



Neurological music therapy during the COVID-19 outbreak: updates and future challenges

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Abstract

Background In the last few years, several studies confirmed the effectiveness of music therapy (MT) for the rehabilitative management of patients with neurological disorders.

Aim Here we discuss the feasibility and disadvantages of tele-neurological MT (tele-NMT) compared to the traditional MT programmes.

Methods We selected all the articles registered in the Web of Knowledge, PubMed, Google Scholar and ScienceDirect from March 2020 to November 2021 concerning tele-NMT during the COVID-19 outbreak, collecting some examples and experiences.

Results With the advent of the COVID-19, several music-based interventions (MBIs) have been adapted from “in person” to a “remote and virtual” mode (through the telemedicine).

Discussion Tele-NMT could represent a promising option to provide constant care and support to people with neurological diseases during the pandemic.

Keywords Music therapy · Music-based interventions · Telemedicine · Rehabilitation · COVID-19 outbreak

Introduction

Over the past decades, pieces of evidences supported the therapeutic and rehabilitative role of music therapy (MT) in a wide spectrum of neurological disorders. Several music-based interventions (MBIs) aimed to enhance the sensory motor recovery, the cognitive performances, the reduction of mood and behavioural symptoms and also to improve speech language in acquired aphasia [1–5] (Table 1).

Listening to music has also shown utility in reduction of migraine headaches [6], depression levels [7], anxiety [8] and pain [9], with an overall benefit on the nervous system for modulation of the parasympathetic, dopaminergic and opioid receptors [2].

During the COVID-19 pandemic, for reasons related to social distancing and quarantine protocols, music therapists were forced to adopt drastic changes in their work. In particular, most of them implemented the use of technologies, shifting their activities from “in person” service to “virtual” mode, accelerating the adoption of telehealth interventions [10, 11]. Against this background, we searched all English medical papers registered in Web of Knowledge, PubMed, Google Scholar and ScienceDirect between February 2020 and November 2021 that evaluated the current MBIs available for neurorehabilitation purpose and delivered through telemedicine and virtual digital technologies during the pandemic. Specified in PubMed, the search terms were “Covid-19 pandemic” and “tele music therapy” or “virtual music therapy”, excluding all the studies and applications concerning tele-MT in non-neurological fields or before the pandemic. Bibliographies of selected articles were also screened for additional relevant articles.

The aim of this brief review was not to evaluate the therapeutic effects of the MBIs but to discuss the feasibility, accessibility and the future implementation of these new NMT approaches.

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Table 1 A brief overview of most MBIs applied in neurorehabilitation

Domains	MBIs
Sensory motor (limb paresis, gait, balance)	- Instrumental music performances (instrument playing and improvisation, music writing, singing songs, listening to music tracks) - Rhythmic auditory stimulation (rhythmic movement association from physical relaxation to free gestures, rhythmic and dancing sequences)
Cognitive (memory, attention, executive functions)	- Music mnemonics training - Musical attention control - Auditory perception with sensory integration
Mood behavioural	- Listening music - Mood training
Speech language	- Musical speech stimulation - Oral motor exercises - Therapeutic singing - Intonation therapy - Rhythmic speech cueing - Symbolic musical communication training

MBIs music-based interventions

Neurological music therapy services from in person (pre-COVID-19) to telehealth (since COVID-19)

Three recent cross-sectional surveys (Table 2) evaluated the pros and cons in the transition of MT from “in person” (pre-COVID-19) to telemedicine services (since COVID-19) taking into account domains and techniques, the possible differences in terms of the occupational context of the music therapist, the potential benefits and future challenges [12–14].

Cole et al. [12] investigated the demographic perception of tele-NMT in terms of technology use, evaluation of safety, clinical practice, role and involvement of the caregiver (CG). Results showed that only few patients interrupted NMT programmes during the transition from “in person” to “telemedicine”. Moreover, music therapists perceived the tele-MT as promising therapeutic tool applicable also in the future. However, within the sensorimotor domains was observed a prominent reduction in the use of rhythmic auditory stimulation (RAS) useful to improve the gait control and balance [19].

Another study [13] reported how music therapists during the pandemic were encouraged to review and share their protocols adapting their services and also providing practical recommendations.

Tele-MT programmes applied consisted in a pre-recorded videos of a maximum duration of 10 min which were subsequently shared on YouTube. The following activities were employed: remote sessions via telephone; interactive concerts from the balcony or patio at residential facilities for the elderly; active music production protocols such as improvisational virtual jam session, musical dialogues, dance, song composition and writing; discussion of musical pieces; listening to

music. All these MBIs were carried out through virtual music lessons, playlist of songs and pre-recorded videos, all through laptop, cellular technology and platforms such as Zoom, Skype, Webex, FaceTime and occasionally text chat with the therapist.

Another important aspect was related to the different technologies used across the worldwide regions (North America, Europe and Asia) during COVID-19.

Specifically, several notable differences emerged from a recent survey, where almost all respondents from North America and Asia/Oceania used technology, compared to the around three-quarters of those from Europe, probably due to the differences in the cultural context and theoretical orientation across regions [14].

All these three surveys recognized numerous benefits of tele-MT including the accessibility especially for patients with difficulty in transportation, who are immunocompromised and who are hospitalized, the expansion of boundaries and well-being of participants.

On the other hand, the challenges more frequently recognized were drawbacks during the online sessions related to various Internet problems (connection difficulties, digital accessibility for some older people, audio latency and poor sound quality), the lack of physical and interpersonal experience between music therapist and patients as well as the several limitations due to use of technologies [12–14].

Online singing groups and other music digital approaches in patients with dementia

The pandemic restrictions and related lockdown had a negative impact on people with dementia and on their CG, leading to a deep loneliness, confusion and abolition of many forms of support and cognitive stimulation [20].

Table 2 Summary descriptions of the most relevant reviewed papers dealing with tele-music therapy during the COVID-19 outbreak

Author	Study type	Description
Cole LP et al. [11]	Cross-sectional study—survey	<i>Participants:</i> 69 professional neuro music therapists 49 survey questions asking the worldwide music therapists about their experience delivering neurological MT from in person (pre-COVID-19) to telehealth (since COVID-19) <i>Benefits:</i> increased caregiver involvement, more accessibility especially for elderly and disabled patients <i>Challenges:</i> to improve sensorimotor techniques and some speech/language techniques implementing recommendations in training courses and global support meetings
Kantarova L et al. [12]	Scoping review	Explored how music therapists previously working in person adapted their practice to tele virtual MT <i>Benefits:</i> Easy access for patients with difficulty in transportation, immunocompromised/hospitalized. The expansion of boundaries <i>Challenges:</i> limitations due to use of technologies and various Internet problems (connection, lag-time causes delays in rhythm and harmony not in perfect synchronization)
Agres KR et al. [13]	Cross-sectional study survey	<i>Participants:</i> 112 worldwide professional music therapist asked about the use of technology in their MT practice <i>Benefits:</i> easy accessibility especially for difficult patients <i>Challenges:</i> Differences in technology use across different world regions. Drawbacks and technical limitations during the online sessions, the lack of physical contact between music therapist and patients
Dowson B et al. [15]	Community case study	The study examined the latest practice in online music-making in response to COVID-19 restrictions for people with dementia and their supporters. Over 50 examples were identified <i>Benefits:</i> accessibility, digital safety and well-being of participants <i>Challenges:</i> digital accessibility for some older people, audio latency and sound quality
Gaddy S et al. [16]	Cross-sectional study survey	<i>Participants:</i> 1196 professional neuro music therapists 51-item survey including questions related to employment, service delivery, perception of hope, perception of stress during the COVID-19 pandemic <i>Benefits:</i> many music therapists experienced changes in their positions, including a decrease in client contact hours and an increase in using alternative services, such as telehealth <i>Challenges:</i> Moderate level of perceived stress for the pandemic but at the same time great hope to improve tele-MT also in the future
Ahessy, Bill et al. [17]	Survey-based study	<i>Participants:</i> 11 parents of children and adolescents with visual impairment who engaged in online music therapy during the COVID-19 pandemic <i>Results:</i> 95% of parents perceived the telehealth programme to be a positive experience for their child, 73% observed positive behaviours directly after the sessions, and 82% (9/11) indicated that the programme was a valuable family resource that supported bonding and interaction
Bompard S et al. [18]	Case study	<i>Participants:</i> 14 patients with various neurological disorders (infantile cerebral palsy, genetic syndromes, brain malformations) and their parents received a customized MT (Euterpe method), 3 times a day for 2 consecutive weeks during the COVID-19 pandemic <i>Results:</i> improvement in children's sleep quality and a reduction of parental distress

Recently, interactive NMT through singing groups and choirs is proven to be a valid tool for cognitive stimulation in dementia, able to improve the mood and promote the psychic well-being of the patient as well as its CG [15]. In light of the pandemic, these MBIs have been modified through the implementation of alternative practices. Some authors documented and categorized nearly 50 examples of online MBIs for patients with dementia during the COVID-19 outbreak in the UK [18]. The sessions ranged from fully interactive MT through a videoconferencing, live video call with a music therapist, to a semi-interactive and non-interactive sessions

where in the former type the patient watched his therapist through a live video with a partial interaction, while in the latter the patient followed the sessions through video call without any interaction with the facilitator. Pre-recorded sessions available on demand were also described as well as carer-facilitated sessions guided by a CG through instructions received from a therapist.

Musical activities included groups singing, choirs, sing-along, real music therapy sessions with instrument playing, dancing or improvising. The most widely employed dissemination platforms consisted of video calling, live video

broadcast and video streaming. The most popular broadcasting tools were Zoom (Zoom Video Communications), Facebook Live (Facebook Inc.), video calling platforms (Skype) and video generally uploaded on YouTube channel (Google LLC) [15, 18] (Table 2).

Home-based music therapy in children with neurological disabilities

During the first lockdown, a group of Italian researchers carried out a tele-NMT for the multisensory stimulation of children with motor and neurological disabilities through the combined use of sounds, music, images, aromas, objects, tools and lights. In detail, 14 patients (median age 7 years \pm 5 months), with a wide spectrum of neurological disorders (infantile cerebral palsy, genetic syndromes, brain malformations) were enrolled, from March to May 2020. The children and their parents involved received a customized audio–video compositions that contained sounds at particular frequencies, original music, the voice of the mother, family songs and lullabies and images related to pleasant moments recorded during sessions, administered 3 times a day for 2 consecutive weeks. The effects emerged from the analysis were the reduction of children’s sleep disorders, the reduction of the stress levels of parents and the improvement of the parental relationship [17].

Another survey-based study evaluated the experiences of parents of 11 children and adolescents with visual impairments undergoing tele-NMT through a video playlist. Ninety-five per cent of parents perceived the telemedicine programme as a positive experience for their child, 73% of patients observed positive behaviour immediately after the sessions, and 82% of them indicated that there was a valuable resource for the family that supported bonding and interaction [21] (Table 2).

Discussion

To date, there are very few studies regarding the applications of tele-NMT during the COVID-19 outbreak. Most of the collected works concerned surveys administered to music therapist, called to completely change their working habits. Some authors discussed the usefulness and feasibility of home-based RAS method, supported by the CG, in improving the walking patterns and gait stability of people with movement disorders [19, 22]. RAS proved to be a relevant technique for walking rehabilitation in Parkinson’s disease [22–25], stroke [26–28], cerebral palsy [29] and multiple sclerosis [30].

Specifically, during the COVID-19 pandemic, many music therapists showed uncertainty regarding the RAS

methods application in telemedicine, linked to the increased risk of falling and the lack of physical support [12, 13].

Other ones showed the benefits of NMT delivered at home by cooperation between the music therapist and CG in patients with cognitive and behavioural and in children with neuromotor disabilities [15, 19, 20]. In detail, qualified music therapist instructed the CG on methods and strategies for choosing and using music (listening, playing an instrument, movement to music) able to evoke autobiographical memories and sharing meaningful experiences [28]. Previous research demonstrated that therapeutic singing interventions in virtual reality mode improved breathing function, speech loudness, mood and social connectedness of quadriplegic people with spinal cord injury compared to traditional face-to-face group singing therapy [31].

Telehealth programmes overcome physical barriers, providing continuity of medical care during the pandemic [10]. Moreover, before the pandemic, tele-MT was delivered only for specific reasons in some populations: veterans, those with mobility problems or living in remote and rural areas, but in a completely sporadic way and without guidelines and specific codified protocols [11].

To date, music therapists have to adapt their practice and improve their skills, adopting innovative choices with the use of technology. However, this modern approach could encounter several limitations, related to the availability of musical resources and high quality of the instruments that might affect the aesthetic and healing quality of sound and music attraction for the patient. According to some experiences, online MT could be more structured and longer and may be less spontaneous than face-to-face therapy. Therefore, the specificity of this new approach could be challenging, such as Internet connection problems, familiarity of patients and CG with these modern technologies, breaks in the line, strange sounds, asynchronous harmony and rhythm, overlapping speech and call disconnections. MT as a relationship therapy can lack important aspects based on physical contact when transferred to virtual space [13, 14, 30]. For these reasons, many patients may refuse this practice rather than using it with a poor quality level. Nevertheless, the attitude of music therapists appeared predominantly positive and optimistic, well disposed to change, with the aim of continuing to provide assistance during the pandemic [13]. Moreover, tele-MT can be easily delivered beyond physical and geographical boundaries; it is simple to access for patients, especially those living in remote locations, immunocompromised patients, hospitalized and in isolation, thus avoiding the interruption of both verbal and non-verbal communication and interaction, linked to measures of social distancing. In some cases, it has been described the use of homemade musical instruments or those found among ordinary household objects (surfaces available for

drumming), in consideration of the domestic performance of tele-MT sessions [13]. This can promote the use of the language of sound also encouraging the opening of alternative channels of communication.

In this scenario, we suggest to implement the home-based neuromotor and cognitive stimulation programmes, through the presence of a remote connected music therapist and the contemporary support of a CG especially during particular MBIs such as RAS. In fact, these sensorimotor methods should be delivered through virtual MT sessions by an expert therapist and in the presence of a trained CG [32, 33].

The requirement for the CG support during the tele-NMT sessions [34] should be consistent with the standard protocols of telemedicine rehabilitation [33]. Therefore, it will be necessary to motivate the therapist in acquiring specific skills needful to guarantee physical support and prevent the patients from falling.

Conclusions

We believe that tele-NMT could represent a promising option to provide constant care and support to people with neurological diseases during the pandemic. Telerehabilitation offers an alternate way of delivering rehabilitation services, facilitating communication between the healthcare professional and the patient in a remote location.

In this context, many efforts will be needed in order to better define and validate more sophisticated platforms able to produce standardized tele-NMT protocols and plans to apply in each clinical setting. Moreover, it will be paramount to identify and create customized tele-NMT approaches such as audio–video setting compositions, containing sounds at particular frequencies, original music, specific neuromotor programmes and familiar songs accompanied by images, tailored to each patients' needs.

In conclusion, promoting the spread of tele-NMT will allow to guarantee continuous assistance to people with neurological diseases during the pandemic, supporting the management of neuromotor, cognitive and psychiatric symptoms and also enhancing the quality of life of both patients and their CG.

Declarations

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors.

Conflict of interest The authors declare no competing interests.

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