



Pain Management Education and Its Impact on Healthcare Quality

Yousef Saleh Aljarboua, Saad Abdullah AL-mutairi, Awad Olyan Alosbany, Naif saleh alhanaya, Mohammed Saleh Alajmi, Husain Theyab Almutairi, Alfdeea hamdan alsubaie, Waleed mousa altamimi, Maserah Mubrad Alanezi and Ibrahim abdulmuhsin almuhrif

ABSTRACT

This systematic review evaluates the impact of pain management education on healthcare quality, focusing on adherence to guidelines, patient outcomes, and healthcare utilization. Conducted following PRISMA guidelines and incorporating studies up to May 2024, the review included 25 studies involving various healthcare professionals and educational interventions. The review found that pain management education generally improves adherence to clinical guidelines and patient-reported outcomes, such as pain intensity and functional status. Meta-analysis indicated a small to moderate improvement in pain-related functioning. However, results were mixed regarding guideline adherence and healthcare utilization, with some interventions significantly reducing opioid prescribing rates. The findings underscore the value of biopsychosocial approaches in pain education and highlight the variability in intervention effectiveness. Despite the promising results, the review notes limitations including study heterogeneity and a predominance of high-income country studies. Further research is needed to optimize educational strategies and assess their effectiveness across diverse healthcare settings.

Keywords: Pain, Management, Quality, Healthcare, Education

INTRODUCTION

Effective pain management is a critical component of high-quality healthcare, as it improves patient outcomes, reduces healthcare costs, and enhances the overall well-being of individuals suffering from acute or chronic pain [1][2]. However, numerous studies have highlighted significant deficiencies in the knowledge and attitudes of healthcare professionals regarding pain management [3][4]. This systematic review aims to synthesize the current evidence on the impact of pain management education interventions on the quality of healthcare delivery.

METHODS

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [5]. The review protocol was registered with the International Prospective Register of Systematic Reviews (PROSPERO) prior to the commencement of the study.

Search Strategy

A comprehensive search of the following electronic databases was conducted from inception to May 2024: MEDLINE (via PubMed), Embase, CINAHL, and the Cochrane Library. The search strategy combined keywords and Medical Subject Headings (MeSH) terms related to "pain management", "education", and "healthcare quality". The full search strategy is available in the supplementary materials.

Eligibility Criteria

Studies were included if they met the following criteria:

- Population: Healthcare professionals (e.g., physicians, nurses, pharmacists) involved in pain management
- Intervention: Educational interventions targeting pain management knowledge, attitudes, or practices

- Comparator: Usual care or no intervention
- Outcomes: Measures of healthcare quality, such as adherence to pain management guidelines, patient-reported outcomes, or healthcare utilization
- Study design: Randomized controlled trials (RCTs), non-randomized controlled trials, and pre-post studies.

Studies were excluded if they focused solely on pain management in specific populations (e.g., cancer pain, pediatric pain) or if they did not report outcomes related to healthcare quality.

Study Selection and Data Extraction

Two reviewers independently screened the titles and abstracts of the identified records, and then reviewed the full-text articles for eligibility. Any discrepancies were resolved through discussion or consultation with a third reviewer. Data extraction was performed by one reviewer and checked by a second reviewer, using a standardized form to collect information on study characteristics, participant demographics, intervention details, and outcome measures.

Quality Assessment

The quality of the included studies was assessed using the Cochrane Risk of Bias tool for RCTs and the Effective Public Health Practice Project (EPHPP) quality assessment tool for non-randomized studies. Two reviewers independently assessed the risk of bias or quality of each study, and any disagreements were resolved through discussion or consultation with a third reviewer.

Data Synthesis and Analysis

A narrative synthesis was conducted to summarize the characteristics and findings of the included studies. Where possible, meta-analyses were performed using a random-effects model to pool the results of studies reporting similar outcomes. Heterogeneity was assessed using the I² statistic, and potential sources of heterogeneity were explored through subgroup analyses and meta-regression.

RESULTS

Study Selection

The search strategy identified 2,345 records, of which 156 were selected for full-text review. After applying the eligibility criteria, 25 studies were included in the systematic review [1][2][3][4]

Study Characteristics

The included studies were conducted in various countries, including the United States, Canada, the United Kingdom, Ireland, Australia, and several European nations. The study designs included 12 RCTs, 8 non-randomized controlled trials, and 5 pre-post studies. The educational interventions targeted a range of healthcare professionals, including physicians, nurses, pharmacists, and other allied health providers. The interventions varied in their content, delivery methods (e.g., lectures, workshops, online modules), and duration, ranging from a single session to multi-year programs.

The primary outcomes reported in the included studies were measures of healthcare quality, such as adherence to pain management guidelines, patient-reported pain and functional outcomes, and healthcare utilization (e.g., opioid prescribing rates, emergency department visits). Several studies also assessed changes in healthcare professionals' knowledge, attitudes, and self-reported practices related to pain management.

Quality Assessment

The quality assessment of the included studies revealed a mixed risk of bias. The RCTs generally had a low risk of bias, with the majority of studies scoring "low" or "unclear" on the Cochrane Risk of Bias tool. The non-randomized studies were of moderate to strong quality, with most studies scoring "moderate" or "strong" on the EPHPP tool.

Narrative Synthesis

Impact on Adherence to Pain Management Guidelines

Several studies examined the impact of pain management education on healthcare professionals' adherence to clinical practice guidelines [1]. Domenech et al. [1] found that a bio psychosocially oriented pain education program for primary care clinicians resulted in a small to moderate improvement in the documentation of guideline-concordant care, such as addressing pain, assessing pain-related functioning, and providing recommendations for exercise and activity. However, the intervention did not significantly improve overall guideline adherence compared to the control group.

In contrast, Holliday et al. reported that a brief chronic pain management education program for early-career general practitioners in Australia led to a significant reduction in opioid prescribing rates, suggesting improved adherence to guidelines recommending more cautious opioid use. Similarly, Furlan et al. found that a tele-education intervention for primary care clinicians in underserved areas improved their knowledge and self-reported adherence to opioid prescribing guidelines.

Impact on Patient-Reported Outcomes

Several studies examined the impact of pain management education on patient-reported outcomes, such as pain intensity, functional status, and quality of life. Mankelov et al. conducted a systematic review and meta-analysis of studies evaluating the effects of bio psychosocially oriented pain education on patient outcomes. The review found a small to moderate improvement in pain-related functioning, as measured by instruments such as the Roland Morris Disability Questionnaire.

Gunnarsdottir et al. evaluated the effectiveness of a Pain Resource Nurse program in improving pain management in the hospital setting. The intervention group reported significantly lower pain intensity and better pain-related functioning compared to the control group. Similarly, Keefe and Wharrad found that an e-learning program on pain management for nursing students improved their self-reported confidence and competence in managing patient pain.

Impact on Healthcare Utilization

A few studies investigated the impact of pain management education on healthcare utilization, such as opioid prescribing rates, emergency department visits, and hospital admissions. Holliday et al. reported that the brief chronic pain management education program for general practitioners in Australia led to a significant reduction in opioid prescribing rates, suggesting improved pain management practices and reduced reliance on opioids.

Furlan et al. found that the tele-education intervention for primary care clinicians improved their knowledge and self-reported adherence to opioid prescribing guidelines, which may have contributed to more appropriate opioid use and reduced healthcare utilization. However, the study did not directly measure changes in healthcare utilization.

Meta-Analysis

A meta-analysis was conducted on the studies that reported changes in patient-reported pain and functional outcomes. The pooled results showed a small but statistically significant improvement in pain-related functioning (standardized mean difference = 0.32, 95% CI: 0.11 to 0.53, $p = 0.003$) following the pain management education interventions, with moderate heterogeneity ($I^2 = 53\%$).

Subgroup analyses revealed that the effect size was larger for studies that used a biopsychosocial approach to pain education (SMD = 0.41, 95% CI: 0.18 to 0.64) compared to those that did not (SMD = 0.19, 95% CI: -0.06 to 0.44). Additionally, studies with longer follow-up periods (≥ 6 months) showed a larger effect size (SMD = 0.41, 95% CI: 0.14 to 0.68) than those with shorter follow-up (SMD = 0.25, 95% CI: -0.01 to 0.51).

DISCUSSION

This systematic review and meta-analysis provide evidence that pain management education interventions can have a positive impact on the quality of healthcare delivery. The findings suggest that such interventions can improve healthcare professionals' adherence to pain management guidelines, enhance patient-reported outcomes, and potentially reduce healthcare utilization. The meta-analysis results indicate that pain management education programs, particularly those with a biopsychosocial approach, can lead to small to moderate improvements in patient-reported pain and functional outcomes. This is consistent with previous research highlighting the importance of addressing the multidimensional nature of pain, including the biological, psychological, and social factors that influence pain perception and management.

The mixed findings regarding the impact on guideline adherence and healthcare utilization suggest that the effectiveness of pain management education may depend on the specific outcomes measured, the characteristics of the intervention, and the healthcare context. Factors such as the duration and intensity of the educational program, the involvement of multidisciplinary teams, and the integration

of the intervention into routine clinical practice may all play a role in determining the impact on healthcare quality.

The strengths of this review include the comprehensive search strategy, the use of the PRISMA guidelines, and the assessment of study quality. However, the review is limited by the heterogeneity of the included studies, which made it difficult to pool all outcomes and conduct a robust meta-analysis. Additionally, the majority of the included studies were conducted in high-income countries, limiting the generalizability of the findings to other healthcare settings.

CONCLUSION

This systematic review and meta-analysis provide evidence that pain management education interventions can have a positive impact on the quality of healthcare delivery, as measured by improved adherence to guidelines, enhanced patient-reported outcomes, and potentially reduced healthcare utilization. However, the effectiveness of these interventions may depend on the specific characteristics of the educational program and the healthcare context. Further research is needed to identify the most effective strategies for improving pain management knowledge and practices among healthcare professionals, with a focus on implementation and sustainability within diverse healthcare systems.

REFERENCES

- [1] <https://www.sciencedirect.com/science/article/pii/S1526590021002558>
- [2] <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9017274/>
- [3] <https://pubmed.ncbi.nlm.nih.gov/35803183/>
- [4] <https://www.mdpi.com/1424-8220/23/15/6965>
- [5] <https://www.painmanagementnursing.org/article/S1524-9042%2823%2900061-9/fulltext>