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Review

Complementary Medicine and Expressive Arts Therapy: Adjuvant for Recovery Following Neurosurgical Procedures

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Abstract

Art as a way of healing is primordial in many cultures. Expressive Arts Therapy (ExAT) uses art, music, dance, and writing to help individuals navigate their healing journey. Patient self-expression as a mode of recovery has been observed in patients with Parkinson's disease, epilepsy, Amyotrophic Lateral Sclerosis (ALS) and cancer. Complementary medical approaches such as acupuncture and mindfulness have also demonstrated benefits in patients suffering from neurological injury. Complementary medicine and ExAT are not mainstream approaches following neurosurgical procedures. There are very few systematic studies evaluating the benefits of expressive arts in neurosurgery. Advances in telemedicine and mobile applications may facilitate the incorporation of complementary medicine and ExAT into patient recovery. The purpose of our study is to explore the use of complementary medicine and ExAT in neurosurgical recovery. We start with a brief introduction of ExAT followed by available

treatments offered. We discuss the benefits of multidisciplinary care and emerging technologies and how they can facilitate incorporation of complementary medicine and ExAT in neurosurgery. Finally, we review several clinical studies that have demonstrated success in using complementary medicine. Our goal is to provide alternative approaches to neurosurgery recovery so that patients may receive with the best care possible.

Keywords
Expressive arts therapy (ExAT); multidisciplinary care team (MDT); neurosurgical recovery; complementary medicine

1. Introduction

Art as a way of healing is primordial in many cultures. Western societies have recently adopted the idea of incorporating the arts for medicinal purposes [1]. Expressive Arts Therapy (ExAT) as a formal practice dates back to mid-20th century Europe during the British tuberculosis epidemic, with artist Adrian Hill coining the term in 1942 [2]. As popularity quickly spread and with the help of pioneers such as Margaret Naumburg, the first American Art Therapy Association was founded in 1969, with the emergence of similar associations in Singapore, New Zealand, and Australia following [2, 3]. In 1994 the International Expressive Arts Therapy Association (IEATA) was founded; since then, IEATA has become a connector for cross-country collaboration and cultural appreciation within the ExAT community [4].

Expressive Arts Therapy (ExAT) combines physical and psychological non-mainstream methods (Figure 1). ExAT uses art, music, dance, and writing with a trained expressive arts therapist to help individuals navigate their experiences and emotions (Table 1) [5-7]. There are no limitations for using ExAT, including settings, supplies, or physical ability [7]. No experience or skill set is required for ExAT to benefit the individual. Although the individual receiving the ExAT does not require experience or a skill set, the art therapist does. Because different cultures have different art forms, expressive arts therapists should be culturally competent [8]. Similarly, complementary medicine refers to conventional treatment methods in conjunction with non-mainstream methods; non-mainstream methods include physical, psychological, or nutritional approaches [9].

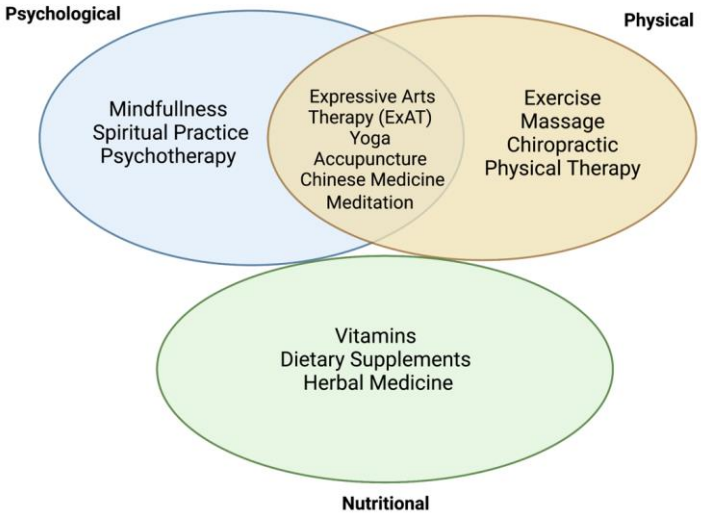

Figure 1 Examples of Complementary Medicine. Psychological approaches include mindfulness, spiritual practice and psychotherapy. Physical approaches include exercise, massage, chiropractic care and physical therapy. Nutritional approaches include the use of vitamins, dietary supplements and herbal medicine. Expressive Arts Therapy (ExAT) combines Physical and Psychological health approaches.

Table 1 Examples of Expressive Arts Therapy Modalities.

Therapy Modality	Examples
Art	Drawing, painting, sketching, clay sculpting, photography, mask-making, coloring, craft making
Music	Listening, composing, playing an instrument
Writing	Film writing, story writing, poems, songwriting, journaling
Performance	Drama, improvisation, story-telling, role-playing, self-portraiture acting, dance, freeform dance, choreography

From the inception of ExAT, its application has been mainly in terminally ill patients and psychiatric cases [6]. Thus, much of the scientific work related to ExAT focuses on depression, anxiety, and quality of life for patients with cancer, with results showing improvement in those areas [10]. However, of late, Expressive Arts Therapy has been applied more broadly, from managing potentially violent adolescent bereavement and elderly care [11-14]. Furthermore, ExAT does not fit a specific condition or severity. Researchers at the World Health Organization (WHO) concluded through a Health Evidence Network synthesis report that the arts are effective in managing and treating acute conditions, helping improve outcomes in rehabilitation and emergency care [15]. Music as a treatment before surgery to aid with anxiety and post-operatively to aid in recovery has shown to be effective in adults and children [16-19]. Our goal is to explore the benefits of incorporation of complementary medicine and ExAT as adjuvants for recovery following neurosurgical procedures.

2. Complementary Medicine and Expressive Arts Therapy in Neurosurgery Recovery

Music therapy has been studied in neurosurgical rehabilitation in Germany since the 90s [20]. This research sparked an increased interest in Neuromusicology. With the addition of modern research, new therapeutic strategies are being investigated to improve music therapy's impact on neurosurgical rehabilitation [20, 21]. With such promising results for music as a therapeutic approach, Expressive Arts Therapy should be applied and scientifically studied more broadly, including in the recovery following neurosurgical procedures. However, ExAT can be challenging to validate and execute using a systematic study framework [22].

Very few neurosurgical programs consider expressive arts to be an integral component of a patient's recovery plan despite benefits of ExAT seen in various patient populations. For example, the Barrow Neurological Institute offers Parkinson's disease patients painting workshops where patients view painting tasks as challenges to be overcome—leading to feelings of pride and autonomy [23]. Despite having tremulous hands, patients can produce an object of beauty. Moreover, they experience a sense of community with other patients who have Parkinson's disease. Making social connections is also a critical component of group art therapy. Group art therapy improves depression and chronic stress in epilepsy patients [24]. Patients feel free to express grief in a supportive community and learn to cope with treatment stress leading to better emotional regulation.

Other benefits of complementary medicine and ExAT include their holistic and mind-body integration approaches. Neurology studies have demonstrated that expressive arts therapy utilizes a holistic approach to wellness that has the potential to improve the overall quality of life. Art therapy after a stroke improves the use of affected limbs and facilitates focused attention and communication, including social interactions and emotional expression [25]. Dance/movement therapy (DMT) has shown many benefits in adult patients with Amyotrophic Lateral Sclerosis (ALS) and cancer patients undergoing chemotherapy. DMT encourages patients to integrate their minds and physical bodies, improving coping, mood, anxiety, stress, body image, and overall quality of life [26]. Patients also experience physical improvements in fatigue, self-care, and treatment adherence.

Performance therapies such as drama and storytelling can lead to personal growth and healing. Drama therapy is an experiential approach that can address trauma, substance use and mental illness. A study by Cheung and colleagues (2010) found that patients suffering from serious psychiatric illnesses experienced a decrease in psychiatric symptoms after engaging in a drama therapy program [27]. Storytelling as a component of a creative expression program (CrExp) improves memory and communication skills in patients with mild cognitive impairment (MCI) who are at risk for developing Alzheimer's disease and dementia [28].

Complementary medicine approaches such as nutrition and supplementation, may also play a vital role in recovery following neurosurgical procedures [29]. Cook and colleagues established that emphasizing nutritional consultation within the first 24-48 hours after TBI may be critical for the successful provision and tolerance of nutrition support [30]. In a 2014 study, 14 key micronutrients important for brain health were identified, and TBI patients were surveyed about their diets. This study found that patients who failed to meet the recommended dietary allowances were linked with worse outcome scores compared to those who had adequate nutrient intake [31]. Considering all of the potential benefits of complementary medicine and ExAT it would be advantageous for the field of neurosurgery to incorporate them into patients' recovery plans.

3. Benefits of Multidisciplinary Care Teams and Expressive Arts therapy in Neurosurgical Recovery

An important factor that improves patient outcomes is the presence of a multidisciplinary care team (MDT). The goal of an MDT is to improve treatment efficiency, maximize patient safety and satisfaction, and optimize healthcare workers' performance [32]. It has been shown that the lowest odds of death were in intensive care units (ICU) with high-intensity physician staffing and the multidisciplinary team, followed by ICUs with low-intensity physician staffing and multidisciplinary team [33]. The success of MDTs is attributed to a diversity of specialists cooperating and driven toward the common goal of patient recovery. The MDT approach requires efficient coordination of all providers in decision-making which facilitates open communication, best target management, education, and direction for complicated cases [34]. The MDT approach also demonstrates a shift from a hierarchical and fixed treatment approach to a horizontal team approach that is dynamic and supportive of personalized care.

Multidisciplinary care teams should include ExAT as it focuses on patient self-expression as a mode of recovery. Patient self-expression through art allows the patient to express emotions about the challenges and pain of recovery [35]. Patients may struggle to vocalize painful experiences, and ExAT provides another mode of communication [36]. Dance allows patients to express themselves physically [37]. Art therapy allows patients to process and conceptualize their feelings by creating images [38]. Drama therapy is a powerful process for self-expression, self-discovery, personal growth, and healing (Sherrell, 2022) [39]. Self-expression through art can clarify the patient's recovery process and lead to more significant psychosocial benefits. As the field of neurosurgery moves into incorporating a multidisciplinary care team in patient care, incorporation of ExAT will provide neurosurgical patients with the best recovery care possible (Figure 2).

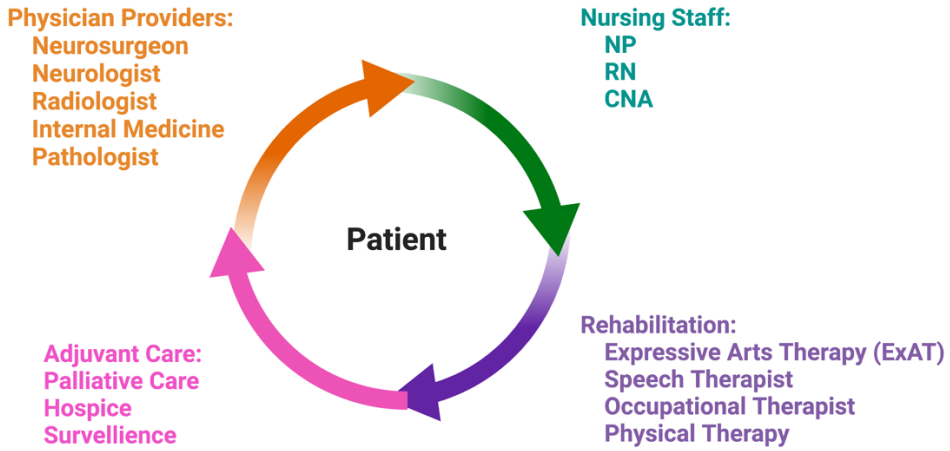

Figure 2 Potential Neurosurgical Multidisciplinary Care Team (MDT) including Expressive Arts Therapy (ExAT). Four essential areas of care including physician providers, nursing staff, rehabilitation, and adjuvant care. All providers working synergistically will lead to better health outcomes for neurosurgery patients.

4. Emerging Innovations and Use of Virtual Technology to Improve Access to Complementary Medicine and Expressive Arts Therapy

Access to complementary medicine and ExAT can be improved using telemedicine and mobile applications (Figure 3). Telemedicine and virtual technology emerged quickly due to the Covid-19 pandemic as tools for improving access to medical services. Kaufman-Shriqui and colleagues (2021) assessed the quality and utility of different telemedicine platforms by offering virtual nutrition consults. Their study concluded that telemedicine is promising for consultations and offered potential benefits such as reducing healthcare costs, improving access to healthcare services, and eliminating geographic barriers to patients worldwide [40].

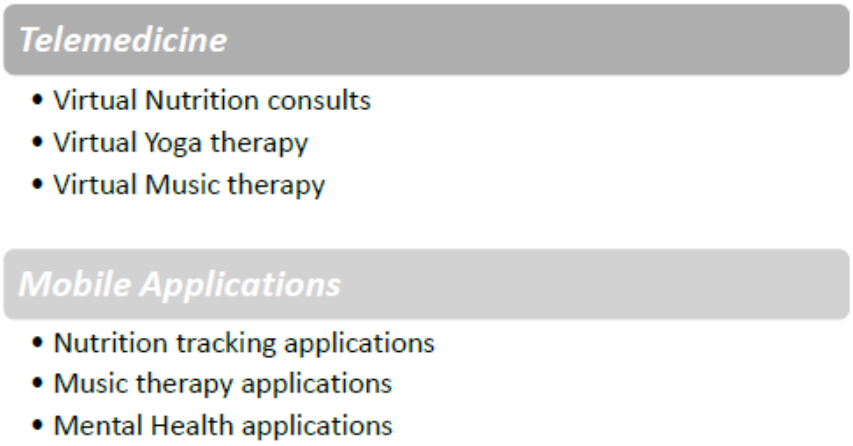

Figure 3 Telemedicine and Mobile Applications Utilized in Complementary Medicine Approaches to Neurosurgical Care. Examples of telemedicine use include virtual nutrition consults, and virtual yoga and music therapies. Current mobile applications include nutrition tracking apps, music therapy and mental health apps.

Telemedicine may also increase interest in complementary medicine and ExAT. A 2021 analysis of two oncology studies found that enrollment in yoga and music therapy increased after switching from in-person to virtual therapy programs [41]. Increased access may also increase exposure to complementary medicine and ExAT to patients who are unfamiliar with benefits of alternative therapies. Complementary medicine has been successful in unexpected ways. For example, yoga improved balance and mobility in patients with chronic Traumatic Brain Injury (TBI) [42]. Music therapy has improved gait [43], upper extremity function [44], reduced agitation, and improved orientation levels in stroke patients [45].

Mobile health applications (apps) also have the potential to improve access to complementary medicine and ExAT. In recent years a variety of nutrition and yoga apps have emerged. Music therapy apps show promise in aiding gait training in Parkinson's, treating episodic migraine headaches, and rehabilitation following stroke [46-48]. Headspace and Calm are two mind-body health apps that help decrease depression [49]. Similar to telemedicine, apps provide increased access and may generate more interest in complementary medicine and ExAT. Since these innovations have emerged so rapidly, it is essential to evaluate their benefits in the patient population. More importantly, we need to assess how neurosurgery can incorporate virtual technology in recovery using complementary medicine and ExAT.

5. Current Studies and Outcomes in Complementary Medicine and Neurosurgery

Systematic clinical studies of the use of ExAT in neurosurgery have not been carried out yet. There are, however, several clinical studies that have evaluated the use of complementary medicine in neurosurgery (Table 2). These studies have successfully included complimentary medicine as adjuvant therapies to neurosurgical recovery and have improved health outcomes. Some of these studies include the use of acupuncture to treat traumatic brain injury (TBI) [50], severe head injury [50], and pre-operative anxiety [50]. Other studies include the use of cognitive behavioral therapy with meditation or mindfulness to manage chronic low back pain [51] and depression in TBI [52]. A brief description of some of these studies follows:

Finnell and colleagues (2016) completed a clinical trial evaluating the impact of acupuncture and sham acupuncture, a practice in which needles appear to penetrate the skin but do not actually pierce the skin, on acute cerebral blood flow and other blood markers following a traumatic brain injury (NCT02623218) [50]. Previous studies on animal and human subjects have shown efficacy of acupuncture in improving cerebral blood flow through both middle cerebral arteries (MCA), internal carotid arteries (ICA), and the basilar artery (BA) [53-55]. Participants receiving acupuncture (n = 5) and sham acupuncture (n = 4) displayed varied cerebral blood flow velocities from their baseline to post-acupuncture measures. Notably, participants experienced increased velocity of blood flow compared to the control with acupuncture in the right MCA and both ICAs and with sham acupuncture in both MCAs, right ICA, and BA [50].

Hu and colleagues (2015) completed a clinical trial evaluating the therapeutic effect of acupuncture and laser acupuncture among patients with severe head injuries receiving conventional treatment using the Glasgow Coma Scale (GCS) and the Medical Research Council muscle-grading scale to measure muscle power (MP) (NCT01773291) [56]. When compared to the control (n = 6), patients receiving acupuncture (n = 7) and laser acupuncture (n = 9) maintained a lower average GCS after 6 weeks (3.14 [ST 1.46] and 3.11 [3.02] vs. 4.67 [2.73]) [56]. In contrast, patients receiving 6 weeks of acupuncture or laser acupuncture maintained higher average MP scores (4.29 [ST 4.46] and 4.33 [3.39] vs. 2.83 [3.49]) [56].

Mindfulness meditation, or meditation, is a safe modality used to train one's non-judgmental awareness and attention to their present-moment experiences, such as emotions or pain [57]. Literature suggests the long-term utility of meditation-based interventions in a multitude of medical and mental health conditions (insomnia, anxiety, depression, and stress reactivity) [58], as well as the positive impact in neural activity in brain regions responsible for adaptive stress, affect, and pain regulation [59-61]. In 2016, Zgierska and colleagues (NCT01775995) found meditation coupled with cognitive behavioral therapy interventions reduced the pain severity and improved physical function in patients with chronic low back pain that had been previously treated with opioids [51, 57]. In a clinical trial, Bedard and colleagues (2012) evaluated the use of mindfulness-based cognitive therapy in reducing depression among patients with a history of traumatic brain injuries using the Beck Depression Inventory (BDI-II) and Patient Health Questionnaire (PHQ-9) (NCT00745940) [52]. When compared to the control (n = 38), patients who received the intervention for 10 weeks (m = 38) maintained a larger decrease in scores from baseline on the BDI-II, as well as the PHQ-9 [52].

Table 2 Completed Clinical Trials evaluating Complementary Medicine Approaches in Neurosurgery.

Study	Title	Intervention	Outcome	Results
NCT02623218	*Translational Research Examining Acupuncture Treatment in Traumatic Brain Injury [50]*	Acupuncture, Sham Acupuncture	Cerebral Blood Flow (MCAs, ICAs, BA)	Increased blood flow: Acupuncture: R MCA, ICAs Sham: MCAs, R ICA, BA
NCT01773291	*Adjuvant Acupuncture for Severe Head Injury [56]*	Acupuncture, Laser Acupuncture	GCS, MRC muscle-grading scale	Lower GCS and increased MP with both interventions
NCT02561572	*The Effect of Acupuncture on Pre-operative Anxiety Levels in Neurosurgical Patients: a Randomised, Controlled Trial [62]*	Yintang point acupuncture	STAI-S6	Lower STAI-S6 anxiety scores with intervention
NCT01775995	*Meditation-CBT for Opioid-treated Chronic Low Back Pain [51]*	Meditation-CBT	Averaged Pain Severity, Physical Function	Greater decrease in pain severity (8wk and 26) and improvement in physical function with intervention
NCT00745940	*Mindfulness-Based Cognitive Therapy Intervention to treat Depression in Individuals with a Traumatic Brain Injury [52]*	Mindfulness-based cognitive therapy	BDI-II, PHQ-9	Greater decrease in baseline scores with intervention

6. Conclusion

Complementary medicine combines traditional care with alternative physical, psychological, and nutritional approaches [63]. Over half of adults diagnosed with the most common neurological conditions utilize complementary medicine, though most of these patients have not discussed these remedies with their providers [64]. This suggests a need for provider education in complementary medicine approaches. ExAT utilizes both physical and non-physical alternative therapy methods to aid in interpreting one's own emotions and the emotions of others [65]. ExAT modalities include movement, art, music, writing, and improvisation [66].

While few neurosurgical departments include ExAT as an integral aspect of their holistic treatment plan, the benefits of ExAT have been established across various patient populations – particularly in neurology studies. ExAT has been utilized among patients recovering from stroke to regain both social and emotional skills [25]. ExAT has also been utilized as part of ALS treatment and has shown improvements in emotional health and treatment adherence [26]. These results suggest the vital role of ExAT in neurosurgical MDTs, as these therapy modalities allow patients other forms of communication and recovery.

In the years following the Covid-19 pandemic, telemedicine and mobile applications have emerged as tools to improve access to care. From a neurosurgical standpoint, improving access to care primarily included the implementation of telemedicine to include treatment options regarding nutrition, supplementation, yoga, and other alternative therapies. Additionally, mobile health applications have emerged as effective ways patients can access adjuvant therapies, including nutrition, mental health, and music therapy. Clinical trials evaluating the use of alternative and complementary approaches, such as acupuncture and meditation, have provided encouraging results. These studies support the value of including non-traditional approaches to recovery such as complementary medicine and ExAT in neurosurgical recovery.

Author Contributions

Conception and design: Lucke-Wold, Carter, Dioso. Data Collection: All Authors. Drafting the article: All Authors. Critical revision of the article: Lucke-Wold, Carter, Romero. Final approval of the version to be published: All Authors.

Competing Interests

The authors have declared that no competing interests exist.

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