Analysis of Challenges in Music-Assisted Therapy During Surgery and Strategies for Rehabilitation Optimization

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Abstract: Perioperative periods are often accompanied by significant anxiety, pain, and stress responses, which impact patient recovery and treatment adherence. Music, as a low-cost, non-pharmacological adjunctive intervention, demonstrates positive effects in alleviating preoperative anxiety, aiding intraoperative analgesia, and promoting postoperative recovery. Addressing current limitations in intervention models — including insufficient standardization, poor individual adaptability, and lack of interdisciplinary integration — this study proposes multidimensional improvement strategies. These include process optimization, precision prescribing, and collaborative mechanism development to advance music therapy toward routine clinical implementation.

***Keywords*:** perioperative period, music therapy, anxiety management, pain control

1. Introduction

Although surgical intervention is an important method to enhance the patients' outcomes, the surgery brings high anxiety, pain and other stress responses, which impair the postoperative recovery. Traditional pharmacological interventions can be used to alleviate these symptoms, but they have side effects and dependence. As an intervention without pharmacological effects, music intervention has clinical significance at different levels by modulating the nervous system, diverting attention and adjusting mood, and it is getting more and more attention in clinical research and practice. It is of great significance to explore its efficacy mechanisms and optimization ways systematically, especially the evidence bases and practical barriers[1].

2. The Importance of Music Intervention in the Perioperative Period

A collaborative effort combining areas like anesthesiology, psychology, rehabilitation approaches, and musical therapy should be established to integrate music-based methods into surgical treatment processes. For instance, a major hospital in Guangzhou organized a cross-departmental team to apply music during operations, using their hospital's digital systems to coordinate protocols while gathering live feedback data. This method demonstrated outcomes such as noticeable decreases in postoperative painkiller usage and reduced time spent in hospitals, with successful cases leading to broader adoption across departments. To put it simply, forming dedicated task forces could prioritize standardizing procedures, develop training programs for healthcare workers, and perform regular effectiveness evaluations to track results. Furthermore, policy initiatives should explore including musical approaches in health insurance pilot projects while supporting multi-site studies through research funding, enabling thorough data collection through observation and medical record reviews. Such efforts demand continuous collaboration between administrative offices and treatment departments to gradually roll out these interventions system-wide, requiring persistent adjustments to balance operational workflows with patient care needs[2].

3. Current Challenges in Music-Assisted Therapy

3.1 High Heterogeneity in Research Design and Lack of Unified Standards for Intervention Protocols

The existing empirical studies on perioperative music intervention show large variability in methods, and no consensus norms have been developed for the timing, frequency, genre of music, or control of volume. Some studies restrict the intervention to only 10 minutes before surgery, while others provide music for the entire surgical procedure. The content of the music varies from pure tones to classical music, and some studies do not describe the rhythm, tonality or cultural background of the music. The adopted measures are also scattered: some use subjective anxiety scores, and others use heart rate variability; thus the measures from different studies cannot be easily compared. Music was delivered through headphones or external speakers, but no specifications were provided for the distance from the sound source to the ears or for the quality

of the audio.

3.2 Patient Individual Differences Are Not Adequately Considered in Interventions

Interests in music differ greatly among patients of different ages, cultural populations, language use, and past experiences, making it inappropriate to select just a few songs for all the patients. Most of the studies use generic soothing music and do not screen or stratify the patients' preferences; they ignore the differences in preferences of emotional arousal, attentional modulation, and neuromodulation to different music genres, and some patients prefer rhythmic music while others prefer a tranquil atmosphere. Furthermore, in standardized playlists, for some patients with high auditory sensitivity and negative musical experiences, these playlists may induce aversion and anxiety. At present, the flow of intervention includes no participation from the patients, nor do the designs consider the needs of the patients, thus reducing music's regulatory efficacy on neurological and psychological states. When needs of individuals are ignored, both intervention stability and the humanistic value of music therapy are lost[3].

3.3 Lack of Interdisciplinary Collaboration and Clinical Integration Mechanisms

Music intervention spans psychology, physiology, rehabilitation, neuroscience, and art therapy. Yet current research and practice remain largely confined to single-department leadership, lacking systematic collaboration mechanisms. Within hospitals, music application often remains at the auxiliary entertainment level, failing to establish clinical pathways grounded in intervention objectives, evaluation feedback, and process control. Communication interfaces between music therapists and clinicians are absent, leaving intervention plans with limited scope for personalization and hindering integration into unified medical information systems. While some pilot programs have achieved phased results, data recording, follow-up assessments, and quality control processes remain inadequate, hindering the establishment of evidence-based closed-loop systems. Researchers predominantly focus on validating intervention efficacy, neglecting feasibility testing and process redesign within real clinical settings.

4. Optimization Strategies and Implementation Recommendations for Music Intervention

4.1 Promoting Standardization and Process Integration of Music Intervention

The development of an evidence-based, standardized intervention protocol should be prioritized, covering uniform intervention points, duration, music types, and rhythmic ranges. Future studies are recommended to use a before-and-after design with clear inclusion criteria (e.g., elective surgery patients with ASA scores I–II), where the intervention group receives a standardized music prescription (30 minutes per session, once preoperatively, intraoperatively, and postoperatively), and the control group undergoes routine care. Assessment should include multiple indicators, such as anxiety scores (e.g., HAMA), pain scores (VAS), and postoperative recovery time, to ensure that the intervention's effects are quantifiable and reproducible. Efforts should be made to integrate music intervention into perioperative workflows, supported by information systems for full-process tracking, to create a replicable pathway.

4.2 Establishing a Systematic Framework for "Precision Music Prescription"

Leverage big data and personalized assessment tools to build a quantifiable, matchable music intervention recommendation mechanism. Introduce questionnaire tools to scale-assess patients' musical preferences, cultural backgrounds, auditory sensitivity, and psychological states, forming personalized profiles prior to intervention. Employ algorithmic models to match optimal music genres, rhythmic intensity, and playback duration, generating customized intervention plans. During intervention, dynamically adjust content and tempo based on real-time physiological feedback (e.g., heart rate, skin conductance response) to achieve closed-loop management. A music database is constructed, organized with tags based on emotional type, physiological effects, and cultural attributes for rapid retrieval and precise matching. A "music prescription" generation system is established, where clinicians or music therapists input patient parameters to automatically generate recommended plans.

4.3 Strengthen Multidisciplinary Collaboration and Policy Support

A collaborative mechanism involving anesthesiology, psychology, rehabilitation, and music therapy should be established to integrate music intervention into the overall perioperative treatment pathway. For instance, a top-tier hospital in Guangzhou formed a multidisciplinary team to implement intraoperative music intervention, utilizing the electronic medical record system for synchronized protocols and feedback. This resulted in an 18% reduction in postoperative analgesic use and an average hospital stay shortened by 1.3 days, with successful outcomes that were subsequently expanded within the

hospital. It is recommended to establish a multidisciplinary task force to standardize protocols, train staff, and assess effectiveness. Additionally, policies should support the inclusion of music intervention in medical insurance pilot programs and fund multi-center empirical research and data collection through scientific projects.

5. Conclusion

Multidimensional clinical significance of music intervention in preoperative, intraoperative, and postoperative periods reduces psychological burden and promotes physiological recovery. To solve the existing problems such as high research heterogeneity, insufficient individual adaptation, and unclear application protocols, the implementation system of music intervention should be improved from standardization, individualization, and multidisciplinary cooperation. Advancing music intervention from being a supplement to becoming an institutionalized medical practice will provide strong support for the improvement of surgical intervention and rehabilitation.

References

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