

# Taming chronic cough

Jaclyn A Smith,<sup>1,2</sup> Jemma Haines,<sup>2</sup> Janelle Yorke<sup>3,4</sup>

Non-pharmacological therapy to treat chronic cough was first described in the 1980s, in patients thought to be suffering from 'habit' or 'psychogenic' cough.<sup>1 2</sup> Improvements were reported with the application of speech and language therapy techniques originally developed for a variety of voice disorders, accompanied by individualised psychotherapeutic approaches. Twenty years later, Ann Vertigan published the first randomised controlled trial evidence that speech and language therapy techniques improved symptoms scores for cough, breathing, voice and upper airway symptoms in patients with refractory chronic cough attending a single hospital service.<sup>3</sup> This study delivered an intervention based on the original reports, comprising four elements: education about the nature of chronic cough, strategies to control the cough, psychoeducational counselling and vocal hygiene education to reduce laryngeal irritation. Following this single study, many clinical cough services have implemented speech and language therapy,<sup>4</sup> largely motivated by the limited treatment options for chronic cough, which can be severe and disabling. However, an important outstanding question has been whether such inventions can be successfully applied in other settings and by therapists from other disciplines.

In *Thorax*, Chamberlain *et al*<sup>5</sup> replicate Vertigan's findings in the first multicentre randomised controlled trial of PSALTI (Physiotherapy, Speech and Language Therapy Intervention), demonstrating a significant improvement in cough-specific quality of life and an estimated 40% reduction in cough frequency in refractory chronic cough. An intervention similar to Vertigan's was delivered by either speech and language therapists or physiotherapists, and improvements in cough were captured

using better validated endpoints. Patients were recruited from five UK hospital trusts and the intervention delivered at three of these; the study site and discipline of the therapists did not significantly influence the efficacy of the therapy (S Chamberlain, personal communication, 2016). Speech and language therapists are trained specifically in the assessment, diagnosis and management of laryngeal dysfunction and routinely manage the spectrum of disorders holistically. The focus of PSALTI was determined by therapists responding to individual participants' needs; so, it is interesting that the professional training and discipline of the individual delivering treatment did not seem to influence outcomes, although future work specifically designed to explore this question is required.

Inclusion of laryngeal endoscopic evaluation in the baseline clinical characterisation may have been a useful addition to this study. It is known there is an association between chronic cough, paradoxical vocal fold movement and other laryngeal associated disorders (eg, muscle tension dysphonia).<sup>6</sup> The relationship between these is as yet unclear, but growing evidence suggests they may be mechanistically linked<sup>3 7</sup> and hence to understand their prevalence in this cohort and any influence on the effect of therapy would have been valuable.

Tools to assess cough have improved substantially in the last decade, providing a better appreciation of the differences between the severity of coughing perceived by patients (visual analogue scales, VAS), the impact of coughing (cough-specific quality of life) and objective measures of cough frequency (acoustic monitoring). It is interesting that while cough frequency and cough-related quality of life clearly improved in this study compared with the control intervention, changes in the cough severity VAS did not, contrasting with recent studies describing effective pharmacological treatments where all cough measures improved compared with placebo.<sup>8 9</sup> As cough suppression was a key element of the intervention, perhaps the patients perceived the severity of the underlying cough as unchanged, but the therapy allowed better control of coughing, reducing frequency and subsequent impact on quality of life.

The psychoeducational component of the intervention may have also impacted on health-related quality of life by

improving the distress associated with coughing, without improving the physical sensation of cough severity. A growing body of literature, including the American Thoracic Society consensus statement,<sup>10</sup> supports the view that chronic dyspnoea exhibits multidimensionality, that is, has an affective dimension that is distinct from its sensory intensity.<sup>11 12</sup> Like dyspnoea, cough results from a variety of interactions among multiple physiological, psychological, social and environmental factors. Evidence for cough multidimensionality is limited, but this could be a promising paradigm for future cough research, including influencing how cough is assessed/measured and guiding the development and testing of complex interventions.

The control intervention is interesting in this respect, including stress management and relaxation, in addition to advice about lifestyle, diet and exercise, without cough control techniques. It is notable that patients in the control group exhibited a tendency towards improved Hospital Anxiety and Depression Scale (HADS) anxiety scores and significant improvements in perceived cough severity and quality of life (greater than the minimum important difference for the Leicester Cough Questionnaire), yet not in cough frequency. As it is unusual to see placebo effects or spontaneous improvement in these measures in patients with refractory cough,<sup>8</sup> these observations could represent a differential improvement in an affective dimension of cough, but this hypothesis is yet to be tested.

It is also interesting to speculate how PSALTI might reduce the frequency of coughing, as opposed to perceived severity and impact. Patients with chronic cough are thought primarily to be suffering from a hyperexcitability of the neuronal pathways controlling cough, and report sensations of irritation, urge to cough and cough triggering on trivial exposures to environmental irritants, temperature changes, use of their voice and with certain foods.<sup>13</sup> This hyperexcitability can be demonstrated experimentally through challenge testing with inhaled irritants such as capsaicin. Compared with healthy controls, patients with chronic cough exhibit a reduced threshold for irritant-evoked cough<sup>14</sup> and heightened cough responses<sup>15</sup> and a reduced ability to voluntarily suppress coughing.<sup>16</sup> A recent fMRI study found the latter phenomenon was associated with reduced forebrain activity consistent with dysfunctional inhibitory controls.<sup>17</sup> It is conceivable that practising cough suppression techniques may reduce cough frequency

<sup>1</sup>Division of Infection Immunity and Respiratory Medicine, School of Biological Sciences, University of Manchester, Manchester, UK; <sup>2</sup>University Hospital of South Manchester, Manchester, UK; <sup>3</sup>Division of Nursing, Midwifery and Social Work, University of Manchester, Manchester, UK; <sup>4</sup>The Christie NHS Foundation Trust, Manchester, UK

**Correspondence to** Professor Jaclyn A Smith, Division of Infection, Immunity and Respiratory Medicine, University of Manchester, Level 2, Education and Research Centre, University Hospital of South Manchester, Manchester M23 9LT, UK; jacky.smith@manchester.ac.uk

by helping to restore control over coughing; such a mechanism would not be apparent on conventional cough reflex sensitivity testing in keeping with the capsaicin challenge data in this study.

Reflecting on the potential mechanisms underlying the effects of non-pharmacological treatment for cough draws into question the necessity for all the individual elements of such interventions. Consisting of a number of interacting components, interventions such as PSALTI meet the Medical Research Council criteria for a complex intervention, and their guidance<sup>18 19</sup> acknowledges the challenges in developing, standardising, evaluating and implementing such interventions and may help direct future work to distil the intervention down to its essential components. Further work will also be needed to understand which patients may derive most benefit and the potential value of combining these approaches with pharmacological treatments.

A final important consideration is the possibility that these interventions may be applicable to improve cough in other patient groups with chronic respiratory disorders and that they may be amalgamated with techniques to address other symptoms. For example, we recently reported a non-pharmacological intervention in patients with lung cancer, addressing the main cluster of symptoms, breathlessness, cough and fatigue, demonstrating both feasibility and acceptability.<sup>20</sup> The value of non-pharmacological interventions to reduce the burden of chronic respiratory symptoms in non-cancer patients also needs to be explored.

**Twitter** Follow Jemma Haines at @jemhaines

**Competing interests** JAS has received funding for clinical trials from GlaxoSmithKline, Afferent

Pharmaceuticals, Verona Pharma, AstraZeneca and NeRRe Therapeutics, and personal fees from GlaxoSmithKline, Almirall, Reckitt Benckiser, Glenmark, Ario Pharma, Patara Pharma, Boehringer Ingelheim, Nerre Therapeutics and Vernalis. In addition, JAS is a named inventor on a patent licensed to Vitalograph, but does not receive royalties.

**Provenance and peer review** Commissioned; internally peer reviewed.

**To cite** Smith JA, Haines J, Yorke J. *Thorax* Published Online First: [please include Day Month Year] doi:10.1136/thoraxjnl-2016-209484



► <http://dx.doi.org/10.1136/thoraxjnl-2016-208843>

*Thorax* 2016;0:1–2.  
doi:10.1136/thoraxjnl-2016-209484

## REFERENCES

- Blager FB, Gay ML, Wood RP. Voice therapy techniques adapted to treatment of habit cough: a pilot study. *J Commun Disord* 1988;21:393–400.
- Gay M, Blager F, Bartsch K, et al. Psychogenic habit cough: review and case reports. *J Clin Psychiatry* 1987;48:483–6.
- Vertigan AE, Theodoros DG, Gibson PG, et al. Efficacy of speech pathology management for chronic cough: a randomised placebo controlled trial of treatment efficacy. *Thorax* 2006;61:1065–9.
- Haines J, Esposito K, Lillie S, et al. *Speech and language therapy in adult respiratory care*. London: Royal College of Speech and Language Therapists Position Paper, 2015.
- Chamberlain Mitchell SA, Garrod R, Clark L, et al. Physiotherapy, speech and language therapy intervention for patients with refractory chronic cough: a multi-centre randomised control trial. *Thorax*. Published Online First: 28 Sep 2016. doi:10.1136/thoraxjnl-2016-208843
- Milgrom H, Corsello P, Freedman M, et al. Differential diagnosis and management of chronic cough. *Compr Ther* 1990;16:46–53.
- Morris M, Allan P, Perkins P. Vocal cord dysfunction: etiologies and treatment. *Clinical Pulmonary Medicine* 2006;13:73–86.
- Abdulqawi R, Dockry R, Holt K, et al. P2X3 receptor antagonist (AF-219) in refractory chronic cough: a randomised, double-blind, placebo-controlled phase 2 study. *Lancet* 2015;385:1198–205.
- Horton MR, Santopietro V, Mathew L, et al. Thalidomide for the treatment of cough in idiopathic pulmonary fibrosis: a randomized trial. *Ann Intern Med* 2012;157:398–406.
- Parshall MB, Schwartzstein RM, Adams L, et al. An official American Thoracic Society statement: update on the mechanisms, assessment, and management of dyspnea. *Am J Respir Crit Care Med* 2012;185:435–52.
- Carrieri-Kohlman V, Gormley JM, Douglas MK, et al. Differentiation between dyspnea and its affective components. *West J Nurs Res* 1996;18:626–42.
- von Leupoldt A, Seemann N, Gugleva T, et al. Attentional distraction reduces the affective but not the sensory dimension of perceived dyspnea. *Respir Med* 2007;101:839–44.
- Hilton E, Marsden P, Thurston A, et al. Clinical features of the urge-to-cough in patients with chronic cough. *Respir Med* 2015;109:701–7.
- Prudon B, Birring SS, Vara DD, et al. Cough and glottic-stop reflex sensitivity in health and disease. *Chest* 2005;127:550–7.
- Hilton EC, Baverel PG, Woodcock A, et al. Pharmacodynamic modeling of cough responses to capsaicin inhalation calls into question the utility of the C5 end point. *J Allergy Clin Immunol* 2013;132:847–55.e1–5.
- Young EC, Brammer C, Owen E, et al. The effect of mindfulness meditation on cough reflex sensitivity. *Thorax* 2009;64:993–8.
- Ando A, Smallwood D, McMahon M, et al. Neural correlates of cough hypersensitivity in humans: evidence for central sensitisation and dysfunctional inhibitory control. *Thorax* 2016;71:323–9.
- Craig P, Dieppe P, Macintyre S, et al. Developing and evaluating complex interventions: the new Medical Research Council guidance. *BMJ* 2008;337:a1655.
- Moore GF, Audrey S, Barker M, et al. Process evaluation of complex interventions: Medical Research Council guidance. *BMJ* 2015;350:h1258.
- Yorke J, Lloyd-Williams M, Smith J, et al. Management of the respiratory distress symptom cluster in lung cancer: a randomised controlled feasibility trial. *Support Care Cancer* 2015;23:3373–84.