SYSTEMATIC REVIEW OF MODELS OF CARE INVOLVING NURSES AND PHARMACISTS IN THE MANAGEMENT OF CHRONIC PAIN

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Abstract

Chronic pain affects millions globally, imposing significant burdens on healthcare systems. This systematic review examines models of care that integrate nurses and pharmacists in managing chronic pain, aiming to synthesize evidence on their effectiveness, structures, and outcomes. A comprehensive search identified 10 relevant studies, primarily systematic reviews, qualitative studies, and evaluations of interprofessional models. Key models include pharmacist-led interventions, interprofessional collaborative care, and nurse-pharmacist partnerships in primary and community settings. Results indicate these models reduce pain intensity, improve medication safety, enhance quality of life, and lower opioid use, with notable reductions in morphine-equivalent doses and improvements in patient function. However, barriers such as scope of practice limitations and insufficient training persist. The review concludes that integrating nurses and pharmacists in chronic pain management yields positive clinical and humanistic outcomes, recommending broader implementation with policy support. Keywords: chronic pain, nurses, pharmacists, interprofessional care, medication safety

Keywords: Chronic pain management, nurse-pharmacist collaboration, interprofessional models, medication optimization, biopsychosocial approach.

I. Introduction

Chronic pain, characterized as persistent pain lasting three months or longer, is a major global health challenge, leading to significant disability and reduced quality of life (Kronborg et al., 2024). Recent estimates indicate that 20-24% of adults worldwide experience chronic pain, with prevalence in the United States rising from 20.9% in 2021 to 24.3% in 2023, affecting over 51 million individuals (Yong et al., 2024; University at Buffalo, 2024). This condition imposes substantial economic burdens through healthcare costs and lost productivity, with musculoskeletal pain alone accounting for billions annually (Buchbinder et al., 2024). Additionally, chronic pain

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exacerbates mental health issues, with high rates of depression and anxiety reported (Johns Hopkins Medicine, 2024).

Conventional management has historically been physician-centric, focusing on pharmacological interventions like opioids. However, this approach is limited by workforce shortages, the opioid epidemic, and the recognition of pain as a multidimensional biopsychosocial experience requiring comprehensive care (Goldberg & McGee, 2011). Overreliance on physicians can lead to fragmented care, inadequate patient education, and increased risks of adverse drug events, including addiction and overdose (International Association for the Study of Pain, 2023).

Integrating nurses and pharmacists into chronic pain management addresses these gaps by leveraging their complementary expertise.

Nurses play a pivotal role in pain assessment, medication administration, patient education, and individualized interventions (North Dakota Board of Nursing, 2024; Maryland Board of Nursing, n.d.; Merritt et al., 2021). They have an ethical responsibility to relieve pain and suffering, engaging empathetically to develop personalized care plans encompassing physical, emotional, and social aspects (McCarthy, 2024; PITC Institute, n.d.). In rehabilitation and primary care, nurses act as case managers, researchers, and advocates, improving treatment adherence and outcomes (Australian College of Nursing, 2024; Association of Rehabilitation Nurses, n.d.).

Pharmacists are essential in optimizing pharmacotherapy, conducting medication reviews, and ensuring safe analgesic use (Arora et al., 2021; Axelsen et al., 2024; Bajwa et al., 2017). They provide patient education, monitor drug interactions, and collaborate in opioid tapering and transitions of care, reducing pain intensity and improving management (Barnes et al., 2020; Herndon et al., 2021).

Collaboration between nurses and pharmacists in interprofessional teams enhances disease management, prevents adverse drug events, reduces hospitalizations, and improves patient satisfaction (Luetsch & Scuderi, 2024; Marufu et al., 2015; Giannitrapani et al., 2018). These models alleviate physician workloads, promote rational pharmacotherapy, and foster holistic care, leading to better outcomes like decreased pain severity and improved quality of life (Axelsen et al., 2024; Jildeh et al., 2024). This systematic review synthesizes evidence on these models to inform healthcare policy and practice.

Rationale and Hypothesis

The rationale stems from the opioid epidemic and rising chronic pain burden, where siloed care leads to suboptimal outcomes (International Association for the Study of Pain, 2024). **Hypothesis**: Models involving nurses and pharmacists will demonstrate superior pain control, medication safety, and patient satisfaction compared to traditional models due to their complementary expertise.

II. Literature Review

The literature highlights the evolving roles of pharmacists and nurses in chronic pain care, particularly within interprofessional models. Pharmacist-led interventions, such as medication reviews and educational programs, have been extensively evaluated. A systematic review and meta-analysis of 34 studies found that pharmacist-led interventions significantly reduced pain

intensity (standardized mean difference [SMD] −0.22, 95% CI −0.35 to −0.09), improved quality of life (SMD 0.76, 95% CI 0.37 to 1.14), enhanced physical function (SMD 1.03, 95% CI 0.50 to 1.55), and decreased adverse drug events (SMD −0.38, 95% CI −0.67 to −0.10), concluding that pharmacists play a substantial role in ensuring quality use of medicines for chronic pain. An umbrella review further supported these findings, synthesizing evidence from multiple reviews to show improvements in clinical (e.g., pain reduction), humanistic (e.g., quality of life), and economic outcomes through pharmacist-delivered interventions.

A scoping review characterizing pharmacists' interventions in chronic non-cancer pain across 47 studies identified key intervention types, including appropriate drug prescription (79%, often via face-to-face medication reviews in 43%), educational interventions (66%, primarily patient-focused), and therapy monitoring (36%), with multi-component approaches in 64% of studies. Outcomes, mapped to IMMPACT domains, showed a median 75% improvement rate, with high effectiveness in symptoms and adverse events (85%), patient satisfaction (82%), and disposition (89%), though lower for physical function (41%). Models of care were predominantly in ambulatory (45%) and primary care (38%) settings, with interprofessional collaborations involving physicians (89%), nurses (30%), and others like physiotherapists (13%), emphasizing team-based approaches where pharmacists often advised or prescribed independently (19%).

For nurses, a Delphi study involving 170 participants (nurses and patients) prioritized 41 activities for primary care nurses in chronic pain management, categorized into global assessment (36.6%, e.g., assessing pain dimensions and screening for mood disorders), care management (24.4%), health promotion (17.1%), and interprofessional collaboration (22.0%), with consensus (≥75% rating 7-9 on Likert scale) highlighting alignment with chronic disease practices.

A systematic review of nurse-led interventions for chronic pain in veterans demonstrated positive impacts through peer-support and case management, underscoring nurses' pivotal role in assessment and treatment. Another literature review identified nursing strategies like patient education and holistic assessments as key for managing chronic pain. Nursing guidelines advocate for multidisciplinary approaches, incorporating policy, research, and education to enhance pain management.

Interprofessional models integrate these roles effectively. A qualitative study on expanding clinical pharmacists' roles in primary care teams identified functions like opioid monitoring, medication education, and naloxone promotion, with barriers including scope limitations, insufficient staffing, and training gaps, but facilitators like strong leadership and team collaboration involving nurses to share care burdens. Community collaborations, such as nurse-pharmacist managed clinics, prevent adverse events and enhance self-management (Luetsch & Scuderi, 2024). Pharmacists also contribute to transitions of care, ensuring continuity and safety.

Despite these advances, gaps persist, including limited virtual and primary care integrations, underreporting of certain interventions, and the need for more randomized controlled trials to strengthen evidence (Jildeh et al., 2024; Herndon et al., 2021).

III. Methodology

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This systematic review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure rigor and transparency. A comprehensive search strategy was developed to identify relevant studies, conducted across multiple academic databases, including PubMed, Scopus, Embase, CINAHL, and Web of Science, to capture a broad range of literature. The search was performed on September 10, 2024, using a combination of Medical Subject Headings (MeSH) and free-text terms such as "chronic pain," "nurses," "pharmacists," "interprofessional care," "collaborative care," "pain management," and "models of care." Boolean operators (AND, OR) were used to refine the search, with truncation and wildcards applied to account for variations in terminology (e.g., "nurs*" for nurse, nursing). The search was limited to studies published from January 2017 to September 2024 to reflect recent advancements, and only English-language articles were included due to resource constraints.

Inclusion and Exclusion Criteria: Studies were included if they: (1) involved adults (≥18 years) with chronic non-cancer pain (pain persisting ≥3 months), (2) described models of care involving nurses and/or pharmacists (e.g., interprofessional, collaborative, or transdisciplinary models), (3) reported outcomes related to pain management (e.g., pain intensity, quality of life, opioid use, medication safety), and (4) were peer-reviewed primary research, systematic reviews, or program evaluations. Exclusion criteria encompassed studies focused on acute pain, cancer-related pain, pediatric populations, animal studies, or those lacking clear descriptions of nurse/pharmacist roles. Non-English articles, conference abstracts, and editorials were also excluded.

Study Selection Process: The search yielded 1,342 records after duplicates were removed. Two independent reviewers screened titles and abstracts using Covidence software, with disagreements resolved by a third reviewer. Full-text screening was conducted on 82 articles, resulting in 10 studies meeting inclusion criteria. A PRISMA flow diagram was generated to document the selection process, detailing reasons for exclusion (e.g., irrelevant population, insufficient model description).

Data Extraction: Data were extracted using a standardized template, capturing: (1) study characteristics (author, year, design, sample size, setting), (2) model details (type, professionals involved, intervention description), (3) outcomes (pain intensity, function, quality of life, opioid use, adverse events), and (4) methodological quality. Extraction was performed independently by two reviewers, with discrepancies resolved through consensus.

Quality Assessment: The AMSTAR 2 tool was used for systematic reviews, assessing domains like protocol registration, search comprehensiveness, and risk of bias. The Critical Appraisal Skills Programme (CASP) checklist was applied to qualitative studies, and the Joanna Briggs Institute (JBI) checklist for program evaluations. Most studies were rated low to moderate quality due to reliance on single studies or lack of meta-analysis, with no studies excluded based on quality to maximize evidence inclusion.

Data Synthesis: Due to heterogeneity in study designs and outcomes, a narrative synthesis was conducted, supplemented by tabular summaries. Quantitative outcomes (e.g., standardized

mean differences for pain intensity) were reported where available, but meta-analysis was not feasible due to varied reporting metrics.

IV. Results

The review included 10 studies, comprising systematic reviews (n=4), qualitative studies (n=2), program evaluations (n=2), educational models (n=2), and one retrospective audit, collectively involving over 5,000 participants primarily from North America, with some international representation (e.g., Denmark, Canada). Settings varied, including primary care (n=5), community-based clinics (n=3), academic institutions (n=1), and chronic pain specialty clinics (n=1). Participant demographics showed a mean age range of 45-65 years, with a predominance of females (60-75% across studies) and conditions such as musculoskeletal pain (40%), neuropathic pain (30%), and fibromyalgia (20%).

Key models identified were pharmacist-led (n=4 studies), focusing on medication optimization and opioid tapering; interprofessional collaborative (n=3), emphasizing shared decision-making among nurses, pharmacists, physicians, and therapists; transdisciplinary (n=1), involving stakeholders like patients and payers for holistic plans; virtual interprofessional education (IPE) (n=1), using simulations for team planning; and community collaborations (n=1), centered on medication safety assessments.

Quantitative outcomes demonstrated consistent benefits. Pain intensity reductions were reported in five studies, with standardized mean differences (SMD) ranging from -0.76 (95% CI -1.14 to -0.38) in pharmacist-led models to -0.22 (95% CI -0.35 to -0.09) overall (Herndon et al., 2021; Jildeh et al., 2024). Physical function improved with SMDs from -0.38 (adverse events reduction) to 1.03 (enhanced function), particularly in multi-component interventions (Bettencourt et al., 2024). Quality of life enhancements showed SMDs of 0.29 to 1.03, with notable gains in humanistic outcomes like patient satisfaction (82% improvement rate) (Bettencourt et al., 2024). Opioid use reductions were prominent in three studies, including a mean decrease of 41.7 mg/day in morphine equivalents in a pharmacist-nurse clinic model, alongside reduced adverse events (e.g., 25% drop in hospitalizations) (Jorgenson & Halpape, 2023; Luetsch & Scuderi, 2024).

Qualitative insights from two studies highlighted themes of improved collaboration and patient empowerment but noted barriers like scope of practice restrictions (Giannitrapani et al., 2018). Educational models showed feasibility in training, with 450 participants reporting enhanced interprofessional skills (Virtual IPE, 2022). Subgroup analyses in systematic reviews indicated stronger effects in primary care settings (e.g., 30% greater pain reduction) versus specialty clinics, and for multi-professional teams over single-discipline interventions.

Table 1: Characteristics of Included Studies
Study
Pollack et al. (2018)
Giannitrapani et al. (2018)
Rahayu et al. (2021)
Jorgenson & Halpape (2023)
Virtual IPE (2022)

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Hooten et al. (2024)
Nurse-Pharmacist Collab (2022)
Impact of Pharmacist (2024)
Expanding Role (2018)
Unleashing Potential (2024)

Table 2: Key Models Described
Model Type
Pharmacist-Led
Interprofessional Collaborative
Transdisciplinary
Virtual IPE
Community Collaboration

Table 3: Outcomes Reported
Outcome
Pain Intensity Reduction
Opioid Dose Reduction
Quality of Life Improvement
Function Improvement
Medication Safety

Illustrations: Table 1 provides an overview of study diversity in design and scale; Table 2 illustrates the structural components and interdisciplinary nature of models; Table 3 quantifies key impacts, highlighting effect sizes and supporting studies for evidence-based interpretation (Jildeh et al., 2024; Luetsch & Scuderi, 2024; Herndon et al., 2021).

V. Discussion

The findings from this systematic review underscore the value of integrating nurses and pharmacists in chronic pain management models, aligning with the biopsychosocial approach to address the multifaceted nature of pain (Goldberg & McGee, 2011). Pharmacist-led models, as evidenced by significant reductions in pain intensity and opioid use (e.g., SMD -0.22 for pain, 41.7 mg/day morphine equivalent reduction), are particularly effective in optimizing pharmacotherapy amid the opioid crisis (Herndon et al., 2021; Jorgenson & Halpape, 2023). These interventions mitigate risks like adverse drug events, which were reduced by up to 25% in community settings, by incorporating medication reviews and patient education—strategies that enhance safety and adherence (Bettencourt et al., 2024; Luetsch & Scuderi, 2024).

Nurse contributions, emphasized in Delphi and qualitative studies, focus on holistic assessments and empathic care, which improve patient satisfaction and function (SMD up to 1.03) by screening for psychosocial factors and promoting self-management (Guérin et al., 2024; McCarthy, 2024). Interprofessional collaborative models amplify these benefits through shared decision-making, leading to better quality of life (SMD 0.29-1.03) and reduced healthcare utilization, as teams distribute workloads and foster comprehensive care plans (Giannitrapani et

al., 2018; Marufu et al., 2015). Virtual IPE and transdisciplinary approaches further innovate by incorporating technology and stakeholder alignment, potentially reducing costs and improving access, though evidence is emerging (Virtual IPE, 2022; Canadian Pharmacists Association, 2012).

However, barriers such as scope of practice limitations, inadequate training, and communication challenges hinder scalability, as noted in qualitative data (Giannitrapani et al., 2018). These align with broader literature gaps, where low-moderate study quality and heterogeneity limit generalizability (Jildeh et al., 2024). Compared to traditional physician-led care, these models show superior outcomes, but subgroup analyses suggest variability by setting—stronger in primary care due to accessibility (Bettencourt et al., 2024). Limitations include potential publication bias toward positive results and underrepresentation of low-resource settings (International Association for the Study of Pain, 2024). Overall, the evidence supports integration, but calls for rigorous RCTs to address gaps and confirm long-term economic impacts.

Implications and Recommendations

Implications: These models can alleviate primary care burdens, reduce opioid-related harms, and improve patient-centered care, potentially lowering global healthcare costs. Recommendations: Expand interprofessional training programs, revise regulatory scopes to enable full practice authority, integrate digital tools for virtual collaboration, and prioritize RCTs in diverse populations. Policymakers should fund team-based initiatives and incentivize adoption in underserved areas.

Conclusion

Integrating nurses and pharmacists in chronic pain management offers a promising pathway to address the global burden of this condition. By enhancing medication safety, reducing pain intensity, and improving patient-centered outcomes, these collaborative approaches transform healthcare delivery. Future research should focus on large-scale implementations and overcoming barriers to realize their full potential.

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