Jurnal SENI MUSIK
Vol. 18, No. 1 Mei 2026 page: 1 - 8
DOI: dx.doi.org/xx.xxxxxx/jsm.v1i1.xxx
P-ISSN: 1829-8990 E-ISSN: 2580-5371

The implementation of Musical Speech Stimulation® in regaining automatic speech in communication rehabilitation after stroke: A single case study

Renata Audia Kuswanto, MT-BC, NZRMTh, NMT
Southern Music Therapy
renata@smt.nz

Abstract

Loss of communication function or known as aphasia commonly occurs after a cerebrovascular accident (CVA). Music therapy has been slowly used as a resort in supplement to speech therapy for communication rehabilitation in stroke, but scientific evidence is still limited. In severe cases of aphasia, automatic speech has been primarily targeted before working on other aspects of communication, such as oral motor training, constructing phrases, making choices, and reading. This single case-study specifically reviews the use of Neurologic Music Therapy® technique, named Musical Speech Stimulation® to regain automatic speech in a patient experiencing a mix of expressive and receptive aphasia. **Method** The subject of this study is a 64 years old Caucasian female who has experienced a stroke and followed by severe chronic aphasia in 2022. Subject has attended concurrent music therapy sessions for communication rehabilitation since April 2023. **Result** the therapy outcomes showed that there was significant increase in verbal automatic speech responses, including intentional terminal phrases. **Conclusion** Musical Speech Stimulation® technique is a feasible non-invasive resort for treatment of post-stroke aphasia to regain communication function, particularly in severe cases of loss of expressive and receptive communication.

Keywords: Communication rehabilitation, Neurologic music therapy®, automatic speech recognition, aphasia, verbal communication

Received: 29/02/2024 Revised: 17/04/2024 Published: 31/05/2026

Penerapan *Musical Speech Stimulation*® dalam mendapatkan kembali kemampuan bicara otomatis dalam rehabilitasi komunikasi setelah stroke: Studi kasus tunggal

Abstrak

Afasia atau yang diketahui sebagai kehilangan kemampuan bicara dan menggunakan bahasa umumnya terjadi setelah Stroke. Terapi musik sudah secara perlahan digunakan sebagai tambahan terapi wicara untuk rehabilitasi komunikasi pada pasien Stroke, namun bukti saintifik masih sangat terbatas. Pada kasus afasia berat, *automatic speech* atau bahasa otomatis seringkali ditargetkan sebagai pada proses penyembuhan sebelum menargetkan aspek lain yang lebih kompleks dalam komunikasi, seperti latihan otot oral, menyusun kalimat, menentukan pilihan, dan membaca. Pada studi kasus tunggal ini, peneliti secara khusus akan membahas penggunaan salah satu teknik Neurologic Music Therapy® yang disebut Musical Speech Stimulation® untuk mengembalikan kemampuan bahasa otomatis pada pasien yang mengalami afasia ekspresif dan reseptif. **Metode** Subjek penelitian adalah seorang perempuan Kaukasia berumur 64 tahun yang menderita Stroke pada tahun 2022. Subjek telah menjalanin program terapis musik untuk rehabilitasi komunikasi dari April 2023 hingga saat ini. **Hasil** Hasil dari program terapi menunjukkan bahwa terdapat pertambahan signifikan pada bahas otomatis yang diucapkan secara verbal, termasuk frasa yang dimaksudkan. **Conclusion** Teknik Musical Speech Stimulation® bisa menjadi salah satu opsi perawatan yang non-invasif bagi penderita afasia post-stroke untuk mengembalikan fungsi komunikasi, terutama pada kasus dimana pasien kehilangan kemampuan berekspresi dan mengerti bahasa.

Kata Kunci: rehabilitasi stroke, Neurologic music therapy® , automatic speech, afasia, komunikasi verbal

Introduction

The life after stroke may appear to be challenging for the survivors and their careers, concerning the complexity of the dysfunctions in communication, cognitive, physical, emotional, and the social aspect of daily living. Stroke or medically understood as cerebrovascular accident (CVA) happened at unpredictable nor unexpected time. Therefore, Stroke survivors and their loved ones may be unprepared in facing the life-changing and devastating situation. The changes of lifestyle and adaptation requires a process where time is indefinite. Although impacts look different with every individual who experienced stroke depending on the location, severity, and the type of stroke, the impact of stroke in communication is significantly challenging and often set as the main recovery goal when it occurred.

The rehabilitation goals prioritize physical and communication functions in the recovery process, especially for the first three to six months after a stroke. This is an essential period due to the momentum of spontaneous recovery of speech, mobility, ambulation, and cognitive functioning (Dow et al., 2017, 26). When an impairment of communication occurs, the patient will be referred to a speech language therapist for regaining expressive and/or receptive communication treatment. The communication impairments usually affected by stroke are *dysarthria, dysphagia, aphasia* and *apraxia.*

Aphasia is prevalent when damage happens on the left brain, affecting the Broca's and Wernicke's area that process language. According to a study by Berthier (2012, p. 163), around 20-40% left stroke survivors would develop *aphasia* onset after the injury. *Aphasia* symptoms were indicated by the loss of ability to communicate, not limited to comprehension of language and verbal expression (Basso et al., 2013, 325). For years, speech therapy has been referred to as the main rehabilitation treatment for *aphasia*. In therapy sessions, therapists would explore different strategies for patients to form the most suitable communication method. However, the efficacy of speech therapy alone has not guaranteed significant recovery of *aphasia*.

Therefore, the rise of music therapy programs in medical rehabilitation settings opened a new approach of communication rehabilitation after stroke. By taking the neurologic perspective of how music is processed in the brain, music-based interventions may seem feasible and non-invasive to address post-stroke communication rehabilitation. Research in music therapy for multidisciplinary acute stroke rehabilitation has been significantly increasing, though still limited in practice due to the novelty of the approach (Street et al., 2020, 541). In the communication area, especially when *aphasia* occurs music therapy is used as activities like singing, listening to music, reading song lyrics show overlap with the activation of brain cortex around the language area and in regaining language possession.

In a severe case of *aphasia*, the therapeutic recovery process has been limited down to speech therapy. However, there have been many opportunities where music-based intervention including Neurologic Music Therapy (NMT)® techniques have been used in supplement to speech therapy both in acute and outpatient settings. NMT® is an approach in music therapy that combines musical-based interventions and the neuroscience perspective through collaborative research with allied healthcare professionals. NMT® techniques are adversely used in neurologic rehabilitation treatment whether it is in acute care or outpatient to address physical, cognitive and

communication goals in addition to patients' physiotherapy, speech therapy and occupational therapy program.

This single case study will overview the implementation of NMT® techniques, specifically Musical Speech Stimulation (MUSTIM)® by a stroke patient in regaining expressive communication skill. This study will also indicate the feasibility of music-based intervention in supplement to the speech therapy treatment for post-stroke aphasia treatment.

Poststroke Aphasia & Automatic speech

Poststroke aphasia is the loss of ability to comprehend and produce language after a stroke accident. *Aphasia* is more common to happen on a left-hemisphere stroke and depending on the size of the lesions and the location of injury may affect the severity of the impairment (Berthier, 2012, 164).

The term automatic speech or non-propositional reflexive speech in relation to *aphasia* was commonly used to assess the ability of patients to respond to familiar phrases like greetings. This happens because automatic speech is not stored in the language cortex but has the potential of unambiguous activation of the language processing area. Although it will seem that a patient is able to show verbal responses, automatic speech does not guarantee the immediate formation of language and meaningful verbal responses. Automatic speech is the result of overlearned and overused phrases that could come out when triggered with certain cues (Bookheimer et al., 2000, 1151).

In the context of music therapy treatment, automatic speech tasks can commonly be achieved through familiar tunes due to the effect of semantic memory of the musical material such as the melody, rhythmic sequence, and the lyrics. In the assessment process, patients may be asked to sing or complete the lyrics of a familiar tune like "Happy Birthday". This basis was utilized in this current case-study to investigate the feasibility of automatic musical speech task in the process of communication recovery.

Research Method

This single-case study was based on an ongoing music therapy program of a client at Southern Music Therapy, Christchurch, New Zealand. The subject of study is "M" - 67 years old Caucasian female who experienced stroke in June 2022 with severe post-stroke aphasia.

The client was referred privately by the career and family to come for a biweekly music therapy session in a community venue. The criteria of study were observed after the first assessment session with a client that includes: familiarity of various popular tunes, intact semantic memory, and had experienced stroke in the last 6 months. Through the assessment, M' baseline showed that she had limited comprehension of language, minimum control of oral motor movement, perseverance on certain repetitive phrases and difficulty to create meaningful verbal responses.

Procedure

Music therapist work individually with M in concurrent 45-minute music-based sessions every week. The session was designed in different planned use of melodic lines, familiar lyrics, rhythmic cueing and visual cueing. Throughout the course of therapy, Maree showed significant improvement in the production of automatic speech through singing familiar songs. The goal of the music therapy treatment is to increase the production of automatic speech that M would find meaningful for the progression of her speech using the Neurologic Music Therapy technique called Musical Speech Stimulation (MUSTIM).

The success rate is determined by the consistency of language production through MUSTIM intervention. The focused phrases were repeated for at least two sessions in a row to increase consciousness to task and to maintain consistency of the outcomes.

Musical Speech Stimulation (MUSTIM)®

The main NMT technique used in the treatment is MUSTIM, whereby the music therapist used familiar songs or tunes to M to explore her unconscious ability to form appropriate verbal responses in a form of song. M was satisfied with the outcomes after going through different songs

When M showed consistent musical responses, MT reinforced training through the repetition of the phrases with or without melodic lines to induce higher awareness of the oral motor movement and the production of appropriate sound.

The focused phrases are listed as below:

Session 1-4 : "Good morning to you", "I am M", "Beautiful Day"

The short phrases were taken from a popular song, "This Little Light of Mine" that has repetitive motives, upbeat rhythm and matching the syllables of wanted phrase "Good morning to you" and "I am M". The trials showed successful outcomes when two phrases were separated by other melodic material. When two different phrases share similar musical materia, there was a potential of perseveration of one phrase over another.

During assessment, a random popular song of "Beautiful Sunday" by Daniel Boone was used to assess automatic speech completion. M successfully completed the missing lyrics with the terminal phrase "Beautiful day" which led to using similar musical material to maintain consistency.

Session 5-10: "I love you"

In these stages, different familiar songs that contained the phrase "I love you" were used to induce the automatic production of the targeted phrase. The familiar songs that related to M knowledge of repertoire included "What a wonderful world" (*They really saying "I love you*") and "Love me tender" (*For my darling "I love you"*)

Session 11 to current: "Wonderful world", "See you later", "Good Bye", "How are you today?"

The musical material used in this treatment combines the use of personalized popular songs and repetition of pre-made musical material. Rhythmic cueing was occasionally used to facilitate the processing of word sequences in learned phrases by emphasizing the prosody of words, such as in the phrase "See you later" as shown below:

3 1 2 1 | 2 3 . . | 1 2 . . | 7 1 . . |
See you la - ter. Good - bye, Good-bye, Good-bye.

The use of a simple melodic line aimed for effective cognitive processing, while the rhythmic pattern encouraged the exaggeration of the articulation of the words.

Conclusion

The result of M ongoing music therapy treatment shows there was significant improvement and increase of words produced through automatic speech musical tasks. The speech therapy program appeared to progress in parallel to the music therapy treatment. In speech therapy, M was working on making decisions through yes or no questions. It was observed that Maree's consistency of yes / no responses increased in the session. Emotional outcomes took part as M had breakthrough moments in the sessions where she realized that she could produce meaningful speech through the songs that may have personal connection to her trajectory.

The potential limitations of these studies include the exclusivity to one subject of study with the criteria of severe *aphasia*. During the treatment process, the subject experienced withdrawal from the sessions for the duration of six weeks that may affect the consistency and validity of the result. Other implications of this study included potential perseverance caused by repetitive training and the lack of contextual understanding of phrases as automatic speech may still be considered a pseudo communication method. Nevertheless, the main objective of this case study was to introduce M to the possibility of improving speech production as a motivator for further communication rehabilitation treatments.

This ongoing treatment is projected to be re-assessed within the next six months in the circumstance where attendance to session is orderly. Future research on the relation between automatic speech and language processing will necessarily be needed. In addition, MUSTIM® has a potential to be implemented in the assessment and/or treatment process of speech rehabilitation in post-stroke recovery program.

References

Basso, A., Forbes, M., & Boller, F. (2013). Rehabilitation of aphasia. In *Handbook of Clinical Neurology* (Vol. 110, pp. 325-334). Elsevier. https://doi.org/10.1016/B978-0-444-52901-5.00027-7

Berthier, M. L. (2012). Poststroke aphasia: Epidemiology, pathophysiology and treatment. *Drugs & Aging*, *22*(2005), 163-182. https://doi.org/10.2165/00002512-200522020-00006

Bookheimer, S. Y., Zeffiro, T. A., Blaxton, T. A., Gaillard, P. W., & Theodore, W. H. (2000). Activation of language cortex with automatic speech tasks. *Neurology*, *55*(8), 1151-1157. 10.1212/wnl.55.8.1151

Dow, D. M., Dow, D., & Sutton, M. (2017). *Healing the Broken Brain: Leading Experts Answer 100 Questions about Stroke Recovery*. Hay House.

Street, A., Zhang, J., Pethers, S., Wiffen, L., Bond, K., & Palmer, H. (2020). Neurologic music therapy in multidisciplinary acute stroke rehabilitation: Could it be feasible and helpful? *Topics in Stroke Rehabilitation*, *27*(7), 541-552. https://doi.org/10.1080/10749357.2020.1729585