The use of music therapy in neuro-rehabilitation of people with acquired brain injury

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The evidence for and uses of music therapy for people following acquired brain injury is growing. The purpose of this article is to provide a practical overview for nurses and highlight the relevance of music therapy to the nurse's role in providing care for this patient population. The term 'acquired brain injury' incorporates traumatic and nontraumatic neurological illnesses, with an associated impact on cognitive, physical, emotional or independent functioning (Australian Department of Human Services, 1994). The Royal College of Physicians and the British Society of Rehabilitation Medicine (2003) have defined brain injury as: 'An inclusive category that embraces acute (rapid onset) brain injury of any cause, including:

- Trauma—due to head injury or post-surgical damage (e.g. following tumour removal)
- Vascular accident (stroke/subarachnoid haemorrhage)
- Cerebral anoxia
- Other toxic or metabolic insult (e.g. hypoglycaemia)
- Infection (e.g. meningitis encephalitis) or other inflammation (e.g. vasculitis).'

ABSTRACT

The purpose of this paper is to provide a practical overview for nurses of the evidence for and uses of music therapy for people following acquired brain injury, and to highlight its relevance to the nurse's role in providing care for this patient population. As a specialist clinical intervention, music therapy is able to effect changes in physical, cognitive, psychosocial and communicative functioning for people with acquired neurological disorders, indicating its role in multiprofessional teams offering maintenance or rehabilitation programmes. Although the growing body of evidence is yet to be assessed, a number of small studies offer promising results. An overview of the evidence for music therapy with people with acquired neurological conditions will be given, with a particular focus on methods of intervention which have been researched to address physical, communicative, cognitive and emotional functioning. The possibilities for collaborative practice between nursing and music therapy are highlighted.

Key words

Music therapy ■ Neurology ■ Rehabilitation ■ Brain injury ■ Stroke

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Definition

The use of music as a recreational distraction for people in care is commonly referred to as 'music therapy' due to the visible and immediate benefits on behaviours and feelings of wellbeing. Although music is often used to improve care environments and lift patients' moods, such a blanket use of music is misguided. Commonly, the use of listening to music or even background music is termed 'music therapy'; however, music therapy is more correctly defined as the planned use of music, implemented by a trained and qualified practitioner using methods which have been researched, to meet predetermined clinical goals addressing a patient's functioning. Thus, delivering music therapy within a treatment programme requires professionals who have undertaken recognized music therapy training and, within the UK, are registered with the Health Professions Council.

In a music therapy session, therapist and patient engage in shared musical activity such as singing, listening, composing, playing or moving to music together. The music played in sessions is most often live rather than recorded, with the patient having an active part in the music-making. Therapeutic intervention is structured upon clinical goals which aim to improve both an understanding of the patient from an holistic perspective while addressing the individual's specific health or educational needs. The clinical goals direct which particular method of intervention is appropriate. Therapy is offered in either individual or group settings, dependent on the patient's needs. Usually, a course of therapy is offered along therapeutic principles, such as regular sessions of consistent duration, clear boundaries as to the beginning and ending of sessions, and ensuring patient confidentiality through offering therapy in a quiet and private treatment space where there will be no disruptions.

Music therapy is an established part of interdisciplinary treatment within many health, education and social care settings in the UK (Twyford and Watson, 2008). It can be used with people of all ages who have health or developmental needs. Music is able to transcend the barriers of spoken language, providing individuals who are not able to communicate verbally for reasons of pathology, ability or culture with a means of expression. Hence, it is useful

in settings where people with complex conditions in neurology, mental health, palliative care, special education, behavioural and learning difficulties are cared for, and forensic settings. In recent years music therapy has been developing as a part of interdisciplinary care in neurological rehabilitation and continuing care settings in the UK (Lindeck and Pundole, 2008; Magee, 2008; Millman, 2008) although provision in rehabilitation settings in the UK remains scarce (Andrews and Turner-Stokes, 2005).

Principles of music therapy

There are four main theoretical principles supporting the use of music with people with neurological problems such as acquired brain injury: music facilitates communication, social interaction, the expression of emotion, and neuronal connections in the brain (*Table 1*). Given these principles, the role of music therapy within a neuro-rehabilitation programme addresses a range of psychological and physical behaviours. A number of international studies examining the role of music therapy in neurological settings have indicated that its primary role is in rehabilitating communication, social and emotional health needs (Pöpel et al, 2002; Magee and Andrews, 2007) as well as physical, cognitive and behavioural functioning as secondary reasons (Tamplin, 2006; Magee and Andrews, 2007).

Music therapists working with patients with brain damage may work from different theoretical perspectives. For example some therapists may focus on functional changes as the primary goals while others may work from a framework in which patients' emotional experiences are primary. The challenge for the music therapist is to respond flexibly to the patient's needs, as well as to have the capacity to provide therapy extending beyond one single model of care as appropriate to the care setting.

Table 1. Principles supporting the use of music therapy

Innate ability	Long before language development, infants communicate immediate feeling states through vocal sounds which are purely musical in nature. For example, a baby expresses distress with loud, high-pitched, repeated vocal sounds of a harsh tone quality, and when engaged in playful behaviour a baby's vocal sounds move in an upward direction and increase in loudness on each repetition. Thus, music is an innate ability in all human beings. In cases where language may be lost through an acquired brain injury, this innate ability enables communicative intent to be expressed
Social medium	Music is a powerful social medium cross-culturally and throughout the lifespan, playing a central role in group experiences such as dancing, singing, and playing music within ritual and spiritual expression
Emotion	Music facilitates private and personal reflection as it elicits emotional responses and conveys feeling states
Neuronal connections	There is growing evidence that music promotes neuroplasticity, thereby enabling connections to be made between healthy and damaged centres of the brain in populations with acquired brain injury

From: Sloboda, 1991; Papousek, 1996; Trevarthen, 1999; Dissanayake, 2001; Overy et al, 2005.

Suggestions for collaborative practice in rehabilitation

Collaborative work between professions who have differing theoretical frameworks is challenging, and music therapists need to be clear about their identity and role (Twyford and Watson, 2008). Similarly, there have been attempts to define and clarify the role of nursing in acquired brain injury and rehabilitation settings both within the UK (see Nolan and Nolan, 1998; Burton, 2003; O'Connor, 2000; Long et al, 2002) and internationally (Kirkevold, 1997; Singleton, 2000; Pryor and Smith, 2002). It is perhaps the work of Pryor and Smith (2002) and Long et al (2002) which addresses this issue most effectively, both addressing research in rehabilitation settings with multiple diagnostic groups, for example, across orthopaedics, brain injury and burns.

Long et al (2002) reported six interlinked nursing roles in rehabilitation:

- Assessment
- Coordination and communication
- Technical and physical care
- Therapy integration and carry-on
- Emotional support
- Involving families.

Pryor and Smith (2002) suggested that a framework for rehabilitation nursing is required in order for nurses to effectively deliver patient care in these settings, with the role of nursing covering continuous assessment, observation and interpretation, teaching and coaching, management, advocacy and coordination of services.

The literature suggests that one of the most defining features of rehabilitation nursing is the manner, or mental attitude, in which nurses approach their work with patients; working 'with' patients to regain self-care rather than nurses 'doing for' or 'doing to' them (Pryor, 2005). As rehabilitation nurses are not seen to be 'doing for' or 'doing to' patients, there is a common misconception that they are lazy, or do not know how to 'nurse', rather than acknowledging the subtlety of the work that rehabilitation nurses engage in when delivering patient care (Nolan et al, 1997; Kirkevold, 1997; Pryor, 2001; Long et al, 2002; Royal College of Nursing, 2007). In addition, nurses themselves or other members of the interdisciplinary team often fail to acknowledge the management of patients' secondary health concerns, not related to the purpose of rehabilitation, as part of nurses' rehabilitative role (Pryor, 2007).

A consensus on a definition of 'rehabilitation' is needed when working in rehabilitation settings. With differing theoretical backgrounds which inform practice, music therapists and nurses need to ensure that they are working from a common ground in delivering rehabilitation serv-

ices. A good starting point is being clear about whether rehabilitation services are time-restricted with specific goals; or if a more social model of rehabilitation, with client choice and control is offered; or if there is a blending of rehabilitation models which provide optimal rehabilitative services for users. A philosophy of therapy and interdisciplinary working is essential (Young et al, 1999) in any rehabilitation environment in order for patient needs to be addressed. Open and clear communication, in all its forms, is needed to ensure that everyone understands what is needed to maximize the patient's potential and that nurses and allied health professionals do not segregate their working practices (Pryor, 2007).

The practical day-to-day realities are the foundation for collaborative working, or potential segregation, between music therapists and nurses. Each care environment has a 'daily routine' with ebbs and flows of workload, periods of intensive activity with multiple therapists, medical and nonclinical personnel all converging, with nurses acting as the central point of contact and coordination. For example, as part of an interdisciplinary programme, music therapy may offer opportunities for physical movement (increased mobility) during a pleasurable activity such as playing a musical instrument. As a result, improving upper limb functioning for a patient may mean regained independence. In these instances, nurses have a role to promote and encourage a patient's participation and independence in regained skills, thus contributing to his/her own self-care rather than fostering patient dependence and helplessness.

Evidence-based practice in music therapy and its relevance to nursing rehabilitation

Emotional wellbeing

Music therapy is often understood to address emotional functioning in people living with acquired neurological trauma or illness. A common misconception is that music improves feelings of 'happiness'. However, for people living with the devastating effects of brain injury, often with limited ability to explore emotional responses using verbal means, music has the potential to play a role in enabling the exploration and expression of feelings of loss, grief, adjustment and anxiety, thereby helping to manage the stress of living in hospital during the rehabilitation process.

Music's capacity to provide a more relaxed environment helps to create an atmosphere which allows for less formal assessment than can be achieved with standardized tools. Although a vast number of descriptive case studies illustrate a variety of music therapy methods addressing quality of life constructs such as self-esteem, self-image, feelings of depression and emotional and social expression (Magee and Wheeler, 2006), the body of evidence to support these assertions needs developing. Methods used within therapeutic interactions to address emotional wellbeing in neurological populations encompass shared music listening, joint instrumental improvization, guided imagery to music, and song methods including composition, singing and reflection (Magee and Wheeler, 2006; Tamplin, 2006).

Music's capacity to engage patients in active participation has been demonstrated to have positive consequences for those undergoing rehabilitation after brain injury. Patients receiving music therapy have been found to be significantly more involved in their rehabilitation, more socially interactive, and show trends suggesting improved mood (Nayak et al, 2000). Mood states have been found to improve after short-term music therapy for neurological patients (Magee and Davidson, 2002).

In addition, people living with chronic disabilities from stroke who participate in music therapy feel less depressed and anxious (Purdie et al, 1997), and in early post-stroke recovery music therapy has been associated with less depressed and confused mood states (Särkämö et al, 2008). The findings from these studies are promising for involvement in music therapy following acquired brain injury. However, caution is urged in using music to enhance 'happy' feelings, as music has the capacity to elicit a wide range of emotional states (Sloboda, 1991), and music therapy should be undertaken by a trained music therapist.

Communication

People with acquired brain injury frequently have neuro-communication disorders which typically include expressive and/or receptive aphasia, oral dyspraxia and dysarthria. The difficulties associated with speaking in social situations for people with neuro-communication disorders can make it hard to cope with everyday life and contribute to depression, emphasizing the need for beneficial interventions (Magee et al, 2006). Music therapy to address neuro-communication disorders usually involves interdisciplinary intervention with speech and language therapy. Singing and speech share many underlying neural mechanisms such as the respiratory muscles, articulators and phonators and rhythmic cueing stimulates and organizes speech musculature (Tamplin and Grocke, 2008).

Therapeutic singing and other vocal methods combine controlled respiration, voice production and articulation, which are all targeted goal areas in dysarthria rehabilitation. For example, limited vocal range, poor voice inflection, speech which is irregular in rate or lacking natural rhythmicity can all be addressed through singing. Using live music enables the therapist to match a patient's baseline response, thereafter subtly altering parameters to increase the difficulty and extend a patient's functioning. Music therapy has been shown to improve voice production, volume and speech intelligibility for people with Parkinson's disease (Haneishi, 2001) and stroke (Magee et al, 2006), and speech naturalness for individuals following traumatic brain injury (Tamplin, 2008).

Aphasia is one of the most devastating effects of brain damage to the left hemisphere following stroke and head injury. Melodic intonation therapy is a method which uses music to enable a person with expressive aphasia (i.e.

Broca's aphasia) to produce short, functional, spoken phrases independently. Small scale studies have found melodic intonation therapy to surpass speech therapy intervention alone (Shlaug et al, 2008) and to result in dramatically increased spoken vocabulary (Overy et al, 2005). Evidence from neuro-imaging studies such as these suggest that music stimulates wider neural networks and warrants much greater investigation. Certainly, the clinical experience of using this method to improve a patient's verbal output is a very exciting one. Thus, the importance of music therapy as part of an integrated communication programme should not be underestimated given the promising evidence from research and practice. Enabling patients to achieve better expression through improved vocal quality and volume, naturalness of speech and verbal output impacts on their ability to engage in everyday activities, make their needs known, and reduce the frustration experienced by both the individual and their communication partner.

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Playing musical instruments requires a range of upper limb gross motor movements and requires skills such as problem-solving, sequencing and different elements of attention

Rehabilitation of gait, posture and upper limb training

The evidence underpinning motor rehabilitation with music therapy stems from a developing understanding of how the brain processes music. By drawing on the combined neural pathways involved in both motor function and music perception, movement to music draws on a wider range of networks within the brain. Rhythm is a central component, influencing the control of movement (Hurt et al, 1998). Music therapy draws on rhythm-based methods for improving the timing of movement, and repetitive music-making tasks to improve the range, strength, coordination and duration of movement (Thaut, 1999).

For people with neurological disorders, gait, posture and stance frequently become problems which considerably reduce independence in mobility and self-care tasks. Much of the research into music and motor function has examined the effects of rhythmic auditory stimulation with a range of neurological populations including traumatic brain injury (Hurt et al, 1998), stroke (Thaut et al, 1995; Thaut et al, 1997), Parkinson's disease (Freedland et al, 2002) and Huntington's disease (Thaut et al, 1999). Carry-over effects of rhythmic auditory stimulation have been examined in home exercise programmes with positive significant results for traumatically brain-injured patients who were no longer making progress in conventional physical therapy (Hurt et al, 1998) and for Parkinson's disease patients (Thaut et al, 1996). Playing musical instruments within structured and rhythmically-planned activities provides feedback about a movement (Tamplin, 2006) which is literally 'sounded out' in the music created.

Playing musical instruments requires a range of upper limb gross motor movements (e.g. arm flexion and extension, hand grasp and release), fine motor skills, muscle strength and endurance as well as overall trunk control and balance (Baker and Tamplin, 2006). Research studies have found improved timing, movement continuity and distance achieved in reaching movements in the paretic arms of stroke patients (Thaut et al, 2002), as well as increased active shoulder and elbow range (Paul and Ramsey, 1998) and hand-grasp strength and functional task performance (Cofrancesco, 1985).

Cognition and behaviour

Cognitive and behavioural difficulties following acquired brain injury are some of the most challenging aspects for patients, their carers and health professionals to treat and manage effectively (Pryor, 2004). Alongside common cognitive deficits affecting executive functioning, memory, perception, attention and abstract thinking, impairments to behaviours such as motivation, initiation, and disinhibition can combine to result in challenging behaviour. Music engages and orders perceptual behaviours, providing focus and structure for attention and motivation to mediate behavioural learning and change (Thaut, 2000). Additionally, it is a powerful tool for use with this

patient group due to its motivational properties and the requirement for patients to sustain attention over time demanded by musical structures. Music therapy methods involving playing instruments require skills such as problem-solving, choice-making, sequencing, listening and the different elements of attention, i.e. focused, selective, sustained, divided and alternating attention (Thaut, 2005). These skills can be extended in group therapy which additionally demands social behaviours encompassing reasoning and turn-taking. Above all, musical activity can be an intrinsic pleasurable reward, and thus a useful medium to access patients who present with challenging behaviours and are difficult to engage by other means.

Specifically composed songs have been used by music therapists to increase independence in personal activities of daily living for people with acquired brain injury (Gervin, 1991). In people with neuro-behavioural disorders, this has facilitated dressing (Gervin, 1991) and brushing teeth (Soeterik et al, 2005). The use of live music by a music therapist in a therapy session enables the pace of an activity to be varied to meet the patient's individual needs. The music can be matched to a patient's rate of completing each step of a process in accordance with an individual's perseveration, motor or attentional difficulties. Music conditions were found to significantly reduce agitation and enhance orientation in people with post-traumatic amnesia following acquired brain injury (Baker, 2001). Recent findings indicate that music enhances the recovery of focused attention and verbal memory when applied during the acute recovery period following stroke (Särkämö et al, 2008).

While the theory and descriptive examples of using music to address cognitive and behavioural disorders in this population are promising, more research is warranted to help refine interventions to match patients' needs. Furthermore, when working with people with cognitive and behavioural difficulties, the use of music should be carefully considered. As an auditory stimulus, the indiscriminate use of music can overload the patient with sensory information, resulting in reduced cognitive performance or increased behavioural agitation. Therefore, using music to enhance cognitive and behavioural functioning warrants professional skills and knowledge provided within music therapy training.

The literature emphasizes the value of music therapy in physical and communicative rehabilitation, with a greater number of descriptive case studies suggesting primary benefits in rehabilitating psychosocial factors. However, a systematic review of the quality of such evidence is pending (Bradt et al, 2007).

Conclusions

The emerging evidence indicates that music therapy as part of a structured interdisciplinary rehabilitation programme can assist nursing staff in the care of people suffering with acquired brain injuries. Caring for this patient population requires coordinated intervention from a range of health professionals to provide a comprehensive patient-centred interdisciplinary service. The practical day-to-day realities are perhaps the foundation for collaborative working between music therapists and nurses, where rehabilitation settings have a daily routine with periods of intensive activity with a variety of health care and non-health care staff working together, with nurses often acting as the central point of contact and coordinators.

Music therapy and nursing can collaborate in the delivery of patient-centred rehabilitative care. Music therapy has the capacity to enhance emotional wellbeing and improve verbal output, motor functioning and behavioural and cognitive responses. BJNN

KEY POINTS

- Emotional wellbeing can be enhanced through providing alternative means for expressing a range of moods including feelings of anger, depression and anxiety
- Patients' speech intelligibility and verbal output can be improved for people with neuro-communicative disorders, thus optimizing communication between the patient and carer
- Music therapy can help increase the control and strength of motor functioning and reduce dependence in activities of daily living
- Music therapy can aid in structuring behavioural and cognitive responses to increase participation in rehabilitation

Further information about published research in music therapy with neurological populations can be viewed at www.rhn.org.uk/institute/musictherapy

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