

Applications

Extended information about research and application of the music

Herlev Hospital
 Department of Clinical Physiology and Nuclear Medicine,
 Herlev Hospital, University of Copenhagen, Denmark
 Paterova T., Gerhardt M.,
 Sondergaard S. and Zerahn B.

THE EFFECT OF MUSIC ON HEART RATE AND MOTION ARTEFACTS DURING GAMMA CAMERA ACQUISITION FOR MYOCARDIAL PERFUSION SCINTIGRAPHY

AIM
 To evaluate the effect of music composed with the purpose of being calming on heart rate, motion artefacts, and patient well-being during image acquisition in myocardial perfusion imaging.

BACKGROUND AND METHODS
 Music has been used in combination with treatment through thousands of years especially in Arabian countries, India, Greece and China. Music is used for reducing patient anxiety during surgical procedures and neuropsychological treatments. Our test hypothesis was that music can relax patients during gamma camera acquisition of myocardial perfusion scintigrams and thus improve imaging and patient well-being simultaneously.

124 patients referred for myocardial perfusion imaging on the suspicion of ischemic heart disease were included in a randomised cross over study. Only studies with successful gating at both rest and stress image acquisition were included. 50 patients listened to music during acquisition of rest image and 51 patients did vice versa. The study comprised 50 women and 51 men. Patients with reduced hearing, arrhythmia and/or moderate dementia or dyslexia were not included.

After the perfusion scintigraphy was performed the patients were asked to fill out a questionnaire on their opinion of the effect of the music.

RESULTS
 Among patients who did not listen to music there was a significant decline in heart rate during stress image acquisition (Table 1). This decline in heart rate was significant for women alone: -2.2 (-2.9) bpm, (p<0.01) but not for men: -2.4 (-4.7) bpm, (p=0.3). Regardless of music being played or not there was no significant effect on heart rate during rest acquisition and there was no difference in the frequency or severity of motion artefacts. 92% of the patients preferred to listen to music during image acquisition (Figure 1) and 51% would prefer free choice of music (Figure 2). 79% of the patients declared that the music had a calming effect, 18% no effect, and 3% found it to be disturbing (Figure 3).

CONCLUSION
 Listening to music during image acquisition for myocardial perfusion scintigraphy after stress rest prevents a decline in heart rate particularly among women and has no adverse effects on the frequency and severity of motion artefacts. A more stable heart frequency during acquisition may in theory improve the quality of quantitative analyses. Overall, music can be recommended during image acquisition since a vast majority of patients preferred to listen to music and no increase in motion artefacts could be shown.

Table 1

	Music at stress	Free	Music at rest
Heart rate (bpm)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)
Change in heart rate (rest to stress)	42.6 (4.2)	45.9	42.6 (4.2)
	(p<0.001)	0.008	0.2 (0.2)

Figure 1: Patients to listen to music during acquisition

Response	Number of Patients
No	8
Yes	91.7

Figure 2: Patients free choice of music

Response	Number of Patients
No	48.5
Yes	51.5

Figure 3: Effect of music evaluated by the patients

Response	Number of Patients
Calming	79
No effect	18
Disturbing	3

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Introduction

Research and scientific studies in the field of "music as medicine" is today internationally widespread and extensive, with numerous studies within both music therapy and music medicine. Articles on the subject is today published in a variety of medical journals, and among these internationally published articles, written by scientists from several countries, are also studies using the specially composed music "MusiCure" by composer Niels Eje - here is a list of articles describing research using MusiCure:

Internationally Published Articles-Overview

The MusiCure program stems from the interdisciplinary project "Musica Humana" (1998-2006) and has ever since been used in research and daily practice for many different patient groups and at hospital departments worldwide. The following contains additional information on research the original Musica Humana project.

1. The Musica Humana project

The basic idea of the original concept with the development of specially composed music for hospital patients was founded by head of ICU at Copenhagen University Hospital, Professor MD Lars Heslet and musicians Niels Eje and Inge Mulvad Eje in the 1990s, and in 1998 the Egmont Foundation donated financial support for the launch of the project "Music Program for intensive care and recovery patients" (later renamed "Musica Humana"). It was first and foremost the idea of an interdisciplinary collaboration between art and medical research, which formed the basis for the Musica Humana group's activities, and also what distinguishes this project from other research projects worldwide.

The Egmont Foundation's funding (1998-2003) was primary donated as economic support for the studio costs to produce a specially composed original music program. A program with the specific aim to improve the sound environment in intensive care and recovery wards at a number of hospitals in Denmark. This specially designed music program had to be created from scratch by the composer Niels Eje, and to be performed and recorded by highly professional instrumental artists. Further according to the project proposal, simultaneously implemented and documented with scientific methods by a research team (doctors, nurses, music therapists, etc.) engaged in the project. During this period, several patient groups and staff from Danish hospitals was attached to the project, and in 2000 the project was officially named "Musica Humana". In the following years until 2006 the project group regularly held meetings under the leadership of Chief Physician Per Thorgaard, Aalborg hospital.

In 2003, a comprehensive report was prepared for the Egmont Foundation - a report which showed positive results in the treatment of hospital patients with this specially developed music. The music was also at this time (five years after the project start) made available through the composer's own label and is now sold exclusively in pharmacies as a CD series: "MusiCure - music as medicine".

Since the launch of the project the Musica Humana representatives has performed a comprehensive extrovert work with the publication and dissemination of research results through articles in professional journals and newspapers, TV and radio performances, as well as made presentations at conferences, congresses and symposia worldwide.

Listen to a Radio documentary about Musica Humana from Radio Netherlands International, by producer Anne Blair Gould

[Radio-dokumentar om Musica Humana fra Radio Netherlands International](#)

[Wikipedia about Musica Humana](#)

2. Music in Healthcare - "music as medicine"

The general interest in the use of music in treatment situations is increasing worldwide and a large number of researchers within several disciplines, has conducted many studies and research projects in this field.

Historically, it is well known that sound and music always has played a role in the connection with treatment and healing, as well as for human motivation to resist disease. There is much evidence that even in primitive cultures, music has played a central role, including the medicine man's work, but also in ancient Greece and the Middle Ages is music inseparable with cure and treatment. In our time, this knowledge is now being 'rediscovered' in earnest, thanks to extensive research in this field.

Several thousand articles are today published in medical journals describing research with music, and the vast majority of these articles details the extensive evidence which now exists for music's positive effects in a variety of treatment situations, including music therapy and the use of 'music as medicine' (music-medicine) in hospitals. In the vast majority of the implemented and described research projects existing music (classical and otherwise) was used, either selected and predetermined by researchers, project managers, hospital staff, or selected according to the patient's own choice.

The specially composed music 'MusiCure', arising from the original Musica Humana project, is created on the basis of deep interest for how music affects people, and from the idea that music should be able to work as a 'neutral' and 'universal' tool for relaxation, inspiration and motivation in relation to existing musical genres and styles. MusiCure seeks thus to address everyone, regardless of the patient (listener's) normal music listening habits and preferences in music, with the overall intention that the music should be neutrally and universally calming, as well as mentally motivating at the same time.

MusiCure as a remedy for treatment of delirium

- tested and experienced through the specially developed MusiCure Pillow

The MusiCure Pillow is a specially designed comfortable 'memory foam' pillow with built-in speaker enclosures that reproduce high quality sound. The pillow is designed for optimal personal and intense listening to the evidence-based MusiCure music - but also, as a "healthy" alternative to ear plugs and headphones.

In 2019-2020, several Danish hospitals, independently of each other, achieved the same positive results with treatment of delirium using the MusiCure Pillow: Hvidovre Hospital, North Zealand Hospital, Hillerød and subsequently projects have been initiated at Herlev Hospital and Rigshospitalet (CPH University Hospital).

The majority of patients get out of their delirium very quickly, do not need medication, and manage without the supervision of the nurses, which freed up resources for other activities in the hospital.

The intervention performed at North Zealand Hospital started in practice when a hospitalized patient went into delirium. The pillows were tested on 13 patients over a period of four months. The results from the registration forms showed that patients were came out of their delirium more quickly when receiving music intervention.

- 7% of patients had no effect on music intervention.
- 23% of patients had some effect on the music but remained delirious.
- 69% of patients left delirium after 2-13 hours of music. 33% of these patients received Serenase medication in connection with their delirium.

3. Music Therapy & Music-Medicine

In the professional health care environment distinction is often made between the terms 'music therapy' and 'music-medicine', although in many cases we may be talking about the same musical pieces on the concrete level and naturally a common overall goal. The difference is that music therapists in treatment and therapy sessions

has a very active role in the different types of music therapy that exists, as opposed to the concept of music-medicine, where the music alone works as a soothing and therapeutic tool.

Music and Psychotherapist Ilse Kjaer describe the distinction between music therapy and music-medicine as follows:

"Is it meaningful to define a difference between music therapy and music-medicine? And what is music therapy and what is music-medicine? Basically music-medicine can be seen as one of many directions within music therapy.

Music therapy requires discipline and focuses on the relationship - therapist/client. A music therapeutic procedure can be seen as a way of communicating, or a kind of psychotherapy with/through music. The music becomes a tool to express the client's feelings and to mirror the emotional chaos more than aiming for a symptomatic relief, so that the client is actually experiencing a psychotherapeutic process.

What is the music doing in a music therapeutic procedure? The music stimulates inner imagery, arouses emotions and triggering memories and associations. The method of Guided Imagery and Music (GIM) uses music to create emotional redemption and relaxation. The method is process oriented and requires interaction with a therapist. The music used is classical music.

Music-Medicine explores music's ability to influence physiological and psychological. Many can use the music as "self-therapy" to promote the biological effects, eg. detente. An anxious person may use 'music as medicine' to exploit music's anti-anxiety effect, as opposed to a music therapeutic intervention, which will rather seek to work in psychotherapeutic way with the problem.

In a music-medicine treatment process the music/sounds affects physiological key areas such as blood pressure, heart rate, respiratory rate, brain wave patterns measured by EEG, body temperature and galvanic skin response. The music can stimulate the immune system as measured by increased serum levels of immunological markers and endorphins."

Source: Sct. Maria Hospice Center web site – Article by Ilse Kjaer: Musikterapi - Musikmedicin

Ilse Kjaer, graduated from Aalborg University, GIM-trained therapist. Many years of clinical experience. Affiliated with Aalborg University as a lecturer. Registered member of Psychotherapist Association MPPF.

'Music-medicine' in everyday life:

Looking beyond the professional healthcare environment and scientific research into music's physical and psychological effects, it should also be mentioned that many people use music as a means of relaxation, stress relief and renewed inspiration in everyday life. It is very differentiated and deeply personal which music each individual finds suitable for relaxation in everyday life, and the main objective is of course that the music has the desired effect - regardless of genre or type. But because of recommendations from professional therapists in healthcare and comprehensive documentation of the specially designed music MusiCure's positive effect, many have chosen to try out this music, which is deliberately created for this purpose. This has resulted in a large number of spontaneous feedback and testimonials on the music's effect in various contexts and situations - a documentation material which has been very valuable in the work to further develop the music. Here are some examples, which we have obtained permission to publish:

"I recently bought "The Journey" MusiCure 1 CD to take with me on my daily commuting by train to and from work: Odense - Copenhagen. The daily travel can often be stressing due to the amount of people and often seating is a problem. I have a busy schedule both at work and at home, and I have found that listening to the CD makes my journey much more pleasant. I can just close my eyes and let the music paint pictures of tranquillity and inspiration in my mind, and I often fall asleep because I get so relaxed. The CD runs for about the same time as my journey, and I wake up feeling refreshed and ready to tackle the next project. I will most definitely buy the other CD's also, but I'm far from tired of this one. I highly recommend the CD."

"I have just been through an extended period of extreme physical and emotional stress, resulting in heart palpitations, high pulse rate, anxiety, muscle tension and insomnia. In my efforts to escape from this stress I have really benefited from MusiCure. By lying down, closing my eyes, and listening to the music and relaxing, I



experienced a significant positive effect on my pulse rate and the tension in my body after 10-15 minutes. I was quite astonished and pleasantly surprised by this clear effect. I have now chosen to combine the music with breathing exercises and integrate this “séance” into my daily routine. This is really helping me.”

4. Intensive Care and music intervention

Implementation and initial testing of the specially designed music sound environment 'MusiCure' started at the Copenhagen University Hospital (Rigshospitalet) ICU 4131, where they had installed an excellent music system with custom ceiling speakers, and in a pilot project the new specially designed music program was tested and compared with other (mainly classical) music. Over a period of approx. 10 months we managed to obtain much valuable experience and feedback directly from patients, staff and relatives. The tests clearly demonstrated the value of the specially composed music, and during the test period valuable direct feedback was collected, information which the composer and producer of the music could use for further development of the musical material.

Comment from Clinical supervisor, head of ICU 4131 at Copenhagen University Hospital, Professor Lars Heslet:

“Many improvements are being made in hospitals today, but such an important factor as the everyday sound environment (and the environment in general) has been far too neglected up until now in the hospital setting – where there is a strong need to give patients an optimistic and positive motivation to get well again. Among seriously ill patients, one can often sense that they are trying to draw themselves out of their bodies, and their friends and family often say that they seem to be losing the will to live, even though the patients themselves are unable to talk about it, as they are often unable to speak.

As a supplement to the medical treatment we can offer as doctors, it is thus important that we can also promote positive feelings in our patients – good experiences which give them a sense of being alive and keep them in their bodies, and which will give body and soul the strength to recover. We have long accepted and recognized the vital connection between mind and body in modern medical science, especially with a focus on patients’ feelings – and music is central here, because it maintains the physical element.

A positive and optimistic audio environment is therefore one of the vital factors which can be changed. By creating a positive image/dream-like experience for patients, using a specially designed music and sound environment, the surroundings in a hospital ward suddenly feel completely different and much less anxiety-inducing for patients.”

Read the complete article by Professor Lars Heslet: [Medicine and music](#)

5. Recovery

A number of studies with specially designed music's effects on patients waking up after anesthesia has since 1999 been implemented in several hospitals in Denmark, Sweden and Norway. In summary, the results from all of these studies show a very high percentage of this group having great benefit of this additional treatment with music. It has in particular helped patients through the process with less stress, anxiety and general discomfort in relation to their recovery. In addition to patients' physical and mental/emotional reactions associated with music therapy are also included evaluation of all practical aspects such as sound source(s), duration of music listening, volume and other circumstances relating to the environment which exists in the recovery wards.

Recovery to music and nature

Most recently, in 2019, at Odense University Hospital (OUH), MusiCure music and films with nature was tested on patients waking up after surgery, with very positive results. Under the headline:

" Fall asleep on the operating table – wake up in the forest"

Fald i søvn på operationsbordet - vågn op i skoven (Tv feature in Danish)

With this project the hospital has tried to make awakening after surgery more relaxing with nature and music, shown on big screens at the end of the hospital bed.

The project is based on experiences in psychiatry and nursing homes, where images and music have been used to calm citizens.

The patient's view after the operation.

- We try to give patients a quieter experience of waking up in a hospital where there usually are many strange sounds and machines, says Britt Darley, who is a ward nurse at the outpatient department at Odense University Hospital.

It is still too early to say what effect music and films have. However, according to Odense University Hospital, the preliminary results have been promising. So far, 224 patients have woken up to nature films and MusiCure music, of which 217 respond that it was "comfortable and relaxing".

- Many of the patients tell us that it is a good experience. They get something else to think about, says nurse Britt Darley.

Other articles re. recovery:

Patients' perception of music versus ordinary sound in a post anesthesia care unit: a randomized crossover trial.

Authors: Ann-Charlotte Fredriksson, Leif Hellström, Ulrica Nilsson, Malmö University Hospital, Sweden

Published in Intensive and Critical Care Nursing 2009

Designed sound and music environment in post anaesthesia care units—a multicentre study of patients and staff.

Authors: Thorgaard P, Ertmann E, Hansen V, Noerregaard A, Hansen V, Spanggaard L., Published in Intensive and Critical Care Nursing 2004.

6. Cardiac Patients - Research in postoperative music intervention

At Örebro University Hospital researchers has conducted several research projects with heart patients treated postoperatively with music. During the rest period after serious surgical procedures as heart valve and bypass operations, project manager Ulrica Nilsson (Professor, Med.Dr., PhD and anesthesia specialist at University Hospital in Örebro) designed studies in which patients in a number of randomized controlled trials were divided into 'music.groups' and 'non-music groups', and through measurements from blood samples and questions about emotional reactions (stress, anxiety, etc.) were examined for both physical and psychological effects of music. Many interesting results were obtained and articles have now been published in international journals, including 'Journal of Clinical Nursing' and 'Heart & Lung: The Journal of Acute and Critical Care'. Attention is directed particularly against the results Ulrica Nilsson can demonstrate around the body's production of hormones, 'Cortisol' and 'Oxytocin' in connection with the two groups' experience of rest time after operations. Cortisol is normally referred to as the body's 'stress hormone' and through the heart patient studies it could be demonstrated that cortisol levels decreased significantly in the group who listened to music.

Published articles:

The effect of music intervention in stress response to cardiac surgery in a randomized clinical trial. Author: Ulrica Nilsson, Professor, RNA and PhD at the Centre for Health Care Sciences at Örebro University Sweden. Published in 'Heart & Lung – The journal of Acute and Critical Care' Oct. 2008

Soothing music can increase oxytocin levels during bed rest after open-heart surgery: a randomized control trial
Author: Ulrica Nilsson, Professor, RNA and PhD at the Centre for Health Care Sciences at Örebro University Sweden. Published in Journal of Clinical Nursing August 2009. See also oxytocin poster, by Ulrica Nilsson

Heart examinations and anxiety

At Northwest Hospital and Medical Centre in Seattle, WA, USA a prospective, randomized, study was completed in 2004. The main objective was to measure the beneficial effects of music intervention on subject anxiety and well-being during cardiac catheterization laboratory procedures; as well as to compare outcome differences with regard to the method of music administration. The subjects were divided into three groups: Group 1, control (no music); Group 2, music environment with a remote sound source from suspended loudspeakers; Group 3, patient focused music environment from a focused sound system (audio pillow).

One hundred and two subjects were consented. Subjects were stratified into groups to obtain equal representation for gender after randomization to groups. The study ended when equal numbers of both genders had been obtained for all groups. The music used in the study was specially designed music (MusiCure) composed by Niels Eje. This study showed that the use of a specially designed sound environment reduced the perceived anxiety level during the procedure by almost half, independent on the delivery method of the sound. See article:

Music interventions in patients during coronary angiographic procedures: A randomized controlled study of the effect on patients' anxiety and well-being. Birgit P. Weeks, Northwest Hospital & Medical Center, Seattle, Washington, USA, and Ulrica Nilsson, Department of Anaesthesia and Intensive Care and Centre for Health Care Sciences, Örebro University, Sweden. Published in European Journal of Cardiovascular Nursing (2010)

Other articles:

Designed sound environment for heart patients before and after invasive procedures Author and study leader: Bitten Gøtzsche, Ward Nurse, Cardiac Laboratory, Department of Cardiology, Aalborg University Hospital, Denmark. Published by Musica Humana, 2010

Specially selected music in the cardiac laboratory—an important tool for improvement of the wellbeing of patients.

Authors: Gøtzsche B, Henriksen BB, Pedersbaek G, Thomsen I. Published in European journal of Cardiovascular Nursing 2003

7. Clinical Physiology - Music at Department of Clinical Physiology and Nuclear Medicine

The department of clinical physiology and nuclear medicine at Herlev University Hospital perform a great number of examinations in nuclear medicine including dedicated PET-CT, but also physiological investigations such as pulmonary function tests, exercise-ECG, and measurement of blood pressure in legs, toes and fingers. Besides, they have a great number of osteoporosis evaluations with DXA scanning.

Music is used here on a regular basis to make the patients relax and feel less stressed – both in the department's daily routines and in research in the effect of the music intervention.

Poster:

The effect of music on heart rate and motion artefacts during gamma camera acquisition for myocardial perfusion scintigraphy. By: Pulawska T., Gerhardt M., Sondergaard, S. and Zerahn, B. Poster from Herlev University Hospital, Denmark

8. Psychiatric patients

Within modern psychiatry and in treatment of many different mental disorders have supplementary treatment with music therapy and music medicine have won strong emphasis in recent years. Extensive research and a series of groundbreaking books in the field has paved the way for the music now being taken seriously as a positive medicine reducing and motivational remedy, without side effects, in the treatment of psychiatric patients. Most recently, writers such as Oliver Sacks ("Musicophilia") and Daniel Levitin ("This is Your Brain On Music") contributed to the debate with creative books that have put renewed focus on music's effect on our psyche and how our brains perceive and process music.

Within research in Denmark has music therapist Torben Egelund Sørensen (Project Manager) and Dr. Jørgen Tybjerg (supervisor) in 2004 implemented a pilot project with anxious psychiatric patients at Horsens Hospital. The project's success has been very influential in the recognition and use of music within psychiatry in Denmark and other Nordic countries, and today music therapy and music-medicine is a standardized offer for the patients at many hospitals and institutions dealing with psychiatric patients.

"Treatment with MusiCure is a completely different procedure than traditional music therapy," explains Torben Egelund Sørensen, music therapist in psychiatry department at Horsens hospital, and project manager for the pilot project with MusiCure.

"When using MusiCure alone are we not talking about using music instead of music therapy as psychotherapy. With MusiCure, it's the music alone that stimulates the brain, sending signals of peace and no danger to the body" he explains. "When the brain hears sounds it knows, it relaxes and sends calming hormones into the body, signalling peace and tranquillity. Pulse and blood pressure decreases. The brain emits including the hormone melatonin, which is the substance that indicates sleep. Therefore, patients also find it easier to relax and fall asleep," says Torben Egelund.

Article:

[Treatment with MusiCure of psychiatric patients suffering from anxiety – a pilot study](#)

Author and project coordinator: Torben Egelund Soerensen, Supervisor: Joergen Tybjerg, MD. Psychiatric Department, Horsens Hospital, Denmark. Published by Musica Humana, 2004 and 'Musikterapi i Psykiatrien – Årsskrift 4-2005.

9. Children and music

The Queen Silvia Children's Hospital in Gothenburg, Sweden, has for several years worked with the use of music to hospitalized children. Initial studies with music showed results which were so good that we are now expanding the study to include 80 children. Among other music were MusiCure used frequently and for this purpose was also purchased audio pillows, and the newly developed Maysound Music Player. Project leader Stefan Nilsson, pain specialist nurse, started to introduce testing of the music in the surgical department and several of the children from the project reported that it was wonderful to wake up on the pillow, and then predominantly positive feedback motivated pilot project for the further development of study.

The results from the project at the Queen Silvia Children's Hospital have in December 2009 been published in the scientific journal "Pediatric Anesthesia" and the article describes very positive results with the use of music postoperatively related to pain, restlessness and anxiety in children aged 7-16 years, including a much reduced use of pain medication (morphine) in the music-group.

Article:

[School-aged children's experiences of postoperative music medicine on pain, distress, and anxiety.](#) Authors: Stefan Nilsson RN, MSC, co-authors: Eva Kokinsky MD, PhD, Ulrica Nilsson Professor, RNA, PhD, and Karin Enskär RN, PhD, Department of Paediatric Anaesthesia and Intensive Care Unit, The Queen Silvia Children's Hospital, Göteborg, Sweden. Published in Paediatric Anaesthesia 2010

Children's experience of different non-pharmacological stimulation after day surgery

- study conducted in 2013-2015 at Odense University Hospital (OUH) and published internationally in 2019. Describing children's pain levels and reactions to cartoon films, storytelling, MusiCure music and films

In 2013-2015, a study was conducted with 241 children in day surgery at Anesthesiologic-Intensive Department V, COPA, Odense University Hospital: "Can auditory and visual intervention reduce pain and distress among minor children in the postoperative care unit?" The study was presented at the International Conference of Nurses ICPAN, which took place in Copenhagen in September 2015.

The large study with the 241 children, aged 3 to 7 years, who in connection with awakening after anesthesia, experienced various forms of non-pharmacological stimulation/distraction in the form of cartoons, films with nature, specially composed music and reading stories aloud, has now been published.

An 8-page article on the project and the results obtained is now published in the American journal 'Journal of PeriAnesthesia Nursing' and it has attracted interest because of the specific non-pharmacological content used in the study.

The purpose of the study was to investigate whether this type of distraction/stimulation (in addition to conventional pain management) could reduce children's experience of post-operative pain, as well as whether the children's parents had an impact on pain experience.

Method and results

The study established 6 groups, a control group, and 5 different intervention groups with different types of non-pharmacologically stimulating content, which were activated already upon arrival at the post-anesthesia care unit (PACU).

The specific content of the 5 intervention groups consisted of the following (the control group was Group 1):

Group 2: A standard stress reducing program with the evidence-based and specially composed music MusiCure by Niels Eje

Group 3: Reading stories from children's book 'My dog Master and other animals', written and read by Thomas Winding

Group 4: A special 'children's program' with selected MusiCure titles, designed with special focus experiences for children (e.g. with nature sounds, rhythmic melodies from 60 to 120 bpm)

Group 5: Cartoons with the characters from 'Rasmus Klump and his friends', (Danish cartoon series)

Group 6: Films with nature, recorded and edited by Inge Mulvad Eje, specially for selected titles from the MusiCure repertoire

Each group consisted of approx. 40 children, and all children at the same time received the same standard treatment and pain management, which is common practice in the ward. Pain level and condition measurements were made after 15, 30 and 45 minutes in the study, with conclusive analysis after the last measurement.

In summary, the results of the study showed positive effect (less pain) in all the intervention groups, compared with the control group, with the exception of group 5 (cartoons) where the pain experienced was not significantly lower. Most significant were the positive results, assessed by parents and children, in group 4 (MusiCure program for children) and group 6 (film with nature for the MusiCure music).

Poster: "Can auditory and visual intervention reduce pain and distress among minor children in the postoperative care unit?"

Music and children with autism

A research project concerning a special group of children with 'autism spectrum disorder' was conducted in Aalborg, Denmark in 2006. Head of the project was teacher and consultant Susan Gulstad, and the purpose of the study was to investigate whether listening to MusiCure had any bearing on the group's ability to calm down and fall faster asleep.

Article:

[Music intervention among children with autism spectrum disorder and sleeping difficulties](#) By Susan Gulstad, Education Consultant, and Dr. Per Thorgaard, Aalborg University Hospital. Published by Musica Humana 2006, and Autismebladet, 2007.

Additional areas where music is used for children (and parents) are birth situations, music intervention for premature infants, children with ADHD, kindergartens and schools, and recreational institutions.

Example of feedback from parents with ADHD children:

" My 5½-year-old son has ADHD/DAMP and has had difficulty sleeping because he is so restless, some days being worse than others. I heard about the music and went to the pharmacy. I turned it on for the first time when we got home from work/pre-school, and what happened? We both fell asleep. It is incredibly soothing and relaxing, and as my son says: 'Mummy, it's sleeps music!' Since then I have played it in his room when he has had difficulty sleeping or is having a bad day.

10. Music in elderly care

In the Nordic countries, the use of music and particularly music therapy have been both recognized and widespread, not least thanks to a pioneering effort by a number of visionary and focused therapists and music therapists, and others who have worked with music as a tool for the elderly.

The use of music and music therapy against older, inter alia, nursing homes and institutions for people with dementia and Alzheimer's patients, as well as at the hospice is a great success and an area which is constantly evolving with new positive actions.

In Norway, chief physician and neurological music therapist Audun Myskja have made a groundbreaking pioneer work on the use of music in the eldercare. In cooperation with composer Anders Rogg, music therapist Kirsten Wiingaard Greens and other specialists, he has implemented projects such as "Music in the last phase of life", numerous articles and books, as well as extensive research in the field, and have managed to make the implementation of music to an everyday event within eldercare, and increase quality of life for older people with Parkinson's, Alzheimer's, dementia, and other disorders. Audun Myskja's work include authoring the book "The musical medicine" which is a major work in the field of music therapy, music-medicine and all aspects of how music is used in healthcare in general. Audun Myskja:

"Music Therapy has shown efficacy in depression, schizophrenia and dementia in the sense that the patients is showing improvement in the ability and willingness of communication and socializing. It is believed that this may have a correlation with the activation of specific areas of the brain. An investigation has shown that the sing-along with familiar songs has given improvement in short-term memory, social ability and motivation in patients with dementia.

Music as a sedative: EEG registrations have shown that music can lower the brain wave frequency, which again can lead to reduction of anxiety, tension and insomnia. It is also believed that music can affect activity in parts of the brain such that consciousness and attention changes, which may have consequences for the treatment of unrest in dementia patients".

More information about Audun Myskja and '[Senter for Livshjelp](#)' (LifeAid Centre for integrated medicine):

MusiCure in elderly care

Shortly after the release of the first MusiCure album (entitled 'The Journey'), we received this feedback from an employee at an Adult Day Care center in St. Louis, USA:

"Just a note to let you know that the Musicure CD works wonders. I work at an adult day care center here in US, with people with Alzheimers, Downs Syndrome, Mental Disabilities, Stroke Patients, and other disabilities. I took the CD to work and played it for these people and we were all amazed at their response. We had played classical music and other types of music for them in the past, but they seemed to not be affected by it in the least, as they continued to be noisy, disruptive, and combative with each other, (as is the daily habits of some of them). From the very beginning of this CD they all sat down, were very still and attentive, and no one made a sound for 70 minutes. This was amazing because to keep them still and quiet for 10 minutes was stretching it. Needless to say they loved it and the rest of the day was the most peaceful one I've experienced there."

The music can also be an important part of the 'increased life quality' initiatives taking place at several care centers, for example in establishing wellness activities for the elderly, focusing on loving care, relaxation, intimacy and wellbeing.

Similarly, in several care centers they also offer MusiCure video, which is special film productions containing pure nature motives and film shot, produced and edited to match exactly to the music. The videos are shown on flat screens in common rooms instead of showing constant news 24/7 (like CNN etc.) and these initiatives have proved to convey much less stress and a quieter and more inspiring atmosphere.

The effect of the MusiCure Pillow on demented citizens

Based on positive experiences with MusiCure and the specially developed MusiCure Pillow in 2017, a major user survey was launched of the pillow's effect on an elderly target group and citizens at a dementia care center in a municipality in Denmark.

The purpose of the study was to investigate:

- Do the citizens of the dementia care center experience a long-lasting positive effect from scheduled daily use of the MusiCure pillow?
- Which citizen profiles can benefit most from using the MusiCure pillow?
- What pedagogical approaches can you use to bring the citizen an effect of lying with the pillow?

The user survey was conducted over 4 weeks, with 9 citizens with dementia testing the pillow every day for 20 minutes. The nursing staff observed the citizens and assessed their condition before, during and after the trial. The overall condition of the citizens was also assessed before, during and after the user survey. The pillow was documented used 154 times during the project period, a total of 50.77 hours (5.64 hours per citizen). The study showed that on average, citizens were in a better state during the actual tests (10.9%) and were overall rated to be in an even better state after the trial (16.4%), showing a positive long-term effect.

Conclusion on the VTV user survey project:

The MusiCure Pillow is an easy to use tool that can produce good results for the right citizen. The pillow requires no major training or adaptation to workflows. The pillow is flexible and can be used where needed. The VTV Spiderweb score shows that the technology supports citizens, staff, management and organization in many ways.

Based on the user survey, it is recommended that it is necessary to use the music pillow focused, based on the care staff's knowledge of the individual citizen. Some citizens want to take the pillow right away, others need to have a systematic use of the pillow. Lastly, it is important to assess the individual's needs for presence or foreclosure.

11. Music for traumatized refugees - Danish Refugee Council

Danish Refugee Integration network have used music therapy as a treatment since the early 90s, and are now using the music program MusiCure, developed by composer Niels Eje. The combination of specially designed music and therapeutic process has proved effective and this kind of music therapy have shown to be in demand among municipal caseworkers and social advisors.

"Normally it's difficult for traumatized refugees to talk about their problems - it is often impossible, to share severe and violent experiences, and the unpleasant symptoms these imply through words. Music is wordless and redeems the violent stress. Trust and confidence are the keys for the families to be able support each other in a therapeutic course" says candidate in music therapy from Aalborg University and chief consultant of the Danish Refugee Council Marianne Badstue.

Insomnia, fainting, difficulties concentrating and phantom pain is part of the symptoms that many refugees in Denmark have to live with. It damages the social situation of families and prevent a successful integration in Denmark. New Swedish research shows that the specially designed music can alter hormonal balance and alleviate stress symptoms.

See Poster: [Music for improvement of trauma-related sleep problems](#), by Jespersen, K.V. and Vuust, P. (CFIN) Summary from the article '[The effect of relaxation music listening on sleep quality in traumatized refugees: A pilot study](#)', Published in *Journal of Music Therapy* 49(2), 205-229, 2012. See also: [Prezi presentation](#) (summary): [The effect of relaxing music listening on sleep quality in refugees \(Jespersen & Vuust\)](#).

"It is deeply inspiring that the specially designed music can help make a difference for traumatized refugees in Denmark," says PhD and Professor at Örebro University Hospital, Ulrica Nilsson, who has published an article describing the relation between music and the hormone oxytocin in the International medical journal "Journal of Clinical Nursing".

Read abstract of Ulrica Nilsson's article:

[Soothing music can increase oxytocin levels during bed rest after open-heart surgery: a randomised control trial](#)

12. The Military

In view of this following letter from a Staff Sergeant in the army's operational command, the Danish military psychologists became interested in music's potential in relation to recovery and preventive abilities in connection with the soldiers mental health and problems they incurs in war zones where they are stationed.

The Staff Sergeant writes:

"I have worked for the Danish defense forces since 1987 and am currently a Staff Sergeant working at the Army Operational Command in Denmark. After being stationed in Bosnia in 1994 where I was involved in direct battle action, I have since been diagnosed as suffering from post-traumatic stress.

This came to expression quite dramatically six years after the event. I was suddenly overcome by severe anxiety attacks and have subsequently had long periods of illness. I have received help from a psychologist and been given tools that make life bearable again today.

One day while I was waiting to see the psychologist, I read an article in a journal that made reference to MusiCure, and I simply had to try it out to see if it could give me peace again and enable me to feel relaxed. The answer is yes! In fact, with quite dramatic effect, and I'd spent so much money on treatment and medication, where nothing else has had a better impact than this form of music.

I'm not the only one today who suffers psychological after effects from being deployed in a battle region. There are several thousand of us, who in recent years have been present in places that are not human or natural for people from our culture to be in. I therefore hope to be able to spread my knowledge of the music, and I am happy to provide details of my experience in using the music and the concept."

In subsequent meetings with representatives from the Department of Military Psychology at the Defense Academy, it was within the military decided to test the music, and specifically test its positive deterrent effect. Excerpt from press release issued by the Defense Academy in 2005:

"Music to help stressed soldiers"

The soldiers in Iraq and Kosovo will be taking a new 'weapon' in use. Music and a relaxation pillow with built in speakers shall help them to calm down in a hectic day. Music as therapy, the right kind of music can be relaxing for patients and help them recover. At Rigshospitalet in Copenhagen this has proved to be true, and now the military also takes up the idea for the soldiers. The Department of Military Psychology has now as an experiment decided to send the music and relaxation pillows down to soldiers in Iraq and Kosovo.

"We will try to see if it is a good offer to the soldiers, and a tool which may help them to counter stress" says Colonel Henrik Lundstein, who is head of the Faculty of Military Psychology, Leadership and Pedagogy at the Defense Academy. It is the research group Musica Humana and composer Niels Eje who is behind the music and the relaxation pillow. The music is called MusiCure. Niels Eje contacted the Defense Academy, because he believed that music could help the soldiers in stressful situations and perhaps prevent further mental disorders. The Department of Military Psychology has looked at the documentation and tested audio pillow.

Source: Articles in Danish newspapers

13. Waiting Rooms - Music in the hospital environment

Music can also be used in the hospital environment, outside the actual treatment situations – for example in waiting rooms. The following quote is from an article about a successful attempt at Frederiksberg Hospital in Denmark:

Music calms the patients

Shorter waiting times and calmer patients. This is the result of using music in the waiting room at the medical clinic at Frederiksberg Hospital.

Patients come more quickly to surgery and the visit to the doctors and nurses happens in a more comfortable atmosphere.

Since the staff in Cardiology-Endocrinology clinic at Frederiksberg Hospital started playing music in the waiting room the waiting time for the ca. 50 patients decreased up to 30 minutes.

"Patients are no longer so frustrated with waiting. They don't complain so much more to the staff after we introduced the music in the waiting room. Imagine how much we save in time, because patients are no longer frustrated and complaining about waiting! There might very well go two to three minutes of each consultation with a complaining, justified or not, but time is too precious for that" says medical secretary, deputy manager Vivian Sundstein, who got the idea with the music.

Vivian Sundstein has only received positive feedback from patients about the music. Some patients say they relax and do not feel they are wasting time in waiting room. Some patients have even been so happy with the music that they have purchased it. The meditative music is by Niels Eje. He has produced several CDs with meditative music under the name MusiCure. "If I feel there is a bad atmosphere in the waiting room, I always investigate whether the music is on or not. Otherwise I will ensure it is on, and then usually a pleasant atmosphere returns quickly in the waiting room again," says Vivian Sundstein.

She believes that the environment in the waiting room can be even more beneficial for patients - and staff. "I have considered whether it was a good idea with a fountain in the waiting room. There is nothing so peaceful and soothing like water! It is perhaps our next project for the waiting room," says Vivian Sundstein.

Source: Frederiksberg Hospital, Copenhagen

14. MusiCure Pillow & MusiCureStream – new applications available

Since the project started in 1998, there has been continuous development of the specially designed music, as a result of this interdisciplinary project, and since then several applications and concepts related to the project have been created.

These are specially developed applications and services that seek to meet current needs in hospitals, institutions, clinics and workplaces and other places where a healthy work environment and stress factors can play a major role for people's well-being.

In addition to the music, the applications include the specially developed pillow with built-in speaker cabinets 'MusiCure Pillow', which, in addition to having been used in connection with research into the effect of music, is also used in daily treatment at many hospitals and institutions.

The 'MusiCure Stream' Streaming service with specially produced nature films that have been edited and edited very carefully to the music. Movies and videos that contain only natural moods, without speech, are an asset that can be used in many areas, including in the elderly care and dementia treatment, and in connection with studies of stimuli for children.

Read more about the MusiCure Pillow at: www.musicure.com

And MusiCureStream: www.musicurestream.com