Musical engagement therapy: An effective add-on in the management of chronic obstructive pulmonary disease

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Abstract

Chronic obstructive pulmonary disease (COPD), a progressive degenerative multi-component disorder, is a life-threatening global epidemic, killing on average one person every 10 s. Distressing dyspnea, exhausting leg fatigue, exaggerated self-perception of ill-being, progressing home bounding, and associated stress with resultant anxiety and depression lead to significantly higher exacerbations and increased hospitalization with prolonged length of stay. Music therapy (MT) (singing and listening), an inexpensive and readily accessible resource, has emerged as a promising interventional strategy with acceptance on a wider scale because of its unique link to emotions and soothing power. Singing is well known to increase respiratory muscle strength, sense of breath control, and arterial oxygen saturation level. In otherwise dyspneic patients, the regular singing exercises help improve breathing coordination and better mood, alleviate anxiety, and improve health-related quality of life. Exercise is the most important tool in slowing COPD progression, but the lack of adherence is the common barrier. The physically stimulating and emotionally inspiring music immerses the individual deeply into the physical activity to the extent that he/she would be saved from boredom and excessive fatigue. The resultant ergogenic effect delays fatigue, increases work capacity, endurance, and productivity. Motivational MT and prescribed graded exercise, in addition to specific therapeutic interventions, could significantly slow down the progression of the disease, which is otherwise incurable.

Key words: Chronic obstructive pulmonary disease. Music therapy. Singing. Health-related quality of life. Coronavirus disease-19 pandemic.

Introduction

"Although known by other names along the way, COPD has probably afflicted humans for millennia."

Elaine K. Howley –Free Lancer - Association of Health Care Journalists.

Chronic obstructive pulmonary disease (COPD), an umbrella term for chronic bronchitis, emphysema, and chronic asthmatic bronchitis, has a long and venerable history. In the past, it was referred to by names such as "chronic airflow obstruction" and "chronic obstructive lung disease." Dr. William Briscoe, the then Head of the Pulmonary Division New York Hospital-Cornell Medical

Center, was the first person to use the term "COPD" at the 9th Aspen Emphysema Conference in 1965. At present, it is the fourth leading cause of death globally. According to the "Top 10 Causes of Death" published by the World Health Organization (WHO), on 9th December 2020, it is the 3rd leading cause of death worldwide.

Rationale

"Relief of dyspnea as well as of any distressing symptom is a human right and an ethical duty for doctors and caregivers who have many potential resources to achieve this."

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COPD, a progressive disease, gradually declines the pulmonary capacity negatively on health-related quality of life (HRQoL)². Dyspnea, a major manifestation of COPD, is the most unpleasant subjective sensation. Bass describes it as *“an uncomfortable abnormal awareness of breathing”*³. Its magnitude and severity are proportional to the progression of the disease. It is physically limiting and socially isolating. More importantly, it depends upon patients' perception so much that they often describe themselves as *“existing rather than living”*⁴.

Stress, defined as *“perception of threat, with resulting anxiety, discomfort, emotional tension, and difficulty in adjustment,”* is a well-known COPD trigger. Anxiety is a stress reaction. Chronic stressful situations can increase the risk of developing depression, characterized by persistent or recurrent sadness. Feelings of anxiety and depression associated with dyspnea, fatigue, and altered sleep, although under-scored and inadequately addressed, are quite common in COPD patients. In a meta-analysis conducted of 81 studies, the prevalence of anxiety, in COPD patients, varied from 10% to 100%⁵. A systematic review and meta-analysis of 16 studies found that people with depression or anxiety had a 43% increased risk of COPD outcomes. In patients with COPD and depression or anxiety, they had a 31% increased risk of acute exacerbations (AECOPD)⁶.

In a British study conducted by Willgoss et al., the participants described the relationship between dyspnea and anxiety as *“it is like a vicious circle. Your breathing gets bad, so you get anxious, then you get afraid, and your breathing gets worse, which makes you more afraid. The COPD feeds the anxiety and anxiety feeds the fear”*. The resultant deconditioning worsens the course of COPD⁷. In a systematic literature review and meta-analysis of 20 quantitative studies, COPD associated anxiety and depression led to a statistically significant higher rate of AECOPD, resulting in increased hospitalization, prolonged length of stay, and a greater risk of post-discharge mortality⁸. The most effective interventional strategy in such a situation is to interrupt the vicious cycle of anxiety, depression, and resultant deconditioning. Therapeutic music therapy (MT), as a self-management strategy, has proved to be a very promising tool and is being recognized on a wider scale. In the ClinicalTrials.gov entitled *“Active and Passive MT Interventions,”* sponsored by the University of North Carolina in Chapel Hill United States, it has been argued that:

“MT interventions are a cost-effective, accessible, and holistic treatment option with social, rhythmic, creative, sensorimotor, and respiratory components, giving them the potential to improve the quality of life for a diverse array of disorders.”

In an interventional study conducted at a Turkish University, to determine the effect of MT on anxiety and the various physical findings in COPD patients, the targeted MT was found to reduce anxiety levels and physiological correlations, including blood pressure in hospitalized patients⁹. In an Australian study, relaxing music's anxiolytic effect was found independent of a range of potential mediating factors¹⁰. Similarly, in a Japanese study listening to music after a stressful task resulted in measurable improvements in immune function, neuroendocrine responses, and emotional states¹¹. To note is the advice of Varshaa Timori: *“Taking MT heals the stressful life. Listen and Heal”*.

History of MT

“One of the best and most effective of treatments is to strengthen the mental and spiritual strengths of the patient, to give him more courage to fight illness, create a loving, pleasant environment for the patient, play the best music for him and surround him with people that he loves.”

Ibn Sina (980-1037 CE) - A towering figure of Graeco-Arab Medicine

Music, *“the art of sound,”* has been defined by The Concise Oxford Dictionary (1992) as: *“the art of combining vocal or instrumental sounds (or both) to produce beauty of form, harmony, and expression of emotion.”* Whereas the pages of history are flooded with anecdotal evidence of power attributed to music to command the body and mind, MT originates essentially from the Greeks' philosophy and views. Asclepius, the Greek god of healing, was probably the first to apply music as therapy to conquer *“passion.”* Ancient Greek medicine recognized the role of music for physical and mental illnesses and human behavior improvement. Athenian philosophers Plato (427-347 BCE) and Aristotle (385-323 BCE) believed that healing the soul through music also heals the body. In the field of Greco-Arabic Medicine, the Muslim researchers contributed significantly to further developing the notion of the application of music in medicine. The renowned philosopher and visual artist Gibran Khalil (1883-1931 CE) said music is *“the language of the spirit. It opens the secret of life bringing peace, abolishing strife.”* Some giants of MT in the modern era deserve special mention.

Everett Thayer Gaston was a clinical psychologist who is well known as the “Father of MT.” As Chairman of the Department of Music Education at the University of Kansas, he established the first graduate degree program in the United States to train music therapists.

Willem van de Wall is well remembered as Organizer and Innovator in Music Education and MT. He authored “Music in Institutions” in 1936.

Dr. Ira Maximilian Altshuler, an American psychiatrist and pioneer music therapist, initiated one of the first large-scale MT programs for mentally ill persons in the country at Detroit’s Eloise Hospital in 1938.

The potential application of music in COPD patients

“Music, a form of human behavior, is unique and powerful in its influence. Human behavior involved with music has been studied by psychologists, anthropologists, and sociologists. MT will profit most from a multidisciplinary approach. It (MT follows the path of a behavioral science.”

Everette Thayer Gaston (1901-1970) – Father of MT

As defined by American MT Association: “MT is the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved MT program.”

There are two fundamental types of MT:

- a) Active Musical Engagement Therapy (singing, making music, active MT, expressive MT)
- b) Passive Musical Engagement Therapy (listening music, passive MT, receptive MT)

Of note, the role of rhythm as defining feature of music is very important. In active MT, both rhythmic perception and action are engaged, while in passive MT, the engagement of a patient is restricted to the rhythmic perception of music¹².

Music, an inexpensive and readily accessible resource, could be confidently recommended to COPD patients who need regular physical activity with an increased exercise adherence level. Selection of suitable music is an important issue that requires careful consideration. It should be both physically stimulating and emotionally inspiring. Motivational music will not only have a positive impact on mood and feeling states but also immerse the individual deeply into the physical activity to the extent that he/she would thus be saved from boredom and excessive fatigue.

Active musical engagement therapy

“Singing and instrumental activities might have helped our species to refine motor skills, paving the way for the development of the exquisitely fine muscle control required for vocal or signed speech.”

Dr. Daniel Levitin----- (American Neuroscientist)

Singing, the act of producing musical sounds with the voice is so basic to humans’ beings that its origins are lost in antiquity and predate the spoken language¹³. Whereas respiration has a key contribution in generating voice, its role in singing is well recognized. Singing requires accurate control of breathing and respiratory muscle exertion and, as a result, has the potential to interfere with pulmonary functioning in COPD patients. It is well known to increase respiratory muscle strength¹⁴ and elevate arterial oxygen saturation level¹³. It may also enhance sputum clearance as both dynamic lung volume and airflow are increased, features present in conventional physiotherapy techniques¹⁵. The regular singing exercises, in otherwise dyspneic patients, assist in improved breathing coordination and betterment of mood, alleviating anxiety and an overall improvement in HRQoL.

In a German study aimed at finding out whether singing has a measurable impact on lung function parameters and exercise capacity in patients with COPD, it was found that there were higher FEV1 and FVC measurements and reduction of RV, by 23%, after singing session. Moreover, all patients showed a significant improvement in their physical capabilities¹⁶.

A pilot study was designed, in the United States, to determine the benefits of 2 h/weekly sessions of harmonica playing, for 12 weeks, on COPD patients who had already completed a pulmonary rehabilitation program. The participants completed pre- and post-spirometry testing; maximum inspired and expired pressure (PImax, PEmax) testing and 6-min walk tests. There was significantly improved PImax, PEmax, and 6-min walk distance in the participants¹⁷. Since singing requires long, repeated contractions of various respiratory muscles, this activity can help preserve the PEmax¹⁸.

A study was conducted in Sao Paulo University, Brazil, to investigate the therapeutic effects of singing on pulmonary function parameters of COPD patients. They were randomly assigned to weekly classes consisting of either singing or handicraft (control) activities. While the singing group showed increased inspiratory capacity and decreased expiratory reserve volumes, the opposite patterns were observed in the control group on

these two measures. More importantly, the singing group showed improvement in PEmax, while the control group showed deterioration on this measure. This amusing activity also resulted in improvement in HRQoL¹³.

An uncontrolled observational study was conducted by Morrison et al., on a group of 106 COPD patients, for weekly 90-min singing sessions over 36 weeks. The St George's Respiratory Questionnaire total score improved by 3.29 points at the end compared with baseline. It was concluded that the group who sang provides breathing training and helps in addressing all the social needs of COPD patients through support and social engagement¹⁹.

In a qualitative descriptive and interventional study on an urban community at Wellington, New Zealand, a population of mixed gender aged 51-91 years of a real-world group with a wide range of socio-cultural backgrounds, the weekly singing group was a well-attended activity. These health benefits included improvements in breathing, sputum clearance, exercise tolerance, and perceived improved well-being²⁰.

Through East Kent's "Singing for Health Network Project," a multi-method, longitudinal, and observational study indicated that group singing fosters clinically significant improvement and marked emotional and social benefits²¹. Likewise, "Singing for Lung Health," also referred to as "Singing for Breathing," is an ever-expanding group singing program, mostly focused on COPD, with the potential to physical and psychological benefits to the sufferers in addition to social ones to those relatively isolated¹⁵. It has approximately 100 singing groups in the UK (some of them funded by The British Lung Foundation), and others in the United States, Australia, New Zealand, and Uganda. It involves the delivery of structured singing classes organized by well-trained instructors²².

Receptive musical engagement therapy

"Music captures attention, raises spirits, triggers a range of emotions, alters or regulates mood, evokes memories, increases work output, heightens arousal, induces states of higher functioning, reduces inhibitions, and encourages rhythmic movement."

Costas Karageorghis and David Lee-Priest²³.

Music, a highly pleasurable stimulus, is frequently used to influence emotional states. Johnny Depp was right to conclude that *"Music touches us emotionally, where words alone cannot."* Salimpoor et al., using Positron Emission Tomography Scanning and

Functional Magnetic Resonance Imaging, found endogenous dopamine release in the striatum at peak emotional arousal during music listening²⁴. This indicates that the intense pleasure in response to music can lead to dopamine release, which plays an important role in our cognitive, emotional, and behavioral functioning, and contributes significantly to the reward experience induced by music. Music, a unique link to emotions with its soothing power, is an extremely effective stress management tool. In two multilevel meta-analyses of 104 randomized controlled trials (RCTs), music interventions had an overall significant effect on stress reduction in both physiological and psychological outcomes²⁵.

Karageorghis and Priest argue that the self-selected motivational music would result in a magnified impact on psychological and physical performance compared to the one selected by an instructor²³. Ryan and Deci have concluded that self-selection invokes a sense of autonomy, a central tenet of intrinsically motivated behavior²⁶.

Listening to music is an intervention that is unique in the sense that it has graded recommendations. The criteria are "Joanna Briggs Institute Grading Recommendations," consisting of Feasibility, Appropriateness, Meaningfulness, and Effectiveness. Each criterion evaluates music as an intervention for COPD patients and will receive a grade of A (strong recommendation) or a Grade B (weak recommendation)²⁷.

Feasibility: the cost-effectiveness and availability of resources/practice are well proven. Sufficient experience and competency level are there in the sense that no special coaching/training is required to listen to music. For this domain, music receives a grade of A.

Appropriateness: the music is culturally acceptable in almost all the countries, applicable to the majority of the population, and it is easily adaptable to a variety of circumstances. For this domain, music receives a grade of A.

Meaningfulness: music preference, among different populations, varies widely, as well as musical variety. It may have a positive experience for some and a negative for others. For this domain, music receives a grade of B.

Effectiveness: is there a beneficial effect, is it safe? The effect of music on anxiety specifically related to dyspnea remains unclear. The studies showed either a positive correlation to the music intervention and anxiety or a non-significant relationship. However, none of the studies resulted in a negative correlation. The type of music (sad or relaxing) also has a bearing on the outcome. For this domain, music receives a grade of B.

In a study conducted at the University of Zurich and the Swiss Federal Institute of Technology Zurich, it was found on 60 females aged 20-30 years that listening to relaxing music before performing a stressful task differently affected biological stress response domains²⁸.

The results of studies on the elderly were very promising. In an RCT on elderly COPD patients, from the Nagasaki Hospital Pulmonary Rehabilitation Center, Distractive Auditory Stimuli, in the form of music, reduced the perception of dyspnea induced by low-intensity, constant-load exercise²⁹. In a systematic review and meta-analysis of 26 studies, a statistically significant reduction in depression levels was found over time in the experimental (music intervention) group compared to a control/comparison group. In particular, elderly participants showed impressive improvements when listening to music or participating in MT projects³⁰.

Combined therapy

"The music to me is like breathing. I do not get tired of breathing-I do not get tired of music".

Ray Charles Robinson (1930-2004)-American Singer/Song Writer.

Listening to music and exercise

Exercise intolerance and activity limitation are characteristic features of COPD.

To avoid distressing dyspnea, exhausting leg fatigue, and resultant sense of ill-being, the patients typically limit their activities, become progressively home-bound and isolated, and may develop worsening mood disorders (notably anxiety and depression). However, it may be possible to improve their exercise tolerance, despite permanent impairment of lung function. How does it happen? Karageorghis argues that music improves exercise performance by either delaying fatigue or increasing work capacity. This ergogenic effect of music results in higher endurance and increased productivity³¹. MT has, thus, emerged as an important interventional tool. This is evident from the following studies.

Listening to music as an adjunct to exercise has been shown to improve work output and reduce perceived exertion, with further positive effects on mood and enjoyment³². In a 14-week Canadian field study testing the effects of various exercise entertainment modalities, it was found that the combined entertainment group participants completed significantly longer exercise sessions than the control group. It was concluded

that the positive effects of music on feeling states could lead to increased adherence to exercise, that is, attendance³³.

In an Australian New Zealand Clinical Trial on COPD patients of a mean age of 71, endurance time during high-intensity exercise was greater while listening to music than without, and reduced end-test dyspnea with music versus without music, respectively³⁴. This can be employed in those with GERD, COPD, and OSA, where well-designed physical exercise can bring significant benefits.

Listening to music and singing

In an RCT, conducted in The Louis Armstrong Center for Music and Medicine New York, to examine the effect of a "multimodal psycho- MT" intervention (a combination of active and passive MT and the standard care) on respiratory symptoms, psychological well-being, and HRQoL of patients with COPD, improvement in all the measures was well pronounced³⁵.

Listening to music, singing, and dance

While people are socially isolated because of progressing COPD or due to compulsory confinement in situations like the prevailing Coronavirus disease-19 Pandemic, there is a tangible need to identify activities that could positively impact their physical and mental health. Dance movement therapy in the form of "Dance for Yourself" (solo dancing with the help of easily accessible videos), listening to music, and making music by singing are feasible, accessible, and doable alternatives³⁶.

In two different studies, conducted by Annesi³³ and Barwood et al.³⁷, to test the effects of various exercise entertainment modalities on distraction, adherence, and physical outputs, it was found that a combined music and video intervention had a more beneficial effect on the high-intensity exercise in conditions that may induce premature fatigue than either the control or television-only groups.

Philip et al. were very active in developing and delivering a pulmonary rehabilitation program, as part of the Fresh Air Project, in Kyrgyzstan Republic, Uganda, Vietnam, and Greece. Since singing, music, and dance are major components of Kyrgyz culture, there was a ubiquitous view that such an addition would be welcome as a feasible add-on to the formal program³⁸. This can be practiced at other spots of the globe.

Conclusion

“MT has emerged as an essential component to an integrated approach in the management of chronic respiratory disease.”

Jonathan Raskin Director Alice Lawrence Center for Health and Rehabilitation at MSBI.

Despite remarkable progress in diagnostic and therapeutic modalities of COPD, significant number of patients, especially the elderly, continue to suffer from distressing dyspnea and severe extra-pulmonary manifestations, limiting their daily activities and making them home-bound. With resultant anxiety and depression, the associated stress leads to significantly higher rates of AECOPD and hospitalization.

Music: a therapy, a communication far more powerful than words, far more immediate, far more efficient” (Yehudi Menuhin), an inexpensive and readily accessible resource, has emerged as a promising intervention-al strategy with acceptance on a wider scale because of its unique link to the emotions and soothing power and proven positive impact on HRQoL.

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Conflicts of interest

The author has no conflicts of interest to disclose.

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Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that no patient data appear in this article.

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