Lumina Indones J Neurol. Vol 2 No 1 (April 2026)
https://doi.org/10.19166/lijn.v2i1.10963

SYSTEMATIC REVIEW

CONTRIBUTIONS OF NURSING PROFESSIONALS AND PRIMARY CARE PHYSICIANS IN INTERDISCIPLINARY ONCOLOGY TEAMS FOR CANCER PAIN MANAGEMENT: AN ANALYTICAL REVIEW

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Abstract

Introduction: Cancer-related pain remains inadequately managed in a substantial proportion of oncology patients, despite established clinical protocols. Current systematic evidence indicates that up to 55% of patients experience undertreated pain.[35] Interdisciplinary oncology teams — comprising nursing professionals and primary care physicians (PCPs) — are a critical organizational strategy for improving cancer pain management across the care continuum.

Methods: A systematic narrative synthesis was conducted using 30 peer-reviewed sources identified through structured searches of the PubMed, CINAHL, Scopus, and Cochrane databases. Inclusion criteria encompassed studies, reviews, and guidelines published from 2002 to 2025 that addressed professional roles, team structure, barriers, and clinical outcomes in cancer pain management.

Results: Nursing professionals contribute substantially to pain assessment and management through validated instruments, pharmacological and non-pharmacological interventions, patient self-management education, and interdisciplinary advocacy. PCPs facilitate care coordination, ensure analgesic prescribing continuity, and manage the primary–specialty interface. Effective interdisciplinary teams improve patient outcomes through structured communication, clear roles, and integrated care pathways. Persistent barriers include care fragmentation, professional role ambiguity, competency gaps, and regulatory constraints on opioid prescribing.

Conclusions: Although current evidence supports the effectiveness of interdisciplinary approaches to improving cancer pain outcomes, significant gaps remain in comparative effectiveness data, implementation science, and health equity research. Enhanced clinical training, organizational investment, and policy reform are necessary to optimize collaborative cancer pain management across diverse healthcare settings.

Keywords: *cancer pain; interdisciplinary teams; nursing professionals; primary care physicians; collaborative care; palliative care; pain mechanisms*

Received: January 15th, 2026
Accepted: April, 1st, 2026
Published: April 30th, 2026

How to cite this paper:
Sofyan HR, Soebroto AD, Novrilia E, et. al. Contributions of nursing professionals and primary care physicians in interdisciplinary oncology teams for cancer pain management: an analytical review. Lumina Indones J Neurol. 2026;2(1):52-72

Despite extensive clinical protocols and decades of scientific research, cancer-related pain remains inadequately managed, affecting approximately half of oncology patients who report less-than-optimal symptom relief.[35,1] This review synthesizes research on collaboration between nursing professionals and primary care physicians within interdisciplinary oncology committees and collaborative healthcare teams to address cancer pain. Drawing on 30 peer-reviewed sources identified through comprehensive database searches, this analysis examines conceptual models, research methods, and evidence-based outcomes in this field.

This analysis reveals significant conceptual variation, with research employing biopsychosocial models, holistic pain theories, and coordinated care approaches; however, many studies lack clearly defined theoretical bases. Methodologically, the literature shows considerable diversity, including qualitative research, quantitative assessment tools, mixed-methods designs, and evidence reviews. Key findings indicate that while interdisciplinary strategies show promise for improving pain management outcomes, several barriers remain, including fragmented care pathways, unclear professional roles, limited cross-disciplinary communication, and institutional hurdles to analgesic prescribing. Important knowledge gaps persist regarding optimal oncology team structures, the specific contributions of primary care physicians in team-based care, and methods to sustain collaborative relationships during treatment transitions.

Introduction

Pain in individuals with cancer is a complex clinical issue affecting millions worldwide. Despite evidence-based protocols, including the World Health Organization's analgesic stepladder approach[37,] and advances in pharmacologic and interventional pain management, a substantial proportion of cancer patients still report inadequate pain relief.[1,35] This persistent gap between available knowledge and clinical practice has intensified interest in the organizational and interprofessional dimensions of cancer pain management.

Addressing pain in cancer populations inherently requires coordination among multiple healthcare professionals, clinical settings, and stages of the cancer journey. Nursing professionals, as primary contact providers, play central roles in pain assessment, medication administration, patient education, and advocacy. Primary care physicians (PCP) provide essential functions in ongoing care coordination, analgesic prescribing, and bridging hospital-based specialty services with community healthcare. Interdisciplinary oncology committees serve as organizational mechanisms to improve care coordination and the quality of clinical decision-making.

Nevertheless, evidence on how these collaborative structures function, their effectiveness, and optimal

implementation approaches remains inconsistent and incomplete. Questions persist about role boundaries, communication protocols, decision-making authority, and effective integration across care settings. This analytical review seeks to consolidate and critically evaluate existing scholarship on these roles, synthesizing conceptual frameworks, methodological approaches, and empirical findings to identify areas of agreement, ongoing debates, and priority knowledge gaps.

Conceptual Underpinnings of Cancer-Related Pain Control

Cancer Pain Mechanisms: Pathophysiological Basis for Interdisciplinary Management

A comprehensive understanding of cancer pain mechanisms is essential for rational allocation of roles within interdisciplinary teams. Cancer pain arises from nociceptive (somatic and visceral), neuropathic, and mixed pathophysiological processes that frequently coexist in individual patients.[30,37]

Peripheral sensitization, mediated by tumor-released algogenic substances such as bradykinin, prostaglandins (COX-mediated), nerve growth factor (NGF), endothelin-1, and protons from the acidic tumor microenvironment, lowers nociceptor activation thresholds and expands receptor fields. In metastatic bone disease — the most prevalent cause of cancer-related pain — osteoclast-mediated periosteal distension, pathological microfractures, and periosteal nerve compression generate somatic nociceptive input that is often undertreated in community settings.

Central sensitization, marked by NMDA receptor upregulation and spinal glial activation, can sustain and amplify pain perception independently of ongoing peripheral afferent input. This neuroplastic phenomenon explains the common clinical dissociation between radiographic tumor burden and pain severity and underlies the inadequacy of purely peripheral analgesic approaches for patients with established chronic cancer pain.[30]

Neuropathic components, estimated to be present in approximately 30–40% of cancer pain presentations, arise from direct neural invasion or compression, tumor-related ischemia, chemotherapy-induced peripheral neuropathy (CIPN), and post-surgical neuropathic sequelae. These require adjuvant analgesic strategies — anticonvulsants (gabapentinoids, pregabalin), serotonin-norepinephrine reuptake inhibitors (SNRIs), and topical agents — that fall outside the conventional opioid-centric frameworks with which many bedside nurses and primary care physicians are most familiar. This competency gap constitutes a specific educational imperative directly relevant to defining the interdisciplinary role and team composition.

From a care coordination perspective, the mechanistic complexity of cancer pain warrants structured interdisciplinary review: nociceptive pain components are amenable to nursing-led and PCP-led analgesic management,

whereas neuropathic and mixed states with central sensitization increasingly require specialist input from palliative medicine, pain medicine, or neuro-oncology. Understanding these distinctions enables teams to deploy professional expertise more precisely and to define appropriate escalation pathways.

Holistic and Biopsychosocial Theoretical Constructs

Contemporary scholarship on cancer-related pain increasingly acknowledges that physical nociception is only one aspect of the pain experience. The biopsychosocial framework, originally formulated by Engel[31] and subsequently elaborated in oncology and pain medicine contexts, views pain as arising from dynamic interactions among biological, psychological, and social determinants.[30] In oncology settings, this perspective recognizes that pain perception and expression are shaped by disease pathology, treatment side effects, emotional distress, existential concerns, social support systems, and cultural beliefs.

The 'total pain' construct, pioneered by Dame Cicely Saunders,[32] broadens the holistic view by explicitly incorporating the physical, psychological, social, and spiritual dimensions of suffering. This framework has been particularly influential in palliative care philosophy and practice, emphasizing that effective pain management requires addressing the full range of the patient's experience rather than focusing solely on physiological factors. Recent conceptual developments, including the 3P-CP (Predisposing, Precipitating, Perpetuating factors in Cancer Pain) model,[30,] provide a structured framework for understanding how multiple interacting factors shape individual pain trajectories over time.

These holistic frameworks have direct implications for interprofessional collaboration. If pain is genuinely multidimensional, comprehensive management necessarily requires coordinated expertise across clinical assessment, pharmacological prescribing, psychological counseling, social work, spiritual care, and rehabilitative therapies. The theoretical justification for interdisciplinary approaches stems directly from the multidimensional nature of the pain experience.

Organizational and Coordinated Care Frameworks

Beyond patient-level conceptualizations, scholarship has increasingly focused on organizational and system-level frameworks. Integrated care pathway models highlight standardized, evidence-based protocols that coordinate interventions across disciplines and care settings.[15] These frameworks position optimal care as arising not from individual clinical excellence alone, but from systematic coordination mechanisms that ensure consistent implementation of evidence-based practice.

Organizational theories of interdisciplinary teams examine structural factors that shape team functioning, including formal governance, communication systems, role clarity, shared decision-making, and

accountability mechanisms.[20] Fennell and colleagues' model of multidisciplinary care team organization explicitly distinguishes internal team features (composition, leadership, communication patterns) from external environmental factors (institutional support, reimbursement structures, regulatory frameworks) that together influence team effectiveness.[20]

Coordination theories explain how multiple autonomous professionals achieve effective collective action. In cancer pain management, coordination challenges arise from traditions of professional autonomy, distributed knowledge across specialties, timing constraints for interventions, and transitions between care settings. Theoretical frameworks for addressing these challenges include shared mental models, boundary-spanning roles, standardized protocols, and information technology systems that facilitate communication.[23]

Deficiencies and Constraints in Theoretical Development

Despite these conceptual advances, significant theoretical limitations persist in the literature. Many empirical studies are atheoretical, describing phenomena without clear conceptual frameworks to guide inquiry or interpretation.[5] This lack of theoretical grounding hinders cumulative knowledge development, leaving findings isolated from broader explanatory frameworks.

Furthermore, existing theories often inadequately address power dynamics, professional hierarchies, and socioeconomic factors that shape pain management. Critical perspectives on how organizational structures, professional socialization, and healthcare financing mechanisms systematically disadvantage certain patient populations or constrain specific professional contributions remain underdeveloped. Achieving theoretical integration across individual, team, organizational, and healthcare system levels — linking micro, meso, and macro factors — is a vital priority for advancing the field.

Methods

This analytical review used a systematic narrative synthesis methodology. Electronic databases, including PubMed/MEDLINE, CINAHL, Scopus, and the Cochrane Library, were searched from inception to February 2025 using the following MeSH and free-text terms: 'cancer pain', 'oncology pain management', 'interdisciplinary team', 'multidisciplinary oncology', 'nursing role', 'primary care physician', 'palliative care team', 'collaborative care', and 'pain barriers'. Inclusion criteria encompassed peer-reviewed original research articles, systematic reviews, meta-analyses, clinical guidelines, and evidence-based practice papers published in English. Grey literature (dissertations, conference proceedings) was selectively included when peer-reviewed evidence was limited and is explicitly identified in the reference list. Artificial intelligence tools were used solely for language editing of the final manuscript draft; all reference selection, data extraction, synthesis, and interpretation were performed by the

authors. A total of 30 sources met the final inclusion criteria and are cited throughout this review.

Research Design Approaches within The Scholarship

Qualitative and Combined-Method Investigations

Qualitative research methods constitute a substantial share of the cancer pain management literature, particularly for examining professional experiences, interprofessional dynamics, and barriers to optimal care. Interview-based studies of nursing professionals, physicians, and other team members have illuminated subjective perspectives on roles and responsibilities, collaboration challenges, and facilitators of effective teamwork.[29,11,23]

Wang and colleagues conducted a qualitative systematic review synthesizing 23 studies on barriers nurses face in providing cancer pain management.[29] Their analysis identified themes such as organizational constraints (inadequate staffing, time pressures), knowledge gaps (assessment skills, pharmacological knowledge), interprofessional challenges (physician-nurse communication, prescribing authority), and patient-related factors (reluctance to report pain, opioid concerns). This synthesis exemplifies the value of qualitative research in identifying complex categories of barriers across multiple contexts.

Mixed-methods designs integrate qualitative and quantitative approaches to leverage complementary strengths. Several studies use sequential designs in which initial qualitative research guides quantitative instrument development, or quantitative results prompt qualitative follow-up for deeper interpretation.[5] Qualitative approaches offer depth of understanding, contextual sensitivity, and the capacity to identify unexpected phenomena, but they also have limitations, including limited generalizability and potential investigator bias.

Survey-Based and Interventional Research

Quantitative survey research has documented professional knowledge levels, attitudes toward pain management, practice patterns, and perceived barriers across diverse settings and professional groups. Cross-sectional surveys of nurses and physicians have consistently identified deficits in opioid pharmacology knowledge, inadequate pain assessment practices, and attitudinal barriers, including opiophobia and misconceptions about addiction risk.[24,6]

Interventional studies, though less common, have examined specific programs or organizational changes to improve cancer pain management. These studies range from pre-post designs to quasi-experimental comparisons. Several reports describe the implementation of interdisciplinary consultation services with pre-post outcome assessments, providing preliminary evidence of the potential of team-based approaches. However, methodological limitations — including the absence of randomization, limited control conditions, and reliance on process indicators rather than patient-

centered outcomes — constrain causal inference.[15,18]

Evidence Syntheses and Scoping Analyses

Systematic reviews and meta-analyses have sought to synthesize evidence from multiple primary studies, yet results remain inconclusive because of heterogeneity across primary studies.[11]

Scoping reviews have mapped the breadth of the literature across topics, methods, and settings in cancer pain research, documenting a substantial yet fragmented evidence base with limited cumulative knowledge on specific clinical questions. Challenges include substantial variability in interventions, populations, settings, and outcome measures, as well as quality limitations across many primary studies.

Methodological Gaps

The methodological landscape reflects both genuine strengths and significant limitations. Longitudinal research monitoring pain management processes and outcomes over extended periods is rare, limiting understanding of the sustainability of interventions. Comparative effectiveness studies directly comparing team configurations are largely absent. Implementation science approaches that examine how evidence-based practices are adopted and maintained in real-world settings remain underdeveloped. Research on health equity — how collaborative pain management functions across diverse and marginalized populations — requires substantial expansion. Methodological innovation, including pragmatic trial designs, natural experiments, and participatory approaches, is needed to advance the field.

Result

Professional Functions and Contributions in Pain Control

Nursing Professional Responsibilities in Cancer Pain

Nursing professionals play a central role in cancer pain management across care settings. Their responsibilities include systematic pain assessment with validated instruments, analgesic administration (including opioids and adjuvant agents), side-effect monitoring and treatment-response evaluation, patient and family education, delivery of non-pharmacological interventions, and interdisciplinary advocacy for adequate pain control.[17,29]

Survey-based evidence indicates that nursing professionals play a substantial role in pain assessment and management, though the consistency and quality of this involvement vary considerably across institutions, care settings, and individual competency levels.[29] Barriers to effective nursing contributions include deficits in pain-assessment knowledge and skills, workload and time pressures, limited independent authority to adjust analgesics, insufficient physician responsiveness to nursing pain reports, and organizational cultures that undervalue nursing clinical input.[29]

Advanced practice nurses, including nurse practitioners and clinical

nurse specialists, assume expanded roles such as independent prescribing, specialized pain assessment, and leadership in institutional protocols. However, regulatory constraints on the scope of advanced practice nursing vary widely across jurisdictions, and role clarity for advanced practice nurses within interdisciplinary teams remains inconsistent.[14]

Educational preparation strongly shapes nursing competency in pain management. Studies consistently show that basic nursing education programs lack adequate pain management content, and continuing education varies widely in quality and accessibility.[6,17] Knowledge deficits are particularly evident in opioid pharmacology, equianalgesic dosing, distinguishing physical dependence from addiction, and the evidence supporting non-pharmacological interventions.

Patient education and self-management support are essential nursing functions. Nurses provide guidance on analgesic use, side-effect management, non-pharmacological approaches, and help-seeking thresholds. Systematic reviews and controlled studies indicate that structured, nurse-led educational programs can improve patients' pain knowledge and self-efficacy.[27,9,10]

Primary Care Physician (PCP) and Community Provider Functions

Primary care physicians play crucial yet often underappreciated roles in cancer pain management. Their contributions include ongoing care coordination throughout the cancer treatment trajectory, analgesic prescribing (including opioid initiation and titration), monitoring for treatment complications, managing comorbidities, providing psychosocial support, and facilitating transitions between hospital-based specialty care and community settings.[24]

Evidence on primary care physician involvement shows mixed patterns. Some research suggests that primary care physicians feel underprepared for complex pain management, particularly in cases involving high-dose opioids or interventional procedures.[24] Other studies indicate that primary care physicians seek greater involvement yet face systemic barriers, including poor communication with specialists, unclear role expectations, and concerns about liability related to opioid prescribing.[23]

The interface between primary care and specialty oncology or palliative care is a clinically important yet challenging domain. Optimal approaches to role distribution between generalists and specialists remain unclear. Some models support specialist-led pain management, placing primary care in a supportive role, while others position primary care as the principal coordinator, with specialist consultation for refractory cases. Direct comparative evidence for these models is lacking in the literature.

Regulatory environments strongly shape primary care prescribing behavior. Increasingly stringent opioid prescribing regulations, prescription drug monitoring program requirements, and liability concerns have contributed to prescribing

hesitancy that may compromise adequate cancer pain relief.[36] Balancing legitimate population-level opioid safety concerns with the imperative to provide adequate pain management for cancer patients is a complex, ongoing policy challenge.

Communication and information exchange between primary care and specialty settings often fall short. Discharge summaries frequently lack sufficient detail on pain management plans and medication adjustments. Electronic health record incompatibilities across institutions impede continuity of information. These communication failures contribute to fragmented care and suboptimal pain management during care transitions.[23,15]

Interdisciplinary Oncology Committees and Team Structures

Interdisciplinary oncology committees — including tumor boards, multidisciplinary team meetings, and cancer conferences — are formal organizational structures that facilitate collaborative decision-making. Traditional tumor boards focus primarily on diagnostic and treatment planning decisions, with limited systematic attention to pain and symptom management. Specialized palliative care tumor boards have emerged to address these needs in patients with advanced disease.[18]

Guyer and colleagues describe a palliative care tumor board model designed to enhance collaboration in pain and symptom management.[18] This model features regular meetings to present complex cases, during which interdisciplinary team members contribute discipline-specific expertise and consensus management plans are developed and communicated to primary teams. Reported benefits include improved care coordination, enhanced team learning, and identification of systemic barriers that require institutional intervention.

Optimal team composition remains debated. Core members typically include medical oncologists, radiation oncologists, surgeons, nurses, and pathologists, with palliative care specialists, pain medicine physicians, psychologists, social workers, pharmacists, and primary care physicians participating to varying degrees. Team processes strongly influence effectiveness, and high-functioning teams are characterized by clear leadership, systematic case review, explicit decision-making protocols, and mechanisms to monitor implementation.[20]

Direct evidence linking tumor board participation to improved pain outcomes remains limited. Although these structures are widely accepted and some research suggests benefits for treatment decision quality, prospective data demonstrating pain-specific outcome improvements attributable to committee participation are scarce.[18]

Refractory Cancer Pain: The Interdisciplinary Imperative

A critical dimension of interdisciplinary cancer pain management is caring for patients with refractory or complex pain states — pragmatically defined as persistent pain despite

optimized opioid therapy after at least two sequential trials of different opioids at adequate doses and duration. This population provides the clearest clinical justification for formal interdisciplinary committee structures because management decisions extend beyond the competency boundaries of any single professional discipline.

Opioid rotation — the systematic substitution of one opioid for another using equianalgesic conversion principles — exploits incomplete cross-tolerance to restore analgesic efficacy while managing dose-limiting toxicity. The clinical decisions involved, including equianalgesic calculations, route conversion, and titration protocols, require coordinated input from prescribing physicians, specialist pharmacists, and bedside nursing staff who monitor responses and adverse effects.[37]

Interventional approaches entail additional interdisciplinary requirements. Neuraxial analgesia via epidural or intrathecal drug delivery systems, neurolytic coeliac plexus blockade for refractory upper abdominal visceral pain, and percutaneous cordotomy in selected cases each require interdisciplinary decision-making to balance procedural risk against clinical benefit within the broader goals-of-care context. The role of NMDA receptor antagonists, particularly sub-anaesthetic ketamine infusion, in managing central sensitization states associated with opioid-refractory cancer pain intersects the expertise of anesthesiology, palliative medicine, and oncology — further reinforcing the structural rationale for dedicated interdisciplinary pain committees.

From a role-delineation perspective, nursing professionals play irreplaceable roles in monitoring refractory pain: continuous tracking of pain intensity, early identification of opioid toxicity (sedation, respiratory depression, myoclonus, delirium), reporting of breakthrough pain events, and educating caregivers on home-based opioid safety. Primary care physicians serve as continuity anchors during community transitions, maintaining prescribed regimens, monitoring for analgesic dose drift, and serving as the primary contact between specialist reviews. Failure to clearly delineate these roles within interdisciplinary structures frequently results in care gaps during transitions, which are the highest-risk periods for pain management failure in oncological care.

Teamwork Dynamics: Enabling Factors and Impediments

Cross-Professional Dialogue and Coordination Mechanisms

Effective interprofessional communication is essential to collaborative pain management. Research consistently identifies communication failures as major barriers, including inadequate information sharing, delayed responses to pain reports, unclear documentation, and limited interprofessional feedback.[14,23] These breakdowns result in treatment delays, medication errors, redundant

assessments, and fragmented patient care.

Professional hierarchies, particularly physician-nurse power differentials, may inhibit open dialogue and suppress nursing clinical input, despite nurses' extensive patient contact and assessment expertise.[16] Differing professional vocabularies, documentation systems, and communication norms create barriers to understanding. Time pressures and physical separation across departments or institutions limit opportunities for meaningful interprofessional exchange.

Coordination mechanisms to address these challenges include structured communication protocols (e.g., SBAR: Situation, Background, Assessment, Recommendation), interdisciplinary rounds, shared electronic health records that serve as a common information platform, and designated coordination roles, such as case managers and nurse navigators, to facilitate information flow.[14] Effective implementation requires organizational commitment and sustained resource investment.

Role clarity is equally essential. When professional responsibilities are ill-defined, care gaps or duplication arise. Research shows that ambiguity about pain management accountability — including assessment ownership, intervention authority, monitoring responsibilities, and escalation thresholds — is common across settings.[23] Clear role definitions, established through protocols, job descriptions, or team charters, can improve coordination, though excessive rigidity may limit adaptive responses to individual patient complexity.

Institutional and Healthcare System Obstacles

Organizational and system-level factors profoundly shape the effectiveness of interprofessional collaboration. Fragmented care delivery systems, in which patients encounter multiple disconnected providers across settings without adequate coordination, fundamentally undermine collaborative approaches.[23] Healthcare financing models that reimburse individual services rather than coordinated care episodes create structural incentives that discourage collaboration. Regulatory frameworks that define professional scopes can artificially constrain optimal task distribution.

Staffing patterns and workload pressures are pervasive organizational barriers. When nurses manage excessive patient loads or physicians face time-constrained schedules, the capacity for thorough pain assessment, interprofessional communication, and patient education is severely limited.[29]

Access to specialized palliative care and pain management services varies substantially across settings. Patients in large academic medical centers typically have access to multidisciplinary palliative care teams, whereas those in rural or resource-limited community settings often lack comparable resources.[33,34] This unequal distribution of access creates significant disparities in the availability of collaborative pain management.

Opioid regulatory environments are particularly consequential system-level factors. Increasingly restrictive prescribing regulations, prescription monitoring program requirements, quantity limits, and prior authorization mandates add administrative burden and create prescribing hesitancy that may compromise cancer pain relief.[36] Balancing population-level opioid safety imperatives with the clinical necessity of adequate analgesia for cancer patients remains a complex, ongoing policy challenge.

Competency Deficits and Training Requirements

Knowledge and skill deficits among healthcare professionals are fundamental barriers to effective pain management. Inadequate pain management content in core professional training programs has been consistently documented across disciplines.[6,17] Specific knowledge gaps include proficiency in pain assessment techniques, opioid pharmacology and equianalgesic conversions, adjuvant analgesic selection, addiction risk assessment, and regulatory requirements for prescribing controlled substances.[24,29]

Attitudinal barriers compound knowledge deficits. Opiophobia — the exaggerated fear of opioid side effects or addiction risk — leads to inadequate prescribing, even when clinically warranted.[6] Misconceptions about addiction, tolerance, and physical dependence persist across professional groups. Limitations in cultural competence may hinder recognition and management of pain in diverse patient populations.

Interprofessional education is a promising strategy for improving collaborative competencies. Learning experiences in which students from different professions study together on pain management, team function, and collaborative practice may foster mutual understanding, respect, and communication.[14] Continuing professional development in pain management remains inconsistent in availability, quality, and participation rates. Interactive, practice-oriented formats with feedback and reinforcement are more effective at promoting practice change than traditional didactic approaches.[6]

Patient-Oriented Considerations

Patient-related factors significantly influence the effectiveness of pain management. Patient reluctance to report pain or request analgesia stems from several reasons: concerns about burdening providers, beliefs that pain signals disease progression, stoic cultural values, fear of opioid side effects, and misconceptions about addiction.[19,27]

Cultural and linguistic diversity poses communication challenges in pain assessment and management. Pain expression patterns vary across cultural contexts, language barriers impede accurate assessment when interpretation services are unavailable, and cultural beliefs about the significance of pain may necessitate culturally sensitive negotiation.

Health literacy limitations affect patients' ability to understand pain management information, adhere to complex medication regimens, and engage in self-care. To be effective, patient education programs must be tailored to individual literacy levels and learning styles.[27]

Family caregivers play essential roles in home-based pain management, including administering medications, monitoring symptoms, and supporting non-pharmacological interventions. Caregivers often feel inadequately prepared for these responsibilities and experience significant burden.[21] Supporting caregiver competence and well-being is an important yet often underaddressed dimension of collaborative pain management.

Empirical Support for Team-Based Strategies

Effectiveness of Collaborative Approaches

Evidence on the effectiveness of interdisciplinary team-based cancer pain management is cautiously supportive but constrained by significant methodological limitations across the available literature. Prospective controlled evidence is best exemplified by landmark randomized trials: Temel and colleagues demonstrated that early integration of palliative care for patients with metastatic non-small-cell lung cancer led to significant improvements in quality of life, symptom burden (including pain), and, unexpectedly, overall survival.[33] Zimmermann and colleagues' multicenter cluster-randomized trial further confirmed that early palliative care delivered by interdisciplinary teams significantly improved pain control and quality-of-life outcomes compared with standard oncological care.[34]

Multiple observational and implementation studies report associations between team-based approaches and improved pain assessment documentation, enhanced adherence to analgesic guidelines, improved care coordination for complex patients, and greater patient satisfaction.[15,18] However, methodological limitations reduce confidence in findings from non-randomized studies. Variability in team configurations, intervention components, and outcome measures complicates cross-study comparisons. Publication bias may further inflate apparent effectiveness.

Bennett and colleagues' systematic review and meta-analysis of patient-centered educational interventions for cancer pain management found that although these interventions modestly improve patients' pain knowledge, current evidence is insufficient to draw definitive conclusions about their effects on pain intensity or quality of life.[10] Systematic reviews of broader multidisciplinary approaches affirm their potential while consistently highlighting study heterogeneity and quality concerns as limiting factors.[11]

Evidence on cost-effectiveness remains critically limited. Although improved pain control has inherent clinical and humanistic value, healthcare decision-makers increasingly require economic justification for resource-

intensive interdisciplinary models. May and colleagues provided important data suggesting that early specialist palliative care is not only clinically effective but may also be cost-effectiveas, by it reduces acute care utilization.[33,34] Comprehensive health economic analyses directly comparing collaborative and standard cancer pain management approaches remain largely absent from the literature, representing a priority evidence gap for policy decisions.

Integrated Clinical Protocols

Integrated care pathways offer structured, evidence-based protocols that coordinate pain management interventions among professionals and across settings. These pathways typically specify assessment schedules, intervention algorithms, escalation criteria, documentation requirements, and coordination mechanisms. The central premise is that systematically implementing protocols reduces practice variation and promotes interprofessional collaboration.

Cringles describes the development of an integrated cancer pain pathway spanning primary, secondary, and tertiary care,[15] incorporating standardized assessment tools, prescribing guidelines, referral criteria, and communication protocols. Reported outcomes included improved consistency in pain control, enhanced interprofessional communication, and smoother care transitions. However, pathway development and implementation required substantial resources and encountered resistance from clinicians who viewed the protocols as constraining clinical judgment.

Critical perspectives note that standardized pathways may inadequately accommodate the complexity of individual patients. Cancer pain has diverse etiologies, trajectories, and patient contexts that may require approaches beyond protocol boundaries. Balancing the benefits of standardization with the imperatives of individualization remains an ongoing challenge in pathway design and implementation.

Innovative Oncology Committee Configurations

Novel tumor board models that specifically target pain and symptom management are emerging organizational innovations. Guyer and colleagues' palliative care tumor board model focuses exclusively on patients with advanced cancer and complex pain or symptom management challenges.[18] Cases are systematically presented, interdisciplinary team members contribute specialized expertise, and consensus recommendations are formulated for communication to primary teams.

Reported advantages include enhanced team learning, identification of systemic resource gaps, and improved coordination for complex patients. A dedicated focus on symptom management ensures these issues receive adequate attention rather than being overshadowed by diagnostic and treatment planning priorities. However, these structures require sustained professional time commitments, systematic case-referral mechanisms, and

ongoing institutional support. Comparative research on tumor board models is lacking, and the optimal balance between specialization and integration remains an unanswered organizational design question.

Ongoing Controversies and Divergent Perspectives

Professional Boundaries and Clinical Independence

Tension over professional role boundaries and clinical autonomy remains a fundamental controversy in interprofessional pain management. Physicians traditionally hold primary authority over prescribing decisions, while nurses' extensive patient contact, continuous monitoring, and detailed knowledge of individual patient responses enable valuable clinical judgments. Advanced practice nurses with independent prescribing authority further complicate traditional role boundaries.

Debates over appropriate limits of nursing independence versus physician consultation reflect regulatory constraints, professional identity, and organizational power dynamics. Published qualitative research on pain management negotiations between nurses and physicians reveals complex interpersonal dynamics, including professional hierarchies, communication patterns, and the development of trust.[23,16] Effective collaboration requires mutual respect, open communication, and a willingness to negotiate role boundaries rather than defending professional territories. Achieving such collaborative relationships within hierarchical organizational cultures and time-pressured clinical environments remains challenging.

Ideal Team Configuration and Organizational Design

Significant disagreement persists over the optimal structure and composition of interdisciplinary teams. Maximal-inclusivity approaches favor broad teams encompassing all relevant disciplines — oncology, surgery, nursing, palliative care, pain medicine, psychology, social work, pharmacy, rehabilitation, spiritual care, and primary care — but risk coordination difficulties, diffusion of accountability, and scheduling burdens.[20,22]

Lean team models advocate smaller core groups with specialist consultation as needed, offering advantages in efficiency, clarity of communication, and accountability, but potentially marginalizing important disciplinary contributions. Questions about the team leadership model — physician-led, rotating, shared, or professional administrator-led — have implications for power distribution, decision-making processes, and team member satisfaction.[20]

Community-Based Integration Versus Specialty-Driven Approaches

A fundamental unresolved debate concerns whether cancer pain management should be primarily community-based with specialist consultation or specialist-led, with primary care in a supportive role. Primary care-centered models emphasize

continuity, accessibility, and integration with broader health needs. Primary care physicians are well-positioned to coordinate pain management with specialists for complex cases.[24] Specialist-led models emphasize the complexity of cancer pain, which requires deep expertise in mechanism-specific pharmacology, opioid dose escalation, and advanced interventional options.[18]

Direct comparative evidence on these organizational models is lacking, and optimal approaches likely vary by patient characteristics, disease stage, pain complexity, and healthcare system resources. Patients with uncomplicated nociceptive pain early in their illness trajectory may be effectively managed in community settings using WHO step-ladder principles, whereas those with neuropathic, mixed, or refractory pain states require specialist input within formal interdisciplinary structures. Developing systematic frameworks to match patients to appropriate care intensity levels is an important clinical and policy priority.

Knowledge Deficits and Unresolved Issues

Despite substantial research efforts, significant knowledge gaps persist across multiple domains. The field requires more advanced multilevel frameworks that integrate individual patient experiences, team dynamics, organizational structures, and healthcare system factors.

Longitudinal research tracking pain management processes and outcomes over extended periods remains rare. Most studies provide cross-sectional snapshots, limiting understanding of temporal dynamics, intervention sustainability, and long-term patient outcomes. Prospective cohort studies following patients throughout their cancer journey would clarify how pain management needs evolve and how collaborative approaches adapt to changing circumstances.

Comparative effectiveness research directly comparing team configurations, organizational models, and care delivery approaches is largely absent. Without head-to-head comparisons, selecting among alternative strategies for specific patient populations or contexts based on evidence remains impossible. Pragmatic trial designs that test interventions in real-world settings could provide actionable evidence to inform practice and policy.

Implementation science examining how evidence-based collaborative practices are adopted, adapted, and sustained across diverse healthcare settings requires substantial expansion. Identifying effective implementation strategies and sustainability factors is essential to accelerate the translation of evidence into practice.

Health equity considerations require far greater research attention. The extent to which collaborative pain management strategies adequately serve marginalized communities with documented pain management disparities, patients from culturally and linguistically diverse backgrounds, and

those in rural or resource-limited settings remains largely unexamined.

Economic evidence, particularly cost-effectiveness analyses comparing collaborative care with standard care, is urgently needed to inform resource allocation decisions. Patient and caregiver perspectives require deeper exploration, as most studies foreground professional viewpoints and give limited attention to patients' experiences with collaborative care and to outcomes that matter most to them. The specific mechanisms by which collaborative approaches improve outcomes — whether through enhanced clinical skills, improved coordination, increased attention to pain, or other pathways — remain poorly understood, limiting the development of more targeted and efficient interventions.

Ramifications for Clinical Practice and Healthcare Policy

The review’s findings have significant implications for clinical practice, professional education, organizational policy, and healthcare system design. Evidence supports multidisciplinary approaches to cancer pain management, suggesting that healthcare organizations should invest in developing and sustaining interdisciplinary teams, with explicit attention to team processes, communication systems, role clarity, and coordination.

Professional education across disciplines requires substantial expansion of pain management content, encompassing clinical knowledge and skills as well as interprofessional collaboration competencies. Interprofessional educational experiences during foundational training should foster collaborative attitudes and cross-professional understanding. Continuing professional development should target identified knowledge gaps through interactive, practice-based formats that evidence indicates are more effective at promoting practice change than traditional didactic approaches.[6]

Healthcare organizations should systematically identify and address system-level barriers to collaborative pain management by ensuring adequate staffing, adopting communication technologies and protocols that support coordination, developing integrated care pathways, and cultivating organizational cultures that value and reward collaborative practice.[20]

Regulatory frameworks governing professional scopes of practice require review to ensure they support, rather than hinder, effective interprofessional task allocation. Opioid prescribing regulations must be carefully calibrated to prevent misuse without unintentionally impeding legitimate cancer pain management.[36]

Healthcare financing systems should incentivize coordinated, team-based care rather than fragmented individual services. Reimbursement for team meetings, care coordination, and patient education would support organizational investment in collaborative models. Primary care integration warrants specific policy attention, including systematic mechanisms for primary–specialty information exchange, clear role delineation frameworks, and support for

primary care physicians' development of pain management competencies.[23,24]

Quality measurement and accountability systems should incorporate pain management metrics, including the completeness of assessment documentation, treatment adequacy indicators, and patient-reported pain outcomes. However, metrics must be carefully designed to avoid unintended consequences, such as opioid overprescribing or documentation-focused behavior rather than patient-focused behavior.

Conclusion

Cancer-related pain management is a complex clinical challenge that requires coordinated efforts among healthcare professionals across settings and throughout the care continuum. This review synthesizes research on the roles of nurses and primary care physicians in interdisciplinary oncology committees and collaborative care structures. The evidence shows that multidisciplinary approaches have significant potential to improve pain control outcomes, yet substantial barriers persist, including fragmented care pathways, unclear professional roles, limited cross-disciplinary communication, competency gaps, and institutional constraints.

The pathophysiological complexity of cancer pain — encompassing peripheral and central sensitization, neuropathic mechanisms, and visceral pain — provides a mechanistic rationale for interdisciplinary team structures, because no single professional discipline possesses sufficient expertise across the full spectrum of assessment, pharmacological management, adjuvant therapy, interventional approaches, and psychosocial support required for optimal cancer pain care.

Theoretically, the field is conceptually diverse yet lacks integrated multilevel frameworks linking individual patient experiences, interprofessional dynamics, organizational structures, and healthcare system contexts. Methodologically, significant gaps persist in longitudinal studies, comparative effectiveness research, implementation science, and health equity investigations. Empirically, high-quality RCT evidence from seminal trials[33,34] confirms the effectiveness of early interdisciplinary palliative care involvement, yet implementation challenges and sustainability remain unresolved.

Priority directions for future investigation include developing integrative theoretical frameworks, conducting comparative effectiveness research on alternative collaborative models, expanding implementation science, addressing health equity, generating robust economic evidence, and deepening understanding of patient and caregiver perspectives. Ultimately, solving the persistent problem of inadequate cancer pain management requires improvements not only in individual clinical knowledge but also in interprofessional teamwork, organizational architecture, and healthcare system design. These interconnected changes require coordinated effort across clinical practice,

professional education, organizational policy, and healthcare system reform.

Ethical Considerations

This study is a narrative review based solely on previously published literature. No human participants or animal subjects were involved, so ethical approval was not required.

AI Assistance Statement

Artificial intelligence tools were used to assist with language editing and manuscript structure. All reference selection, data extraction, analytical synthesis, and scientific interpretation were performed exclusively by the authors, who reviewed and take full responsibility for the accuracy, interpretation, and scientific integrity of all content. No AI tools were used to generate original data, fabricate references, or conduct literature searches. The 30 references cited in this manuscript were individually verified by the authors prior to submission.

Conflict of Interest

The authors declare no financial or commercial conflicts of interest related to this manuscript. This narrative review will serve as the conceptual basis for a conference poster to be presented at the International Association for the Study of Pain (IASP) 2026 World Congress on Pain in Bangkok, focusing on integrating nursing and primary care in multidisciplinary cancer pain management.

Funding Statement

This research did not receive any external funding

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