



## **Collaboration Between Pharmacists and Nurses in Pain Management and Opioid Safety**

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## **Abstract:**

Effective pain management requires a multidisciplinary approach that emphasizes the collaboration between pharmacists and nurses. Nurses play a crucial role in assessing patient pain levels, monitoring responses to treatment, and providing education on pain management strategies, while pharmacists contribute their expertise in medication management, including dosing, potential drug interactions, and opioid safety protocols. By working together, nurses and pharmacists can develop individualized pain management plans tailored to patients' needs, ensuring optimal therapeutic outcomes. Regular interdisciplinary meetings and communication can facilitate knowledge sharing and help to address both the clinical and emotional aspects of pain care, ultimately improving patient satisfaction and safety. Furthermore, the opioid crisis has underscored the need for enhanced collaboration between pharmacists and nurses in ensuring the safe use of opioids. Pharmacists can assist nurses by providing critical information on the risks associated with opioid therapy, including the potential for addiction and overdose. They can also recommend non-opioid alternatives or adjunct therapies, thereby minimizing reliance on opioids. Joint education initiatives and training sessions can empower both professions to recognize signs of opioid misuse, improve patient screening processes, and effectively manage side effects. Together, pharmacists and nurses can foster a culture of safety and responsibility in pain management, paving the way for better patient outcomes and reduced instances of opioid-related harm.

## **1. Introduction**

The management of pain, particularly when it involves the use of opioid analgesics, represents one of the most clinically nuanced and ethically fraught domains in contemporary healthcare. It exists at a critical nexus, demanding that practitioners navigate the profound responsibility to alleviate human suffering while simultaneously upholding an equally compelling duty to prevent harm. This harm extends beyond the expected pharmacological side effects to encompass the devastating societal and personal consequences of misuse, addiction, and overdose [1]. Pain itself is a multidimensional experience, encompassing sensory, emotional, cognitive, and social components, making its assessment and treatment inherently complex. When opioids are introduced into the therapeutic equation, this complexity is exponentially heightened by their potent psychoactive properties, their potential to induce physiological dependence, and their role as drivers of a public health catastrophe. The healthcare system's relationship with opioid pain management has been marked by pendulum swings—from historical undertreatment due to exaggerated fears of addiction, to a late-1990s and early-2000s era of aggressive promotion for both acute and chronic non-cancer pain, often fueled by misleading marketing about their safety profile [2]. This period laid the groundwork for the current crisis, revealing a system ill-equipped to balance access for legitimate need with robust safeguards against diversion and misuse.

The opioid crisis, now universally recognized as a public health disaster of staggering proportions, has

served as a brutal and unequivocal exposé of systemic failures across the continuum of care. It has highlighted deficiencies in medication stewardship, gaps in prescriber education on pain and addiction, inconsistent application of evidence-based prescribing guidelines, fragmented patient monitoring, and inadequate patient and community education regarding risks and safe storage [3]. The consequences are quantified in hundreds of thousands of lives lost to overdose, with countless more individuals and families grappling with the ravages of opioid use disorder (OUD). This crisis has transcended clinical discourse to become a social, economic, and political imperative, forcing a fundamental re-examination of long-standing healthcare paradigms. It has become irrefutably clear that traditional, siloed approaches to patient care, where prescribers, dispensers, and caregivers operate in parallel with limited communication, are not only insufficient but potentially dangerous in the context of high-risk medications like opioids. Such fragmentation creates vulnerabilities—missed signs of misuse, unchecked drug interactions, poor care transitions, and inconsistent patient messaging—that can have fatal outcomes [2].

In response to this urgent need for systemic resilience, the collaborative partnership between pharmacists and nurses emerges not merely as a beneficial adjunct to care, but as an essential and transformative paradigm for achieving the dual goals of safe, effective, and patient-centered pain management. This alliance is founded on the strategic leveraging of distinct yet profoundly complementary expertise, creating a dynamic and robust safety net around the patient. Nurses, by virtue of their continuous, frontline presence at the

bedside, in the clinic, and in the community, possess an unparalleled, holistic insight into the patient's lived experience. They are the primary gatherers of the narrative of pain, assessing not just a numerical rating but the qualitative dimensions: how pain alters mood, disrupts sleep, impedes mobility, and strains personal relationships [4]. They are adept at interpreting behavioral cues in patients who cannot self-report, such as those with cognitive impairment or critical illness, and they contextualize pain within the broader psychosocial framework of the patient's life. This deep, relational understanding provides the critical "why" behind the "what" of a pain complaint, informing whether a pharmacological intervention is appropriate and what adjunctive non-pharmacological strategies might be most effective. Conversely, pharmacists bring to this partnership a specialized, granular expertise in the science of medication therapy. Their role has evolved decisively from a product-centered dispensing function to a patient-centered clinical one, particularly in the realm of pain management and opioid stewardship. As medication therapy experts, pharmacists contribute a deep mastery of pharmacology, including the intricate pharmacokinetics and pharmacodynamics of opioids and their adjuvant medications. They are skilled in identifying and mitigating dangerous drug-drug and drug-disease interactions through comprehensive medication reconciliation—a process vital at every transition of care [5]. Pharmacists serve as institutional and community sentinels for medication safety, utilizing prescription drug monitoring program (PDMP) data to identify patterns of concerning use, analyzing prescribing patterns against emerging guidelines, and leading initiatives to promote multimodal analgesia to reduce baseline opioid requirements [6]. Their expertise is crucial in calculating appropriate dosing in complex patients with renal or hepatic impairment, thereby preventing iatrogenic harm from accumulation and toxicity. The convergence of these two perspectives—the nurse's holistic, patient-in-context view and the pharmacist's focused, medication-in-system view—facilitates a more complete and actionable clinical picture. This synergy enables the creation of truly tailored therapeutic plans that consider both the subjective experience of the patient and the objective safety parameters of pharmacotherapy. It fosters vigilant, proactive monitoring where the nurse's real-time observations of efficacy and side effects are immediately contextualized by the pharmacist's understanding of pharmacological timelines and risk profiles. This collaborative dynamic is essential for the proactive mitigation of

risks, such as early identification of sedation progressing to respiratory depression, or the coordinated management of opioid-induced constipation. Furthermore, this partnership ensures consistency in patient education, where the nurse's counseling on functional goals and the pharmacist's detailed instructions on proper use, storage, and disposal of medications reinforce a single, clear message, empowering patients as active participants in their own safety [7].

## **2.The Evolving Role of the Pharmacist in Pain Management and Opioid Stewardship**

The pharmacist's role has undergone a profound transformation from a primarily dispensing function to that of an integral member of the direct patient care team, particularly in the realm of pain management and opioid safety. This evolution is centered on the principles of comprehensive medication management and opioid stewardship.

## **3. Medication Therapy Expert and Safety Analyst**

Pharmacists provide indispensable expertise in the selection of appropriate analgesic regimens. This involves a detailed review of the patient's medication history, including over-the-counter products and herbal supplements, to identify potential drug-drug or drug-disease interactions that could complicate therapy [2]. They evaluate the appropriateness of opioid therapy based on diagnosis, evidence-based guidelines, and risk assessment tools. Pharmacists are uniquely positioned to assess pharmacokinetic and pharmacodynamic factors, such as renal or hepatic impairment, which critically influence opioid dosing and the risk of adverse effects like respiratory depression or sedation [3]. During medication reconciliation—a process vital at care transitions—pharmacists identify and resolve discrepancies, ensuring accurate and safe medication lists, which is a cornerstone of preventing medication errors in complex pain regimens [4].

## **4. Educator and Counselor for Patients and Providers**

Patient education is a critical component of safe opioid use, and pharmacists are expertly trained to deliver this counseling. They ensure patients and their caregivers understand the proper use, storage, and disposal of opioids, the management of common side effects like constipation, and the recognition of dangerous signs of overdose [5]. Furthermore, pharmacists educate patients about

realistic expectations for pain relief and the importance of adhering to prescribed doses. Equally important is their role as educators for other healthcare providers. Pharmacists provide timely information to physicians and nurses on emerging evidence, guideline updates, formulary considerations, and the appropriate use of opioid-sparing adjuvants and non-pharmacological alternatives [6]. They also play a key role in promoting the safe prescribing of naloxone, the opioid overdose reversal agent, for patients at risk [7].

## **5. Monitor and Steward of Opioid Use**

As central figures in hospital and community opioid stewardship programs, pharmacists lead initiatives to promote safer prescribing. They develop and implement guidelines, order sets, and protocols for postoperative pain management that emphasize multimodal analgesia, thereby reducing baseline opioid requirements [8]. Pharmacists conduct retrospective and concurrent reviews of opioid prescriptions, flagging potential issues such as high morphine milligram equivalents (MME), concurrent prescriptions for benzodiazepines (a dangerous combination), or signs of doctor-shopping through prescription drug monitoring program (PDMP) data review [9]. In the inpatient setting, they monitor for efficacy and signs of opioid-induced adverse drug events, recommending dosage adjustments or therapeutic alternatives as necessary.

## **6. The Central Role of the Nurse in Assessing, Managing, and Advocating in Pain Care**

The nurse's role in pain management is continuous, dynamic, and rooted in a holistic, patient-centered philosophy. Nurses serve as the primary assessors, frontline implementers, constant monitors, and key patient advocates throughout the pain management journey.

## **7. Frontline Assessor and Holistic Evaluator**

Pain assessment is a complex nursing skill that extends far beyond asking a numerical rating. Nurses conduct comprehensive pain assessments that include the location, quality, intensity, and temporal pattern of pain. Crucially, they evaluate the functional impact of pain—how it affects mobility, sleep, mood, and activities of daily living [10]. Nurses are trained to assess nonverbal cues in patients who cannot self-report, such as those with cognitive impairment or critical illness, using validated behavioral pain scales [11]. This holistic

assessment integrates psychosocial, cultural, and spiritual dimensions of the pain experience, providing a rich, contextual understanding that is vital for tailoring interventions and evaluating their true effectiveness [12].

## **8. Implementer and Titrator of Therapy**

Nurses are responsible for the safe administration of prescribed analgesics, employing rigorous safety checks (e.g., the five rights of medication administration) to prevent errors. A critical collaborative function is their role in titrating medications within prescribed parameters or according to protocol. For instance, in patient-controlled analgesia (PCA) management, nurses monitor pump settings, assess efficacy, and manage side effects in close coordination with pharmacists and physicians [13]. They are also primary implementers of non-pharmacological interventions, such as repositioning, guided imagery, relaxation techniques, and application of heat or cold, which are essential components of a multimodal approach [14].

## **9. Continuous Monitor and Patient Advocate**

Nurses provide ongoing surveillance for both the therapeutic benefits and the adverse effects of opioid therapy. They monitor vital signs, sedation levels (using tools like the Pasero Opioid-Induced Sedation Scale), respiratory status, and bowel function to detect and mitigate risks like respiratory depression and opioid-induced constipation early [15]. This continuous monitoring at the bedside generates real-time data essential for collaborative decision-making. Furthermore, nurses act as powerful patient advocates, ensuring the patient's voice is heard in care planning. They communicate unmet pain relief needs to the prescriber and pharmacist, and they also advocate for caution, expressing concerns about over-sedation or signs of aberrant behavior that may indicate misuse or undermanaged addiction [16].

## **10. Theoretical and Practical Frameworks for Effective Collaboration**

Successful collaboration is not accidental; it is built on defined models, clear communication structures, and shared goals. Several frameworks facilitate the effective integration of pharmacist and nurse expertise in pain management.

## **11. Interprofessional Collaborative Practice Models**

The World Health Organization and other leading bodies endorse interprofessional collaborative practice as a means to improve health outcomes. In pain management, this can take structural forms such as integrated pain management teams or interprofessional rounds. On these rounds, pharmacists, nurses, physicians, and other providers jointly review complex pain cases, allowing for immediate information exchange and consensus building on the care plan [17]. In ambulatory care, collaborative drug therapy management agreements can authorize pharmacists, under protocol, to initiate, modify, or discontinue pain medications based on patient assessment and in consultation with the nurse and physician, streamlining care and improving access [18]. Shared electronic health records (EHRs) are a technological cornerstone of these models, providing a common platform for documentation, plan visibility, and secure messaging between team members [19].

## 12. Communication and Trust as Foundational Pillars

The efficacy of any model hinges on the quality of communication. Structured communication tools, such as SBAR (Situation, Background, Assessment, Recommendation), provide a clear framework for nurses to communicate concerns or observations to pharmacists and prescribers, leading to precise and actionable recommendations [20]. Mutual respect and trust are cultivated through consistent, respectful interaction and a shared understanding of each other's competencies. When nurses value the pharmacist's drug expertise and pharmacists respect the nurse's clinical assessment skills, a synergistic relationship flourishes. Joint participation in interprofessional education (IPE) activities, such as simulation training on complex pain scenarios or opioid overdose response, builds this shared mental model and fosters a culture of teamwork from the earliest stages of professional development [21].

## 13. Practical Strategies for Collaborative Optimization of Pain Management

Moving from theory to practice, several concrete strategies demonstrate how pharmacist-nurse collaboration directly enhances care quality and safety across settings.

### Inpatient and Perioperative Care

In the hospital, collaboration is intensive. Pharmacists participate in nursing shift handoffs or dedicated pain rounds to discuss high-risk patients. They work with nurses to develop and use standardized protocols for postoperative pain that mandate multimodal analgesia (e.g., combining

regional anesthesia, NSAIDs, acetaminophen, and judicious opioids), which has been shown to reduce opioid consumption and related side effects [22]. For patients on PCA, the nurse-pharmacist duo ensures proper pump programming, monitors for clinical response and adverse effects, and coordinates lockout intervals and dose adjustments. Pharmacists also support nurses in managing opioid-induced side effects by recommending proactive bowel regimens or adjuvant medications for neuropathic pain [23].

## 14. Ambulatory and Primary Care

In clinics and primary care settings, collaboration often focuses on risk mitigation and chronic pain management. Pharmacists can screen PDMP data and conduct comprehensive medication reviews, then discuss findings with the nurse care manager. Together, they can develop a unified message for the patient regarding safe medication use. Nurses, during follow-up phone calls or visits, assess functional outcomes and screen for signs of misuse using validated tools, relaying this information to the pharmacist to inform ongoing medication therapy management [24]. They collaboratively develop and provide consistent patient education on topics like medication adherence, side effect management, and the use of naloxone rescue kits.

## 15. Transition of Care and Discharge Planning

Care transitions are high-risk periods for medication errors and adverse events. Proactive collaboration is vital. Pharmacists conduct a final medication reconciliation at discharge, while nurses provide the discharge instructions. A collaborative process ensures the patient receives a clear, unified, and understandable pain management plan. The pharmacist may counsel the patient on the new regimen, while the nurse ensures the patient comprehends warning signs and follow-up plans. They can jointly coordinate with community pharmacists and home health nurses to ensure continuity, perhaps by flagging the need for a follow-up phone call to assess pain control and pill counts [25].

## 16. Addressing the Opioid Crisis: A Unified Front for Safety and Stewardship

The collaboration finds its most urgent application in direct response to the opioid epidemic. Together, pharmacists and nurses form a robust defense at multiple levels.

### Screening, Risk Assessment, and Mitigation

Prior to opioid initiation, collaborative risk

assessment is key. Nurses may administer validated screening tools for substance use disorder risk (e.g., the Opioid Risk Tool), while pharmacists review the PDMP for prescription history. Combining these data points creates a more complete risk profile [26]. For patients deemed at risk, the team collaboratively implements mitigation strategies: prescribing naloxone, using urine drug screening, employing opioid treatment agreements, and scheduling more frequent follow-up visits. The nurse's ongoing therapeutic relationship facilitates monitoring adherence to the agreement, while the pharmacist ensures safe dispensing patterns [27].

## 17. Prevention of Diversion and Misuse

Nurses are instrumental in educating patients on secure storage and proper disposal of unused medications, a key public health intervention to prevent diversion within households [28]. Pharmacists, particularly in community settings, are trained to identify forged prescriptions or behavioral red flags indicative of misuse. A system where nurses and pharmacists feel empowered to communicate concerns to each other and to prescribers creates a culture of safety and accountability, preventing individuals from exploiting gaps between care settings [29].

### Management of Opioid Use Disorder (OUD)

For patients with OUD, collaboration is essential for facilitating treatment. Nurses provide non-judgmental screening, brief interventions, and linkage to care. Pharmacists, especially those with added qualifications, are increasingly involved in dispensing and managing medications for OUD (MOUD) like buprenorphine, providing adherence counseling, and monitoring for safety and diversion [30]. In emergency departments, a collaborative model where nurses identify patients with opioid overdose or OUD and clinical pharmacists assist in initiating buprenorphine has shown significant success in engaging patients in treatment [31].

## 18. Barriers and Challenges to Optimal Collaboration

Despite the clear benefits, significant barriers impede the full realization of this collaborative potential. Recognizing these challenges is the first step toward addressing them.

### Systemic and Regulatory Hurdles

Fragmented healthcare systems with poor communication channels between community pharmacies, clinics, and hospitals hinder continuity. Restrictive scope-of-practice laws in some regions may limit pharmacists' ability to make therapeutic interventions or access comprehensive patient

records, forcing collaboration to rely on informal channels [32]. Reimbursement models often do not adequately compensate pharmacists or nurses for collaborative care activities like comprehensive medication reviews or lengthy patient counseling, creating a financial disincentive for organizations to support these time-intensive practices [33].

### Professional and Cultural Factors

Historical hierarchies and professional silos can persist, leading to a lack of role clarity or mutual understanding. Unfamiliarity with each other's skills and knowledge bases can breed reluctance to consult or defer [34]. In high-pressure environments, time constraints are a pervasive barrier; nurses and pharmacists may be too burdened with routine tasks to engage in proactive, interdisciplinary consultation. Furthermore, implicit biases towards patients with pain or substance use disorder can affect both professions, potentially undermining the consistent, compassionate, and evidence-based approach that collaboration seeks to uphold [35].

## 19. The Future Trajectory: Advancing the Partnership through Innovation and Integration

The future of pharmacist-nurse collaboration in pain management is poised for growth, driven by technological innovation, expanded scopes of practice, and a deepening commitment to interprofessional care models.

### Technological Augmentation and Telehealth

Advanced analytics integrated into EHRs can provide collaborative alerts. For example, an algorithm could flag a patient on high-dose opioids and a benzodiazepine, generating an alert for both the nurse care manager and the pharmacist to jointly address [36]. Telehealth and virtual care platforms open new avenues for collaboration, allowing clinic-based nurses and remote clinical pharmacists to co-manage chronic pain patients in rural or underserved areas, conducting joint video visits to assess progress and adjust plans [37]. Digital tools for patient-reported outcomes allow patients to log pain scores and function, creating a shared data stream for the team to review.

### Expanded Roles and Population Health

The scope of practice for both professions is expanding. More states are granting pharmacists prescribing authority for naloxone and in some cases for initiating or managing MOUD [38]. Nurses, particularly Advanced Practice Registered Nurses (APRNs), are essential prescribers in pain management. This evolution necessitates even closer, more collegial collaboration. Furthermore, both professions are moving beyond individual patient care to address population health. They can

jointly lead community outreach programs on safe opioid disposal, contribute to public health surveillance of overdose trends, and develop institution-wide quality improvement projects to reduce preventable opioid-related harm [39].

### **Cultivating a Collaborative Culture from Education to Practice**

The foundation for future collaboration is laid in educational institutions. Strengthening IPE, where pharmacy and nursing students learn together through case-based learning and simulations, is critical to developing collaborative competencies early [40]. Healthcare institutions must actively foster a culture of psychological safety, where both nurses and pharmacists feel empowered to speak up with questions or concerns without fear of reprisal. Leadership must invest in creating the structural time, physical space, and technological infrastructure needed for this teamwork to thrive [41].

### **20. Conclusion:**

The complex, multidimensional challenge of pain management in the era of the opioid crisis demands a coordinated, interdisciplinary response. The collaboration between pharmacists and nurses represents a powerful and essential synergy that directly addresses this challenge. By combining the nurse's holistic, continuous, patient-centered assessment and advocacy with the pharmacist's specialized expertise in medication therapy management and safety systems, this partnership creates a continuum of care that is greater than the sum of its parts. It enhances the therapeutic efficacy of pain interventions, constructs a vigilant defense against the risks of opioid therapy, and provides a compassionate, unified front for patients navigating often-difficult treatment journeys. While systemic, cultural, and logistical barriers exist, the trajectory is clear: the future of safe, effective, and equitable pain management depends on the continued deepening and formalization of this critical alliance. Through sustained commitment to interprofessional education, innovative care models, and supportive policy, the pharmacist-nurse collaboration will remain indispensable in fulfilling the dual mandate of alleviating suffering and protecting patients from harm, ultimately steering pain care toward a more rational, humane, and safe paradigm.

### **Author Statements:**

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### **References**

1. Pitcher M.H., Von Korff M., Bushnell M.C., Porter L. Prevalence and Profile of High-Impact Chronic Pain in the United States. *J. Pain.* 2019;20:146–160.
2. Woolf C.J. What is this thing called pain? *J. Clin. Investig.* 2010;120:3742–3744.
3. Lalonde L., Leroux-Lapointe V., Choinière M., Martin E., Lussier D., Berbiche D., Lamarre D., Thiffault R., Jouini G., Perreault S. Knowledge, attitudes and beliefs about chronic noncancer pain in primary care: A Canadian survey of physicians and pharmacists. *Pain Res. Manag.* 2014;19:241–250.
4. Tsubaki K., Taguchi K., Yoshida T., Takanashi R., Shimizu E. Long-term effects of integrated cognitive behavioral therapy for chronic pain: A qualitative and quantitative study. *Medicine.* 2023;102:e34253.
5. Goldberg D.S., McGee S.J. Pain as a global public health priority. *BMC Public Health.* 2011;11:770.
6. Patel K.V., Guralnik J.M., Dansie E.J., Turk D.C. Prevalence and impact of pain among older adults in the United States: Findings from the 2011 National Health and Aging Trends Study. *Pain.* 2013;154:2649–2657.
7. Yang J., Bauer B.A., Wahner-Roedler D.L., Chon T.Y., Xiao L. The Modified WHO Analgesic Ladder: Is It Appropriate for Chronic Non-Cancer Pain? *J. Pain Res.* 2020;13:411–417.
8. Hara K.W., Borchgrevink P. National guidelines for evaluating pain-Patients' legal right to prioritised health care at multidisciplinary pain clinics in Norway implemented 2009. *Scand. J. Pain.* 2010;1:60–63.
9. Pieretti S., Di Giannuario A., Di Giovannandrea R., Marzoli F., Piccaro G., Minosi P., Aloisi A.M. Gender differences in pain and its relief. *Ann. Ist. Super. Sanita.* 2016;52:184–189.
10. Tabeeffar H., Chang F., Cooke M., Patel T. Community pharmacists and chronic pain: A

- qualitative study of experience, perception, and challenges. *Can. J. Pain.* 2020;4:29–39.
11. Ranganathan P., Caduff C. Designing and validating a research questionnaire—Part 1. *Perspect. Clin. Res.* 2023;14:152–155.
  12. Staudt M.D. The Multidisciplinary Team in Pain Management. *Neurosurg. Clin. N. Am.* 2022;33:241–249.
  13. Quince T.A., Kinnersley P., Hales J., da Silva A., Moriarty H., Thiemann P., Hyde S., Brimicombe J., Wood D., Barclay M., et al. Empathy among undergraduate medical students: A multi-centre cross-sectional comparison of students beginning and approaching the end of their course. *BMC Med. Educ.* 2016;16:92.
  14. Thapa P., Lee S.W.H., Kc B., Dujaili J.A., Mohamed Ibrahim M.I., Gyawali S. Pharmacist-led intervention on chronic pain management: A systematic review and meta-analysis. *Br. J. Clin. Pharmacol.* 2021;87:3028–3042.
  15. Ehde D.M., Dillworth T.M., Turner J.A. Cognitive-behavioral therapy for individuals with chronic pain: Efficacy, innovations, and directions for research. *Am. Psychol.* 2014;69:153–166.
  16. Landmark T., Romundstad P., Dale O., Borchgrevink P.C., Kaasa S. Estimating the prevalence of chronic pain: Validation of recall against longitudinal reporting (the HUNT pain study) *Pain.* 2012;153:1368–1373.
  17. Hadi M.A., Alldred D.P. Promoting the role of pharmacists in chronic pain management: How can we make an impact on policy and practice? *Int. J. Pharm. Pract.* 2015;23:165–166.
  18. Tsuyuki R.T., Beahm N.P., Okada H., Al Hamarneh Y.N. Pharmacists as accessible primary health care providers: Review of the evidence. *Can. Pharm. J.* 2018;151:4–5.
  19. Bartley E.J., Fillingim R.B. Sex differences in pain: A brief review of clinical and experimental findings. *Br. J. Anaesth.* 2013;111:52–58.
  20. Raja S.N., Carr D.B., Cohen M., Finnerup N.B., Flor H., Gibson S., Keefe F.J., Mogil J.S., Ringkamp M., Sluka K.A., et al. The revised International Association for the Study of Pain definition of pain: Concepts, challenges, and compromises. *Pain.* 2020;161:1976–1982.
  21. Dahlhamer J., Lucas J., Zelaya C., Nahin R., Mackey S., DeBar L., Kerns R., Von Korff M., Porter L., Helmick C. Prevalence of Chronic Pain and High-Impact Chronic Pain among Adults—United States, 2016. *MMWR. Morb. Mortal. Wkly. Rep.* 2018;67:1001–1006.
  22. Mathew S., Chamberlain C., Alvarez K.S., Alvarez C.A., Shah M. Impact of a Pharmacy-Led Pain Management Team on Adults in an Academic Medical Center. *Hosp. Pharm.* 2016;51:639–645.
  23. AM A.L., Gosling C.M., Khasawneh E., McKenna L., Williams B. Challenges Faced by Female Healthcare Professionals in the Workforce: A Scoping Review. *J. Multidiscip. Healthc.* 2020;13:681–691.
  24. Driscoll M.A., Edwards R.R., Becker W.C., Kaptchuk T.J., Kerns R.D. Psychological Interventions for the Treatment of Chronic Pain in Adults. *Psychol. Sci. Public Interest.* 2021;22:52–95.
  25. Bennett M.I., Bagnall A.M., Raine G., Closs S.J., Blenkinsopp A., Dickman A., Ellershaw J. Educational interventions by pharmacists to patients with chronic pain: Systematic review and meta-analysis. *Clin. J. Pain.* 2011;27:623–630.
  26. Maciel H.I.A., Costa M.F., Costa A.C.L., Marcatto J.O., Manzo B.F., Bueno M. Pharmacological and nonpharmacological measures of pain management and treatment among neonates. *Rev. Bras. Ter. Intensiv.* 2019;31:21–26.
  27. Lim J.A., Choi S.H., Lee W.J., Jang J.H., Moon J.Y., Kim Y.C., Kang D.H. Cognitive-behavioral therapy for patients with chronic pain: Implications of gender differences in empathy. *Medicine.* 2018;97:e10867.
  28. Gleichgerricht E., Decety J. Empathy in clinical practice: How individual dispositions, gender, and experience moderate empathic concern, burnout, and emotional distress in physicians. *PLoS ONE.* 2013;8:e61526.
  29. Boren L.L., Locke A.M., Friedman A.S., Blackmore C.C., Woolf R. Team-Based Medicine: Incorporating a Clinical Pharmacist into Pain and Opioid Practice Management. *PMR.* 2019;11:1170–1177.
  30. Semerjian M., Durham M.J., Mirzaian E., Lou M., Richeimer S.H. Clinical Pharmacy Services in a Multidisciplinary Specialty Pain Clinic. *Pain Pract.* 2019;19:303–309.
  31. Bukhari N., Manzoor M., Rasheed H., Nayyer B., Malik M., Babar Z.-U.-D. A step towards gender equity to strengthen the pharmaceutical workforce during COVID-19. *J. Pharm. Policy Pract.* 2020;13:15.
  32. Murphy L., Ng K., Isaac P., Swidrovich J., Zhang M., Sproule B.A. The Role of the Pharmacist in the Care of Patients with Chronic Pain. *Integr. Pharm. Res. Pract.* 2021;10:33–41.
  33. Gauntlett-Gilbert J., Brook P. Living well with chronic pain: The role of pain-management programmes. *BJA Educ.* 2018;18:3–7.
  34. Hartung D.M., Hall J., Haverly S.N., Cameron D., Alley L., Hildebran C., O’Kane N., Cohen D. Pharmacists’ Role in Opioid Safety: A Focus Group Investigation. *Pain Med.* 2018;19:1799–1806.
  35. Ketenci A., Zure M. Pharmacological and non-pharmacological treatment approaches to chronic lumbar back pain. *Turk. J. Phys. Med. Rehabil.* 2021;67:1–10.
  36. Nielsen C.S. Chronic pain is strongly associated with work disability. *Scand. J. Pain.* 2013;4:180–181.
  37. Giannitrapani K.F., Glassman P.A., Vang D., McKelvey J.C., Thomas Day R., Dobscha S.K., Lorenz K.A. Expanding the role of clinical pharmacists on interdisciplinary primary care teams for chronic pain and opioid management. *BMC Fam. Pract.* 2018;19:107.

38. Breivik H., Eisenberg E., O'Brien T. The individual and societal burden of chronic pain in Europe: The case for strategic prioritisation and action to improve knowledge and availability of appropriate care. *BMC Public Health*. 2013;13:1229.
39. Wu M.-J., Zhao K., Fils-Aime F. Response rates of online surveys in published research: A meta-analysis. *Comput. Hum. Behav. Rep.* 2022;7:100206.
40. Tait R.C. Empathy: Necessary for effective pain management? *Curr. Pain Headache Rep.* 2008;12:108–112.
41. Misro A., Hussain M., Jones T.L., Baxter M.A., Khanduja V. A quick guide to survey research. *Ann. R. Coll. Surg. Engl.* 2014;96:87.