical circulatory assistance may be considered. Different mechanical assist devices are available and can be grouped by their intended duration of use (short, intermediate, or long term) and their means of insertion (percutaneous or surgical). At present in the UK, these devices are not funded for long term use in people who are not thought suitable for heart transplantation, but owing to the rapidly expanding technology in this area the decision making process is complex.

- At an early stage, the specialist should have a discussion with a centre that provides mechanical circulatory support about:
  - People with potentially reversible severe acute heart failure or
  - People who are potential candidates for transplantation.

**Overcoming barriers**

Some of these recommendations will be challenging to implement. Hospital trusts will need to ensure that they have a specialist heart failure team, provide urgent serum natriuretic peptide testing, and can offer echocardiography within 48 hours. This will entail upstream costs, but some downstream savings, so commissioners will need to work imaginatively with trusts to ensure implementation in a cost constrained environment. Clinicians may need to review their practice so that they do not routinely use opioids, nitrates, or non-invasive ventilation for respiratory distress and to ensure that treatment with an angiotensin converting enzyme inhibitor,  $\beta$  blocker, and aldosterone antagonist is started during the hospital stay. Cardiology and heart failure multi-disciplinary teams will have a key role in supporting local implementation of this guideline. The development of NICE Quality Standards (prioritised statements designed to drive measurable quality improvements within a particular area of health or care) for acute heart failure will facilitate such organisational changes. In addition, professional societies (such as the British Society for Heart Failure, British Cardiovascular Society, and

British Society of Echocardiography) and patient organisations could facilitate guideline implementation by disseminating information and educating their members. The National Heart Failure Audit can provide key data to monitor implementation.

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All authors were members of the Guideline Development Group for the NICE guideline. (KD a systematic reviewer, ED health economist, ER research fellow, AL specialist trainee adviser, and JM guideline chair).

- 1 Cleland J, Dargie H, Hardman S, McDonagh T, Mitchell P. National heart failure audit. April 2012-March 2013. National Institute for Cardiovascular Outcomes Research (NICOR), 2013. [www.ucl.ac.uk/nicor/audits/heartfailure/documents/annualreports/hfannual12-13.pdf](http://www.ucl.ac.uk/nicor/audits/heartfailure/documents/annualreports/hfannual12-13.pdf).
- 2 Cleland JG, Swedberg K, Follath F, Komajda M, Cohen-Solal A, Aguiar JC, et al. The EuroHeart failure survey programme—a survey on the quality of care among patients with heart failure in Europe. Part 1: patient characteristics and diagnosis. *Eur Heart J* 2003;24:442-63.
- 3 National Institute for Health and Care Excellence. Acute heart failure: diagnosing and managing acute heart failure in adults. (Clinical Guideline CG187). 2014. [www.nice.org.uk/guidance/cg187](http://www.nice.org.uk/guidance/cg187).
- 4 National Institute for Health and Care Excellence. Chronic heart failure: the management of chronic heart failure in adults in primary and secondary care. (Clinical Guideline 108). 2010. [www.nice.org.uk/guidance/cg108](http://www.nice.org.uk/guidance/cg108).
- 5 Intensive Care Society. Levels of critical care for adult patients. ICS, 2009.
- 6 Felker GM, Mentz RJ. Diuretics and ultrafiltration in acute decompensated heart failure. *J Am Coll Cardiol* 2012;59:2145-53.

**ANSWERS TO ENDGAMES, p 38**

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**ANATOMY QUIZ**

**Anatomical lines of the pelvis on an anteroposterior radiograph**

- A: Iliioischial line (posterior column; right)
- B: Iliopectineal line (anterior column; left)
- C: Dome (roof of acetabulum; left)
- D: Anterior wall of the acetabulum (left)
- E: Teardrop (ridge of the acetabulum floor; left)
- F: Posterior wall of acetabulum (right)
- G: Shenton's line (right)

**STATISTICAL QUESTION**

**Understanding confidence intervals**

Statements *a* and *b* are true, whereas *c* and *d* are false.

**PICTURE QUIZ**

**An unusual headache**

- 1 In this age group unilateral headache is usually caused by temporal arteritis, with trigeminal neuralgia or carotid artery dissection also in the differential diagnosis. The normal ESR and later neurological deficits suggested an alternative diagnosis, however.
- 2 Deviation of the tongue to the left is suggestive of weakness in the left sided muscles, which causes unopposed movement to the left. The muscles of the tongue are innervated by the hypoglossal nerve and these features are therefore in keeping with left hypoglossal nerve palsy.
- 3 A normal unenhanced computed tomogram of the brain makes non-vascular causes less likely, so vascular imaging—with computed tomography or magnetic resonance angiography—is the next step.
- 4 The main aim of treatment in patients with arterial dissection is the prevention of stroke. Treatment involves the use of antiplatelet or antithrombotic drugs.
- 5 Although the prognosis depends on the severity of the initial insult, patients typically recover well from carotid dissection, with over 75% of patients making a good functional recovery. The small risk of recurrent stroke necessitates the use of long term antiplatelet drugs.