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Published in:
Journal of Geriatric Oncology

DOI:
[10.1016/j.jgo.2021.01.007](https://doi.org/10.1016/j.jgo.2021.01.007)

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Document Version
Publisher's PDF, also known as Version of record

Publication date:
2021

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

van der Wal-Huisman, H., Heineman, E., & van Leeuwen, B. L. (2021). Live bedside music in daily clinical practice of a surgical hospital ward among older patients: A controlled study design of an innovative practice. *Journal of Geriatric Oncology*, 12(6), 960-963. <https://doi.org/10.1016/j.jgo.2021.01.007>

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Live bedside music in daily clinical practice of a surgical hospital ward among older patients: A controlled study design of an innovative practice



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ARTICLE INFO

Article history:

Received 22 December 2020

Accepted 21 January 2021

Available online 31 January 2021

Keywords:

Older patients
Live bedside music
Hospital ward
Postsurgical care
Experienced pain

ABSTRACT

Objective: There is an increasing interest in the role of the arts, particularly music, in healthcare. Music seems an attractive non-pharmacological intervention for older patients to improve postoperative outcomes. Although live music elicits more meaningful responses from an audience than recorded music, the use of live music is still rare on hospital wards. In view of the positive effects of recorded music on older surgical patients, we designed, in collaboration with a conservatoire, an innovative practice named Meaningful Music in Health Care (MiMiC). The aim is to determine whether live bedside music implements into daily practice and allows improves patient outcomes.

Method: This manuscript provides an overview of a trial evaluating if live bedside music can improve postoperative outcomes in older patients. The MiMiC initiative is a non randomized controlled trial study among older surgical patients on three hospital wards. Live bedside music is performed by professional musicians, once a day for six or seven consecutive days. The primary outcome is experienced pain; secondary outcomes are anxiety, relaxation and physical parameters (heart rate, heart rate variability, blood pressure, respiratory rate and oxygenation). Measurements of these variables are collected before the intervention, 30 min afterwards and again after three hours. Daily evaluations determine whether this innovative practice can be implemented in daily practice.

Conclusion: This manuscript describes a new practice, live bedside music by professional musicians, on surgical hospital wards aiming to improve patient outcomes. It offers a new field of interprofessional collaboration for the benefit of patients. Further research must be conducted focussing on patient outcomes, including cost-effectiveness and the experiences of patients and healthcare professionals.

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1. Introduction

The incorporation of arts in healthcare has significantly increased in the past decade [1]. For several years, recorded music has been used to improve the outcome of hospitalised patients [2]. Several reviews and meta-analyses have indicated the positive effects of music played through headphones, music pillows, MP-3 or CD players or background sound systems on pain, anxiety and stress [2–4]. Considering that the population worldwide is ageing and surgery is an important part of treatment for various diseases including cancer, music may be a suitable non-pharmaceutical intervention, for the increasing population of older (cancer) patients. There is, however, quite a difference between recorded music and live music. People visit live concerts for a reason. Live music elicits more meaningful responses, partly as a consequence of the social connection of listening to music together, and feelings of

connection and engagement with the musicians by sharing a physical space [5,6].

Increasingly, musicians work in venues outside of concert halls in practices that meaningfully contribute to society [7,8]. However, live bedside music for hospitalised patients is still rare, and documentation regarding the intervention has not often been addressed in the literature [9]. In view of the positive effects of recorded music on surgical patients and the additional benefits of live music, the present study examines whether live bedside music improves patient outcomes, integrates into the daily practice on a surgical hospital ward and allows feasible patient monitoring [2–4]. Below, we describe the study design concerning Meaningful Music in Health Care (MiMiC), a new initiative in the Netherlands.

2. Methods

We initiated a non randomized controlled trial in September 2016 among adult surgical patients at the University Medical Center Groningen in collaboration with the professorship of the Prince Clause

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Conservatoire in Groningen, the Netherlands, with convenience sampling. As there was a lack of data concerning the possible effect of live music on pain in the older surgical patient, no sample size was calculated for this exploratory study. Based on the number of admitted older patients that meet the inclusion criteria, we assumed it feasible to include 8–12 older patients during each live bedside music session. This was also true for the control group. The study is registered in the Netherlands Trial Register (NTR number: NL6046).

2.1. Collaborating Conservatoire and Musicians

A partnership was established with the Prince Claus Conservatoire and their research group, Lifelong Learning in Music. This research group fosters the development of musicians by helping them to become learning, inquisitive and entrepreneurial musicians in society. The focus of the research group is the meaning of musical practice for both musicians and health care professionals and the development of the practice of live music for hospital patients. The conservatoire selected the musicians for this study: a violinist, a cellist, a clarinetist and a flautist (who also plays the bass flute and bass clarinet). All the performers involved in MiMiC are professional and multi-faceted musicians. They are accomplished chamber musicians who can play solo, improvise and arrange music and have adequate social awareness. As the musicians work in changing compositions, the choice of instruments is important because of practicality and range. One or two instruments have a bass range, and one or two have a higher range for a more melodic role or a middle voice [7,10].

2.2. Preparation Phase

In the preparation phase, we consider several aspects regarding the collaboration between the musicians and the nursing ward. The hospital ward is a new working environment for the musicians; therefore, they are educated on privacy regulations, infection prevention and (hand) hygiene. They are also informed of what to expect regarding sensory perceptions on a hospital ward so they are prepared for their performances. The possible emotional impact of encounters with patients is discussed.

In collaboration with the nursing management of each participating ward, an appropriate period during the day is chosen for the intervention with as little disruption as possible to the daily routine of essential patient care. It is discussed with the head nurse of each ward how musicians should act if a patient's situation acutely deteriorates. All nurses and other medical personnel on the ward are informed about the aim of this live bedside music project through presentations, emails and posters before its start.

2.3. Live Bedside Music Intervention

A live bedside music session, called a 'MiMiC session', takes place on a surgical ward once a day, for six or seven consecutive days, according to a predetermined schedule. Consecutive days are deliberately chosen so a bond can be built between the musicians and the patients. Each session starts on the ward with a briefing between the musicians, a mediator, the coordinating nurse of the ward and the researchers. During this session, the panel discusses which patients are present and able to participate that day. The response of the patients to the music on the previous day is evaluated. Furthermore, patient details that are relevant for the musicians and the mediator are discussed (for example, the emotional or cognitive status, in the case of delirium). After the briefing, the musicians play for the nurses during their coffee break, often referring to a live bedside musical moment the performers experienced the day before. In this way, the involvement of the nurses is stimulated. Each ward participates for two separate weeks.

After the joint session, one of the musicians walks the hallway and plays an improvisation to notify the patients that 'the music' is present.

Then the musicians visit the patients at their bedside. The mediator acts as an intermediary between the nurses, patients and musicians, managing the planning of the visits to the patients' rooms. The mediator enters the room before the musicians to ensure appropriate timing. The music consists of the repertoire of the musicians, genre-based improvisation, idiomatic improvisation and person-centred improvisation. For person-centred improvisation, the musician seeks input from the patient by asking them to describe a landscape, a feeling or a colour. By using improvisation, the musician can meaningfully communicate with the patient and involve the patient in the music creation process. For more information regarding person centred improvisation see attached video. Each session lasts approximately 10–15 min; one or two pieces are played, depending on the patient's wishes or condition. The musicians perform for approximately 75 min each day, and afterwards, there is a brief evaluation in which the experiences of the musicians and nurses and the reactions of patients are discussed.

2.4. Data Collection

Because we do not want to compromise on the quality of the musicians, the availability of the musicians is the guiding principle for planning the MiMiC sessions. In the week before a MiMiC session, all eligible patients on the participating wards are informed by posters, and a patient information letter is distributed to patients who meet the inclusion criteria. Before surgery, or as soon as possible after surgery in the case of emergency surgery, informed consent is obtained according to local regulations by the researchers and research assistant. Patients must be aged 60 years or older and able to provide informed consent. Patients are excluded if they are unable to communicate or have total (perception) deafness. There are no selection criteria regarding type, duration or location of surgery.

Patients are excluded if the patient deteriorates at the moment of participation to such an extent that live music cannot be performed or data collection is not realistic.

The same research assistants collect data on patient outcomes from the control group, in which no live music is played. The data from the control group are collected during six separate weeks for five consecutive days when the musicians are absent. The same inclusion and exclusion criteria and sampling method are used in the control group. Patients cannot participate in the intervention prior to participating in the control group.

2.4.1. Outcomes

The primary outcome measure is a change in the level of experienced pain. Pain is measured using a visual analogue scale (VAS). Patients rate pain on a 10-cm horizontal line, with one end representing no pain (0 cm) and the other representing severe pain (10 cm). The VAS, used in previous studies related to music, measures various subjective clinical phenomena, including pain and anxiety; the scale is reliable as well as easy and convenient to use [11–15]. In addition, the type and dosage of pain medication used are collected from the patient's file.

Secondary endpoints are anxiety, physical parameters, relaxation and satisfaction (see Table 1.). Levels of anxiety and relaxation are measured using a VAS [16]. Furthermore, the chosen structure of a MiMiC session is evaluated to determine the feasibility of registering patients' experiences and the daily evaluation with the nursing team.

To measure the physical effects of music during and after the intervention, blood pressure, oxygenation and respiratory rate are measured. In addition, heart rate variability (HRV) is measured during the intervention with the HeartMath emWave 2 (Boulder Creek, CA) using an ear clip. Heart rate variability is the change in time intervals between two consecutive heartbeats. The frequency of the heartbeat is under the influence of the sympathetic and parasympathetic nervous systems and is considered a measure of neuro-cardiac function that reflects heart-brain interactions and autonomic nervous system dynamics. [17–19]. Music may act as a medium to increase parasympathetic

Table 1
Study design.

Time point	STUDY PERIOD				
	Enrolment	Allocation	Post-allocation	Follow-up	
	-T	T-1. -30 min	T0 Intervention	T1 +30 min	T2 +3 h
ENROLLMENT:					
Eligibility screening	X				
Informed consent	X				
Baseline characteristics	X				
INTERVENTION:					
Live bedside music			X		
Standard care					
ASSESSMENTS:					
Pain:					
VAS		X		X	X
Pain medication		X			X
Anxiety: VAS		X			X
Physical parameters:					
Blood pressure		X		X	X
Heart rate		X		X	X
Heart rate variability		X	X	X	X
Respiratory rate		X		X	X
Oxygenation		X		X	X
Relaxation: VAS		X		X	X

outflow and therefore inhibit sympathetic activity, improving variability indicating a better physiological state [20,21]. Experiences of the patients are evaluated using open questions. In addition, the following baseline measurements are registered:

- Date of birth, sex and nationality
- Clinical data including admission date, date of surgery, description of surgery (classification based on location: head/neck, extremities, intracavitary), American Society of Anesthesiologist, physical status classification, comorbidities (Charlson comorbidity index [22]), use of beta-blockers and cigarette smoking
- Patient personal experience with playing a musical instrument or singing

Based on daily evaluations of music sessions with patients, this practice is developed to make it optimally suitable for daily practice. Moreover, a group of 'critical friends' advise us throughout the research project. This group of critical friends consists of professionals from several fields of expertise as well as members of the layman audience.

2.5. Data Management

Data will be entered by the researcher and research assistant in a secured database. Monitoring will be done by a fellow researcher. To promote data quality, data will be checked on double entry, range checks for data values and source data verification will take place in 10% of the study subjects. According to the guidelines for on-site monitoring, this study is classified as a study with negligible/no risks, therefore requiring minimal monitoring.

2.6. Planned Analyses

Statistical analyses will be performed using IBM SPSS Statistics version 23 (IBM Corporation, Armonk, NY).

Outliers will be detected visually with parametric and non-parametric tests. Endpoints will be assessed on distribution using Q-Q plots and the Shapiro-Wilk test ($p > 0.05$). Data will be presented as the mean and standard deviation if normally distributed or as the

median and range. Numbers and percentages will be used for categorical data. Analyses will be performed in both groups as well as between the live bedside music group and the control group. The chi-squared test will be used for categorical data. To determine an effect between the pre-test and post-test or follow-up test, a paired *t*-test will be used; the Wilcoxon signed-rank test will be used if the data is not normally distributed. To determine a difference between the control group and the live bedside music group, we will use an independent *t*-test or ANOVA if the data are normally distributed and the Mann-Whitney *U* test if not. Data on HRV, measured using the HeartMath emWave 2, will be analysed in both time and frequency domains using Kubios HRV Premium software [23]. Automatic correction to the measurements will be applied to remove artefacts, such as extra systoles.

2.7. Ethical Considerations

The medical ethical board concluded that this study did not fall within the scope of the Dutch Medical Research Involving Human Subjects Act and provided dispensation for further assessment. The study is registered in the Netherlands National Trial Register (trial ID: NTR 5874). Common ethical principles in clinical research are followed. Data collection is conducted following the Declaration of Helsinki.

3. Discussion

Based on the evidence of the positive effects of recorded music on postoperative outcomes, such as pain and anxiety, we have designed a study on live bedside music by trained professional musicians on surgical hospital wards. To our knowledge, this is one of the first European studies examining the effect of live bedside music on surgical patients in collaboration with a conservatoire.

3.1. First Experiences

The initial reaction of the healthcare professionals, especially the nurses, to musicians on the ward was to maintain a professional distance focussed on patient wellbeing. There was a concern that the live bedside music intervention could disrupt the daily routine, and some nurses were apprehensive about participation in a music session. This changed positively as more nurses experienced the live music sessions and saw the reactions of patients.

At first, I thought that this music would be disrupting for the patients and also our routine. But I saw what it did to my patient, he started to talk more about himself, and I saw a smile on his face that I had not seen for such a long time. We shared something. And it offered a pleasant break during the day, and the whole atmosphere on the ward changed. - Nurse.

Though they did not know what to expect, almost all the patients responded positively and were surprised that live bedside music was offered. Some patients were reluctant to have the musicians in the room because the attention of the musicians playing specifically for them alone was overwhelming. In that case, the musicians played in the hallway, and often the next day, the musicians were welcome in the patient's room. Because the live bedside music was offered for several consecutive days, relationships were often built between the team of musicians, the patient and nurse.

The first day I was still very ill and tired, just listening to the music from the hallway was enough. It was emotional for me. The next day, they came into my room, and I started to know them. It offered me distraction during this tough period. It was not about me being sick and being a patient, but about me as a person. I enjoyed it. - Patient.

The support of the head nurses was crucial during the process of implementation. By involving the nurses on each ward in the live bedside

music sessions, they became more willing to adjust their procedures, make time available and motivate the patient to participate.

3.2. Barriers and Facilitating Factors

There have been several barriers and facilitating factors regarding the MiMiC initiative. The bedside music does not interfere with the medical treatment and, to the best of our knowledge, has no side effects. An important facilitating factor is the professionalism of the musicians that enables them to respond to the patients' needs concerning the type of music, volume and interaction level. A disadvantage of this flexibility is the lack of standardisation of the intervention because of the varying duration and composition of the intervention. Due to the limited availability of the musicians, it takes time to attain a suitable sample size.

Positive experiences and subjective effects on patients are encouraging and lead participants in this practice to believe that musicians could have a permanent role in hospital settings. However, more research must be conducted to gain insight into the effects on patients and the interprofessional collaboration between healthcare professionals and musicians. This is necessary for the further development of this new practice. One of the aspects that also must be explored, and is relevant for further implementation is, the cost-effectiveness of this intervention. Findings from this study will inform a future study with a larger sample, potentially creating the opportunity for clustering and offering the possibility for in-depth interviews with patients and healthcare professionals about their experiences and further optimisation of the intervention.

4. Trial Status

The recruitment of the patients will start on September 17th, 2016. Recruitment is expected to be completed by October 01th, 2021. The data analysis and- writing of the scientific manuscripts will be carried out after completion of recruitment.

5. Conclusion

Collaboration between professionals from the field of arts and healthcare in everyday practice is possible. Live bedside music in daily clinical practice by professional musicians is realistic and offers a new field of interprofessional collaboration for the benefit of older patients after surgery. Further research must be conducted that focuses on patient outcomes, cost-effectiveness and the experiences of patients and healthcare professionals.

Contributor ship statement

All authors contributed substantial, approved the final version and are accountable for all aspects.

Funding

The authors received no funding from an external source.

Declaration of Competing Interest

The authors declare no conflict of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jgo.2021.01.007>.

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