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Research Article

Covid-19 and absence of music therapy: Impact on mother-child dyad during invasive procedures in pediatric oncology[☆]

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ABSTRACT

During COVID-19 pandemic, Italian pediatric oncology departments were obliged to adopt restrictive measures to minimize the risk of in-hospital infections in frail patients and staff members. Access to the wards was significantly reduced and music therapy (MT) activities were suspended. The aim of this study was to compare the level of anxiety and sedation in pediatric patients undergoing invasive procedure before (T1), during (T2) and after (T3) the pandemic, with and without the presence of MT.

From January to September 2020, all children aged 2–15 with oncological and hematological diseases undergoing to invasive procedure were enrolled. During T1 and T3 children received preoperative preparation with MT by a certified music-therapist. In T2 they received music or video by clinical staff. Preoperative anxiety scores were measured with the m-YPAS scale. Interviews with mothers were performed. The average consumption of drugs used was analyzed.

Significant differences in preoperative anxiety levels between scores in T1, T2 (p.value = 0,0000014) and in T2, T3 (p.value = 0,0000031) were observed. No difference between T1-T3 (p.value = 0,96). Higher dosage of midazolam in T2 (1,14 mg 0,189) compared to T1 (0,71 mg 0,399) and T2 (1,14 mg 0,189) were observed. Mothers also recorded higher scores on anxiety and stress without music therapy.

Introduction

The outbreak of the coronavirus disease (COVID-19) in 2020 caused great public concern (Wang, Horby, Hayden, & Gao, 2020) and huge psychological distress. National health services were overwhelmed as they struggled to offer an effective and timely response to the needs of the large number of infected patients. In Italy, the first responses to the pandemic outbreak were to implement social distancing, a “stay at home” policy, and quarantine protocols (Mervosh, Lu, & Swales, 2020; Salute, 2021) in an effort to reduce the impact on healthcare facilities. Italian pediatric oncology departments were obliged to adopt restrictive measures to minimize the risk of in-hospital infections in frail patients and staff members. Access to the wards was significantly reduced for educators, teachers and volunteers, and there was significant reduction

in the work carried out by clinical psychologists (Clerici, Massimino, & Ferrari, 2020), as well as in support activities with music therapy (MT).

MT is defined as the systematic use of musical experiences aimed at achieving therapeutic goals by a trained music therapist (MTt) and requires the establishment of a relationship between patient, music and MTt. Passive listening to pre-recorded music provided to the patient by a nurse or other medical staff is considered Music Medicine (MM). MM does not imply the presence of a therapeutic relational process, nor does it require the systematic evaluation of the sound elements or music employed (Bradt, Dileo, & Shim, 2013).

In pediatric oncology patients undergoing invasive procedures (IP) are offered MT as a complementary/non-pharmacological intervention to reduce preoperative anxiety, to mitigate stressful environmental factors, to improve comfort and promote compliant behaviors (Geipel,

Abbreviations: IP, invasive procedures; MT, music therapy; MM, music medicine; MTt, music therapist; m-YPAS, Modified Yale Pre-Operative Anxiety Scale.

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Koenig, Hillecke, Resch, & Kaess, 2018; Giordano, Zanchi et al., 2020). When compared to pharmacological sedation, MT is cost-effective, has no apparent risks, and can provide patients and families with physical, emotional and cultural benefits (Loewy, Hallan, Friedman, & Martinez, 2005; Loewy, Stewart, Dassler, Telsey, & Homel, 2013). MT interventions can also save time, weigh less on staff and equipment resources in pediatric care (Millett & Gooding, 2018), and reduce procedural time (Chlan, Heiderscheit, Skaar, & Neidecker, 2018). During the Covid outbreak, literature explored recommendations to expand tools and employ communication technologies in order to stay in contact with patients (Clerici et al., 2020; Giordano, Scarlata et al., 2020; Knott & Block, 2020; Cousins-Booth & Rizkallah, 2020), and several professional MT organizations paid particular attention to remote intervention modalities (AMTA, 2020; BAMT, 2020; AIM, 2020). However, in our context, support with MT was completely suspended for 3 months. In this period, IP were carried out with pharmacological aid only. The aim of this study was to compare the level of anxiety and sedation in pediatric patients undergoing IP with and without the presence of MT before, during and after Covid 19 pandemic. Our secondary aim was to assess mothers' anxiety levels.

Methods

Participants

From January to September 2020, children aged 2–15 with oncological and hematological diseases hospitalized at the Pediatric Oncology and Hematology Ward at the Polyclinic Hospital in Bari, Italy, who underwent at least 2 procedures with the support of MT between January and March, 2 without MT between April and June, and 2 between July and September with MT, were enrolled in this study.

The study protocol of MT in IP was approved by the Hospital Ethics Committee of Bari, (n° 5340 12/7/2017) and parents signed an informed consent form.

Design and procedure

During the first three months (T1), a 15 – 20 min MT bedside preparation session was provided by a certified MTt before the IP. During this individual session, an interactive relational approach,

developed from the model of "free improvisation therapy" was used (Bunt & Stige, 2014). This approach included the use of both active techniques, involving various musical instruments, free improvisation, singing and song-writing, together with receptive techniques, centered around choice, creation and listening of play lists with the MTt. The MTt tailored the MT intervention to each child following individual assessment (Robb, Burns, & Carpenter, 2011). At the end of the session, the MTt accompanied the children and their parents to the operating room. The musical process - active and/or receptive - continued in the operating room until analgo-sedation was administered. Over the following three months (T2), MT was not used in preparation and accompaniment of the IP. In the operating room, the medical staff chose to use cartoons from YouTube® or music in an attempt to distract the patients until analgo-sedation was administered. The MTt was not present. In the final 3 months (T3), the same procedures as in T1 were adopted. Clinical staff was made up of the same team in T1, T2, T3. (Fig. 1)

Measure

The Modified Yale Pre-Operative Anxiety (m-YPAS) scale was used to assess children's reactions in the operating room. The m-YPAS is an observational behavioral checklist (Kain et al., 1997) to measure the levels of preoperative anxiety in young children. The m-YPAS has been used in more than 100 studies evaluating preoperative anxiety in different health fields such as surgery, anesthesia and pediatrics. In this study, the scale was adapted specifically to periods T1, T2 and T3, with 17 questions in the form of a Likert scale (not at all, ..., very much so), and was administered to the mothers of the children by a psychologist at the end of September 2020 by a link via mobile phones. A questionnaire, in the form of a Likert Scale and an optional open-ended question, was also sent to the mothers as a self-assessment evaluation.

The average consumption of drugs used during the procedures was analyzed. Data collection was carried out by a psychologist researcher.

Statistical analysis

Descriptive and inferential analyses were carried out on the data in order to highlight potential differences in the level of anxiety of patients in the three periods, based on the scores from the questionnaire. In particular, statistical analyses were aimed at identifying:

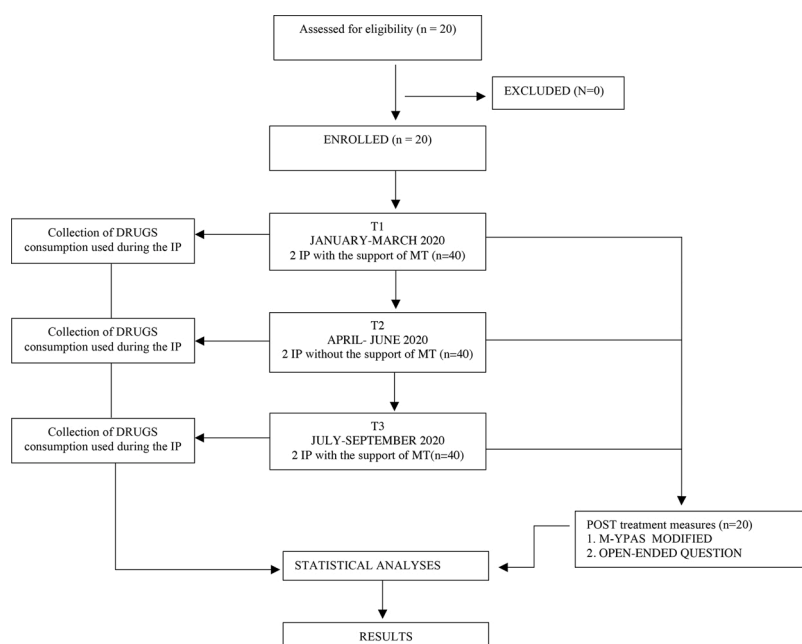


Fig. 1. Flow chart describing enrollment and data collection of participants.

- 1) differences between scores in T1-T2, T2-T3, T1-T3.
 - 2) differences in the scores recorded in the questionnaire submitted to the patients' mothers
 - 3) differences in the drug dosage given to patients in T1, T2, T3.
- A significance level of 0.05 was chosen. Statistical analyses were performed using the open-source statistical software R-2018.

Results

A total of 20 parent-child dyads participated in the study (child age M = 6.65 SD 3.363, Parent age M = 38.25 SD 5.485). Assuming the hypothesis of normal distribution of scores (confirmed by the Shapiro-Wilk and Kolmogorov-Smirnov test) and homoscedasticity (confirmed by the F-test), the one-sided paired t-test with right tail shows a significant difference in pre-operative anxiety levels between scores in T1, T2 (p = 0,0000014) and in T2, T3 (p = 0,0000031). There are no differences between T1-T3 (p = 0,96). Results are shown in Fig. 2a and Fig. 2b.

Levels of anxiety with and without MT were also recorded in the patients' mothers: assuming normal distribution and equal variance (verified with Shapiro-Wilk test and F-test with significance level equal to 0.05), the one-sided paired t-test with p equal to 0,00000117 shows a significant difference between the scores related to the period with MT and those related to the period without MT. Fig. 3 shows the scores recorded in the two periods.

With regards to mean dosages of the drugs administered to the patients in T1, T2 and T3, Wilcoxon's non-parametric test showed a difference with a significance level of 0.05 in the dosages of midazolam administered in T1 (0, 71 mg ± 0,399), T2 (1,14 mg ± 0,189) and T3 (0,92 mg. ± 0,288), with dosage always higher in T2.

Nine out of 20 responses to the open-ended question were completed and they are reported in Table 1. All the responses describe how MT is experienced positively by the children, both before and after the procedures, and how its absence generated anxiety and concern in the

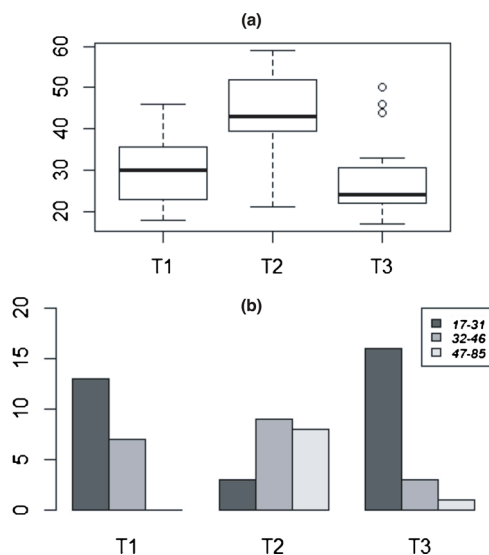


Fig. 2. (a) Box-plot representation of the variables computed as difference between the three moments T1 T2 T3. The X-axis represents periods T1 (with MT), T2 (without MT), and T3 (with MT). The Yaxis represents the mean anxiety score of all children in each time. The e values of T1 and T3 T2, reflect the benefits of MT in anxiety level reduction. Outliners in T3 confirm that there is no statistical evidence to affirm that the mean score of the two groups (T1, T3) is different (p-value = 0.96). (b) Bar graph showing the score frequencies obtained by patients, divided into 3 bands from 17 to 85, in T1, T2 and T3. Comparison of the scores obtained by patients in T1, T2 and T3. In each period, the three bars represent the number of patients who reached a score between 17 and 31, 32 and 46, 47 and 85 respectively.

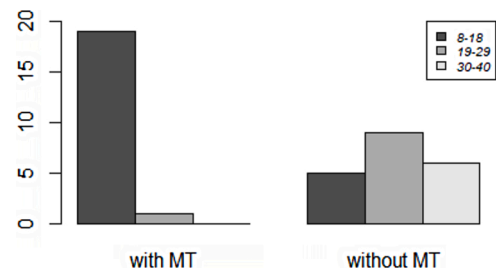


Fig. 3. Graphic representation of anxiety level experienced by mothers. Score frequencies obtained with mothers, divided into 3 bands from 8 to 40, in the presence and in the absence of MT. For each period the three bars represent the number of mothers who reached a score between 8 and 19, 19 and 29, 30 and 40 respectively.

Table 1

Responses to the open-ended question (9 out of 20) completed by mothers.

MOTHER	RESPONSE
1	The absence of music therapy, especially during IP, changed my child's mood and the way in which he faced the procedures. When music therapy was present, he didn't even realize what he really had to face, for him it was simply "going to play with the music therapist". When music therapy was no longer there, my child began to wonder why he had to go into that room.
2	Music therapy helps children, especially young children, not to think about what's going on around them at that moment.
3	Every time my son has to undergo IP, I struggle to keep him quiet because he can't wait to go and play with his music therapist friend. He's had to undergo IP for over a year, but he was very anxious and worried when there was no music therapy because of COVID.
4	Music therapy is essential for little ones dealing with IP. They come into the room calmly and my son always looks forward to it. When he wakes up, he doesn't look for me but for the music therapist so he can play together with the musical instruments!
5	With music therapy, children feel calmer and don't have to think so much about what they have to do.
6	Music therapy has been fundamental in dealing calmly with the whole clinical process.
7	Music therapy is essential for our children when they undergo IP.
8	In my humble opinion, but above all from what I see my daughter going through, music therapy in the IP room is of fundamental importance ... because it offers support and helps face the procedures with a positive spirit.
9	Music therapy is essential and is of enormous support to children undergoing IP!

children undergoing IP.

The responses indicate that MT is seen as an integral part of the procedures, and that its presence is also positively perceived by mothers, who perceive their children to be calm and relaxed.

Discussion

This study indicates that the absence of MT due to the pandemic, resulted in higher levels of pre-operative anxiety in pediatric patients undergoing IP and increased use of anxiolytic drugs for sedation. Higher levels of anxiety and stress were also recorded in mothers.

IP in pediatric patients requires adequate analgesia and sedation. This is obtained by a combination of pharmacological agents, as there is no single drug that provides rapid onset and offset of effect, adequate cardiovascular and respiratory function control, amnesia and inactivity (Ghadami Yazdi, Ayatollahi, Hashemi, Behdad, & Ghadami Yazdi, 2013). A greater dosage of benzodiazepines (midazolam) was administered in T2 compared to T1 and T3. However, data show that the increased use of benzodiazepines in T2 was not sufficient to lower pre-operative anxiety in patients undergoing IP to the same level as in T1 and T3. The changes in preoperative anxiety status recorded in T1, T2

and T3 suggest that preparation and accompaniment of the procedure with MT, which offers distracting, holding and supporting (Uggla et al., 2016), constitute an effective complementary non-pharmacological intervention, capable of lowering preoperative anxiety levels and of acting on those factors that would otherwise be addressed through use of greater sedation (Fallek et al., 2020; Ghetti, 2012).

During suspension of MT because of the Pandemic, children were not able to participate in the shared creative process and initiative building that MT usually offers. As a consequence, it was not possible to encourage a greater sense of positive control for the patients over their environment or facilitate emotional self-regulation (Uggla et al., 2016).

Active and receptive MT interventions are based on building a therapeutic relationship between the patient, the music, and the MT. Compared to other types of approaches which also use music, literature indicates that MT is more effective (Bradt et al., 2013; Fallek et al., 2020; Mondanaro et al., 2020), especially in pediatric contexts (Giordano, Rutigliano, Muggeo, Fusaro, & Santoro, 2021; Stegemann, Geretsegger, Phan Quoc, Riedl, & Smetana, 2019; Uggla, Mårtensson Blom, Bonde, Gustafsson, & Wrangsjö, 2019). In T1 and T3, MT was integrated into patient care throughout the entire interactive preparation process. These processes refocus the patient's attention, distract from the procedure itself or from the waiting time beforehand (Loewy et al., 2013), help the child acquire a sense of security and calm for future proceedings, offer a strong sense of support, and deeply contrast the passivity of submitting oneself to surgical procedures (Ghetti, 2012). In T2, clinical staff, already under strain due to the complexity of the situation related to the pandemic (Giordano, Scarlata et al., 2020; The Lancet, 2020; Zaka, Shamloo, Fiorente, & Tafuri, 2020), used different strategies of support and non-pharmacological distraction (YouTube® videos and listening to music) immediately before IP. Several studies in literature indicate that these interventions have positive effects on anxiety and stress in the operating room (Lane, Palmer, & Chen, 2019; Tan et al., 2020). In the light of the results obtained in this study, this approach appears not to have been as effective as MT. The Covid-19 pandemic has indeed further highlighted how specialized academic and clinical training and careful selection of intervention techniques by a MT are essential in order to exploit the potential of MT in an optimal way in a medical setting such as IP.

Literature has reported that clinical staff also show positive attitudes to MT during IP, since children who received MT tend to be more peaceful and collaborative, allowing for an optimal situation for procedure performance (Giordano, Zanchi et al., 2020; Tan et al., 2020). Despite the fact that MT is not yet firmly established in various medical/hospital contexts, this study, conducted in a critical emergency situation, suggests that MT is an effective and important aid in reducing anxiety and stress in pediatric cancer patients, and highlights its value as a complementary/non-pharmacological support to sedation during IP. This study also highlighted the importance of tailoring the MT intervention to the needs of each pediatric patient undergoing IP.

Limitations

It was not possible to include a higher number of participants due to the complications and limits imposed by the emergency situation.

Although it was likely that the mothers' responses were reliable, bias cannot be excluded as it was not possible to collect data at the end of each period, and the COVID-19 pandemic could also be considered a confusing variable for preoperative anxiety, especially for mothers.

Regarding the increase in benzodiazepine administration in T2 compared to T1 and T3, our results may reflect the individual anxiety levels of our participants in the Covid 19 period and may not represent an absolute comparison. Higher dosage of midazolam in T2 may also depend on the general context and other factors.

A more thorough evaluation of the pharmacological interaction and dosage of medication in the pre-anesthesia phase is recommended for future studies.

Conclusion

The simple design of this study was able to demonstrate a clear contrast between pre-procedural anxiety when the music therapist was present, and when he was absent due to the Covid-19 outbreak. These effects were observed both in the patients and their mothers, with MT having a positive impact on the mother-child dyad. The combination of reduced anxiety and sedation in children who received MT compared to those who did not, suggests that MT can be an effective, complementary intervention for pediatric patients undergoing invasive procedures.

Author contributions

All authors have contributed to write the paper and agree upon it.

Declaration of Competing Interest

The authors have no conflicts of interest or funding to disclose.

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References

- Bradt, J., Dileo, C., & Shim, M. (2013). Music interventions for preoperative anxiety. *The Cochrane Database of Systematic Reviews*, 6, CD006908. <https://doi.org/10.1002/14651858.CD006908.pub2>
- Bunt, L., & Stige, B. (2014). *Music therapy: An art beyond words (Second edition)*. Routledge.
- Chlan, L. L., Heiderscheid, A., Skaar, D. J., & Neidecker, M. V. (2018). Economic evaluation of a patient-directed music intervention for ICU patients receiving mechanical ventilatory support. *Critical Care Medicine*, 46(9), 1430–1435. <https://doi.org/10.1097/CCM.0000000000003199>
- Clerici, C. A., Massimino, M., & Ferrari, A. (2020). On the clinical psychologist's role in the time of COVID-19, with particular reference to experience gained in pediatric oncology. *Psycho-Oncology*, 29(9), 1374–1376. <https://doi.org/10.1002/pon.5418>
- Cousins-Booth, J., & Rizkallah, M. (2020). COVID 19: Notes from the United Kingdom. *British Journal of Music Therapy*, 34(2), 77–79. <https://doi.org/10.1177/1359457520972568>
- Fallek, R., Corey, K., Qamar, A., Vernisie, S. N., Hoberman, A., Selwyn, P. A., et al. (2020). Soothing the heart with music: A feasibility study of a bedside music therapy intervention for critically ill patients in an urban hospital setting. *Palliative & Supportive Care*, 18(1), 47–54. <https://doi.org/10.1017/S1478951519000294>
- Geipel, J., Koenig, J., Hillecke, T. K., Resch, F., & Kaess, M. (2018). Music-based interventions to reduce internalizing symptoms in children and adolescents: A meta-analysis. *Journal of Affective Disorders*, 225, 647–656. <https://doi.org/10.1016/j.jad.2017.08.035>
- Ghadami Yazdi, A., Ayatollahi, V., Hashemi, A., Behdad, S., & Ghadami Yazdi, E. (2013). Effect of two different concentrations of propofol and ketamine combinations (Ketofol) in pediatric patients under lumbar puncture or bone marrow aspiration. *Iranian Journal of Pediatric Hematology and Oncology*, 3(1), 187–192.
- Ghetti, C. M. (2012). Music therapy as procedural support for invasive medical procedures: Toward the development of music therapy theory. *Nordic Journal of Music Therapy*, 21(1), 3–35. <https://doi.org/10.1080/08098131.2011.571278>
- Giordano, F., Rutigliano, C., Muggeo, P., Fusaro, T., & Santoro, N. (2021). Ettore's song: The hero who had the courage to fight Achilles. *Journal of Health Psychology*, 26(1), 5–11. <https://doi.org/10.1177/1359105320968144>
- Giordano, F., Scarlata, E., Baroni, M., Gentile, E., Puntillo, F., Brienza, N., et al. (2020). Receptive music therapy to reduce stress and improve wellbeing in Italian clinical staff involved in COVID-19 pandemic: A preliminary study. *The Arts in Psychotherapy*, 70, Article 101688. <https://doi.org/10.1016/j.aip.2020.101688>
- Giordano, F., Zanchi, B., De Leonardi, F., Rutigliano, C., Esposito, F., Brienza, N., et al. (2020). The influence of music therapy on preoperative anxiety in pediatric oncology patients undergoing invasive procedures. *The Arts in Psychotherapy*, 68, Article 101649. <https://doi.org/10.1016/j.aip.2020.101649>
- Kain, Z. N., Mayes, L. C., Cicchetti, D. V., Bagnall, A. L., Finley, J. D., & Hofstadter, M. B. (1997). The Yale Preoperative Anxiety Scale: How Does It Compare with a «Gold Standard»? *Anesthesia and Analgesia*, 85(4), 783–788. <https://doi.org/10.1097/0000539-199710000-00012>
- Knott, D., & Block, S. (2020). Virtual music therapy: Developing new approaches to service delivery. *Music Therapy Perspectives*. <https://doi.org/10.1093/mtp/miaa017>
- Lane, D., Palmer, J., & Chen, Y. (2019). A survey of surgeon, nurse, patient, and family perceptions of music and music therapy in surgical contexts. <https://doi.org/10.1093/MTP/MIY008>
- Loewy, J., Hallan, C., Friedman, E., & Martinez, C. (2005). Sleep/sedation in children undergoing EEG testing: A comparison of chloral hydrate and music therapy. *Journal of Perianesthesia Nursing: Official Journal of the American Society of PeriAnesthesia Nurses*, 20(5), 323–332. <https://doi.org/10.1016/j.jopan.2005.08.001>

- Loewy, J., Stewart, K., Dassler, A.-M., Telsey, A., & Homel, P. (2013). The effects of music therapy on vital signs, feeding, and sleep in premature infants. *Pediatrics*, *131*(5), 902–918. <https://doi.org/10.1542/peds.2012-1367>
- Mervosh, S., Lu, D., & Swales, V. (2020). *See which states and cities have told residents to stay at home*. The New York Times. <https://www.nytimes.com/interactive/2020/us/coronavirus-stay-at-home-order.html>.
- Millett, C. R., & Gooding, L. F. (2018). Comparing active and passive distraction-based music therapy interventions on preoperative anxiety in pediatric patients and their caregivers. *Journal of Music Therapy*, *54*(4), 460–478. <https://doi.org/10.1093/jmt/thx014>
- Mondanaro, J. F., Sara, G. A., Thachil, R., Pranjić, M., Rossetti, A., EunHye Sim, G., et al. (2020). The effects of clinical music therapy on resiliency in adults undergoing infusion: A randomized, controlled trial. *Journal of Pain and Symptom Management*. <https://doi.org/10.1016/j.jpainsymman.2020.10.032>
- Robb, S. L., Burns, D. S., & Carpenter, J. S. (2011). Reporting guidelines for music-based interventions. *Journal of Health Psychology*, *16*(2), 342–352. <https://doi.org/10.1177/1359105310374781>
- Salute, M. della. (s.d.). Covid-19, i casi in Italia alle ore 18 del 31 marzo. Recuperato 26 aprile 2021, da http://www.salute.gov.it/portale/news/p3_2_1_1_1.jsp?lingua=italiano&menu=notizie&p=dalministero&id=4370.
- Stegemann, T., Geretsegger, M., Phan Quoc, E., Riedl, H., & Smetana, M. (2019). Music therapy and other music-based interventions in pediatric health care: An overview. *Medicines (Basel, Switzerland)*, *6*(1). <https://doi.org/10.3390/medicines6010025>
- Tan, D. J. A., Polascik, B. A., Kee, H. M., Hui Lee, A. C., Sultana, R., Kwan, M., et al. (2020). The effect of perioperative music listening on patient satisfaction, anxiety, and depression: A quasixperimental study. *Anesthesiology Research and Practice*, *2020*, 3761398. <https://doi.org/10.1155/2020/3761398>
- The Lancet, null. (2020). COVID-19: Protecting health-care workers. *Lancet (London, England)*, *395*(10228), 922. [https://doi.org/10.1016/S0140-6736\(20\)30644-9](https://doi.org/10.1016/S0140-6736(20)30644-9)
- Uggla, L., Bonde, L. O., Svahn, B. M., Remberger, M., Wrangsjö, B., & Gustafsson, B. (2016). Music therapy can lower the heart rates of severely sick children. *Acta Paediatrica (Oslo, Norway: 1992)*, *105*(10), 1225–1230. <https://doi.org/10.1111/apa.13452>
- Uggla, L., Mårtensson Blom, K., Bonde, L. O., Gustafsson, B., & Wrangsjö, B. (2019). An explorative study of qualities in interactive processes with children and their parents in music therapy during and after pediatric hematopoietic stem cell transplantation. *Medicines (Basel, Switzerland)*, *6*(1). <https://doi.org/10.3390/medicines6010028>
- Wang, C., Horby, P. W., Hayden, F. G., & Gao, G. F. (2020). A novel coronavirus outbreak of global health concern. *Lancet (London, England)*, *395*(10223), 470–473. [https://doi.org/10.1016/S0140-6736\(20\)30185-9](https://doi.org/10.1016/S0140-6736(20)30185-9)
- Zaka, A., Shamloo, S. E., Fiorente, P., & Tafuri, A. (2020). COVID-19 pandemic as a watershed moment: A call for systematic psychological health care for frontline medical staff. *Journal of Health Psychology*, *25*(7), 883–887. <https://doi.org/10.1177/1359105320925148>