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Optimizing Post-Myocardial Infarction Care: Utilizing Bayesian Modeling Evidence to Confirm the Effectiveness of the Family-Centered Empowerment Pattern on Patients' Psychological Outcomes

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Abstract

This study evaluated the effectiveness of the Family-Centered Empowerment Model (FCEM) on psychological outcomes in post-myocardial infarction patients using a high-precision Bayesian multivariate approach. A Randomized Controlled Trial (RCT) was conducted with70 patients, comparing FCEM with standard care across nine longitudinal time points. Bayesian analysis confirmed that FCEM significantly outperformed the control group, resulting in substantial improvements in perceived stress, state anxiety, and quality of life. These findings highlight the potential of FCEM as a powerful rehabilitation strategy for post-MI patients. The model not only supports individual recovery but also engages the family in the care process, leading to better emotional and psychological outcomes. Additionally, the use of Bayesian modeling demonstrated superior accuracy in estimating longitudinal clinical data compared to traditional statistical methods, offering more reliable insights for clinical decision-making. Health policymakers and healthcare institutions should consider integrating FCEM into standard cardiac rehabilitation programs. Promoting family-centered care models and advanced analytical methods like Bayesian modeling can enhance the quality of healthcare delivery and reduce the long-term burden of cardiovascular diseases. This approach not only improves individual patient outcomes but also contributes to the overall efficiency and effectiveness of the healthcare system. Adopting such evidence-based and family-inclusive strategies can lead to better patient engagement, improved mental health, and reduced healthcare costs. It is recommended that future research and policy development prioritize the implementation of FCEM and similar models in diverse healthcare settings to maximize their impact on public health.

Keywords: Bayesian Inference, FCEM, Myocardial Infarction, Quality of Life, Longitudinal Analysis

1. Background

Myocardial Infarction (MI) remains a leading cause of death globally, with significant psychological consequences such as stress, anxiety, and reduced quality of life. These effects are even more severe in high-stress populations like military personnel, where occupational demands can worsen mental health outcomes. Cardiac Rehabilitation (CR) is a key intervention, but traditional programs often face challenges like poor accessibility and low adherence.[1] The Family-Centered Empowerment Model (FCEM) offers a promising alternative by involving family members in the rehabilitation process, enhancing motivation and emotional support. This study evaluates FCEM's effectiveness in improving psychological outcomes, such as stress, anxiety, and quality of life, among MI patients. A Bayesian multivariate mixed-effects model is used, which provides greater flexibility and accuracy compared to classical methods like ANOVA or GEE.[2] Healthcare policymakers should consider adopting FCEM in cardiac rehabilitation programs, especially for high-risk groups. Integrating family-based models and advanced analytical methods like Bayesian modeling can improve care quality, reduce long-term health costs, and enhance patient outcomes. Promoting such evidence-based strategies is essential for building a more effective and patient-centered healthcare system.

2. Methods

This Randomized Controlled Trial (RCT) allocated acute Myocardial Infarction (MI) patients to either the Family-Centered Empowerment Model (FCEM) or standard care. Psychological trajectories, specifically Quality of Life, Stress, and Anxiety, were assessed longitudinally using standardized inventories. To ensure analytical robustness, an advanced Bayesian multivariate framework was

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employed, offering superior precision in handling complex clinical data compared to traditional statistical methods.

3. Results

Baseline analysis confirmed demographic balance between groups, ensuring the validity of observed outcomes. The advanced Bayesian model revealed a profound clinical advantage for the FCEM group, characterized by significant relief in perceived stress, effective management of anxiety, and robust improvements in both physical and mental quality of life. Methodologically, the Bayesian approach demonstrated superior analytical precision over conventional models, validating the findings as highly robust for policy application.

4. Discussion and Conclusion

The findings of this investigation provide compelling evidence that the Family-Centered Empowerment Model (FCEM) is a highly effective therapeutic mechanism for post-MI rehabilitation. By shifting the focus from the individual patient to the family unit, FCEM fosters a supportive environment that significantly ameliorates psychological morbidity. This aligns with broader literature suggesting that psychological interventions are essential for preventing poor prognosis in cardiac patients.

1. Clinical Policy and Military Health

Given the heightened vulnerability of military personnel to stress-induced cardiovascular events, incorporating FCEM into the standard of care is strongly recommended. This model is cost-effective, accessible, and addresses the “treatment gap” left by low adherence to center-based rehabilitation. It effectively mitigates the psychological risk factors that contribute to recurrent MI and mortality.

2. Research and Methodological Policy

The study demonstrates the clear superiority of Bayesian multivariate modeling over classical frequentist methods in longitudinal clinical trials. Policymakers and research boards should encourage the adoption of Bayesian frameworks for future health studies. This approach ensures that treatment effects are estimated with maximum precision, particularly in complex, multi-outcome studies involving chronic diseases like stroke or multiple sclerosis.

In conclusion, adopting FCEM as a standard rehabilitation protocol represents a strategic investment in patient quality of life and long-term survival, supported by high-precision evidence derived from advanced Bayesian analytics.

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Author Contributions

Authors contributed equally to this work.

Conflict of Interest Disclosures

All authors declared that they have no conflict of interest.

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