Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
Introduction

The 2019 novel coronavirus disease (COVID-19), caused by the virus officially named SAR-CoV-2, appeared in Wuhan, Hubei Province, China at the end of 2019, not only caused great public concern (Wang, Horby, & Hayden, 2020), but also brought about huge psychological distress, especially for Clinical Staff (CS) (Zhang et al., 2020). Due to the rapid increase in the number of cases from December 2019, the outbreak was classified by the World Health Organization (WHO) as a pandemic on March 11, 2020. In Europe, Spain, UK and Italy have recently reported the highest numbers of cases (https://covid19.who.int/) and deaths (as of 11 May 2020; WHO, 2020).

The North of Italy has been the most affected area of the country (Motta Zanin, Gentile, Parisi, & Spasiano, 2020). As a result, like in many other countries, the Italian National Health Service has been overwhelmed and has struggled to give an effective and timely response to the needs of the large number of infected patients. This situation had a significant impact on the physical and mental wellbeing of frontline healthcare workers, who were under increasing daily pressure for prolonged work shifts, scarcity of personal protective equipment, fear of being infected and of infecting their own family members (Lancet, 2020), and for the stress associated with the loss of many patients, colleagues and in some cases of their loved ones (Zaka, Shamloo, Fiorente, & Tafuri, 2020). Some studies have shown that, when in close contact with patients with emerging infectious disease, including SARS (Chung, Wong, Suen, & Chung, 2005), MERS-Cov (Kim, 2018), Ebola (Van Bortel, Basnayake, & Wurie, 2016) (Liu, Wang, & Zhou, 2019), H1N1 (Honey & Wang, 2013), Clinical Staff (CS) can suffer from loneliness, anxiety, fear, fatigue, sleep disorders, which are likely to result in a poorer quality of healthcare for patients (Su, Weng, & Tsang, 2009). What is more, long-term psychological consequences are also likely to be brought about, including higher levels of burnout, psychological distress and post-traumatic stress disorder. In addition, the newly recruited CS for the Covid Hospitals were usually without any adequate psychological training to cope with stressful work conditions (Zaka et al., 2020). Recent studies have focused on the severity of the psychological problems observed in CS (Kang, Li, & Hu, 2020), and on the urgency of providing them with psychological assistance (Xiang, Yang, & Li, 2020) and help to reduce their levels of tiredness, sadness, fear and worry.

Music therapy (MT) has been shown to play an important role in helping address physical symptoms and psychological distress (Fallek, 2020), and for the stress associated with the loss of many patients, colleagues and in some cases of their loved ones (Zaka, Shamloo, Fiorente, & Tafuri, 2020). Some studies have shown that, when in close contact with patients with emerging infectious disease, including SARS (Chung, Wong, Suen, & Chung, 2005), MERS-Cov (Kim, 2018), Ebola (Van Bortel, Basnayake, & Wurie, 2016) (Liu, Wang, & Zhou, 2019), H1N1 (Honey & Wang, 2013), Clinical Staff (CS) can suffer from loneliness, anxiety, fear, fatigue, sleep disorders, which are likely to result in a poorer quality of healthcare for patients (Su, Weng, & Tsang, 2009). What is more, long-term psychological consequences are also likely to be brought about, including higher levels of burnout, psychological distress and post-traumatic stress disorder. In addition, the newly recruited CS for the Covid Hospitals were usually without any adequate psychological training to cope with stressful work conditions (Zaka et al., 2020). Recent studies have focused on the severity of the psychological problems observed in CS (Kang, Li, & Hu, 2020), and on the urgency of providing them with psychological assistance (Xiang, Yang, & Li, 2020) and help to reduce their levels of tiredness, sadness, fear and worry.
MT involves the systematic use of musical experiences aimed at achieving therapeutic goals by a trained music therapist (MTp). It also implies the establishment of a relationship between patient, music and MTp (Bradt, Dileo, & Shim, 2013), (Giordano et al., 2020). MT has been shown by some systematic reviews to reduce pain, improve sleep quality, decrease anxiety and tiredness and induce a relaxation response without the use of medication (Mofredj, Alaya, & Tassaoust, 2016) (Bradt, Dileo, & Magill, 2016) (Tan, Lester, & Lin, 2020). Among palliative care patients, MT has been observed to produce positive changes in pain, anxiety, physical comfort, emotional state, social interaction, and spiritual wellbeing (McConnell & Porter, 2020). Among palliative care patients, MT has been observed to produce positive changes in pain, anxiety, physical comfort, emotional state, social interaction, and spiritual wellbeing (McConnell & Porter, 2017) (Schmid, Rosland, & von Hofacker, 2018). Through dopamine state, social interaction, and spiritual wellbeing (Giordano et al., 2017)( Schmid, Rosland, & von Hofacker, 2018). MT has been shown by some systematic reviews to reduce pain, improve mood, performance, attention and concentration (Raglio, Imbriani, & Oddone, 2017). However, no studies have been conducted so far with a focus on MT support intervention administered to CS assisting COVID patients. The aim of this preliminary study was to investigate the influence of MT as a support intervention to reduce stress and improve wellbeing in a sample of CS assisting patients with COVID-19.

**Materials and methods**

**Participants**

Over a 5-week period (from 1 April 2020 to 6 May 2020), emergency recruited CS to assist COVID-19 patients at the newly designated Coronavirus Unit of the University Hospital of Bari – Italy-, were invited to participate in this study.

Inclusion criteria were: (a) age ≥ 18 years, (b) work at the Covid Unit, (c) willingness to cooperate. Exclusion criteria were: (a) severe physical, neurological or psychiatric conditions in the previous twelve months, (b) refusal to participate in the study.

During these weeks the School of Medicine of the University of Bari made available single room hotel accommodation to each newly recruited CS, to prevent the risk of contagion in their families and also to help them find an appropriate accommodation. All CS staying at the hotel in question were informed about and asked to participate in this study by the Unit Coordinator on the basis of the above inclusion/exclusion criteria. Enrolment took place on the basis of participant agreement.

**Receptive music therapy**

An interactive relational approach of receptive MT (Bruscia, 1998a) (Grocke & Wigram, 2007), supplemented by Guided Imagery and Music (Bruscia & Grocke, 2002) was used. Some specific playlists (PLs) were created to favor relaxation and reduce anxiety and stress (Breathing PL), to recover energy and support concentration (Energy PL), to release tension and instill calm and peace of mind (Serenity PL).

In the relaxation PL (Breathing) music tracks were selected on the basis of the following elements: steady pulse; quiet mood; predictable melodic lines; little dynamic change; supportive bass line; stability in volume, timbre, rhythm, harmony and pitch; simple structure; clear form. The Breathing PL was structured by selections from classical music of the Western tradition and modern selections with similar features (Bonny, 2002, p. 301-324).

By contrast, in the “stimulating” PLs (Energy and Serenity) music tracks were more changeable in instrumentation and in dynamic flow, unpredictable in melodic lines, volume, timbre, rhythm, harmony, pitch, loose structure and unclear form. Bass line could range from supportive to non-supportive (Grocke & Wigram, 2007) (Wigram & Bonde, 2019).

The Energy PL and Serenity PL were arranged on the basis of selections from pop, rock and jazz music.

All playlists length was from 15 – 20 min. A listening guideline was created for all the PLs (“Find a quiet and comfortable space”, “close your eyes”, “focus on an image or a colour”, “breathe slowly” etc.). The MTps tailored music to each CS based on the results of their weekly feedback assessment (Robb & Burns, 2011).

**Design and procedure**

After Board Institutional review approval and after obtaining informed consent, 34 CS were included in this preliminary study. In the first week CS received MT contents on their mobile phones from a MTp clinician:

1 2 Playlists (PLs) - Breathing and Energy – were prepared by three trained MTps; 2 a listening guide tailored to the playlist mood; 3 a short questionnaire (MTC-Q1) to fill before and after each listening.

At the end of week 1, two researcher MTps interviewed CS on the phone to assess their listening experience. On the basis of the feedback collected the two MTps prepared 2 customized playlists for each CS to listen to during the next week. All CS received their customized playlists, listening guide and MTC-Q1.

This procedure was repeated for four weeks. CS were let free to decide when and how to listen to their PL during the weeks.

At the end of the study, an MTC-Q2 questionnaire was administered to assess the MT intervention.

**Measures**

The MusicTeamCare-Q1 (MTC-Q1) was used to investigate the effects of receptive MT intervention to reduce stress and improve wellbeing of CS. The MTC-Q1 is a self-assessment questionnaire, in the form of a Likert Scale, whereby a subject evaluates in a scale from 0 to 10 (with 0 = not at all and 10 = very much so) how much he/she feels tired, sad, fear and worried.

MTC-Q1 was administered by a link via mobile phones. CS were invited to fill it at 2 time points: before listening to PL (T0) and within one hour after the end of listening (T1).

Once a week a researcher MTp interviewed the CS on the phone about their listening experience to assess the relevance of the playlist proposed to the potential needs of participants. At the end of the study an MTC-Q2 was used. The MTC-Q2 self-assessment questionnaire, was designed by 24 closed-ended questions, with the exception of a few specific cases, in order to investigate some aspects as perceived through the MT intervention. In this preliminary study the analysis of the questionnaire was limited to 3 questions only (n.11 how useful was the the Listening Guide prepared by MTp, n.14 How useful was weekly assessment?, n.16 What did you feel through weekly feedback by MTp?)

Data collection was made by a psychology researcher.

**Statistical analysis**

Statistical analysis was performed using IBM SPSS Statistics software, version 21. Firstly, descriptive statistics were computed (mean scores (M), frequencies, standard deviations (SD)). Secondly, a paired-samples t-test was used to compare the MTC-Q1 scores at T0 and T1. For all statistical tests a p-value lower than 0.05 was considered statistically significant.

**Results**

This study involved 34 CS (14 doctors, 20 nurses). The sample included 22 women and 12 men. The age range of participants was 22–59
The participants were enrolled from the Covid Unit of the University Hospital of Bari. All the participants subscribed to a written informed consent form. 5 subjects dropped out after week 2.

1st week Playlist

Breathing

The variations in the emotional status of CS in the first week before and after listening to the breathing playlist are reported in Fig. 1. The Breathing Playlist elicited a significant variation in the emotional status of CS. In more detail, in terms of the difference in tiredness perceived between T0 and T1, the test revealed a statistically significant result (t = 7.695, df = 20, p < 0.05). Moreover, there was a significant decrease in the intensity of perceived sadness (t = 6.432, df = 20, p < 0.05) and fear (t = 9.735, df = 20, p < 0.05) between T0 and T1. Finally, the results indicated a significant reduction in worry intensity between T0 and T1 (t = 5.056, df = 20, p < 0.05).

Energy

The variations in the CS emotional status in week 1 before and after listening to the Energy playlist are reported in Fig. 2. In particular, paired-samples t-test results indicated a significant decrease in tiredness (t = 4.873, df = 20, p < 0.05), sadness (t = 8.545, df = 20, p < 0.05), fear (t = 6.419, df = 20, p < 0.05), and worry (t = 6.190, df = 20, p < 0.05) between T0 and T1.

Customized playlists

Breathing

The variations in the emotional status of CS in the following week before and after listening to the customized personalized PL are reported in Fig. 3a. The customized Breathing Playlist generated a significant variation in the emotional status of CS. More specifically, the paired sample t-test indicated a significant decrease in the intensity of perceived sadness (t = 2.492, df = 9, p = 0.034), fear (t = 5.056, df = 9, p = 0.001), and worry (t = 3.535, df = 9, p = 0.006) after listening.

Energy

The variations in the emotional status of CS in following week before and after listening to the customized energy playlist are reported in Fig. 3b. The customized Energy playlist generated a significant variation in the emotional status of healthcare workers, as indicated by the results of the paired-samples t-test. More specifically, there was a significant decrease in the intensity of perceived tiredness (t = 10.423, df = 10, p = 0.000), sadness (t = 4.282, df = 10, p = 0.002), fear (t = 3.858, df = 10, p = 0.003), and worry (t = 2.334, df = 10, p = 0.042) intensity.
The present study is a preliminary, pilot study and therefore it is not intended to produce conclusive evidence. Future research efforts will require a larger sample of participants and different study settings. It was not possible to use randomization procedures due to the nature of the treatment in question and to the situation of emergency.

However, further research is required to determine the full efficacy of this intervention in terms of providing support to CS and prevent burn-out in situations other than health emergencies.

Qualitative Data from MTC-Q2, including phone feedback topics,
specific aspects of the music used for the playlists, personal experiences with music listening, etc. are currently being investigated and studied for future publication.

Conclusions

In conclusion, this study seems to confirm that in an emergency situation it is possible to put in place a remote MT support intervention targeted to CS exposed to highly stressful situations. Thanks to the music and the presence of a certified MTp, MT can become an important form of support provided, even indirectly, by means of the non-invasive but constant presence of a professional music therapist who guides the CS in listening and taking care of themselves in unexpected and unpredictable extreme situations.

Declaration of Competing Interest

Nothing to declare.

References

Allen, K., & Blascovich, J. (1994). Effects of music on cardiovascular reactivity among surgeons. JAM, 27(22), 1724.
Bonny, H. (2002). In Barcelona Publishers (Ed.). Music & consciousness. Ghilsum, NH: Barcelona Publisher.
Bradt, J., Dileo, C., & Shim, M. (2013). Music interventions for preoperative anxiety. The Cochrane Database of Systematic Reviews, 6.
Lounsbury, D. (2019). Soothing the heart with music: A feasibility study of a bedside music therapy intervention for critically ill patients in an urban hospital setting.
Lehrer, Woolfolk, & Sinne (Eds.). Principles and practices of stress management (9), 1430–1435. https://doi.org/10.1097/CCM.00000000000013199.
Xiang, Y. T., Yang, Y., & Li, V. (2020). Timely mental health care for the 2019 novel coronavirus disease outbreak at individual, community and international levels. Bulletin of the World Health Organization, 98(7), 470–473. https://doi.org/10.1016/S0020-593X(20)30315-5.
Kingsley Publishers. The inershded moment: A call for systematic psychological health care for frontline medical workers. The Lancet, 395(10223), 470–473. https://doi.org/10.1016/S0140-6736(20)30318-9.
Giornale Italiano Di Medicina Del Lavoro Ed Ergonomia, 38, 257–260. https://www.who.int/emergencies/diseases/novel-coronavirus-2019 (COVID-19).