



The role of music therapy in paediatric rehabilitation

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Summary

Meeting the needs of the child in rehabilitation requires an interdisciplinary approach, whereby a variety of health care professionals are called upon to work together in planning and coordinating each patient's programme. The Registered music therapist is one of the allied health professionals who plays an integral role in this team approach. Music therapy is a recognized allied health profession, which is becoming acknowledged in the expanding world of health care as a therapy able to meet the expansive needs of the patient in rehabilitation. This article will present a literature review which advocates the role of music therapy in rehabilitation, with particular focus on the needs of the paediatric patient. Case vignettes will be used as further evidence to support the role of music therapy in this context, together with considerations for future research.

Introduction

'Music therapy is a systematic process of intervention wherein the therapist helps the client to promote health, using music experiences and the relationships that develop through them as dynamic forces of change' [1]. The use of the term 'music therapy' implies the presence and involvement of a trained and qualified music therapist; a treatment process (including assessment and evaluation) and the use of music in the treatment process. Such implications enable a distinction to be made between music therapy and music education/music entertainment.

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Music therapists use the evocative, stimulating, relaxing, emotional and functional qualities of music to achieve growth toward therapeutic objectives [2]. In a paediatric setting, music therapy intervention aims to support and assist a child in any or all of the following ways: to promote adaptive coping; to reduce pain or distress and to increase and promote developmentally appropriate skills [3].

Music therapy in rehabilitation

The role of music therapy in paediatric rehabilitation is not well documented, however evidence based literature reveals a significant number of articles in the area of music therapy and adult rehabilitation. Paediatric rehabilitation offers different challenges to working in adult rehabilitation, and this is primarily due to a child's ongoing development. Chorazy ([4], p. 19) states that 'although disorders similar in causality, diagnosis and treatment affect both children and adults, it is the wide range of developmental phenomena that distinguishes the rehabilitation of head injured children and adolescents from that of adults'. Michaud *et al.* ([5], p. 604) state that the goals of paediatric rehabilitation are to 'limit secondary damage, relearn lost skills and learn new skills that will be needed to compensate for disabilities'. For these reasons, it is difficult to utilize literature pertaining exclusively to adult rehabilitation techniques to inform music therapy practice within the paediatric population.

Kovich and Bermann ([6], p. 9) suggest that 'the value of a team approach towards rehabilitation cannot be overemphasized' and that because 'deficits resulting from head injury are medical, physical, functional, communicative, behavioural, cognitive and social ... therapeutic intervention aimed at all of these areas necessitates working with a team of professionals'. The registered music therapist is a professional member of the allied health team who is able to provide therapeutic intervention in meeting the particular rehabilitative needs of each patient.

Music therapists working in clinical, teaching and research settings throughout the world have documented their work in the area of adult rehabilitation through a variety of means: from case studies using anecdotal evidence to descriptive clinical approaches and the adoption of control/experimental group designs using more formal research methods. While any research method may have its limitations in analysing information, it is important that music therapists continue to actively record and investigate their findings in the area of rehabilitation.

This literature identifies several key areas in music therapy rehabilitation:

- role and models of intervention [7–16],
- pre-rehabilitation context, i.e. working with the unconscious patient or patient with post-traumatic amnesia [17, 18],
- motor skill areas [19–22],
- speech, language and communication [23–29],
- cognitive skills areas [12, 14, 15],
- psychosocial support [30, 31],
- contraindications, that is the inappropriate use of music for patients with particular neurological impairments [32–35], and
- outcome measures and research [36].

Each of these areas present some of the theoretical frameworks and structures which inform the music therapist working in paediatric rehabilitation. O’Callaghan [32] states that cerebral areas used for the execution of musical and language skills are relatively independent and that when working with patients in rehabilitation, music therapists use methods that encourage the activation of preserved neural pathways. Robb [31] reports on the usefulness of song writing techniques in assisting the emotional needs of adolescents who have been traumatically injured. Some studies which have incorporated more formal research methods include work in speech and communication by Cohen [24, 27, 28], where familiar songs and other musical exercises are used to improve rate of speech and verbal intelligibility. Data from a study by Prassas *et al.* [21] in the area of physical rehabilitation indicates that acoustic rhythm positively influences gait parameters in stroke patients.

The music therapist uses the expanding literature base of music therapy in paediatric health care to further inform their clinical practise, particularly in the areas of specialized techniques to be used within each individual programme.

A qualitative study using grounded theory in detailed analysis of music therapy sessions in a paediatric

rehabilitation setting also provides valuable information for the music therapist working in this context [37]. This project explored and categorized the techniques used by the music therapist in this context and also considered the value of this type of research to the development of a platform for research in paediatric music therapy. ‘Grounded theory method was chosen, as the current study of music therapy in paediatric rehabilitation is limited so there was not an adequate source of information from which to create an hypothesis for an empirical study. In order that the researcher did not look “in the wrong place”, she decided to use a method that could elucidate current practice rather than test an hypothesis. It is proposed that the outcomes could generate an hypothesis relating to music therapy efficacy with children receiving rehabilitation service’ (Edwards, 2001, personal communication).

Rationale for music therapy in paediatric rehabilitation

It is well accepted and recognized that music plays an integral role in the stimulation and development of children [38, 39]. From as early as the 16th week *in utero*, early musical development for the foetus has begun in the areas of hearing, movement, orientation to the space around the body and touch [33, 40]. Throughout life, a child experiences music in many forms, from passive listening to lullaby music as a newborn infant or engaging actively in body awareness songs as a toddler. Music can attract, distract, comfort, support, maintain and extend a child’s abilities in achieving normal growth and development. ‘Songs, rhymes, chants, musical games and lullabies have been used for centuries to support and teach very young children the social, language, motor and emotional skills required for functioning within and integration into, their immediate (family) and wider environments’ ([41], p. 203).

Briggs [42] proposes a model of musical development which integrates musical skills research with accepted models of child development. The basic framework for this model is based on significant developmental milestones and transitions identified in the major models of developmental psychology such as Freud, Piaget, Rosen and Kegan. The development of musical skill is then divided into four phases, whereby each phase is further divided into three main areas: auditory, vocal/tonal and rhythmic. This schema is a useful guide in assessing developmental progress for the child in rehabilitation. Such literature, therefore, suggests that music therapy in the field of paediatric rehabilitation is indicated, as it can address functional skills, development, provide

sensory, cognitive and physical stimulation and can occur within the context of enjoyment and familiarity.

Music therapy programmes in paediatric rehabilitation

Music therapy goals in paediatric rehabilitation fall into four main areas: psychosocial care, motor skills, behavioural/cognitive skills and speech/language/communication skills.

Each client is assessed for their potential to benefit from music therapy, before goals and techniques for the programme are devised in conjunction with the interdisciplinary team. Goals specific to music therapy are determined, along with goals that augment other therapies. Claeys *et al.* ([7], p. 73) state that ‘music has been found to be especially motivating in physical and occupational therapy settings, due to its provision of the structure necessary for clients to complete and maximally benefit from their exercise routines’.

Music therapy techniques are then planned, through consideration of the programme goals, the client’s age, family history, musical preferences and functional abilities. Music therapy techniques may include song singing, instrument playing, improvisation, song writing, movement to music and music listening. Music therapy programmes are designed to focus on children’s abilities and aim to create a positive and supportive environment in which children can participate at their own level while also meeting important rehabilitative goals.

Music therapy rehabilitation for psychosocial care

Children involved in rehabilitation programmes are often confronted with many challenges. While in the acute phase of their illness or accident, children in rehabilitation may be required to undergo surgical or invasive procedures, participate in different forms of assessments, deal with numerous different medical and allied health staff, and commence therapy programmes. Many of these children will also be faced with injury, disability, altered body image and a new future to the one they may have envisaged.

Rehabilitation programmes require children to participate in daily therapy in a wide range of disciplines, which can prove tiring and frustrating. It is crucial to address the psychosocial needs of the child involved in rehabilitation. Issues associated with the child’s illness or accident need to be addressed, along with issues associated with the child’s current ability to cope with hospitalization. Music therapy can be effective in meet-

ing the diverse psychosocial needs of the child involved in rehabilitation, regardless of their level of functioning.

It is well documented that music therapy programmes for children in hospital can be effective in meeting psychosocial needs. Through techniques such as song-writing and improvisation, music therapy can offer opportunities for children to express feelings, increases opportunities for appropriate communication and can assist children in identifying strengths that restore a sense of self-worth and dignity, and improve self-esteem [43, 44]. Psychosocial goals in paediatric music therapy rehabilitation programmes may include providing the patient with opportunities for:

- Increased motivation: to regain skills, to continue therapy;
- Increased self-esteem;
- Reduction of anxiety: about the future, medical procedures;
- Emotional and self-expression: body image, level of functioning, losses; and
- Enjoyment.

Robb [31] documented the effectiveness of song-writing techniques in meeting the psychosocial needs of adolescents being treated for traumatic injuries, including brain and spinal cord injury. She suggested this intervention could ‘address a variety of needs simultaneously. It facilitates self-expression; increases self-esteem; enhances coping skills ... and promotes socialization’ (p. 37). Claeys *et al.* ([7], p. 73) state that ‘interactions which are positive and concrete are essential [to rehabilitation programmes]’ and also discuss ‘the importance of an individual creative process and a final music product which elicits expression, pride and ownership from the client’ (p. 74).

CASE VIGNETTE

Jane, a 15 year-old female, was admitted to hospital following internal bleeding to the brain, which resulted in an acquired brain injury and a right hemiplegia. While Jane experienced many physical losses as a result of her injury, she also experienced many emotional losses. These included decreased self-esteem (due to changes to physical and cognitive skills and changes in physical appearance), independence (Jane required assistance for several daily living activities), loss of control and lack of motivation.

Jane was referred to music therapy just prior to discharge as an inpatient. A referral to music therapy was made due to the significant trauma Jane had experienced and because she enjoyed music, having been involved in

the school band prior to her admission. In consultation with the rehabilitation team, the goals for Jane's music therapy programme were determined.

Jane's goals included:

- to provide opportunities for self-expression,
- to increase strength and use of the left hand,
- to increase self-esteem,
- to provide opportunities for choice and control, and
- to increase/maintain motivation.

Jane participated in weekly music therapy sessions through song-writing, instrument playing (drums, glockenspiel, keyboard), instrumental improvisation and song singing. Evaluation of the programme was conducted through observation by the music therapist regarding Jane's participation in each session and in relation to specific techniques, informal feedback from Jane and her family throughout the programme, informal feedback from the rehabilitation team regarding improvement in Jane's skills and emotional status, and written feedback from Jane and her parents in music therapy surveys (administered to all families involved in music therapy programmes at the hospital).

It was evident that, through music therapy, Jane was able to express how she felt about her injury, being in hospital and the future ahead. After just a few sessions together, Jane wrote her first song:

'Snow Ballad'

I'm standing in the middle of a field of my days,
Untouched by human kindness,
Not kissed by warm suns rays,
As little drops of snow flakes glide
Slowly, steadily, to bless the ground at my self's side.
But far off in the distance I see a weak sun's ray,
And I begin to force my way along,
For I must get there someday.

This was in contrast to a song she wrote several weeks later:

'I'm Back!'

Isolated,
Stuck in a world of loneliness,
Anticipated I would be home.

I'm back!
Back to my home,
Back to my life,
Back to my friends,
No longer alone.

Reaching out to the few friends I made,
Although I really loved them all,
I'm glad I haven't stayed.

Jane's songs illustrate the determination she developed during her rehabilitation programme, and the hope she

held for the future. Jane was very proud of these songs, and she performed these, along with improvisations and other familiar songs, in a concert for all staff involved in her care at the hospital. This concert also signified the end of Jane's music therapy programme.

Not only did music therapy provide opportunities for Jane to express herself, but it also enhanced her self-esteem, increased her motivation and determination, provided enjoyment and provided appropriate physical and cognitive stimulation. Jane commented that music therapy made her feel 'happy, like there was something I can do'. Jane's parents also commented that music therapy was 'the only therapy that gave her any joy ... she picked up emotionally and physically when involved in music'.

Music therapy rehabilitation for motor skills

Music therapy cannot only provide children with emotional motivation, it can also provide physical motivation. 'Because of the innate properties of music, and the wide range of methods and tools available to the music therapist, music therapy can be interesting and motivating to the patient' ([45], p. 229). Music can offer structure, stimulation and motivation for exercise routines, and can offer a purposeful and enjoyable activity for specific motor patterns through playing of instruments, which provide both auditory and physical feedback. Different instruments can be utilized to encourage use of different muscles. For example; playing the keyboard promotes use of fine motor skills, playing the drums encourages use of both arms, reach, grasp, coordination, strength of the upper limbs and shoulder stability.

A study by Hurt *et al.* [19] provided preliminary evidence that rhythmic auditory stimulation (RAS) can facilitate long-term gait training in patients with traumatic brain injuries. RAS was studied using a frequency entrainment design and as a therapeutic stimulus to facilitate gait patterns in eight patients with persisting gait disorder. After 5 weeks of daily RAS training, statistics revealed significant improvements in mean velocity, cadence, stride length and also stride symmetry.

CASE VIGNETTE

Eight year old 'Lisa' was admitted to hospital following cerebral abscesses and subsequent repeated brain surgery. This injury left Lisa with persistent cognitive and motor deficits, including an inability to walk, talk and perform any daily functions independently.

Once medically stable, Lisa participated in music therapy sessions three times a week. These sessions focused on encouraging Lisa to communicate, increase the strength of her upper limbs, increase her motor planning skills and enjoy herself.

During music therapy sessions, Lisa would play the drum, keyboard, claves and shakers and use her head and arms to dance to music played by the music therapist.

Lisa found music very motivating. As soon as the drumbeat would start on the keyboard, Lisa would wave her arms high in the air and move her head to the music. Inspired by the depth and volume of sound made by the large drum, Lisa would beat the drum as loudly as she could with both arms, laughing after each turn. Lisa's playing of the drum increased in duration and the drumbeats became louder, faster and more controlled throughout the programme. Lisa was able to play the keyboard independently, using buttons appropriately and remembering their functions. This gave a clearer picture of what Lisa was capable of in terms of motor planning, which was not being demonstrated in other therapies.

It was evident through Lisa's programme that music therapy encouraged not only the use and strength of her upper limbs, but also a freedom of movement that was not observed elsewhere in other therapy programmes.

Music therapy rehabilitation for behavioural/cognitive skills

Literature consistently documents the fact that children with a sustained moderate-to-severe brain injury will experience cognitive and academic problems [5]. This will include difficulties in problem solving, sequencing, staying on-task and memory. Such difficulties can directly impact on progress in a child's rehabilitation programme. Purdie ([15], p. 48) states that 'cognitive and behavioural impairments limit the rate of improvement in rehabilitation tasks. Specific disorders of memory and attention are particularly important, since all aspects of rehabilitation require some degree of learning and adjustment to environmental change'.

Music therapy can be effective in the rehabilitation of cognitive skills, as it is motivating, enjoyable and engages children on many levels. Research has shown that musical stimulation activates areas of the brain required for cognitive processing ([32], p. 40). Thaut [16] suggests that music can be effective 'as a background stimulus to improve motivation and attention during the relearning process of activities of daily living' (p. 264), and that 'rhythm and melody provide excellent

structures to organize, sequence and remember verbal information' (pp. 264–265). Taylor ([33], p. 41) suggests that 'certain types of music lend themselves very well to the integration of perceptual, stimulus-response, relational, and motor learning as well as to including both informative and affective aspects of cognition'.

While there are few articles specifically documenting the effectiveness of music therapy in addressing behavioural/cognitive skills in paediatric rehabilitation, its importance in the field of rehabilitation has been identified in the literature [12, 15].

CASE VIGNETTE

Nine year-old 'Taylor' was involved in a motor vehicle accident in which her mother was killed, and in which she and her younger sister sustained multiple injuries including spinal cord damage. Taylor also received a moderate head injury and damage to her brain stem. Among other losses, this resulted in a decrease in Taylor's attention span, moderate impulsivity and uncertainty about her short-term memory function.

In music therapy sessions, Taylor was able to attend to one task for periods of 20–30 minutes. Being shown only once how the electronic keyboard worked, Taylor was able to use the keyboard independently, remembering specific numbers for different sounds, and how to play complex songs, and the function of several different buttons. Taylor was also able imitate five six-note phrases played once by the music therapist. Taylor was able to correctly imitate both notes and rhythm approximately eight out of 10 times. Music therapy sessions demonstrated that Taylor had the capacity to attend for long periods, remember complex instructions and remain focused on one activity throughout a session.

While the skills Taylor demonstrated in music therapy were not formally evaluated in terms of skill generalization to other therapies or activities of daily living, Taylor's participation in music therapy became a useful assessment tool for other members of the rehabilitation team. Music therapy sessions seemed to provide a clearer indication of Taylor's cognitive abilities, as she appeared to perform at a higher level in these sessions.

Music therapy rehabilitation for speech, language and communication skills

Singing and speaking are natural pathways for human expression and share the common elements of vocal frequency and frequency range, rhythm or rate, intensity

or volume, diction or articulation and lyrics or language. When singing, one must be able to reproduce different vocal frequencies in order to follow a melody, match the rhythm, stay in time and have adequate breath control to achieve volume and appropriate natural phrasing [25, 46]. Cohen [24, 26–28] has reported on the use of singing as therapy for adults with speech difficulties including dyspraxia and various dysarthrias related to a wide range of neurological disorders. The interventions reported in the 1992 study included physical exercise to increase relaxation of head, neck, shoulder and trunk to improve pre-articulatory movement patterns; vocal warm-ups to improve intonation and rate of speech; rhythmic and speech drills to improve intelligibility and singing or pre-morbid song material to improve vocal intensity.

Music therapists are also beginning to recognize that current rehabilitation programmes addressing the treatment of aphasia such as Melodic Intonation Therapy (MIT) may be modified to more appropriately address the musical elements in the MIT programme. The repetition of phrases used in a modified MIT programme are more melodic in structure and less like the speech/song style of intonation adopted in MIT [23].

CASE VIGNETTE

Twelve-year-old Nathan was a pedestrian involved in a car accident which left him with severe multiple injuries including a closed head injury. He was referred to music therapy by the speech pathologist to address his communication difficulties, which included dystharia with particular articulatory deficits. Lack of motivation during his speech pathology sessions was also identified as an issue of concern. Nathan enjoyed listening to music and his favourite bands included Offspring and Matchbox 20.

Combined music therapy and speech pathology sessions were adopted to address the areas of articulation, rate of speech, pitch and volume control. Familiar song material such as 'Feelings' by Offspring and 'Push' by Matchbox 20 were used to facilitate improvements in the above areas and also provided opportunities for increased motivation. Vocal exercises in the form of scalic passages were also used to improve Nathan's pitch range. Song material was initially played and sung at a slow tempo to encourage Nathan to participate and then increased in rate as he improved and tolerated the duration of these sessions. Staff and family members reported improvements, particularly in the areas of articulation and pitch control, and that Nathan also used these sessions as times to express his

emotional needs. During the initial stage of rehabilitation Nathan felt angry and frustrated about being in hospital and not being able to communicate these feelings. It was through known song material such as the song 'Feelings' by Offspring that provided opportunities for Nathan to release his emotions and identify them in front of his family and therapy staff.

Conclusion

Through the literature and case vignettes presented, it is evident that music therapy has a role to play in the management of paediatric patients requiring rehabilitation. While research studies have been conducted in the area of music therapy and adult rehabilitation, it is important to begin to establish a research base for music therapy in paediatric rehabilitation. This is a necessary step to take to ensure that music therapists and health clinicians who have a particular interest in the role of music in paediatric rehabilitation are provided with evidence based literature, which will ensure best practise.

Magee [36] states that the literature of music therapy with brain injured clients in neuro-rehabilitation settings offers mainly descriptions of treatment approaches and clinical practices, with few identifying measured treatment outcomes. As previously described, there is a small amount of empirical research which links treatment with outcomes and makes recommendations for clinical practice.

'The potency of music as a medium for therapy is the extent to which it is able to reach individuals, regardless of physical, sensory, cognitive or communication abilities' ([36], p. 26). In order to best inform clinical music therapy practice and the practice of other health care clinical staff who may use music in a paediatric rehabilitation setting, ongoing studies using a variety of research methodologies are required to establish and enrich the current literature base of music therapy in paediatric rehabilitation.

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