Nonpharmacological interventions for breathlessness

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Purpose of review

Breathlessness is difficult to palliate and nonpharmacological interventions are effective management strategies currently available for mobile patients. These are a diverse group of interventions, currently poorly defined and inconsistently used. This review concentrates on identifying and recommending the most effective nonpharmacological strategies for breathlessness, to aid clinical practice.

Recent findings

Much of the evidence presented is based on a Cochrane Review, which demonstrated that facial cooling, by handheld fan, mobility aids (e.g. rollators) and neuromuscular electrical stimulation all had evidence to support their use in breathlessness. Breathing exercises, pacing and positioning are frequently used to manage breathlessness, but need definition and further research. Anxiety reduction techniques and carer support are used in chronic disease management and applicable for breathlessness, but act indirectly. Exercise is a long established management strategy in both respiratory and other chronic diseases to maintain fitness (which reduces breathlessness) and increase psychological well being.

Summary

All patients with breathlessness should learn appropriate nonpharmacological interventions. Some can be taught by clinicians without specialist training, but others require specialist skills and high levels of engagement by cognitively intact and highly motivated people. Specialist breathlessness services may be more effective in delivering complex nonpharmacological interventions, but more research is needed.

Keywords

breathlessness, exercise, fan, mobility aids, neuromuscular electrical stimulation, nonpharmacological

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Introduction

Breathlessness is often compared with cancer pain in the palliative care literature: both are multidimensional symptoms the impact of which can be modified by, and have an effect on, psychological, social, physical and spiritual experiences and interventions [1]. However, the evidence base for the management of pain is more extensive with existing effective pharmacological treatments for somatic pain widely prescribed. Effective treatments for palliating breathlessness include nonpharmacological [2] approaches, which are unevenly provided and unusual outside palliative care and some respiratory units. Despite an improving evidence base in this area, there is limited implementation of the evidence, which currently exists. It is clear that confusion remains about which nonpharmacological interventions should be used and in which combinations both because of the paucity of the evidence base and its generally low quality. Many studies in this area are underpowered, give inadequate definition of the interventions provided, use heterogeneous outcome measures and inappropriate methodology for the question being asked. Unlike pharmacological interventions, there are no companies with a financial interest in establishing the effectiveness of these strategies, which will require money from cash-strapped health services if newly provided.

In this review, the term nonpharmacological is first discussed and the areas of the literature chosen for detailed review described. The evidence for the most important nonpharmacological interventions (as currently understood) is outlined and recommendations for a clinical approach set out. There is a brief discussion considering reasons that nonpharmacological interventions are not implemented as widely as the evidence suggest they should be.

The term nonpharmacological, although currently widely accepted, is unsatisfactory as it is a collective noun of

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exclusion rather than delineating positively a collection of helpful interventions. It gives no indication of the mechanism of action of the different approaches but simply refers to any intervention for breathlessness, which is not a drug but does not customarily include surgical, nutritional or radiotherapeutic approaches.

In practice, nonpharmacological interventions for breathlessness need to be appropriate for an individual's functional status, prognosis and likely disease trajectory, choice and their motivation for learning a new skill or technique and level of cognition and ability to concentrate.

Most require that the team or individual clinician have specialist or further training to provide them adequately.

It is not easy to replace the term nonpharmacological, but it may be more helpful to at least define the approaches used as direct or indirect.

Direct interventions are those which are specifically aimed at reducing the feeling of breathlessness: they are specific for breathlessness or have been tailored for breathlessness from a more general approach, for example, use of walking aids or pacing.

Indirect interventions may treat, support or help factors, which help to reduce the impact or severity of breathlessness and may be part of a complex intervention for breathlessness but may be useful in the management of any symptom, or part of a palliative approach to any advanced progressive disease (see Tables 1 and 2) [3–12]. Many have only been tested as part of a complex intervention to manage breathlessness [13,14].

Some interventions work both directly and indirectly: this includes exercise, which both desensitizes the individual to the sensation of breathlessness and improves physical fitness increasing the level of activity limited by breathlessness. Exercise is not included in this review; it is established as standard in the management of all chronic illness, particularly respiratory conditions, having a favourable impact on many symptoms and morale, general fitness and cardiovascular risk factors. There is still a gap in the literature on the effectiveness of exercise on breathlessness associated with cancer [15,16]. Most research in this area has been related to fatigue and quality of life.

In this paper, direct interventions are reviewed in detail, that is, those approaches that have been tested for breathlessness in patients. Indirect approaches are briefly mentioned as part of the clinical recommendations. Interventions have been considered singly but are more often delivered as part of a complex intervention. There is a number of developing breathlessness services [13,17], and there are two randomized controlled trials (RCTs) currently underway to investigate effectiveness (ISRCTN04119516, NCT01165034).

Key points

- Nonpharmacological interventions are the most effective interventions currently available to palliate breathlessness in the mobile patient.
- Encouraging exercise (and activity) early in the disease course is important in preventing breathlessness associated with deconditioning and to maintain health in those with chronic disease.
- Mobility aids (e.g. rollators) can help to reduce breathlessness and all mobile patients should be given a review of mobility aids by an allied health professional.
- Activity is an important distraction technique.
- The fan or facial cooling by, for example, a flannel is suitable for patients with breathlessness of any aetiology and should always be offered.
- Intervention needs to be appropriate for the person (who will generally require motivation and application to learn a new technique), for the stage of disease and disease trajectory.
- Nonpharmacological interventions require a higher level of support and education in early implementation to develop and maintain concordance with treatment.
- Allied health professionals (occupational therapists and physiotherapists) are trained in specific skills (e.g. exercise therapy, breathing techniques and pacing) as part of their professional training and need to be part of any multiprofessional team specializing in breathlessness management.

Methods

Bausewein *et al.* [2] conducted a Cochrane Review of nonpharmacological interventions: this evidence was updated with a short systematic literature search to the present day using the same search terms. The search was confined to those interventions identified in the Cochrane Review as having the potential to improve breathlessness or for those treatments commonly used and recommended in the management of breathlessness, although the evidence base is weak (e.g. breathing techniques).

Results

There is increasing evidence that using a fan directed to the cheeks (and possibly other methods of facial cooling) relieves the symptom of breathlessness. This was first demonstrated in volunteers with induced breathlessness [18]. The Cambridge Breathlessness Intervention Service (CBIS) has used the handheld fan routinely for

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Table 1 Key nonpharmacological interventions for breathlessness that can be used in any healthcare setting without special services/equipment. (http://www.cuh.org.uk/addenbrookes/services/clinical/breathlessness_intervention_service/breathlessness_index.html)

Intervention	Postulated mechanism of action	Most effectively used for	Benefits/advantages
Hand-held fan – (facial cooling using water has also been described but less practical). Some elderly frail patients may need weaker fan	A draught of air over the area of the face subserved by two-third branches of trigeminal nerve stimulates nasal receptors altering the signal to brainstem respiratory complex and changing respiratory pattern. Relative benefits of reduced air temperature versus airflow over the nasal receptors have not been delineated. A fan directed to the face enabled higher ventilator workloads with less central respiratory drive in healthy volunteers undergoing hypercapnic challenge, possibly as a result of improved diaphragmatic electromechanical coupling and improved diaphragmatic function [3].	Patients with any severity of breathlessness at any stage of their illness. Helps with breathlessness at rest and helps increase mobility by reducing length of breathlessness episodes.	Reducing length of SOB episodes on exertion or at rest. Instilling feeling of confidence that patient and carer do have an intervention they can use to reduce impact SOB. Staff do not need specialist training to administer.
Positioning			
Forward lean in standing or sitting	Positions shoulder girdle and upper limbs to make efficient use of breathing accessory muscles. Facilitates abdominal contents forward so diaphragm movement not hindered. Forward lean in sitting is thought to enhance respiratory muscle function in patients with hyperinflated lungs by loading the diaphragm (BTS/ACPRC, 2009) [4•].	Most applicable in restricted mobility or breathless at rest.	To aid recovery of moderate to severe breathlessness after exertion (BTS/ACPRC, 2009) [4•]. Can be used with pursed lips breathing, recovery breathing and the hand-held fan.
High-side lying or forward lean onto pillows	High-side lying facilitates abdominal contents down and forward so diaphragm movement is not hindered. Forward lean in sitting is thought to enhance respiratory muscle function in patients with hyperinflated lungs by loading the diaphragm (BTS/ACPRC, 2009) [4•]. Patient is fully supported promoting relaxation and reducing energy expenditure.		Used for breathlessness at rest (BTS/ACPRC, 2009) [4•]. Can be used with a 'desk' fan.
Activity pacing/energy conservation	Identifying what individual energy is available and enabling maximum use of this energy. Identifying personal limitations.	Useful at any stage of illness.	Enables patient to gain more control over activities and routine. Can increase overall well being. Helps with planning and prioritizing activities. Can prevent exhaustion and episodes of breathlessness if patient can know their limits and not push beyond them.
Walking aids	Allow a 'forward lean' position to be maintained during ambulation. Provides a portable recovery station so the patient can stop and recover their breathing whenever required. Improves confidence in mobility.		Moderate to severe exertional breathlessness (BTS/ACPRC, 2009) [4•]. Has been shown to reduce exertional breathlessness and increase walking distance [5].
Neuromuscular electrical stimulation (NMES)	Increases muscle bulk, simulating effect of exercise.	At any stage of illness but particularly when less mobile.	Patients who live alone. Those unable to get out to attend group rehabilitation. Patients with a short prognosis. Patients with co-morbidities that prevent exercise.
Exercise	Stops spiral of disability developing. Changes structure of quads muscles for more effective metabolism of glucose and less production of lactic acid.	Most effectively used before patient is deconditioned. Therefore, used in patients who are predicted to become breathless, such as patients with lung cancer, pulmonary fibrosis, cystic fibrosis. Helpful strategy in patients with any chronic condition. Much more limited in patients with severe breathlessness when activity (mental and physical) may still be helpful in 'distraction'/relief for carer and reduced dependency on carers.	Patients who are still quite mobile. Patient before they have developed SOB as may reduce/defer onset SOB by reducing deconditioning.
Anxiety reduction	Works on central perception of breathlessness reducing impact.	Best used early in disease course to help with all aspects of living with a life-threatening, relapsing and remitting disease.	Often most useful if taught to patient and carer (though may use different techniques).

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Table 1. (*continued*)

Intervention	Postulated mechanism of action	Most effectively used for	Benefits/advantages
	Interrupting panic/anxiety cycle.	Requires motivation and cognitive energy so patients need to be relatively fit.	Those with higher levels of anxiety at baseline (i.e. when first seen).
Huge range of anxiety reduction techniques including CBT (needs skilled clinician to administer) and simple relaxation therapy, which may be administered at least initially via a CD/website until skilled professional available		Less useful when patients are at end of life/very ill.	Those willing to persevere with learning a new skill.

8 years now. In both qualitative research evaluations and service reviews, the fan is cited by most patients as one of the most useful interventions for reducing the impact of breathlessness. This finding was confirmed in experimental conditions by Galbraith *et al.* [19••] in a randomized controlled crossover trial of 51 patients breathless at rest using a handheld fan directed at the cheeks versus fan to the leg. Patients experienced a significant decrease in breathlessness measured on a visual analogue scale when the fan was directed to the cheeks ($P = 0.003$). In a longitudinal study by Bausewein *et al.* [20•] compared the fan with a wristband to relieve breathlessness, patients, but were unable to detect any benefit over 2 months but about half continued to use the fan for breathlessness relief compared with 20% who used the wristband. A randomized double-blinded study comparing oxygen and air suggests that air flow via nasal cannulae for 15 h per day relieves breathlessness as much as medical gas. Both treatments provided relief of breathlessness defined by a decrease of 1 point on a numerical rating scale, with 46% of individuals gaining relief from oxygen and 42% from air [21••] (see Table 1).

Breathing techniques

Research into breathing techniques is confounded by variation in definition of the technique used, study populations with mixed disease severity and their introduction as part of a complex intervention without the particular impact of changing breathing pattern being evaluated. Recommendations (Table 2) have been made on the basis of the evidence and on the results of the qualitative evaluation of some techniques used in the CBIS [12,13].

Breathing control and diaphragmatic breathing are two distinct techniques and different recommendations have been made for each [12]. More research is needed into breathing control, but currently it can be recommended as a technique that may help those with mild-to-moderate breathlessness, particularly those with additional hyperventilation, anxiety or panic. Diaphragmatic breathing has frequently been reported to cause asynchronous and paradoxical breathing patterns, increased work of breathing and dyspnoea in those with chronic obstructive pulmonary disease (COPD) [6,8,9]. These adverse effects may be due to worsening dynamic hyperinflation; therefore, diaphragmatic breathing is not recommended for those who have severe COPD with hyperinflated lungs [12]. The effect of diaphragmatic breathing on breathlessness not caused by hyperinflation is an area for future research. Both breathing control and diaphragmatic breathing appear futile in managing severe breathlessness in which the patient relies on using accessory muscles at rest.

Pursed lips breathing (PLB), often done instinctively by those with severe COPD, has been shown to reduce dynamic hyperinflation by maintaining patency of unstable airways and, therefore, improving expiratory flow [8,10]. A systematic review concluded that PLB may reduce breathlessness intensity and recovery times, reduce respiratory rate, improve tidal volumes and improve oxygen saturation [11]. However, only those with severe COPD in which dynamic hyperinflation is a significant factor in their breathlessness appear to benefit from PLB [10], leading it to be recommended for this patient group [12]. In less severe disease, patients may find the increased work of breathing from PLB outweighs its benefits. Future research should focus on patients for whom dynamic hyperinflation contributes to their breathlessness but who do not instinctively use PLB and methods to help such patients to master PLB, including the role of biofeedback.

CBIS clinical experience and service evaluation suggests that patients with moderate-to-severe breathlessness find focusing on blowing out onto a handheld fan and gradually increasing the length of their out breath helps them slow their respiratory rate and regain breathing control after exertion. Although widely used in clinical practice and described in the literature [22], a name for this technique has not been identified. In CBIS, this technique is called 'recovery breathing' [23] and further research is required into its effectiveness.

Paced breathing and 'blow as you go' have been recommended for managing breathlessness in those with COPD [12]. These techniques may help patients with moderate-to-severe exertional breathlessness. Those with mild breathlessness may find the techniques cumbersome without significant benefit. Again the evidence is weak and more research is required.

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Table 2 Breathing techniques

Technique	Putative mechanism of action	Benefits	Comments
Breathing control 'Normal tidal breathing encouraging relaxation of the upper chest and shoulders' BTS/ACPRC (2009) [4•]	Promotes efficient breathing pattern, efficient use of respiratory muscles and appropriate tidal volume. Deters acute hyperventilation and reduces the frightening symptoms of hyperventilation. May have a calming influence.	Mild-to-moderate breathlessness of any pathology. Used during exertion or after exertion to aid recovery.	Regular practice is required to master technique. Regular practice may improve a patient's breathing pattern and reduce chronic hyperventilation. Appears futile for patients with severe disease that rely on their breathing accessory muscles at rest.
Diaphragmatic breathing 'Breathing using abdominal movement; reducing the degree of chest wall movement as much as possible' BTS/ACPRC (2009) [4•]	Active increase in tidal volume with associated reduction in respiratory rate [6,7]. May improve breathing efficiency by slowing respiratory rate, promoting diaphragm use and deterring breathing accessory muscle use. May have a calming influence.	Not recommended in BTS/ACPRC 2009 [4•] guidelines for physiotherapy breathlessness management.	May promote hyperventilation. Has been reported to cause asynchronous and paradoxical breathing patterns, increased work of breathing and dyspnoea in patients with severe COPD [6–9].
Pursed lips breathing 'The generation of a positive pressure within the airways by expiration against partially closed lips' BTS/ACPRC (2009) [4•]	Creates positive-end expiratory pressure (PEEP) to maintain patency of unstable airways, improving expiratory airflow and therefore reducing dynamic hyperinflation [8,10].	Moderate to severe exertional breathlessness. Specifically benefits patients with moderate to severe airflow obstruction leading to dynamic hyperinflation (BTS/ACPRC (2009) [4•,10]. Used during or after exertion, often with a 'forward lean' position. Has been shown to reduce exertional breathlessness, lowers respiratory rate and improve tidal volume, oxygen saturations and speed breathing recovery [11].	Pursed lips breathing is often done instinctively by patients who will benefit the most. May increase work of breathing in patients in whom pathological hyperinflation is not a significant cause of breathlessness [10].
Recovery breathing 'Patient focuses on blowing out while gradually and deliberately increasing the length of the out breath as their breathing recovers' *CBIS Manual* (2011) [12]	Focuses on allowing time for sufficient expiration to deter nonpathological dynamic hyperinflation and hyperventilation.	Recovery from moderate to severe exertional breathlessness of any pathology. Used after exertion to aid recovery. Often combined with a 'forward lean' position. May benefit patients who hyperventilate or dynamically hyperinflate due to panic/anxiety.	As pursed lips breathing an optional feature of this technique it avoids the increased work of breathing pursed lips breathing may cause in patients without pathological dynamic hyperinflation.
Paced breathing 'Breathing to a rhythm, that is, in time with walking or stairs' BTS/ACPRC (2009) [4•]	Helps maintain control of breathing and may deter hyperventilation by co-ordinating respiratory rate with functional activity.	Moderate to severe exertional breathlessness of any disorder.	Patients with mild breathlessness benefit little from this technique and therefore find it cumbersome.

The hand-held fan and positioning are often adjuncts to these techniques. T, cognitive behavioural therapy; SOB, breathlessness.

Positioning

There is little research into positions to ease breathlessness. However, the forward lean position while fixing the shoulder girdle is often taken up instinctively by breathless patients and is recommended for breathlessness in COPD [12]. An accepted hypothesis is that the forward lean position loads the diaphragm to improve its mechanical advantage and, therefore, reduces breathlessness in those with hyperinflated lungs [12]. However, this position does not address the cause of the flattened diaphragm and patients invariably complain that bending down during functional activity aggravates their breathlessness, bringing this theory into question. High side lying and forward lean onto pillows are recommended in clinical practice for breathlessness at rest without strong supporting research evidence [12]. Further research is required into the mechanism of positioning on reducing breathlessness (Table 1).

Activity pacing and energy conservation

In order to understand activity pacing, it is important to appreciate the concept of activity, as any effective intervention regarding pacing involves the analysis of activity (breaking down its component parts) and trying to simplify component parts whenever possible to conserve energy. Occupational therapists are trained in analysis of activity and in clinical practice focused on the pattern of activities, the meaning and purpose that people place on them and the impact that illness has on the ability to carry them out [24]. There is extensive discussion of this topic in the occupational therapist literature (Table 1).

As an intervention, there are few research studies to demonstrate the benefits of activity pacing specifically, although there are many that propose its benefits as part of a programme of nonpharmacological interventions for the breathless patient [9,25–30]. Much of the literature

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refers to activity pacing or 'energy conservation' within the context of chronic fatigue management or neurological conditions [31–33], but the principles can be equally applied to the breathless patient, regardless of the cause. The National Comprehensive Cancer Network (NCCN) [34] recommends energy conservation for cancer-related fatigue as part of a programme of 'educational therapies' and judges this as high-level evidence with uniform NCCN consensus.

Activity pacing may appear to be easy; however, in reality, it is incredibly difficult for patients, as it requires a modification in behaviour, which may involve changing habits and routines developed over many years. It is important to consider how the person functioned prior to being breathless; whether they were 'always on the go' or whether they took the pace of life more slowly. This factor is important, as it will influence the way in which they respond to any ideas around pacing. Another important starting point is to establish a baseline level of activity (i.e. the amount of activity the individual usually carries out).

One central principle is encouraging a balance between activity and rest, and identifying where individuals are on this continuum. The 'all or nothing' approach usually results in individuals going 'all out' on a good day to make the most of the energy they have, leaving nothing in reserve and often resulting in feeling complete exhaustion the succeeding day (or days) so that they are unable to carry out anything. With this pattern of activity, there are two extremes: the individual needs to be encouraged to do less on their 'good days' to enable them to achieve more on their 'not so good' days – with the overall effect being able to do slightly more over time, with a more balanced rate of activity. For those who are so apprehensive about being breathless that they begin to avoid engaging in activity, the principle of balancing activity and rest still applies. However, an emphasis needs to be placed on encouraging a gradual 'reintroduction' to activity.

Analogies are often a good way of explaining how to use and conserve energy (Black and Cox 2007, unpublished material) describe some useful ones (in the context of cancer-related fatigue, but can be applied to any cause of breathlessness) such as a rechargeable battery, an envelope, a bank account or a jug, with the concept of identifying those things that drain or 'top up' the energy.

Other important strategies in activity pacing are encouraging people to prioritize which activities are important to them, plan around their best times, plan activities in advance and try to maintain a good posture so as not to lose energy unnecessarily. They may also require encouragement to allow themselves to either do things differently or not at all. Breaking down activities and simplifying the component parts can also identify where energy is lost and can be conserved. This might also involve the introduction of assistive aids and devices such as bathing or walking aids.

There is a lack of robust evidence to support the teaching of activity pacing/energy conservation to the breathless patient. Most of the research to date evaluates these concepts incorporated into a wider programme of interventions. Despite this, pacing and energy conservation continues to be routinely taught as part of a range of techniques to encourage self-management of breathlessness. Although challenging to carry out in practice, research to investigate the effect of activity pacing specifically is required to truly establish what benefit it has for the breathless patient.

Walking aids

There is strong evidence that the use of a walking frame may reduce exertional breathlessness in those with COPD [12]. Using a walking frame allows the forward lean positioning to be maintained during walking, provides psychological reassurance and may increase walking distance in those with COPD [8].

Neuromuscular electrical stimulation

Deconditioning and peripheral muscle weakness are known to play a major role in breathlessness in COPD [35], but these factors also affect breathless patients with cancer or chronic heart failure. To counteract this, exercise training is a key component of pulmonary rehabilitation programmes. However, patients are often not capable of exercise and exercise training [36] and it is often hard for a patient with advanced disease to maintain any sort of exercise alone. Neuromuscular electrical stimulation (NMES) of leg muscles, either quadriceps muscle alone or in combination with other leg muscles, seems to be an interesting alternative to increase lower limb muscle strength. NMES is usually applied several times a week for 30–60 min up to 4–8 weeks. Studies that tested NMES in patients with COPD or chronic heart failure showed positive effects on skeletal muscle function, exercise capacity and disease-specific health status [37,38]. One pilot study on cancer patients also showed nonsignificant improvements in muscle strength and exercise activity [39•]. Three studies examined the effect of NMES on breathlessness in COPD patients [8,36,40]. All three studies showed a significant reduction in breathlessness. Overall, the intervention seems to be well tolerated by participants. The equipment is not expensive and has been used in other area of physiotherapy practice for some years.

Music

Music can be an effective attention-diverting strategy, which can be used to reduce breathlessness [41].

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However, the evidence for music in the relief of breathlessness is conflicting and studies have been primarily conducted on COPD patients. Only one uncontrolled study included patients with lung cancer [42]. Music is normally tested in connection with exercise provoking breathlessness such as walking or upper extremity training or can be included in a training programme [43]. Different types of music have been offered to participants such as pop, country, big band or classical music. Four studies [43–45], of which one was uncontrolled [44], showed a positive effect of music on breathlessness. Another four RCTs could not support these positive findings [46–49].

Acupuncture and acupressure

There is increasing evidence that acupuncture and acupressure might have a positive effect on breathlessness in patients with advanced disease. Two studies using acupuncture [50,51], two trials testing acupressure [52,53] and one study evaluating a single treatment with TENS over acupoints (Acu-TENS) [54], all conducted on COPD patients, showed relief of breathlessness in the intervention group. One study testing acupuncture in cancer patients [55] and one in a mixed group with advanced lung disease [56] showed no improvement in breathlessness. The latter two studies had less intense treatment regimens compared to the abovementioned acupuncture and acupressure studies, which might be one explanation for the lacking effect. However, acupuncture is not available in every service.

Breathlessness services

Over the past 10 years, a variety of breathlessness services have been developed to support patients suffering from dyspnoea. Earlier services were provided by nurses offering counselling, breathing re-training, relaxation and teaching of coping and adaptive strategies [31,57] or open access to nurse specialists with regular telephone assessments [58]. These studies showed that such services have a positive effect on breathlessness. Services developed in more recent years are multiprofessional, composed of doctors, physiotherapists and nurses, and are offered to patients with intractable breathlessness from any disease with the aim to enhance the self-management of breathlessness [13,59•]. Interventions include nonpharmacological interventions (psychological, social and physical), palliative care input (e.g. end of life issues, psychosocial issues, family concerns) and pharmacological review, which are as follows (BIS Current Model 2010):

(1) Referral:
   (a) By letter/form downloaded from hospital Website, by post or fax.
   (b) Discussed at weekly Multidisciplinary Team (MDT), or if urgent phone call to referrer or patient to assess most effective, rapid way to help patient/carer (BIS not an emergency service, but will respond to help patient in any way it can).
   (c) One clinician sees first unless psychosocial complexity.
   (d) First clinician decided by patients' apparent most important need.
(2) First visit:
   (a) Usually at home unless patient chooses otherwise unless there are safety issues, the patient lives out of area.
   (b) Assessment and interventions as outlined in text but always listening, fan and encouragement support with exercise, attention to carer (if present).
(3) After first visit:
   (a) Patients sent a written plan/summary of discussion and usually phoned to see how they are finding using interventions.
   (b) Carer contacted if not there, letter written to carer as well.
   (c) GP or other referrer copied in to patient letter.
   (d) Referrer may be contacted for discussion if issues need further help/investigation/support.
   (e) Discussion at next MDT.
   (f) Next there may be:
      (i) second or third visit with MDT discussion weekly and
      (ii) referral to another service, for example, hospice or pulmonary rehabilitation with telephone contact marinated until it happened.
(4) Discharge occurs when BIS feels that:
   (a) the patient/carers has been referred onto a suitable service which can offer long-term support,
   (b) when there has been an improvement so that the patient/carer feel they find the impact of the breathlessness easier to manage,
   (c) it is no longer making a useful impact: re-referral possible,
   (d) if the patient /carer have improved but they are likely to need help in the future, a longer term telephone follow up arranged (e.g. patients ILD) and
   (e) some patients are palliative care patients and die during period offering advice.

Discussion

Data from the Cochrane review by Bausewein *et al.* [2] on which this work is based demonstrated that walking aids, chest wall vibration and NMES relieved breathlessness in chronic obstructive airways disease. It is clear that nonpharmacological interventions are effective in helping breathlessness. The nonpharmacological intervention with the best evidence base in respiratory practice (pulmonary rehabilitation) is still only provided for less than

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4% of patients with COPD [60], whereas drug therapy that has a much smaller impact is widely available [61]. This may be because physicians and service commissioners are most used to thinking about drug interventions that may have a higher cultural status in medicine than nonpharmacological interventions, which are not surgical and not invasive and may seem like 'nonclinical activities'.

In this review, literature searches have been carried out on those interventions that are used daily in clinical practice, because clinicians feel they are useful, although there is little evidence for them because clinicians need to understand the evidence base for their practice and it is important to identify where further work is needed. Indirect interventions for which there is strong evidence (e.g. exercise) have also been included in the clinical recommendations. In contrast, although there is evidence for chest wall vibration, it has not been included in clinical recommendations as it is not widely available; the equipment used in the trials has not been well described. It has been identified as an area that needs further pragmatic clinical and cost–effectiveness research to find out whether it is worth investing in the equipment and the training to use it.

It is clear that there needs to be consensus on how nonpharmacological interventions can be defined and one approach is using direct and indirect terminology and a hierarchy of use of the different interventions depending on the disease trajectory of the patient (Table 1). As the disease advances, many nonpharmacological interventions that require motivation and learning cannot be used as patients are mentally fatigued, but then pharmacological and indirect nonpharmacological activities such as carer support come in.

Conclusion

Nonpharmacological interventions need to be implemented more widely wherein there is clear evidence of their effectiveness (see Fig. 1). The work of dissemination will need to come from clinical, academic and commissioning bodies as there are no financial gains to individual companies from this. First rate evidence is needed for increased credibility of nonpharmacological interventions in the clinical community, which requires defining nonpharmacological interventions, and then investigating them as single components, and learning how and when they are most effectively implemented. This would inform service design and commissioning at a time when cost-effectiveness and increasing patients' participation in self-management of chronic diseases are pressing issues worldwide. The individual components in any future studies not only need clear definition but also quality control in multicentre trials so that

Figure 1 Summary of approach to managing breathlessness

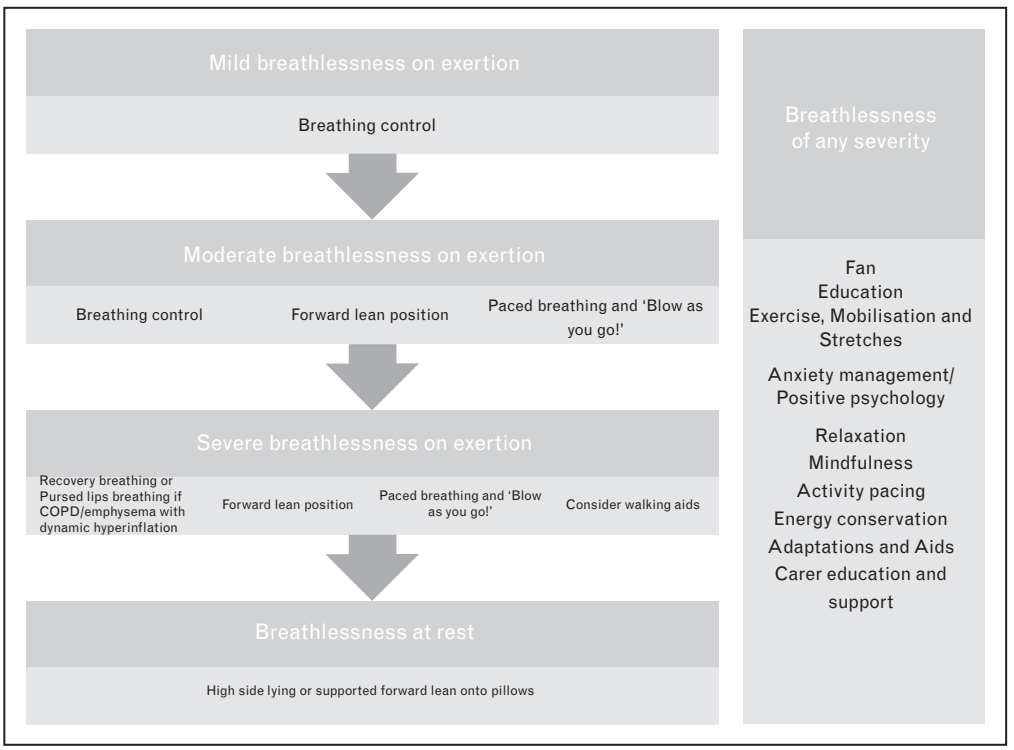

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Table 3 Direct and indirect interventions for palliating breathlessness

Direct interventions with a good evidence base	Direct interventions with low evidence base: recommendation based on clinical 'best practice' or developing evidence base.	Indirect: some evidence of effectiveness in work not related to breathlessness.
All mobile patients have an expert review of their walking aids and encouragement to use them to maintain and improve fitness and enhance ability to participate in distraction therapies	Breathing exercises carefully tailored to that person's disease process (see Table 2).	Encouragement to exercise or to have some activity that can act as a distraction from breathlessness unrelated to the underlying condition. The role of exercise is clear from the COPD literature; further work is needed in cancer patients.
Neuromuscular electrical stimulation is offered in concert with any exercise or activity programme; the best timing is uncertain, but it would seem more effective to use early than later to prevent muscle loss	Acupuncture and acupressure may be worth trying if local practitioner available.	Anxiety reduction.
A handheld fan (or encouragement to use alternative acceptable facial cooling) with appropriate education and explanation	Music as a distraction or possible alteration of central perception; there is also evidence available from other areas of clinical practice.	Carer support.

it is clear which intervention is being tested. This is particularly important in areas like breathing re-training, which appears to be a loosely defined term, yet almost universally provided by physiotherapy services.

In the CBIS, all nonpharmacological interventions are introduced with extensive education and support from a specialist as a part of a complex intervention as these treatments require motivation and engagement from patients (and often support from carers). Education has been shown in pain management to have an impact equivalent to a drug intervention [62]. This is an important area for investigation as education requires money for extra clinical time and training. Breathlessness services show promise, but the results are awaited of two RCTs (ISRCTN04119516, NCT01165034), which should give robust guidance on the effectiveness of specialist services delivering complex interventions for this difficult symptom. Investigations of complex interventions usually require a mixed method approach, which may entail a lengthy programme using the Medical Research Council (MRC) methodology [16,63].

At the current time, we would recommend the following for all patients with breathlessness (see Table 3).

For the more complex nonpharmacological interventions (e.g. pacing and breathing retraining) that require new habits, it is important to use the skills of physiotherapists and occupational therapists who receive specialist training in these areas at undergraduate and postgraduate level. As well as recommending research in these areas, it seems clear that these professions should be part of any team managing breathless patients (Table 1).

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References and recommended reading

Papers of particular interest, published within the annual period of review, have been highlighted as:

- • of special interest
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Additional references related to this topic can also be found in the Current World Literature section in this issue (p. 174).

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