



Music therapy, a review of the potential therapeutic benefits for the critically ill



A. Mofredj, MD^{*}, S. Alaya, MD, K. Tassaioust, MD, H. Bahloul, MD, A. Mrabet, MD

Service de Réanimation, Centre Hospitalier Général, 13300 Salon de Provence, France

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ABSTRACT

Intensive care units are a stressful milieu for patients, particularly when under mechanical ventilation which they refer to as inhumane and anxiety producing. Anxiety can impose harmful effects on the course of recovery and overall well-being of the patient. Resulting adverse effects may prolong weaning and recovery time. Music listening, widely used for stress release in all areas of medicine, tends to be a reliable and efficacious treatment for those critically ill patients. It can abate the stress response, decrease anxiety during mechanical ventilation, and induce an overall relaxation response without the use of medication. This relaxation response can lower cardiac workload and oxygen consumption resulting in more effective ventilation. Music may also improve sleep quality and reduce patient's pain with a subsequent decrease in sedative exposure leading to an accelerated ventilator weaning process and a speedier recovery.

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1. Introduction

Throughout history, music has been used to heal, but its power to reduce stress and enhance emotional health has only recently started receiving scientific evidence from studies examining the neurochemical changes that occur when listening to or engaged in music actively [1,2]. A potential interest in the therapeutic field has then emerged, and music has been successfully used as a complementary therapy in different branches of medicine [1,3,4].

The first documented case of music therapy (MT), reported in the *JAMA*, dates back to 1914 [5]. Dr Kane, upon witnessing the beneficial effect of the phonograph in the recovery wards, moved it into the operating room itself. He found that patients almost universally tolerated anesthetic induction better and also benefitted from reduced anxiety before undergoing the “horrors of surgery.” In 1918, Hyde and Scalapino reported, in an electrocardiographic recording-based experiment, that minor tones increased pulse rate and lowered blood pressure, whereas stirring music increased both blood pressure and heart rate [6]. Few years later, a decreased need for pharmacological analgesia in patients undergoing painful dental procedures was shown during exposition to both loud auditory stimulus as well as background music [7]. However, MT came into existence, as a formalized profession, only after World War II when music educators and musicians were playing music in the veteran hospitals in an attempt to boost morale of people with post-war physical and emotional traumas [1,4,8]. Here, clinicians started hiring musicians at their clinics as they observed significant benefits of

music on health of postwar sufferers. Since then, there have been many significant milestones in the field of MT across the globe [4].

2. Defining music therapy

Music has been used in various forms in medicine, from passive listening to commercial music to active music making and discussion, so that defining MT remains too complex [9,10]. Biley [11] defined MT as a controlled form of listening to music and its influence on the person, physiologically, psychologically, and emotionally, during treatment of illness or injury. According to the American Music Therapy Association, MT is “the use of music and/or its elements (sound, rhythm, melody, harmony, dynamic and tempo) to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program” [3]. This relationship between the patient and the music therapist is so a key element to MT [3,9,10,12,13]. Although music therapists are increasingly being included in interdisciplinary health care teams, in most of the published studies, MT was usually provided by medical personnel.

3. Where to apply MT?

MT is widely used for treatment of and assistance in various diseases, although most clinical studies have been carried out in the neurologic field [9,14–18]. Positive effects on the motor parameters in individuals affected by Parkinson disease, Alzheimer disease, multiple sclerosis, ataxia, or spasticity have been clearly demonstrated [9,15,19]. In elderly people with gait impairment, music-based multitask training, prolonged for 6 months, was able to improve gait and balance and

^{*} Corresponding author at: Service de Réanimation, Centre Hospitalier Général, 207, Avenue Julien Fabre, 13300 Salon de Provence, France. Tel.: +33 4 90 44 98 60; fax: +33 4 90 44 92 54.

significantly reduced both the rate of falls as well as the risk of falling [20]. Gait and related activities also improved in Parkinson disease and brain-injured patients [9,21]. Music was also able to improve mental state and social functioning in a wide range of psychiatric disorders including but not limited to depression, anxiety, schizophrenia, autism, and dementia [9,19].

Surgery is another field of investigation, with the aims to relieve self-reported pain and related symptoms, reduce anxiety, and possibly reduce the dosing of the drugs [14–17,22,23]. Indeed, patients have a high level of anxiety and fear when they are in the hospital, particularly when referred for surgery experience [24]. It is also known that anxiety often potentiates the severity of pain [24,25]. So, physicians try to reduce the magnitude of the problem by administering tranquilizers or sedatives, of which benzodiazepines are the most effective. However, sedatives have a number of untoward side effects that may prolong patient recovery [24,26].

Therefore, increasing attention is being paid to a variety of nonpharmacological interventions such as MT. Lepage et al [27] observed that MT decreases the consumption of sedative drugs during spinal anesthesia. In a more recent study, anxiety and the BISTM index were significantly lower in patients receiving MT [28]. Leardi et al [29] observed a reduction of the stress response to intraoperative relaxing music in outpatients. Berbel et al [30] compared preoperative music with diazepam, and they concluded that music is as effective as benzodiazepines in the control of anxiety.

Bringman et al [31] compared the effects of premedication with oral midazolam with those of relaxing music on the prevention of preoperative anxiety, and they concluded that music causes a greater reduction in the level of preoperative anxiety than midazolam. Unlike benzodiazepines, MT is devoid of adverse effects, representing an advantage of this type of treatment. A recent Cochrane review concluded that MT demonstrated a beneficial effect on preoperative anxiety and recommended its use as an alternative to sedative drugs [22].

These results are consistent with the findings of a previous review on the use of music for anxiety reduction with coronary heart disease patients [32]. A similar review also indicated that MT may have beneficial effects on anxiety in cancer patients [33]. It has been shown to increase comfort and relaxation, to lower treatment-related distress, and to decrease nausea and vomiting [33,34]. Music has also been used as an anxiolytic-like stimulus in patients with asthma, with osteoarthritis, or undergoing dental or endoscopic procedures [3,9,17,35–37].

MT has also gained a growing interest as a complementary treatment of pain. Although the most ancient research was conducted in patients undergoing painful dental procedures, a lot of work was done by nurses and reported in nurse's dedicated journals [38–41]. Benefits of MT have been reported in patients with various acute and chronic pain including cancer-related pain, pediatric immunization, shockwave lithotripsy, fibromyalgia syndrome, labor, or postoperative pain [9,14,23,25,42–46]. In the postoperative period, MT reduces pain intensity levels and analgesic requirements [9,18,47–49]. Patients could then be mobilized earlier after the surgery when compared to the control group. Positive effects have been similar in adults and pediatric populations requiring from minimal to major surgical procedures [9,18,23,25,47]. A recent review of the literature confirmed that MT reduced postoperative pain, anxiety, and analgesia use and increased patient satisfaction [50]. Music was effective even when patients were under general anesthetic.

4. Music therapy in intensive care unit?

Patients admitted to the intensive care unit (ICU) are susceptible to numerous stressful factors such as fear of the unknown and dying, sleeplessness, noise, agitation, discomfort, pain, thirst, immobility and frustration with being restrained, dyspnea, confusion, communication problems, and inability to relax [51–53]. Receiving mechanical ventilatory support is also stressful, particularly when patients are unable to

match one's own breathing pattern with the ventilator and during endotracheal suctioning [51, 53, 54]. Because of the placement of the endotracheal tube, patients are also unable to speak, eat, or swallow. As patients recover from acute illness, they can be "weaned" from ventilatory support. Weaning requires increased respiratory effort and can further exacerbate anxiety and its manifestations. So, weaning can be a lengthy and distressing process [37]. Patients have referred to mechanical ventilation as inhumane, unpleasant, and anxiety producing [52].

It has been estimated that great anxiety is provoked in approximately 70% to 80% of intensive care patients, especially in ventilator-dependent patients whose respiratory functions fail to maintain adequate gas exchange and systemic oxygenation [51,55]. Anxiety can impose harmful effects on the course of recovery and overall well-being of a person [51,53]. If unmanaged, anxiety stimulates the sympathetic nervous system, increases work of breathing and fatigue, and severely impedes ventilator weaning [37,51]. Subsequently, sympathetic nervous system arousal can impose numerous adverse responses, including arterial and venous constriction, myocardial stimulation, and bronchoconstriction [51,56]. Bronchoconstriction can cause elevated airway resistance, increase the work of breathing and oxygen demand, and increase muscle tension leading to generalized fatigue. Apart from these actions, sympathetic nervous system stimulation can also result in increased rate and depth of respiration and elevated heart rate. Psychological stressors, such as fear and anxiety, are also among the most potent activators of the hypothalamic-pituitary-adrenal axis [54]. Prolonged activation of the stress response can cause myopathy, fatigue, hypertension, and immunosuppression. These adverse responses may prolong and jeopardize the weaning process resulting in an increase of recovery time and patient mortality [37,51,53].

Current practice to alleviate distressing symptoms and facilitate patient comfort and safety and promote recovery involves the administration of sedative and analgesic medications [37,54,57]. These potent medications are often administered at high doses for prolonged periods and are associated with adverse effects such as hypotension, gut dysmotility, immobility, weakness, delirium, and posttraumatic stress disorder which can lead to prolonged ventilation and increased lengths of ICU stays [37,57]. A strong correlation exists between continuous sedation and prolonged ICU stays, increased rates of organ failure, and reintubation [36].

Given the known benefits of reducing sedative exposure in the ICU, research findings that support nonpharmacological interventions may both improve patient experience and facilitate patients' participation in their own care [37,51,57–59]. Patients who were most awake and aware of their surroundings during mechanical ventilation (MV) had also the lowest posttraumatic stress disorder-like symptoms after hospital discharge [37]. So, incorporating music into the care of the ventilated patient has strong potential to alleviate the symptom burden and the high cost of conventional treatments as well as increase patient satisfaction [57,60]. Music therapy can abate the stress response, decrease anxiety during MV, and induce an overall relaxation response by reducing stimuli that cause stress, synchronizing body rhythms such as breathing and heart rate, and positively influencing emotional feelings of the listener [37]. This relaxation response can lower cardiac workload and oxygen consumption, which promotes more effective ventilation and accelerates ventilator weaning [48,51,57,58].

Clinical studies have clearly provided support for using MT as an effective anxiolytic agent in intensive care populations [26,51,57,59–65]. MT can reduce anguish and anxiety without the use of medication [66]. It can also promote and encourage rest and sleep by way of creating a peaceful atmosphere. Furthermore, the use of headphones shuts out undesired background noise, which is common in the ICU [57,65]. Music provides a way of filtering out unpleasant and unfamiliar sounds which are part of the hospital environment and in that way can reduce the need for sedative drugs, thus leading to a speedier recovery [57,63]. The anxiety reduction is significant in both nonsedated, alert patients and in sedated patients [58,62], with a reduction in sedative exposure

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