

Neurologic Music Therapy In The Acute Stroke Setting:

Embedding the Service and Demonstrating Its Efficacy

What is Neurologic Music Therapy?

Music therapy has traditionally been understood in terms of a psychosocial good; the therapeutic value of music was considered to derive from the emotional and social roles it plays in a person's individual life and the culture they inhabit. Traditional therapeutic aims of this nature, deriving from a psychodynamic model, foster interpersonal connection, group association, and symbolic representation of beliefs, anxieties, traumas, and desires. In other words, traditional music therapy took Freud's talking cure and replaced free association with free improvisation. Neurologic music therapy (hereafter abbreviated to NMT) has, over the last 30 years, modified this model.

With developments in brain imaging and new insights into music and its affect on brain function, the role of music therapy has undergone dramatic shifts since the 1990s (Thaut, 2014). Research techniques in cognitive neuroscience, such as brain imaging and brain-wave recordings have enabled us to observe human brain function *in vivo*. Consequently, a picture of the relationship between music and the brain has emerged, revealing that music has distinct and sophisticated influences on the brain in *cognitive, affective, linguistic, and sensorimotor* processes (Bower, 1981). Above all, biomedical researchers have 'found not only that music is a highly structured auditory language involving complex perception, cognition, and motor control in the brain, but also that this sensory language can effectively be used to *retrain and re-educate* the injured brain' (Thaut, 2014, my italics).

NMT thus relies on the principle of *neuroplasticity*, and under the NMT conception, music is therefore construed as a *treatment modality*, as opposed to merely a psychosocial good; that is to say, when the brain is engaged in music it is being *changed* by music. As such, we can use NMT to access healthy parts of the brain and circumnavigate damaged tissue to achieve a cognitive, sensorimotor, or linguistic goal. So what does this mean for NMT in the acute stroke setting?

Etiology of the project

The acute stroke unit (hereafter abbreviated to ASU) at Charing Cross Hospital identified the need for a novel, evidence-based intervention for patients who were unable to engage in ‘traditional’ therapy due to mood or impairment severity. Feasibility in the acute setting and cost effectiveness were primary considerations, along with improving patient experience and psychosocial outcomes. A 3-phase improvement methodology was implemented, and it involved collaboration between Imperial College Healthcare NHS Trust, Chroma Therapies Ltd, and Imperial Health Charity.

This project has been divided into three stages:

Phase 1: 8-week pilot project to introduce 1 day per week of NMT to ASU, and to evaluate the impact on patients and feasibility in acute care. Data included: patient-specific clinical outcomes; patient, carer and therapist feedback.

Phase 2: Successful grant submission to IHC to fund an increase to 2 days per week over 9 months, allowing us to embed NMT in 1:1 and group sessions, and gather more detailed data to support the case for ongoing funding (**Phase 3**).

Aims of the project

Put within a neuro-scientific framework the standardized, clinical NMT techniques can be applied in core areas of training and retraining the injured brain. By synthesising the two notions of, on the one hand, the psychodynamic model of music therapy and, on the other, the neuro-scientific model, the aims of bringing music therapy onto the ward have been:

- 1) To increase patient outcomes by using NMT techniques alongside traditional therapies (PT, OT, SALT).
- 2) To improve patient experience by offering psychotherapeutic support in group and individual sessions.
- 3) To engage hard-to-reach patients not responding to traditional therapeutic interventions.
- 4) To fully embed NMT onto ASU.

Above all however, it must be noted from the outset that this was *not a research project*, but, rather, an attempt to demonstrate how NMT can improve, principally, patient experience and increase patient outcomes. Evidencing this has taken two main forms: quantitative data, and qualitative feedback from staff, families, and patients, and video documentation of sessions.

Data collection

One of the challenges of working in an acute rehabilitation setting has been establishing appropriate outcome measurements to capture the effect of NMT on patients. Early on in the project it was concluded by the MDT that ratified outcome measures were generally too time-consuming or encompassed too wide a scope to adequately measure significant change in patients. Consequently, some research-based outcomes were (10m Walk, MoCA, BDAE) used but generally the therapist and music therapist would agree on an appropriate means of measuring a baseline and post-intervention outcome that:

- 1) Would not hinder the therapy contact time for the patient.
- 2) Would be easy and practical to administer.
- 3) Would be measurable and repeatable.

Another challenge in collecting data has been the variable length of patient stay. In the acute setting patients could be on the ward from a single day to 6 + months. Data was therefore collected at the beginning and end of a single session to ensure maximum opportunity to document patient change.

Above all however, it is crucial to note that not all music therapy interventions were appropriate to record quantitatively, both in terms of logistics and patient best interests. For example, a particularly young patient who had been admitted to the ward was not engaging in existing therapy, and so was referred to music therapy by occupational therapy in the hope of making a substantive connection. The patient was non-verbal, had demonstrated no insight into his condition, and was refusing to engage with family members. As the MT session went on he began to improvise at the keyboard with the therapist: the patient then began to cry, improvise, and eventually extend his hand to be held. Immediately after that session the patient was with family members on the ward and continued to express the same affect with them as he did in the NMT session. This was the first since the onset of his stroke.

In instances like this there is no objective measure to adequately convey the affect this session had on the patient. To stop the session to obtain consent to video record the patient, or discuss how to best capture it in an outcome measure, would be missing the point entirely. There have been many instances like this where patients have been referred to NMT to *start* their rehab journey; in other words, as a way of making first contact with patients for whom traditional therapeutic interventions simply cannot reach. Kant (year) referred to music as the quickening art, and what has been observed by the team is that many hard to reach patients are being returned

to themselves out of their inert, disengaged states through NMT. IT has been a large part of NMT's contribution to the ward and will be reflected in therapist testimonials and patient case studies.

For now, however, we will begin to look at the quantitative data in detail, presenting some of the data across the three impairment domains: (1) sensorimotor, (2) cognitive, (3) speech and language.

Project Statistics

Start date: January 8th 2019

End date: August 28th 2019

Total number of patients admitted to 9S ASU = **160**

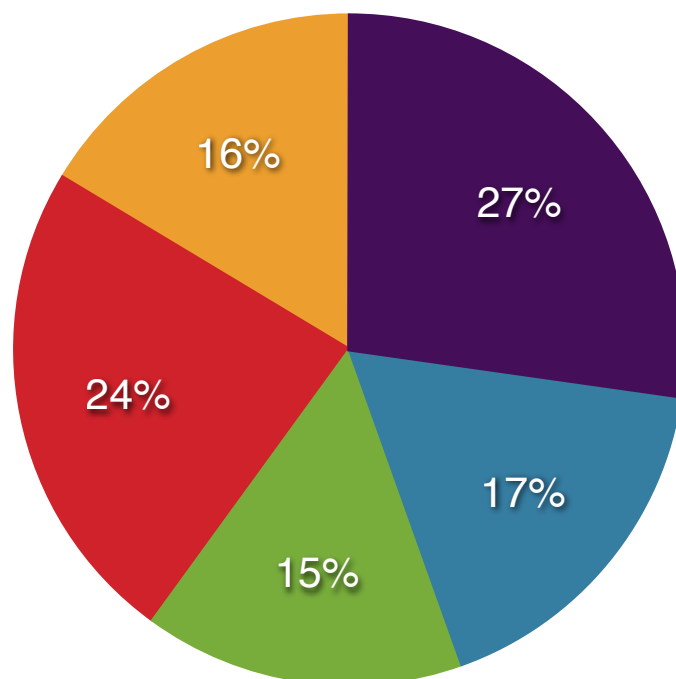
Proposed target for number of music therapy patients to be seen: **40-45** individuals / **40-50** groups

Total number of patients receiving individual music therapy = **83**

Total number of patients participating in groups = **49** (open group and exercise group)

Distribution of 1-1 sessions

- Sensorimotor
- Speech and Language
- Cognitive
- Psychosocial
- Hard to engage



Sensorimotor - Predominantly joint sessions with physiotherapy (and occupational therapy), focusing on transfers, sit-to-stands, increasing range of movement, increasing rep-count, adding quality and control to movement arcs, weight bearing, fine-motor and gross motor skills. Techniques used but not limited to:

Rhythmic Auditory Stimulation (RAS)
Therapeutic Musical Instrument Performance (TIMP)
Patterned Sensory Enhancement (PSE)

Psychosocial - This intervention was for patients who were referred to music therapy by the MDT for low, flat mood and exhibiting depressive states; aggression and frustration; lack of insight, and patients with pre-morbid mental health diagnosis. The role of music therapy here falls back into the traditional model of the psychodynamic use of music to facilitate self-expression, autonomy, and group solidarity. These were predominately 1-1 sessions, but some group sessions.

Speech and Language - Working with speech and language therapists to address a variety of impairments; receptive and expressive aphasia, dysarthria, and apraxia. Sessions were often recorded having obtained patient's consent to gain best insight into the intervention and outcome of NMT within this impairment domain.

Techniques used but not limited to:

Melodic Intonation Therapy (MIT)
Musical Speech Stimulation (MUSTIM)
Rhythmic Speech Cueing (RSC)
Oral Motor Respiratory Exercises (OMREX)
Vocal Intonation Therapy (VIT)
Therapeutic Singing (TS)

Hard to Engage - Patients who were not responding to traditional therapeutic input were referred to music therapy to try and spark some form of response and engagement. This was a relatively high category, and in fact had lots of carryover with the *psychosocial* referrals. The hope was that NMT could help bring patients back into the room, so to speak, and to help begin their rehabilitation journey. Although the term 'techniques' is not an entirely sufficient way of capturing the intervention, techniques used, but not limited to, were:

Clinical Improvisation (CS)
Therapeutic Singing (TS)

Cognitive - Although the 'smallest' category there was significant overlay between cognitive interventions, speech and language, and sensorimotor; which is to say, cognition is of course

involved in all of these processes. However, specific referrals to music therapy for cognitive issues were for spatial neglect, apraxia, procedural / working / and prospective memory, sustained / divided / and alternating attention, and executive function.

Techniques used but not limited to:

Musical Attention Control Training (MACT)

Musical Neglect Training (MNT)

Musical Mnemonics Training (MMT)

Macro Outcome Analysis

Cognitive (Sample size 17 patients)

> 88.2% of patients receiving NMT for cognitive impairments were able to achieve one of their MDT goals in under two NMT sessions.

> 70.5% of patients receiving NMT for cognitive impairments were able to achieve two or more of their MDT goals in under four NMT sessions.

Speech and Language (Sample size 19 patients)

> Aphasia: (Sample size – 12 patients)

100% of patients receiving NMT for aphasia achieved their target language in one session.

> Dysarthria: (Sample size 7 patients)

100% of patients receiving NMT for dysarthria were able to increase their decibel output by 72%.

66.7% of patients receiving NMT for dysarthria were able to increase their phonation duration by 40%.

Sensorimotor (sample size 30 patients)

> 85.7% of patients receiving NMT for gait irregularities (RAS) improved on average by over 40% in a single session.

> Mean cadence and velocity of patients receiving RAS over the duration of the project increased from 75% to 86.54%.

Sensorimotor

Rhythmic Auditory Stimulation (Arias & Cudeiro, 2008)

One of the primary interventions used to help with gait irregularities was RAS (Rhythmic Auditory Stimulation). The 10m walk (2019) outcome measure was used to track developments in gait. Below we present a selection of individual patients, tracking their cadence baseline, outcome, and velocity from their first to their last session. All patients names have been changed to protect confidentiality.

The formula for calculating cadence over 10m is as follows:

$$60/\text{time} \times \text{number of steps} = \text{cadence}$$

The formula for calculating velocity over 10m is as follows:

$$60/\text{time (in seconds)} \times 10 \text{ meter (distance)} = \text{velocity}$$

Patient 1:

Diagnosis: Right MCA infarct. Left-sided weakness and minimal movement in left leg. Immobile. Assistance of two, rota-stand transfer. Low mood and disengaged.

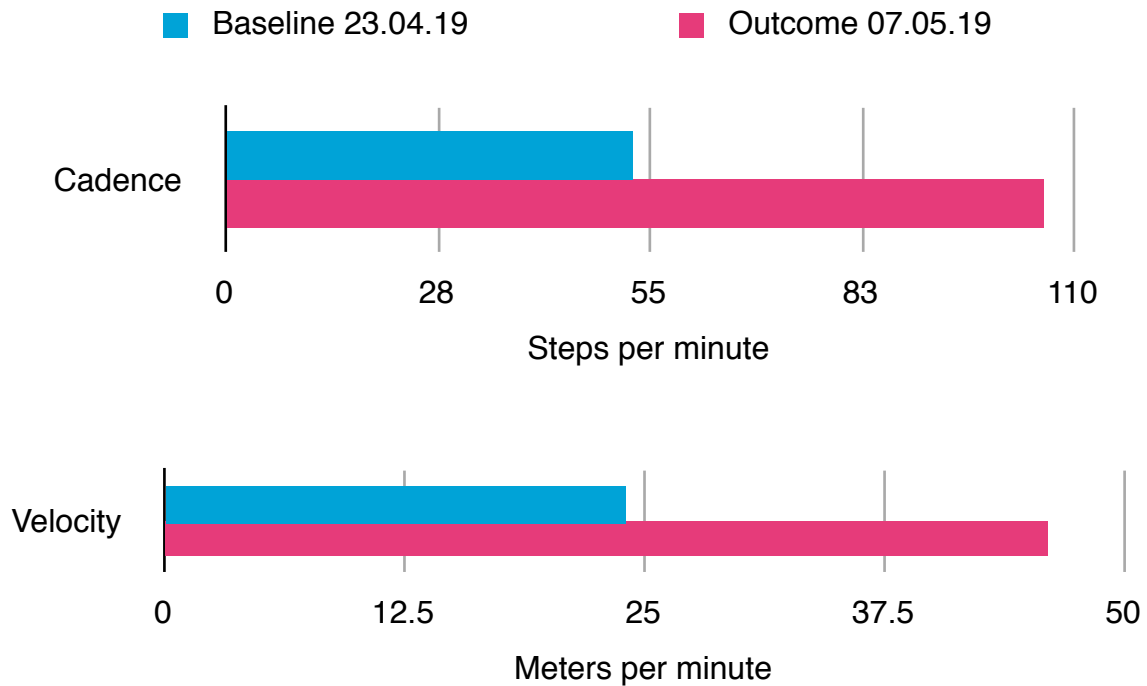
Treatment:

> Attended music therapy group whilst on 9HASU prior to NMT. Reported that the group was ‘ ‘. Mood reported by occupational therapist in email exchange: ‘Just wanted to hand over that patient 1 absolutely loved music therapy group today, and he seems really changed by it. Would love to know if there are things we can do with him whilst you’re not here.’

> Began working with physiotherapist using Patterned Sensory Enhancement (PSE) to increase strength in legs, begin weight transfer movements, and increase quality, control, and rep rate of knee and leg raises.

> Aims of session were to increase velocity as patient reported walking much slower as feels lack of confidence when executing movements.

> Beginning of second session started Rhythmic Auditory Stimulation (RAS) alongside PSE.



> Patient sit to stands also increased from **8** in 1 minute, to **12** in 1 minute after two sessions of NMT.

Patient 2:

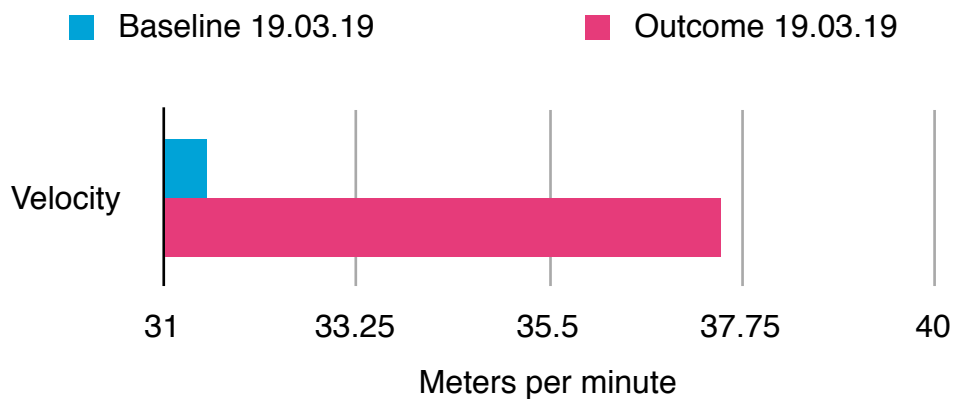
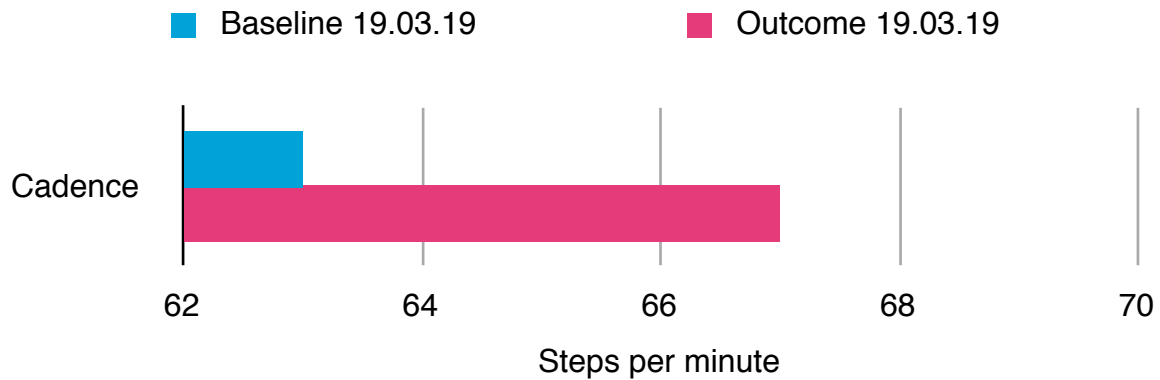
Diagnosis: Right MCA. Hemianopia. Patient reported loss of confidence in walking, slightly apraxic and trouble initiating movements.

Treatment:

> Rhythmic Auditory Stimulation to help with initiating movement and using pulse in the form of piano accompaniment to cadential harmonic progression over a 2/4 pulse.

> Patient increased with confidence and moved from, in one session of NMT, walking with a frame to walking with assistance of one to walking unassisted.

> Patient reported that doing music is 'lovely' and the rhythm helps 'concentrate what you're doing.'



> Because the patient went from using a frame, to walking unassisted in a single session, therapists were able to start referral for early supported discharge (ESD).

Patient 3

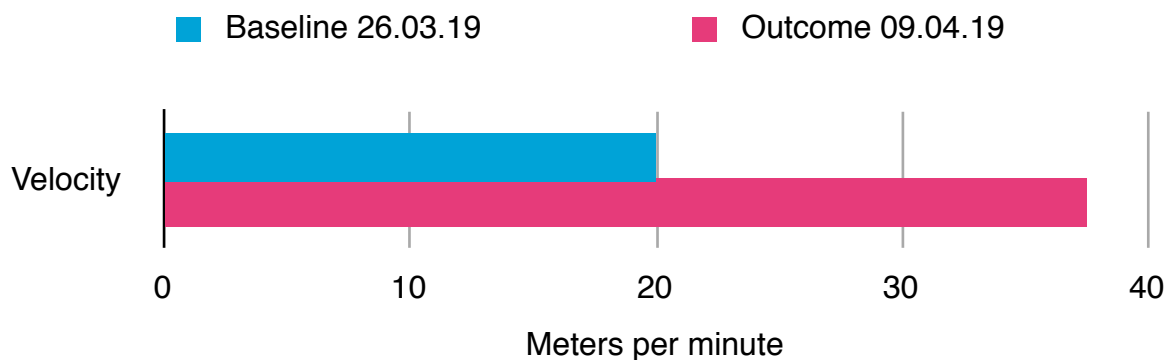
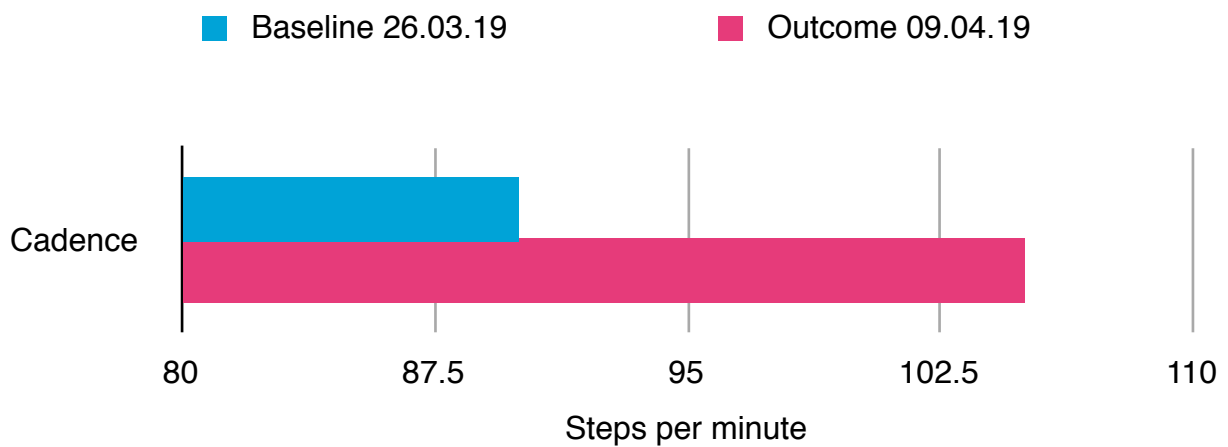
Diagnosis: Left occipital haemorrhage: mixed dementia: hypertension and low mood. Blind.

Treatment:

> Patient was referred to music therapy to help increase mood, foster engagement with therapists and other members of the ward (in group) and to increase walking and reduce stride length to increase control over movement.

> Initially PSE over 3/4 waltz movements to instill confidence shifting weight from left to right and hold for two beats.

> Moved on to RAS to address velocity and stride length irregularity and build confidence whilst walking.



Patient 4

Diagnosis: Left MCA infarct - left insula and basal ganglia. Dense right upper limb weakness and moderate right lower limb weakness. Patient struggled with transfers and required hand-held assistance of two. Required lots of prompting with foot placement and prompting to promote weight bearing through each lower limb when stepping.

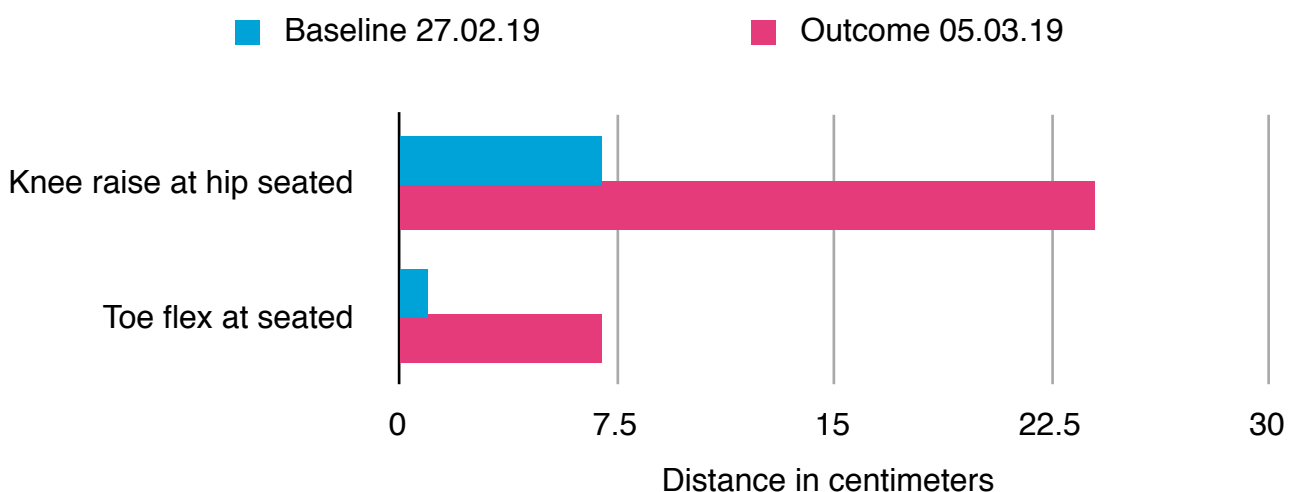
Treatment:

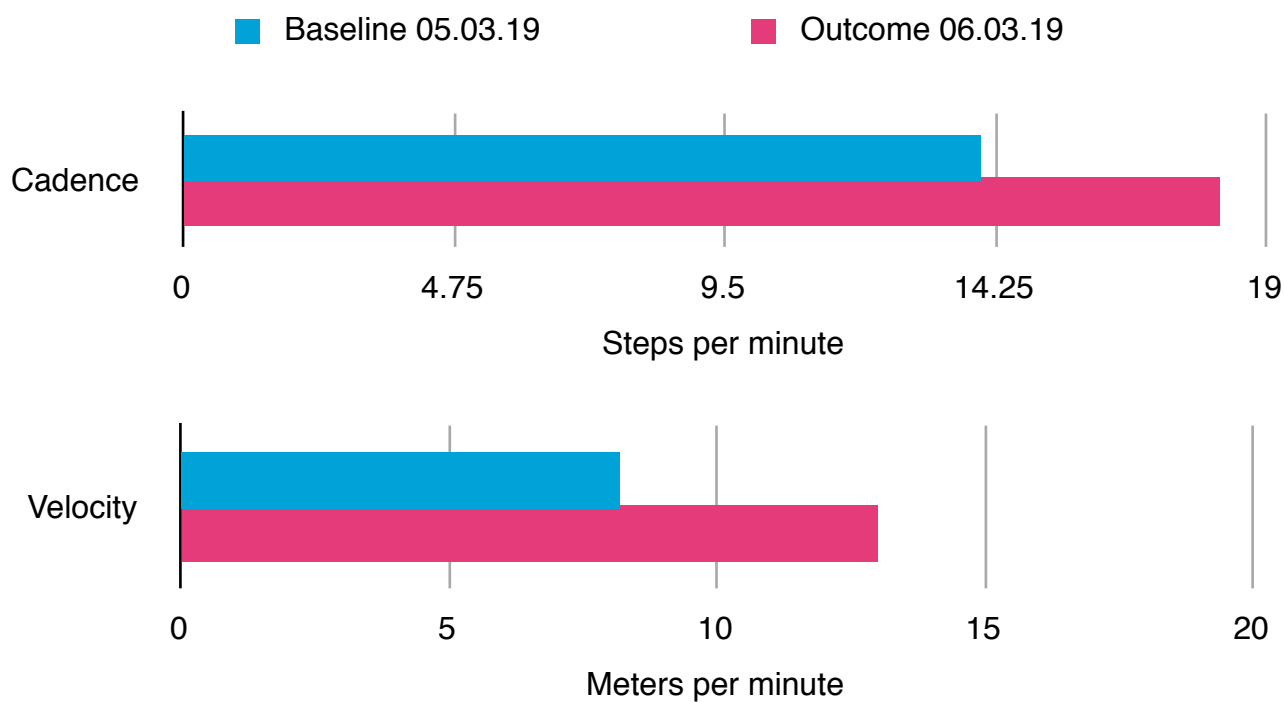
> Began with Therapeutic Musical Instrument Performance (TIMP) to work on strengthening upper limb whilst seated and then to standing, over time.

> Moved on to use patterned sensory enhancement (PSE) to generate hip flexion in both seating and standing and increase range of movement in foot. Used ascending arpeggiated movements to prime and cue standing and to increase length of time able to stand. Baseline standing tolerance at session 1 = 10 seconds. Outcome standing tolerance at end of session 2 (the next day) 40 seconds.

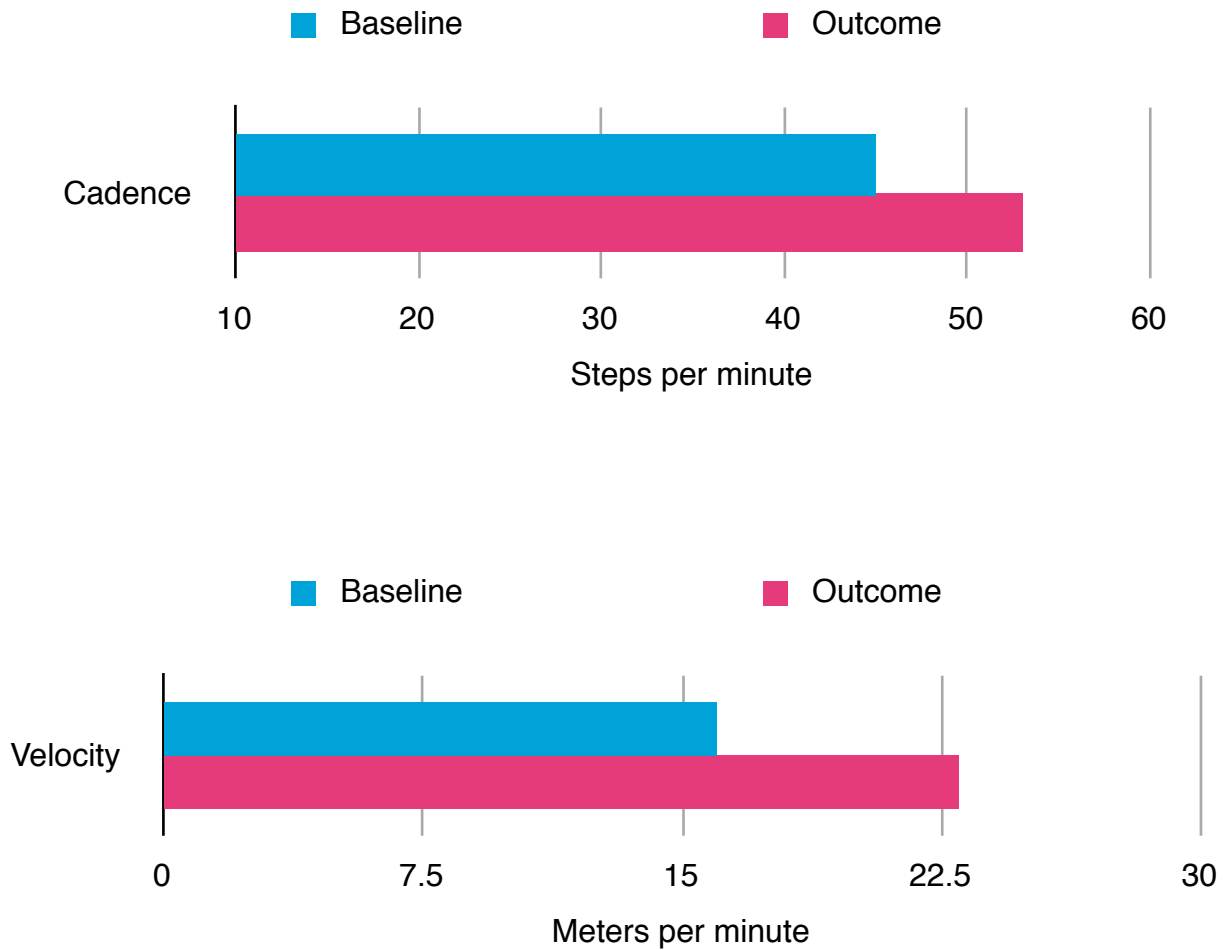
> Aims were to increase patient confidence, help initiate cueing in walking by using rhythmic priming of the RAS protocol and to help with standing hip flexion.

> Patient was struggling to initiate the appropriate movements and physiotherapy were finding it making progress challenging. After the NMT intervention patient 4 was able to meet his physiotherapy goals, and physiotherapists were able to move onto more challenging exercises to return patient to pre-morbid baseline.





Mean cadence and velocity of total number of patients with documented RAS scores (11):



This does not take into account the ad hoc nature of treatment. Of 83 patients seen, 15 were for specific RAS and gait interventions, however it was only possible to, at the time, properly document 11 patients owing to logistical or ethical considerations.

In addition to working on GAIT, there are also upper and lower limb interventions that are treated with TIMP and PSE.

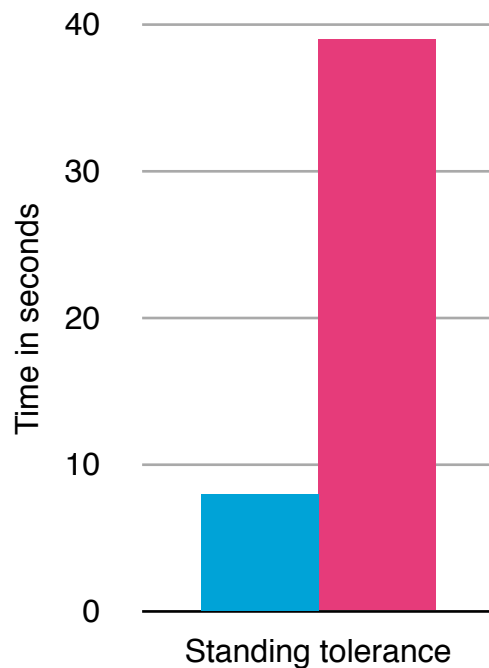
Lower Limb Weakness

Patient 5

Referral: Ride side lower limb weakness and poor balance.

Treatment: PSE and TIMP.

■ Baseline 15.01.19 ■ Outcome 15.01.19

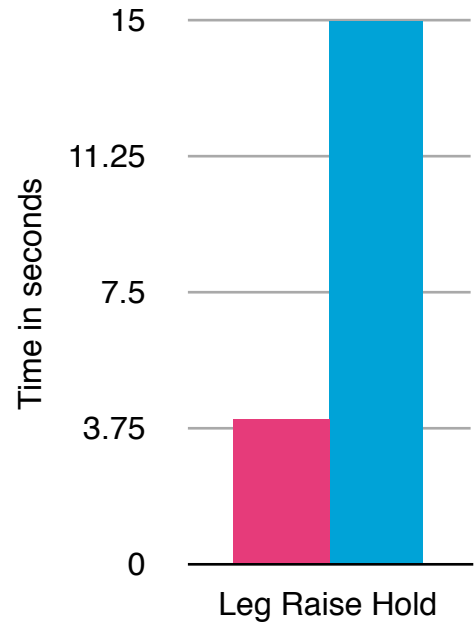


Patient 6

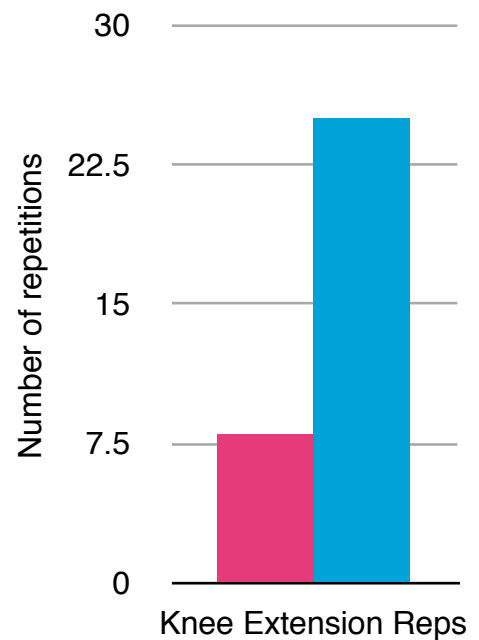
Referral: Poor isolation of movement of upper left leg. Leans back and relies on trunk to carry load. NMT to help promote better control of knee and produce a slower and more controlled arc to knee raise and foot extension.

Treatment: PSE, TIMP, Lyrical Movement Entraining (a technique where a melody and lyrics are put to specific movements to help organise the body).

■ Baseline 18.06.19 ■ Outcome 19.06.19



■ Baseline 18.06.19 ■ Outcome 19.06.19

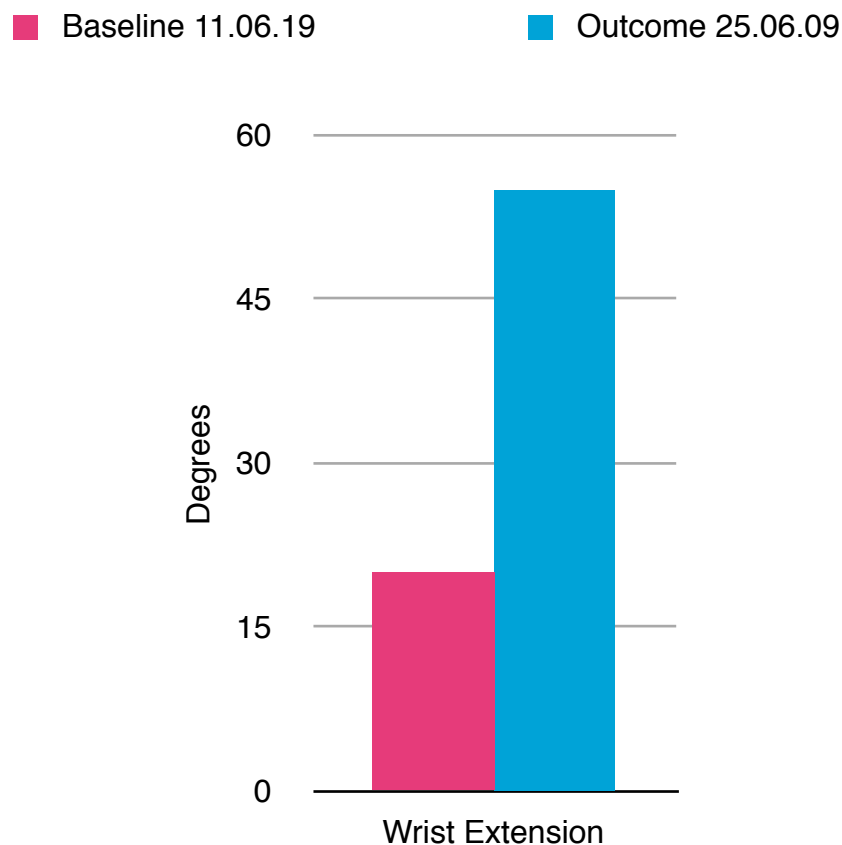


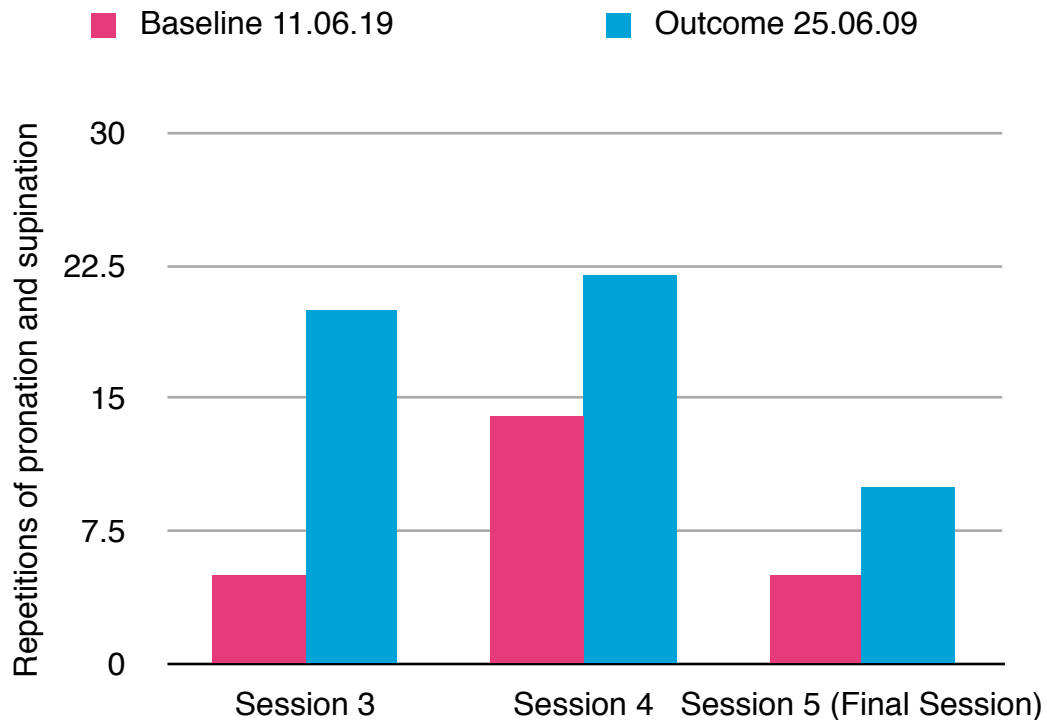
Upper Limb Weakness

Patient 7

Referral: Left MCA infarct. Recurrence of right sided weakness on right upper limb and wrist. Prior to admission patient was working in catering, so retraining wrist and building strength in the forearm was very important to them, and was actually a cause of much of their anxiety, i.e. not being able to return to work.

Treatment: PSE, TIMP. Focussing on wrist extension, pronation and supination.





Patient's baseline improved from session 3 to session 4. In session 5 a 5kg leg weight was applied to arm and patient carried out shoulder reps and, with the motivation of rising cadential sus-chord inversions, able to carry out double the repetitions.

Sit-to-stands

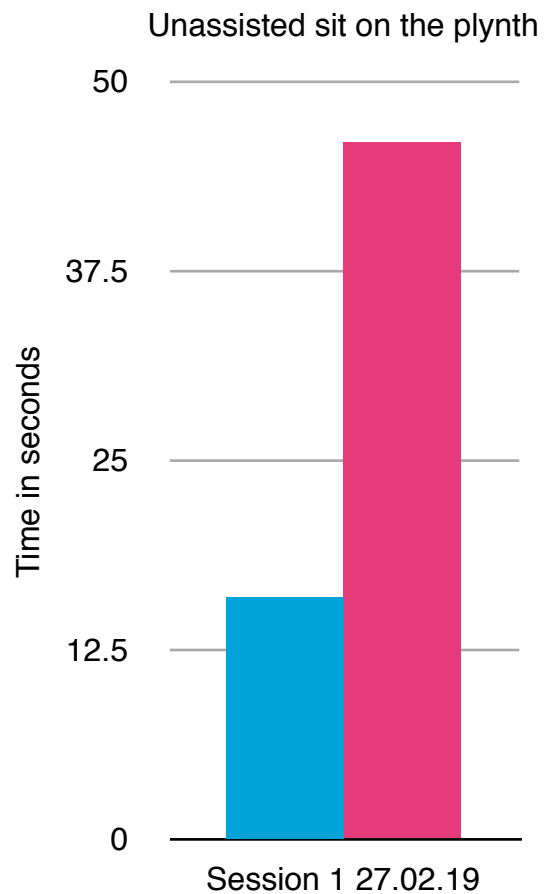
Sit-to-stands are one of the more common elements to a patient's recovery. Achieving this is a key stage in beginning to think about standing for longer periods of time, weight bearing on individual legs, and then walking.

Patient 8

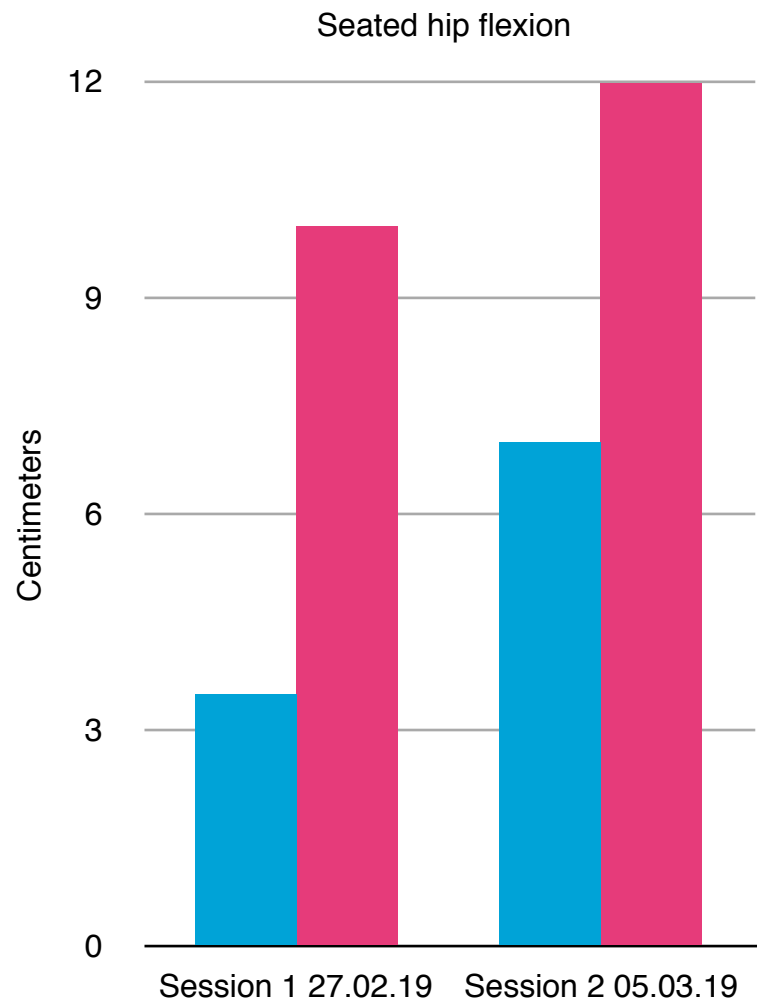
Referral: Right frontal spontaneous bleed. Aims of NMT were to use music to focus, and motivate the patient (who worked in performing arts) to be able to start reaching his sensorimotor goals to move him forward in the referral process.

Treatment: Began by working on establishing an unassisted stand. Working on being able to increase hip flexion, and to gradually increase the degree of full extension at the knee in a standing hoist.

■ Baseline ■ Outcome

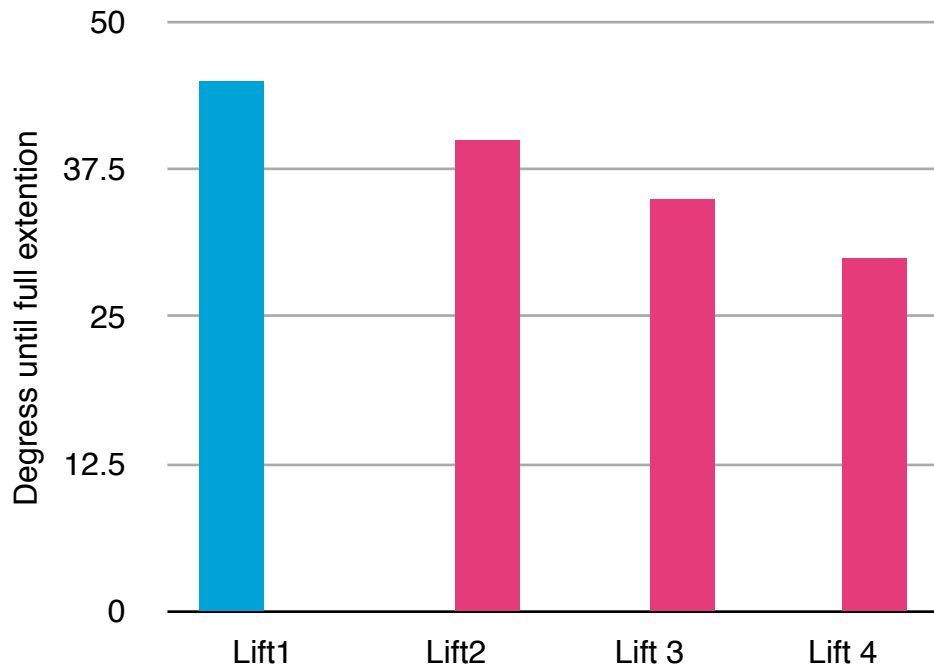


■ Baseline ■ Outcome



■ Lift without music

■ Lift with music

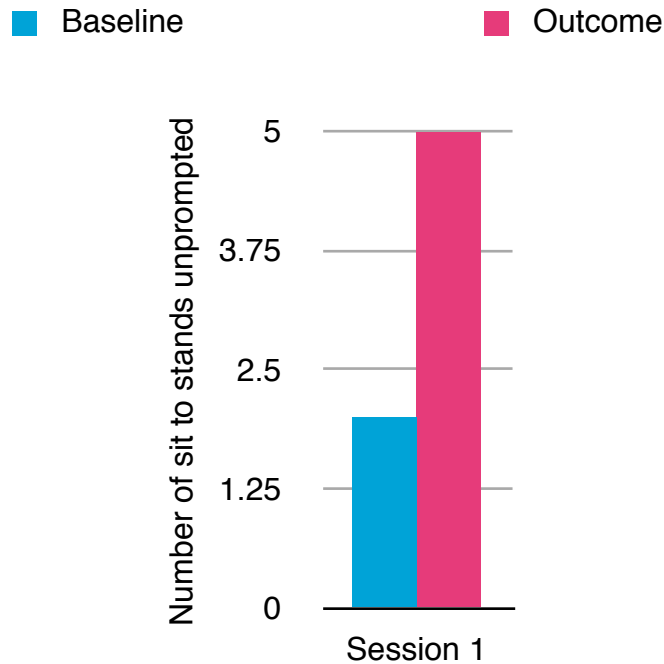


The gains made in the NMT sessions at the beginning of this patient's recovery paved the way for sitting out for longer, joining in other therapy groups, and being able to tolerate sitting in a tilt and space for the first time. The patient self-rated the last session as 'Nine out of ten'.

Patient 9

Referral: Patient presenting with severe anxiety around standing, and was reported as having a flat mood and being hard to engage. Patient would not look or smile at therapists, nurses or doctors. It was hoped that music therapy could help engage and instill a sense of independence with patient's standing.

Treatment: Therapeutic performance (therapist plays for patient, or improvises around their presentation), therapeutic instrument improvisation (TIMP)



> Patient required significant verbal prompting to stand at baseline. With the introduction of music patient was not only able to stand 3 more repetitions than previously but was able to initiate standing for the first time without the need of a prompt.

> During the session the patient would initiate conversations, was reported by the therapies team to be markedly more engaged and was able to make eye contact throughout interactions.

Cognitive Interventions

Adequately capturing outcome measures for cognitive impairments have proven difficult from the outset. Mainly because measuring a non-musical baseline task involves the inclusion of many hard to control variables, and secondly, because traditional cognitive baseline measures are too time-consuming to merit use. Outcomes measures that were meaningful to a patient's individual recovery were thus designed by the MDT and the music therapist.

The primary impairments that NMT focused on were spatial neglect, divided and sustained attention, and working memory.

Attention

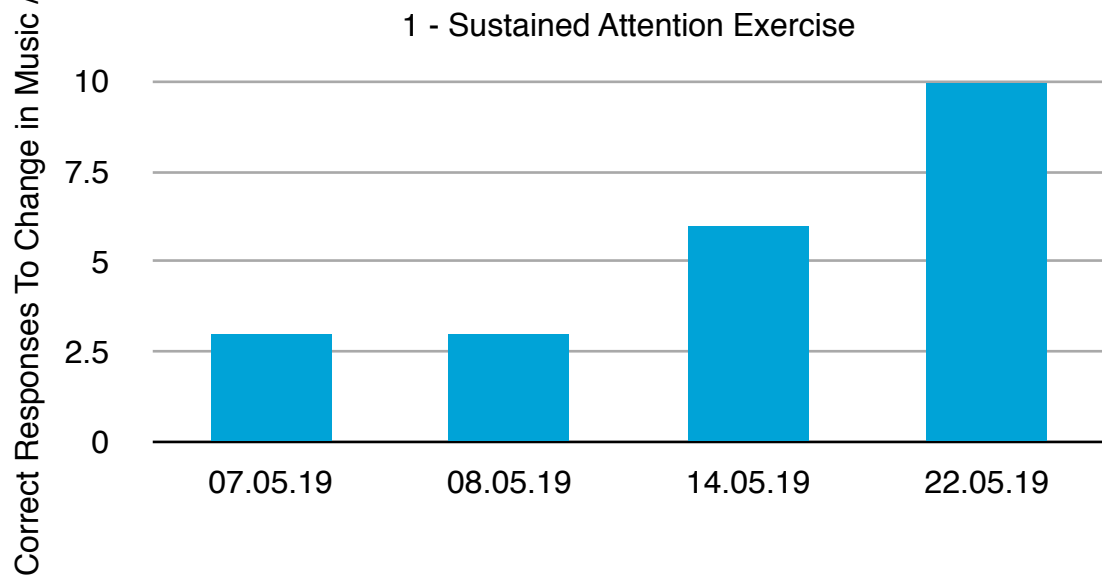
Patient 10

Referral:

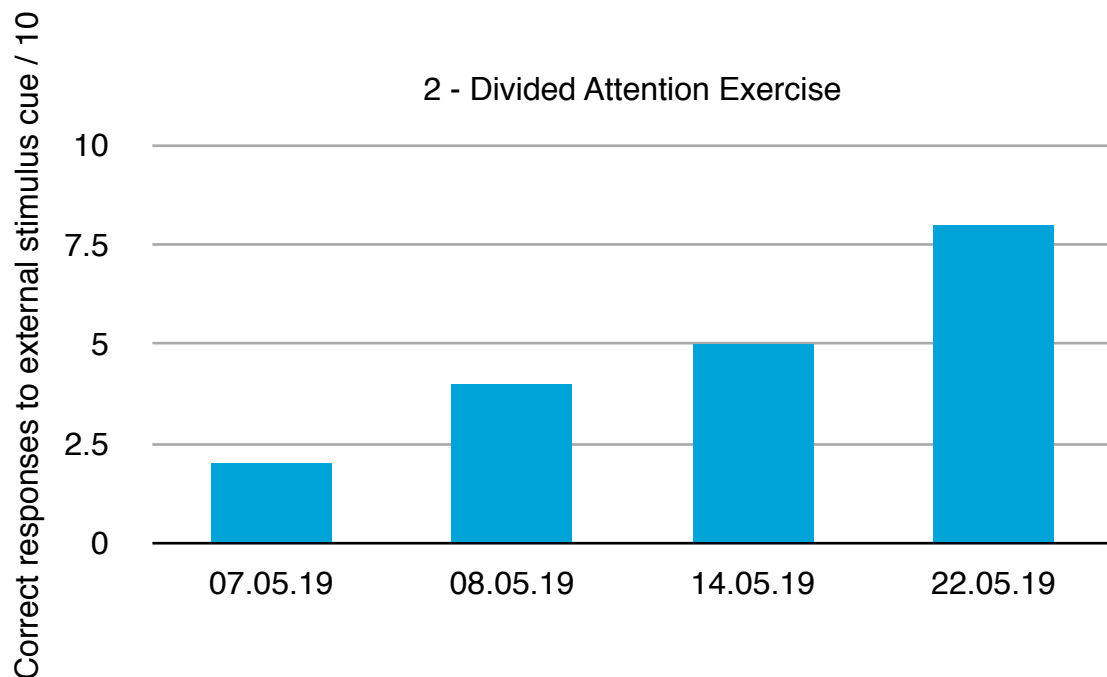
Patient referred to music therapy to assist with focusing attention amongst competing stimuli to help focus patient when attempting activities of daily living. It was reported that the patient was easily distracted when brushing teeth, and struggled to follow instructions.

Treatment: Musical Attention Control Training (MACT) x2 exercises.

- 1) The therapist and client play together on musical instruments, with the client following as closely as possible the variation introduced by the therapist (changes between tempo, play and rest, note duration etc.)



- 2) Therapist and client play together following a basic improvisational scheme and every so often a specific musical cue appears to which the patient has to respond to musically, for example, hearing a triangle being played means the patient has to stop playing.



This patient's baseline fluctuated across all impairment domains owing to a particularly severe stroke. It was reported, however, that activities of daily living, when undertaken immediately after an NMT session, increased patient's focus to the task, and time taken to complete the task was reduced compared to when done without NMT.

Highlighting the carryover of intervention, this patient also received treatment for trunk realignment (sensorimotor) whilst following instructions (executive function / working memory) and freely improvising with the therapist (psychosocial reflection).

By using the trunk realignment techniques the patient had to reach designated, colored stickers on the piano in the bass clef and return 'home' in the treble clef to realign back to centre. The patient was able to reach the bottom 87th (out of 88) note and back to the top of the keyboard, prompting him *without* a verbal cue to realign to centre. The repetition of this movement aims to instill the feeling of what 'centre feels like'.

Using therapeutic instrumental performance alongside the music therapist's improvisation, the patient hit hand drums in designated positions, just out of reach of patient's full range, designed to engage patient's trunk and core. When hearing the sound of the triangle the patient would realign and return to centre.

During the free, clinical improvisation at the piano the patient was able to produce scalar melodies with the use of space and motivic development, and was engaged in the task for 8 minutes without distraction. Again working on his sustained attention whilst taking part in an activity that was a large part of his life prior to the onset of stroke. This patient then went on to CNRU inpatient rehab on the adjoining ward.

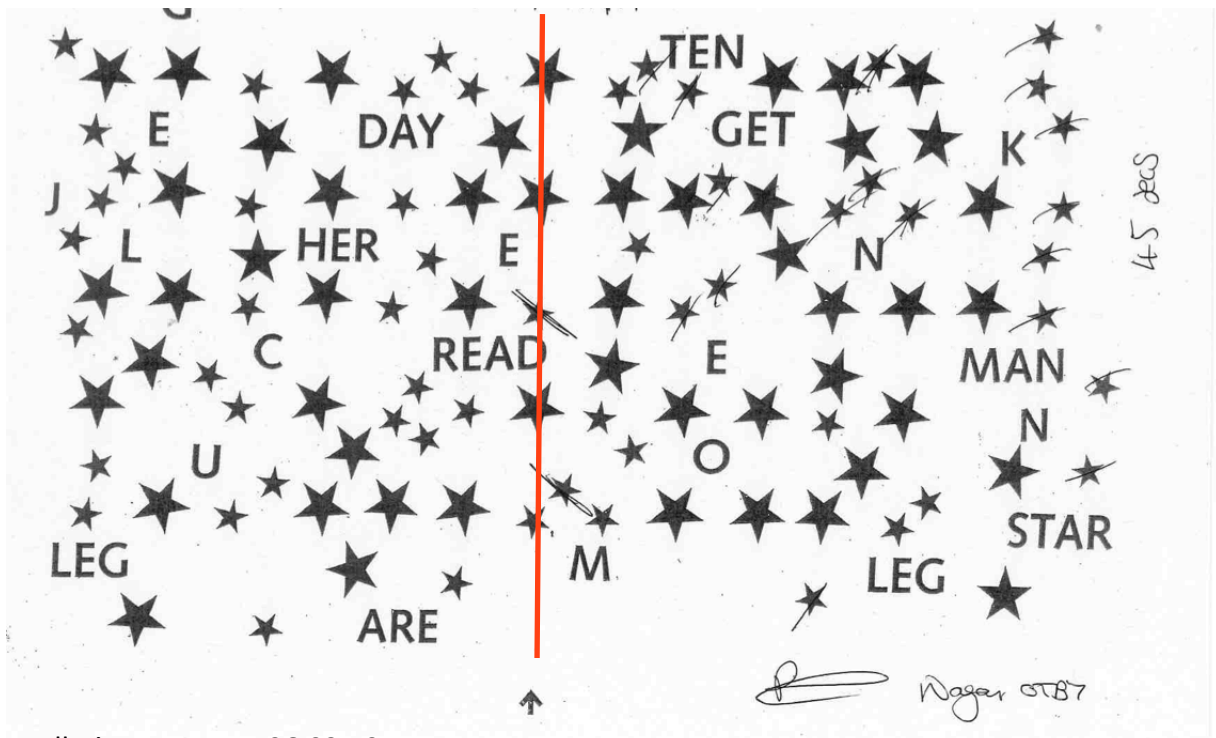
Neglect

One of the most common afflictions in stroke patients is neglect (hemineglect). This disabling condition leaves patients unaware of items on one side of space (typically the left). It is most prominent and long-lasting after damage to the right hemisphere.

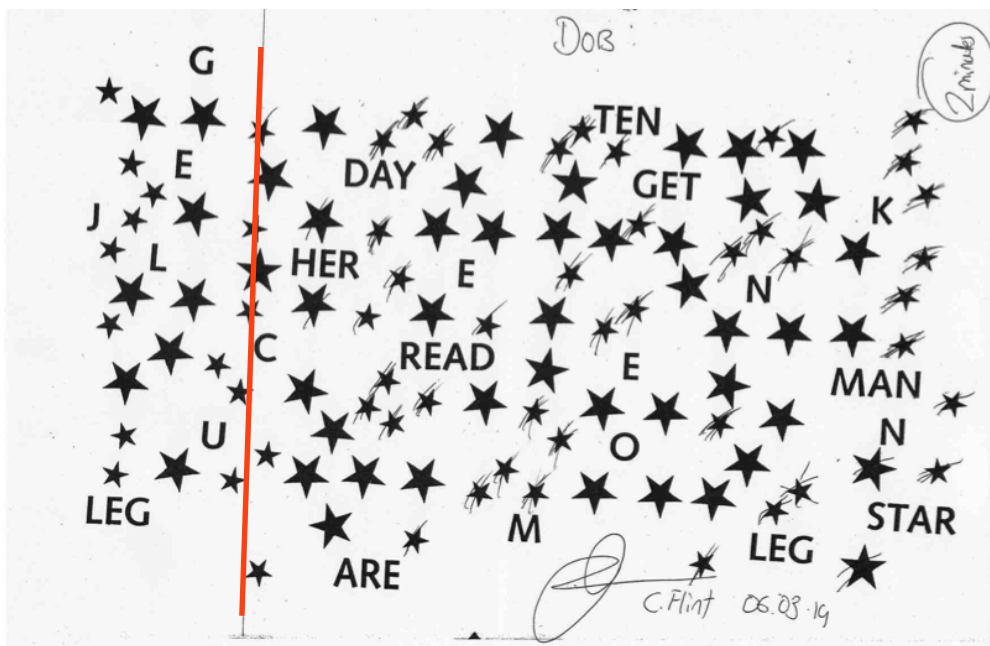
NMT offers a novel and evidence-based approach to this impairment with Musical Neglect Training, wherein familiar auditory cues (such as a nursery rhyme or an arpeggio) are used to help patients scan their neglected spatial field. Below are two star cancellation charts demonstrating the powerful affect music can have on treating this condition.

Patient 11

Star cancellation baseline 05.03.19



Star cancellation outcome 06.03.19



Severe neglect can inhibit the progress of a patient's recovery as it prevents them from properly engaging in activities of daily living, transferring, and orientating themselves in the environment. NMT's contribution helps reduce the time it takes for patients to not only start to scan the entirety of their visual field, but also the time it takes for them to gain insight into the specific type of stroke they have had.

Speech and Language and Cognitive

As mentioned before there is a high level of carryover between impairment domains. This next patient highlights this, and will allow us to then look further into the speech and language data.

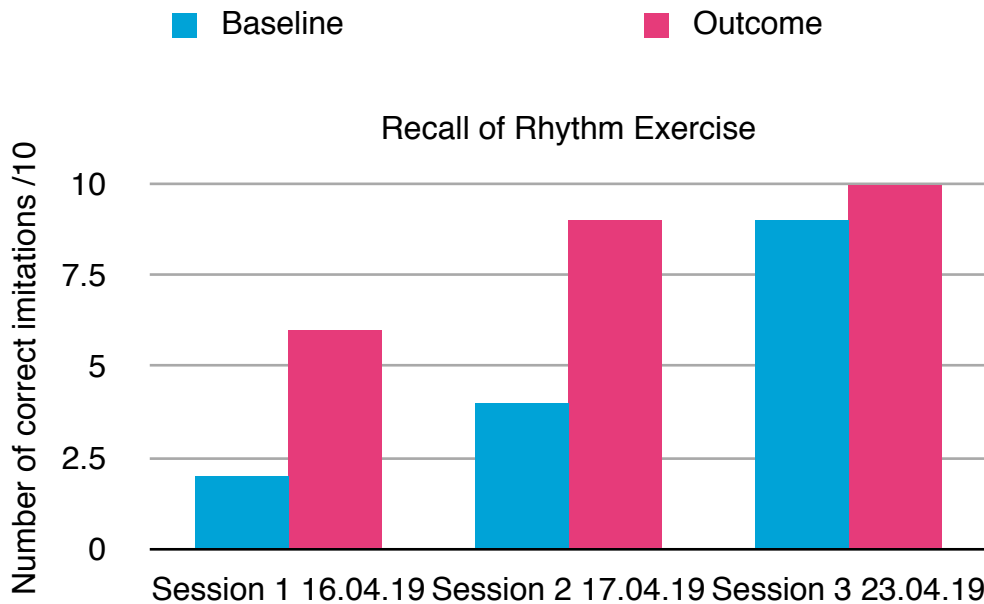
Working Memory, Auditory Processing and Comprehension Complexity

Patient 12

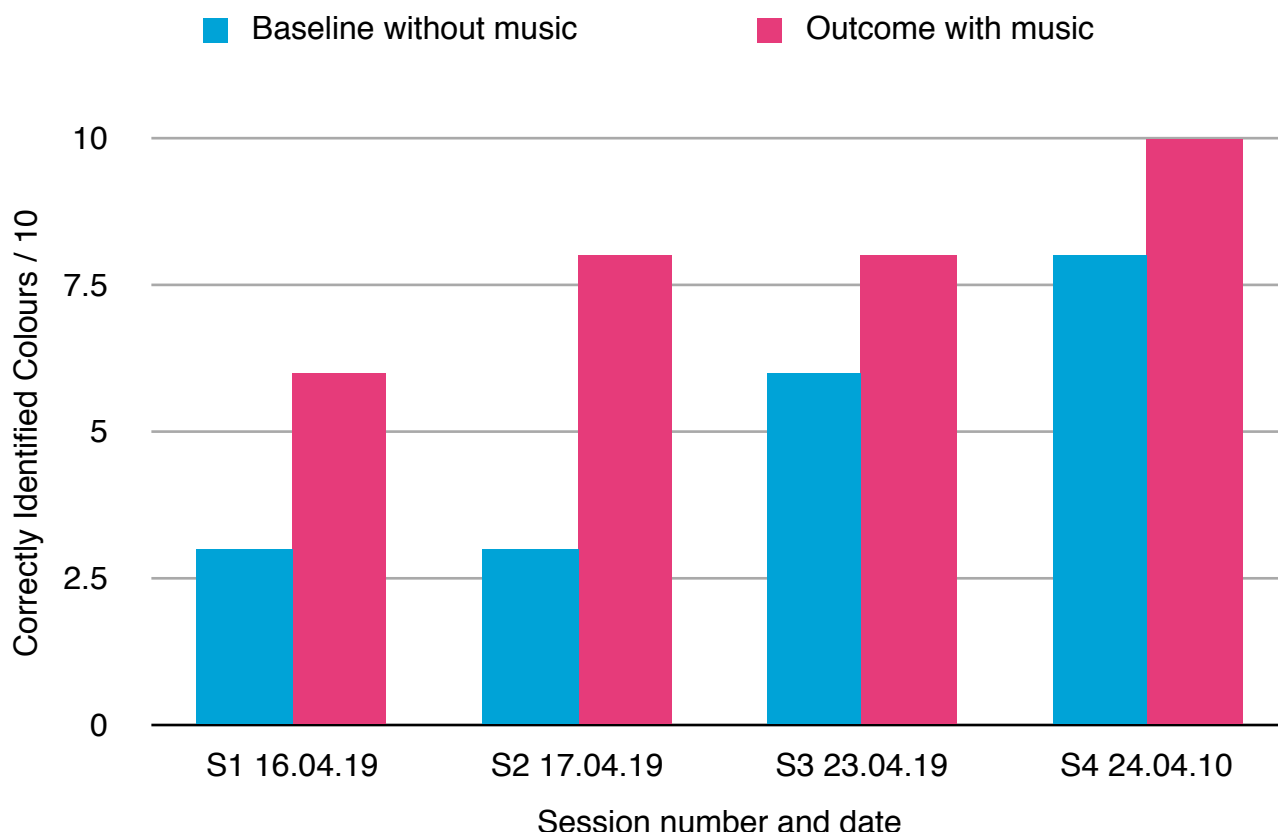
Referral: Patient referred to NMT by occupational health and speech and language therapists to initially develop their working memory, as it was reported patient was struggling to remember instructions and information given by therapists, nurses, and doctors. In addition the patient had severe receptive aphasia, impinging on his semantic understanding.

Treatment:

Recall of rhythm. Therapist would play drum patterns which the patient would imitate, increasing in difficulty.



In addition to working on his working memory, working alongside the speech and language therapist we designed an intervention to equate a key colour with a melody or cadence. For example, a blue sticker was placed on c (the tonic), a red placed on e (major third) and green on g (perfect 5th). This provided an auditory cue to help process the semantic information of blue, red, and green. The patient was played the tonic then sang the ascending colours. The patient was then asked to play a colour, and would use the melody which he had sung (in this case, a simple arpeggio) to help correctly identify the colour on the keyboard. This was contrasted with colour stickers on a table, in the same order, where the SALT asked him to 'find blue / red / green' - this acted as his baseline measure.



During this activity the patient was able to self-correct, and implement coping strategies for processing information. As we increased the difficulty to two key-words and then three, for example, 'find blue and green' 'find blue, then green, then red' the patient would often rush and not process the information properly - and so, had the experience of knowing how to process information, which he can then use as a model to inform other areas of his rehabilitation. Having the joint NMT and SALT session allowed for a musical solution to help with semantic and auditory comprehension and offer solid insight into his condition and how best to handle it in day-to-day life.

Patient 13

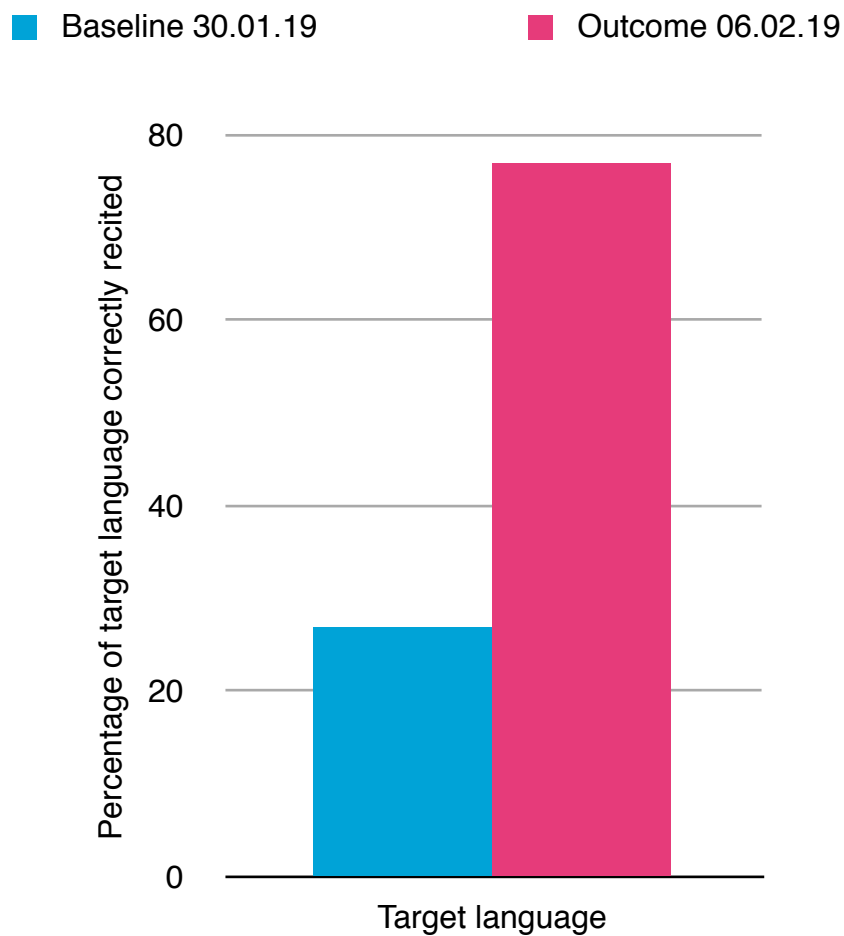
Referral: Expressive aphasia. Hoping that NMT can help the patient retain and express target information so they can communicate with healthcare professionals. After speaking with the patient and discussing and identifying where they were having problems, patient and therapist agreed that target language would be:

- 1) To be able to say what has happened to him
- 2) To be able to say his phone number.
- 3) To be able to say what his allergies are.

Treatment: Musical Speech Stimulation

Baseline: Session 1. 30.01.19

Patient unable to say phone number or what happened to him. Use original song to entrain phone number and sentence - 'I've had a stroke and finding words is hard. Please give me extra time.'



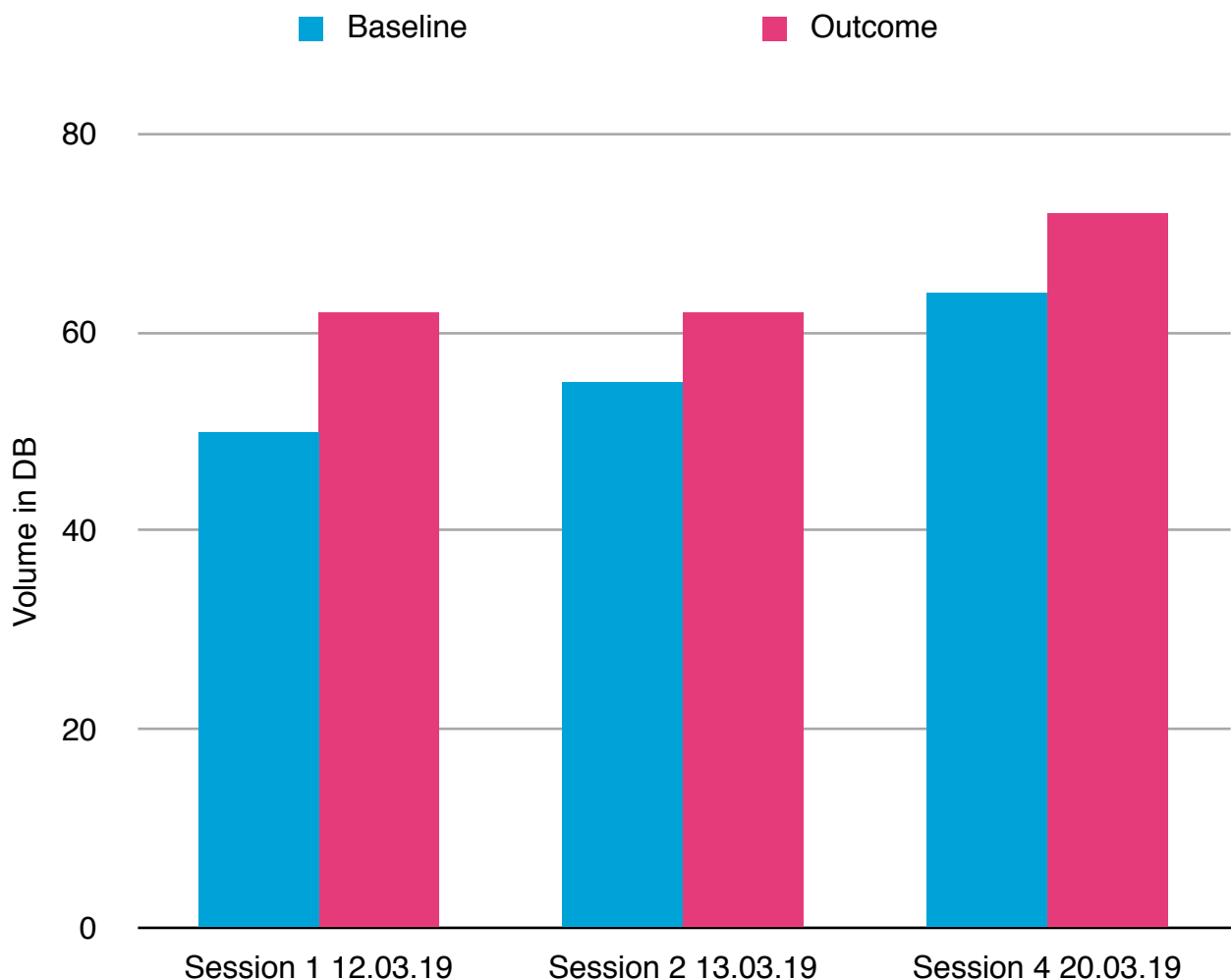
By the final session patient was able to initiate target language with minimal (x1) prompt with

melody. At baseline patient was unable to initiate the language in spontaneous spoken discourse and expressed the need to be able to.

Patient 14

Referral: ACA infarct. Dysarthria, apraxia and cognitively impaired. Patient unable to coordinate phonation. Speaking presents as whispering. It was hoped that NMT would help increase the decibel range such that the patient would be more easily understood.

Treatment: Oral Motor Respiratory Exercises and Therapeutic Singing.



Patient's family were concerned about not being able to hear what she was saying, and it was affecting ability to properly assess cognitive baseline. NMT was able initiate strength in voice allowing MDT to make appropriate assessment and rewrite goals owing to change in intelligibility.

Patient 15

Referral: Patient not engaging with SALT. Patient not producing any intelligible sound. Unable to pace articulations when he made them. Not producing reliable vowel sounds or having reliable form of decision making. It was hoped that NMT might be able to make some progress with getting a reliable word.

Treatment: Melodic Intonation Therapy, Therapeutic Singing, Rhythmic Speech Cueing.

Sessions took place with patient and his wife, and the therapist was able to handover the MIT technique to her, and record videos of the target language for the patient to practice on their iPad. Patient was also eventually able to initiate technique himself and it was reported by nurses that 'We've never heard him use words before - it's amazing when he says hello.' It was also stated by the therapies assistant that 'we can't get him to say his name when we do it, but when you sing it with him he can say his name consistently on demand, it's incredible.' Patient responded well to MIT and it was a powerful intervention for both him and his family, that is, for them to listen to him speaking intelligible words after weeks without hearing him speak a word at all. Patient is still making progress in inpatient rehab and SALT have continued using the MIT techniques to expand his vocabulary.

Baseline: Verbal. Non-purposeful, unintelligible. 'Ooo and uhh' sounds only.

Outcome: Patient able to respond to and say:

- 1) Hello
- 2) His name
- 3) No
- 4) His wife's name
- 5) Milk

One of the speech and language therapists working with this patient in the sessions said the following:

'The NMT service has been supporting the Speech and Language Therapy team to deliver melodic intonation therapy to a gentleman with severe aphasia and apraxia of speech following a

stroke. This gentleman was initially unable to produce any clear verbal output but he has been able to say some single words such as 'hello' and his name, his wife's name, and 'no' during NMT sessions. The music therapist's sessions are fun and engaging for patients, which appears to improve their participation with impairment based tasks such as this. He also involves family members in sessions and encourages them to carryover some of the strategies that he teaches.'

Patient 16

Referral: Receptive and expressive aphasia.

Treatment: Melodic Intonation Therapy, Rhythmic Speech Cueing

A speech and language therapist working alongside the music therapist summarised NMT's contribution below:

'AT presented with receptive (understanding) and expressive language difficulties and apraxia of speech. This is where the brain does not make a motor plan for the muscles we use to speak. This meant that AT was able to understand simple information but was unable to make any sounds. Therapy started with trying to regain single vowel sounds and automatic speech, such as counting. For AT the music provided a vehicle to achieve these goals where typical therapy had not reached him. Inconsistency is the nature of apraxia of speech and with one successful attempt to produce a target the next may be unsuccessful which can be understandably very frustrating.

By using a melody and rhythm to hang the language onto, the task is observed to be more automatic and the tune takes over. The sessions were also a cathartic experience for this gentleman, his family and the therapists working with him. He left the acute stroke unit able to communicate with key words and engage in simple conversation.'

Baseline: non-verbal.

Outcome: able to communicate key words and engage in simple conversation.

Hard-to-reach and psychosocial

We have used therapists' feedback, ones who worked closely with the music therapist and hard-to-reach patients, to evidence the contribution of NMT with this patient group. Patient's names have been anonymised.

Occupational Therapist Feedback for 'Fred':

'Fred was well known and loved within his community in particular for his vibrant personality skills as a musician. When Fred had his stroke he initially had weakness throughout his right arm and leg and slurred speech, which had vast implications for his mobility, functional independence, mobility and critically his leisure and social participation. Fred was lonely, low in mood and isolated in hospital, engaging in exercise or activities of daily living was challenging and often highlighted his weakness and disability. Fred came alive in music therapy sessions and achieved movement, strength and endurance targets that were far greater than our initial goals, Fred continued to progress and used the strategies practiced in music therapy to support his walking, self-care and communication outside of sessions, his mood lifted and he quickly became known for his character by staff and patients on the ward, he was always enthusiastic to start into his day's activity. Fred unfortunately suffered a set back when his stroke extended and his impairments worsened to the extent that he lost all movement in his right side. Weeks past where Fred stayed in bed much of the time declining to sit out, eat or participate in therapy and again his mood greatly deteriorated. Overtime, it became clear that rehabilitation was no longer an appropriate approach in meeting Fred's longer term needs and optimizing his quality of life. Our focus shifted to maintaining engagement and quality of life so that Fred would not lose his residual abilities and could continue to participate in valued occupations. This remained challenging due to the extent of Fred's low mood and the established pattern of disengagement, Charlie agreed to join in on sessions with Fred with a goal of getting out of bed so that he could make it to music group. At first he was reluctant, but soon Fred was attending up to 3 therapy groups a week (in which he sang or drummed the table regardless of the group activity) and was regularly sitting out of bed for mealtimes again and chatting with staff throughout the day. Fred left the ward weeks later to attend a long term care setting, by the time he left his bedside was surrounded by brightly coloured pictures he had painted, he called on many of the staff to say goodbye and many of the patients to say good luck.'

Physiotherapist and Occupational Therapist Feedback for 'Montel'

'Montel presented on admission with variable alertness and fatigue. These initially were consistent barriers limiting his engagement in therapy. As an MDT we also knew little about his social history. What we did know was that he was painter by trade and a very social man, enjoying

all music particularly 'The Blues'. Because of this it was suggested that perhaps we try Music Therapy to help with his engagement, as he might find it enjoyable / meaningful. It seemed to be beneficial, as he started to 'emerge'. He appeared more awake more consistently; we observed for the first time meaningful movement (e.g. reaching and attempting to play the keyboard); he demonstrated sustained attention (up to 5mins); and also appeared to really enjoy himself (e.g. smiling). Other observations included: Montel looking reflective, and on occasion, when we saw him, attempt to verbalise (either mouthing or producing inaudible words). Although these observations have been seen multiple times in sessions, the carryover has not always been consistent with Montel making struggling to meet his functional gains with therapy input from any of the MDT.

As a therapy team we feel Music Therapy has been a great tool in facilitating social and quality of life improvements for the patient. He objectively appears to love music and it often helps to settle him. I also think Music Therapy helped to first engage this patient in therapy and potentially helped to build a rapport with him.'

We feel it was great and beneficial that we had Music Therapy to consider as an option with this patient.'

Open Music Group

For the Trust, music therapy has above all brought a new dimension to the dynamic of rehabilitation on the ward: the open music group. One of the hopes of the project was that it would help engage hard to reach patients, and possibly offer a space where patients could come together and share their experience of stroke and being on the ward.

This has been achieved through the open-music group sessions. Meeting once a week for an hour, the group is made up of half a dozen or so patients coming together to talk about what they are going through, what struggles they are undertaking, what success they have achieved, and what hopes or fears they have for the future, amongst a myriad of other things. The group allows each patient to listen to one another, support their fellow members, and foster not only a sense of solidarity, but also the feeling that they are able to be there for someone else.

Managed by the therapist but led by the associations of the group, patients report feelings of calmness, relief, friendship, and fun that they carry with them throughout the week. It is an open group meaning any patient is welcome to join, but it tends to be members of the ward who are slightly higher in cognitive capacity, however members who are non-verbal or who have high-level physical impairments also join the group.

Through improvisation, singing songs selected by patients and therapists, or engaging in free improvisations, or indeed sometimes, silence – a rare gift in the acute setting - some truly wonderful moments have been observed when people suffering the same pain come together to share it; that is to say, when a person feels alienated from themselves and to then have someone sit next to them, someone who knows what they are going through and have them lovingly place their hand on theirs, this sense of shared support is something no doctor, nurse, or therapist can give.

Qualitative data collected by therapies assistants with a three question survey. Patient's names have been anonymised.

Question 1: What did you like about the music therapy group?

Janine - 'It makes me feel like myself. It's jolly. It really brightens up the day and makes me feel good. Really lightened my mood. Enjoyed the drums - found them hard but in a good way.

Sue - 'What a friendly group where you meet some people with the same problems and from different wards.

Margaret - 'Thought it was relaxing because everyone knew each other. Music is always a mood lifter.'

Robert - 'I liked that it was a group with other patients.'

Alfie - 'Nice to socialise and make friends with people going through something similar.'

Question 2: Did you feel part of a group?

Fred - 'I used to be in a band. It was special to be a part of this again.'

Keith - 'Yes very much so; very inclusive.'

Brian - 'Felt welcome and comfortable. I enjoyed it a lot and would encourage others to join.'

Pam - 'Felt grateful, everyone was very friendly.'

Chris - 'The therapist made an impact: the group worked hard and the music was marvelous.'

Question 3: Did you feel able to express yourself?

Elizabeth - 'Yes. Sharing memories of music in the group - I remembered one of the songs from the TV: was so nice to hear it again.'

Michael - 'Felt like I had a voice..'

Denis - 'Absolutely yes. It's not just the music it's the therapists as well - they're good at what they do. I felt thoroughly relaxed'

Mark - 'It helps. And it helps in other ways. Not just your physical but your mental.'

Lyn - 'Oh that I enjoyed, that I enjoyed an awful lot.'

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