

A Comprehensive Analysis of Economic Models Assessing the Cost Effectiveness of Physiotherapy Interventions Post Total Knee and Hip Replacement

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Abstract

Background: Osteoarthritis is a primary cause of pain and disability, and it places a considerable economic burden on individuals and the society. In the management of total knee or hip replacement (TKHR), the long-term effectiveness of physiotherapy interventions may slowly accumulate over a period.

Objectives: To evaluate all the model-based cost-effectiveness (CE) of physiotherapy interventions for patients with (TKHR).

Study selection: Studies that assessed model-based CE of physiotherapy interventions following TKHR and were published in English language. The methodological quality of the included studies was assessed using the Philips Checklist criteria.

Data extraction/data synthesis: Two reviewers, using a predefined data extraction form, independently extracted data. A descriptive synthesis was used to present the results.

Results: Eight hundred eighty-six studies were identified, and the only 3 that met the inclusion criteria were included. Different model structures and assumptions were used in the included studies. The included studies were conducted in the United States of America (n = 1), Singapore (n = 1) and Italy (n = 1). The societal (n = 2) and healthcare (n = 1) perspective were adopted in the studies. The included studies reported an incremental cost effectiveness ratio (ICER) of \$57,200 and 27,471 Singapore dollar (SGD) per quality-adjusted life years in a time horizon of lifetime and three months, respectively. Physiotherapy (hydrotherapy) interventions were potentially cost-effective.

Conclusion: Based on the best available evidence, the findings of this review suggest that physiotherapy interventions were CE and cost saving. However, it is important to note that among others the CE of the interventions was a function of the healthcare system, duration of interventions, patient compliance and price.

Keywords: Systematic review; Decision-analytic model; Economic evaluation; Total knee and hip replacement

Introduction

Total knee and hip replacements represent critical interventions for patients suffering from osteoarthritis, rheumatoid arthritis, and other degenerative joint conditions. These surgeries have proven effective in relieving pain, improving joint function, and enhancing the overall quality of life for millions of individuals worldwide. However, the rising costs of healthcare, coupled with an aging population, have heightened the importance of assessing the cost-effectiveness of various components of care, including post-operative interventions like physiotherapy. Physiotherapy plays a crucial role in the rehabilitation process following joint replacement surgeries [1]. It helps patients regain strength, range of motion, and functionality, ultimately reducing the risk of complications and the need for further medical interventions. Nevertheless, healthcare systems must allocate limited resources efficiently, making it essential to evaluate the economic impact of physiotherapy interventions within the context of total knee and hip replacements. This paper explores the economic models and methodologies employed to assess the cost-effectiveness of physiotherapy interventions in the post-operative care of joint replacement patients. By synthesizing and analyzing existing research findings, we aim to shed light on the key factors influencing cost-effectiveness evaluations, such as patient outcomes, healthcare utilization, and cost variables. Moreover, we will discuss the potential benefits of incorporating economic considerations into clinical decision-making and policy formulation, emphasizing the need for

evidence-based practices in healthcare resource allocation. Ultimately, this analysis aims to provide valuable insights for healthcare providers, policymakers, and researchers working toward optimizing the delivery of care for patients undergoing total knee and hip replacement surgeries.

Search strategy

We identified articles that used model-based economic evaluation of physiotherapy interventions for patients with TKHR. The inclusion criteria were model-based economic evaluation studies that assessed the cost-effectiveness of physiotherapy interventions, studies meeting with explicit analysis of both costs and effects of an intervention, studies with at least one comparator, all age groups, and published in the English language. The exclusion criteria were abstract unavailable, studies not yet fully completed, conference papers, and clinical trial-based cost-effectiveness studies. Duplicates were removed electronically

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Received: 01-Aug-2023, Manuscript No. jnp-23-113301; **Editor assigned:** 03-Aug-2023, Pre QCNo. jnp-23-113301 (PQ); **Reviewed:** 17-Aug-2023, QC No. jnp-23-113301; **Revised:** 22-Aug-2023, Manuscript No. jnp-23-113301 (R); **Published:** 29-Aug-2023, DOI: 10.4172/2165-7025.1000616

Citation: Shah E (2023) A Comprehensive Analysis of Economic Models Assessing the Cost Effectiveness of Physiotherapy Interventions Post Total Knee and Hip Replacement. J Nov Physiother 13: 616.

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and manually. Two independent researchers (TG & CF) were involved in screening the title and abstract of each study. Full-text articles were obtained and were excluded if they did not meet the inclusion criteria. Any disagreement in study selection was resolved through discussion and consultation with other members of the team (FF) where necessary [2,3].

Data extraction and study quality assessment

After screening based on title and abstract, full papers were retrieved and key data were extracted by two reviewers (TG & CF). The key components extracted from each study include author, country of the study, population, intervention type, comparator, model type, health states, study perspective, time horizon, discount rate, outcome measure and costs. Incremental cost-effectiveness ratio (ICER) and sensitivity analysis were also extracted. The model structures used in the included articles were assessed. We identified the important clinical events and/or health states included in the model. Methodological Quality of the Included Studies for Economic Models on Cost Effectiveness of Physiotherapy Interventions Following Total Knee and Hip Replacement.

Evaluating the methodological quality of studies included in a systematic review or meta-analysis is crucial to ensure the reliability and validity of the findings. In the context of economic models assessing the cost effectiveness of physiotherapy interventions following total knee and hip replacement surgeries, several key criteria should be considered when assessing the methodological quality of the included studies.

These criteria are as follows:

Study design: Assess whether the study design is appropriate for the research question. Randomized controlled trials (RCTs) and observational studies with appropriate control groups are often preferred for economic evaluations. Studies should employ rigorous research designs to minimize bias.

Data sources and collection: Evaluate the sources of data used in the economic model. High-quality studies should rely on reliable and representative data sources, including clinical trials, patient registries, or nationally representative databases. Ensure that data collection methods are well-described and validated.

Model structure: Examine the structure of the economic model. Assess whether the model captures the relevant aspects of physiotherapy interventions and their impact on patient outcomes and costs. Models should be transparent and based on sound clinical evidence[4-7].

Model parameters: Check the accuracy of the input parameters used in the economic model. This includes the effectiveness of physiotherapy interventions, costs associated with therapy, and long-term outcomes. Parameters should be well-documented and based on systematic reviews or meta-analyses where possible.

Time horizon: Determine the length of the time horizon used in the economic model. A longer time horizon is generally preferred to capture both short-term and long-term effects of physiotherapy interventions, including potential cost savings over a patient's lifetime.

Discounting: Verify whether the study appropriately discounts costs and outcomes over time. Discounting is necessary to account for the time value of money and should be conducted in accordance with recommended guidelines.

Sensitivity analysis: Assess whether sensitivity analyses were conducted to test the robustness of the results. Sensitivity analyses should vary key parameters and assumptions to evaluate the impact on

cost-effectiveness outcomes.

Reporting quality: Evaluate the clarity and completeness of the study's reporting. Studies should follow established reporting guidelines for economic evaluations, such as the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) checklist [8].

Conflict of interest: Consider potential conflicts of interest that may bias the study's findings. Transparency regarding funding sources and conflicts of interest is essential for assessing the credibility of the research.

Generalizability: Determine the extent to which the study's findings are generalizable to the broader population of patients undergoing total knee and hip replacement surgeries. Assess whether the study accounts for variations in patient characteristics and healthcare settings.

Peer review: Note whether the study has undergone peer review, which adds an additional layer of quality assurance.

In summary, evaluating the methodological quality of studies examining the cost effectiveness of physiotherapy interventions following total knee and hip replacement surgeries requires a comprehensive assessment of study design, data sources, model structure, input parameters, and reporting quality. Rigorous and transparent research methods are essential to ensure that the findings can inform healthcare decision-making effectively.

Conclusion

In conclusion, economic models assessing the cost effectiveness of physiotherapy interventions following total knee and hip replacement surgeries have played a crucial role in guiding evidence-based decision-making in healthcare. These models underscore the importance of investing in post-operative physiotherapy as a cost-effective strategy to improve patient outcomes and reduce the economic burden of joint replacement procedures. As healthcare systems continue to evolve, the insights gleaned from these models will remain invaluable in achieving the dual objectives of delivering high-quality care and managing healthcare costs effectively.

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