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A Narrative Approach to the Evolution of Chronic Pain Management: From Opioids to Non Pharmacological Therapies

Aldy Rofaldy H. Rauf
Universitas Muhammadiyah Palu, Indonesia
Correspondent: aldy.rofaldy@gmail.com

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ABSTRACT: Chronic pain remains a major global health concern, often managed through opioid based treatments despite mounting evidence of their limited long term effectiveness and associated risks. This narrative review aimed to synthesise two decades of evidence on the transition from opioid centric pain management to multimodal, non-pharmacological strategies. A comprehensive literature search was conducted across PubMed, Scopus, and Google Scholar, focusing on studies from 2005 to 2025. The review examined the comparative effectiveness of opioid and non-opioid therapies, implementation challenges, economic implications, and policy responses across various health systems. Findings suggest that while opioids may offer short term relief, their prolonged use leads to dependency, adverse effects, and diminishing returns. In contrast, cognitive behavioural therapy, mindfulness, and physical rehabilitation demonstrate substantial efficacy in pain reduction, functional improvement, and quality of life enhancement. Countries with robust regulatory frameworks and universal health coverage have shown greater success in implementing non pharmacological care models, whereas low resource settings face significant barriers. The review underscores the urgency of shifting toward integrated, patient centred approaches supported by policy, education, and system level reform. Future research should prioritise long term evaluation and context sensitive implementation models to ensure equitable access and improved outcomes.

Keywords: Chronic Pain Management, Opioid Alternatives, Non Pharmacological Therapy, Multimodal Pain Strategies, Policy and Regulation, Health Equity, Patient Centred Care.

INTRODUCTION

Chronic pain is increasingly recognised as a complex public health challenge that transcends biomedical boundaries and imposes substantial social and economic costs worldwide. Epidemiological surveys conducted in North America, Europe and parts of Asia consistently estimate the prevalence

of chronic, non-cancer pain at 19 30 % of the adult population, representing more than 1.5 billion people globally (Busse et al., 2018). In high income regions, the direct health care expenditure associated with persistent pain is comparable to, or exceeds, the combined costs of heart disease, cancer, and diabetes, whereas indirect costs stemming from lost productivity and disability benefits further amplify the societal burden. Against this backdrop, opioid analgesics emerged in the late twentieth century as a seemingly convenient pharmacological cornerstone for the management of moderate to severe chronic pain; prescribing rates in the United States alone quadrupled between 1999 and 2010, mirroring similar trajectories in Canada, Australia, and parts of Europe (Volkow & McLellan, 2016). The initial enthusiasm, however, gradually gave way to concern as accumulating evidence linked long term opioid therapy to tolerance, dependence, opioid use disorder, and overdose mortality (Busse et al., 2018; Ibrahim., 2018).

Parallel to the mounting clinical and public pressures, regulatory and professional bodies began recalibrating analgesic guidelines to temper opioid utilisation. The seminal 2016 U.S. Centers for Disease Control and Prevention (CDC) guideline advocated conservative initiation, rigorous benefit risk reassessment, and preference for non-opioid modalities where feasible (Dowell et al., 2016). Subsequent updates in 2022 reinforced these principles while emphasising shared decision making and individualised care pathways (Dowel et al., 2022). Comparable directives were issued by the European Pain Federation and the International Association for the Study of Pain, collectively signalling a paradigm shift toward multimodal, biopsychosocial frameworks (Swarm et al., 2019). Concomitantly, research attention pivoted to the comparative efficacy, safety, and implementation of non-pharmacological interventions such as cognitive behavioural therapy (CBT), mindfulness based stress reduction, structured exercise, acupuncture, and spinal manipulation either as stand-alone strategies or components of integrated pain programmes (Goesling et al., 2016; Miller et al., 2018).

Robust empirical data reinforce the urgency of this reorientation. Randomised controlled trials indicate that the number needed to treat for achieving ≥30 % pain relief with long term opioids typically ranges from 5 to 11, whereas the number needed to harm for clinically significant adverse outcomes, including endocrine dysfunction, fractures, and cognitive impairment, is often comparable or lower (Busse et al., 2018). Econometric analyses further reveal that prolonged opioid regimens are associated with incremental annual health care costs exceeding USD 10,000 per patient relative to non-opioid comparators (Barnett et al., 2020). Conversely, meta analyses of non-pharmacological approaches demonstrate modest to moderate reductions in pain intensity and disability, coupled with negligible serious adverse events, thereby presenting a favourable benefit risk calculus for many patient groups (Chen et al., 2020). These quantitative insights underscore the clinical and economic rationale for diversifying chronic pain management beyond opioid monotherapy.

Despite the apparent consensus on the necessity of change, several structural realities complicate implementation. Health care providers must reconcile patient expectations for rapid analgesia with the slower, effort dependent trajectories characteristic of behavioural and physical therapies (Wandner et al., 2020). Reimbursement models in many jurisdictions still privilege procedural and prescription

based care over time intensive counselling or multidisciplinary rehabilitation, thereby perpetuating opioid centric paradigms (Becker et al., 2018). Furthermore, rural and low resource settings often lack trained personnel to deliver evidence based non pharmacological services, exacerbating inequities in pain outcomes (Herzig et al., 2018). From the patient perspective, logistical barriers, out of pocket costs, and scepticism toward unfamiliar modalities can attenuate adherence and undermine effectiveness (Wakaizumi et al., 2021).

A second set of challenges arises from the intrinsic heterogeneity of chronic pain conditions. Phenotypes such as fibromyalgia, neuropathic pain, and osteoarthritis share overlapping yet distinct pathophysiological mechanisms, necessitating tailored therapeutic constellations (Sullivan et al., 2017). Precision medicine initiatives aimed at stratifying patients on the basis of psychosocial, genetic, and neuroimaging markers remain in their infancy, limiting clinicians' ability to predict who will benefit most from specific non opioid interventions (Hah et al., 2017). The scarcity of high quality head to head trials comparing multimodal packages further complicates evidence synthesis and guideline development (Eucker et al., 2022).

These complexities are compounded by divergent international policy landscapes. Some Nordic countries have instituted national registries and stringent monitoring systems that curtailed high dose opioid prescribing, whereas several low and middle income countries (LMICs) continue to grapple with inadequate access to any form of analgesia, let alone sophisticated non pharmacological programmes (Wang et al., 2020). The resulting patchwork of regulatory stringency and resource allocation creates a fertile ground for disparities in treatment exposure and outcomes, yet comparative analyses remain scarce.

A critical appraisal of the extant literature reveals three principal gaps. First, long term observational data directly juxtaposing opioid centric versus multimodal strategies on pain related, functional, and psychosocial endpoints are limited, particularly beyond 24 months (Cherpak & Santos., 2016). Second, little is known about how socioeconomic status, health literacy levels, and cultural beliefs modulate engagement with, and response to, non-pharmacological therapies, especially within LMIC contexts (Nasution et al., 2024). Third, inconsistency in chronic pain definitions and outcome measures hinders meta analytic aggregation and the translation of research into policy (Pylkkö et al., 2016). These lacunae collectively impede the formulation of nuanced, context sensitive guidelines.

Accordingly, the present narrative review seeks to synthesise two decades of evidence on the evolution of chronic pain management, with a particular emphasis on the transition from opioid reliance to non-pharmacological and integrative modalities. Specifically, we examine (i) temporal trends in opioid prescribing and associated morbidity; (ii) comparative effectiveness and safety profiles of established non opioid pharmacological and non-pharmacological interventions; (iii) health system and patient level facilitators and barriers to multimodal implementation; and (iv) emerging frameworks for personalised, biopsychosocial care.

The scope of this review encompasses adult populations (≥18 years) with non-cancer chronic pain across diverse geographical regions, including high income countries where opioid over utilisation has been most pronounced and LMICs where access to alternative therapies is variably constrained. By integrating findings from randomised trials, cohort studies, qualitative investigations, and policy analyses, we aim to generate a holistic understanding that can inform clinicians, researchers, and policy makers in tailoring sustainable, evidence based strategies to mitigate the global burden of chronic pain.

METHOD

This narrative review examines the evolution of chronic pain management, focusing on the shift from long term opioid therapy toward evidence based non pharmacological and multimodal approaches. A comprehensive search was conducted in PubMed, Scopus, and Google Scholar for peer reviewed literature published between January 2005 and March 2025. The strategy combined predetermined keywords with Boolean operators to optimise sensitivity and precision, employing terms such as "opioid", "chronic pain", "pain management", "non pharmacological intervention*", and "multimodal therap*", while excluding studies restricted to acute pain. Retrieved titles and abstracts were screened for relevance, followed by full text assessment to confirm methodological rigour and alignment with the review aims. Eligible papers included randomised controlled trials, cohort studies, systematic reviews, and meta analyses that empirically or theoretically evaluated the clinical efficacy, functional outcomes, or safety profiles of opioid and non-opioid interventions for adult, non-cancer chronic pain. Publications not written in English, lacking primary data, or failing peer review were excluded. To enhance reliability, a three stage screening process was applied, with four independent reviewers evaluating each record and resolving discrepancies through consensus. Data from the selected studies were extracted into a structured matrix and synthesised thematically, enabling the identification of recurrent patterns in effectiveness, harm, and implementation across diverse therapeutic modalities. This approach provides an integrated perspective on the comparative value of opioids and alternative strategies, simultaneously highlighting knowledge gaps that merit future investigation.

RESULT AND DISCUSSION

The findings of this review are organised thematically to highlight the comparative effectiveness of opioid based and non-pharmacological interventions for chronic pain management, patterns of integration into clinical practice, and global variations in policy and accessibility.

The short term effectiveness of opioids in managing acute and postoperative pain has been consistently supported by randomised controlled trials. Mahmud et al. (2020) demonstrated that opioid administration leads to substantial reductions in pain intensity, as measured by tools such as the Visual Analog Scale (VAS), particularly in postoperative and cancer related pain (Mahmud et al., 2020). However, these benefits do not persist in the long term. Sholihah et al. (2023) revealed that patients using opioids for chronic, non-cancer pain often exhibit diminished analgesic response over

time, necessitating increased dosages to achieve the same relief (Sholihah et al., 2023). This phenomenon, known as opioid tolerance, contributes to a growing concern over dependency and diminished efficacy.

The risks associated with long term opioid use have been substantiated by numerous studies. Sari et al. (2019) estimated that 8 12% of long term opioid users develop opioid use disorder (OUD) (Wibowo et al., 2020). Wibowo et al. (2020) identified gastrointestinal distress, disrupted sleep patterns, and cognitive impairments as prevalent side effects of chronic opioid exposure (Wibowo et al., 2020). Miftahurahma et al. (2023) discussed the emergence of opioid induced hyperalgesia, a paradoxical condition where patients become more sensitive to pain, further complicating clinical management (Miftahurahma et al., 2023). Collectively, these risks highlight the necessity of routine monitoring and underscore the argument for transitioning toward safer, more sustainable strategies.

Non pharmacological therapies have garnered increasing attention as viable alternatives. Cognitive behavioural therapy (CBT), mindfulness based interventions, physical therapy, and relaxation techniques are among the most frequently studied approaches. Peñalveret al. (2024) found that such interventions significantly reduce pain intensity and comorbid depressive symptoms while also reducing catastrophic thinking about pain (Peñalver et al., 2024). Kligler et al. (2018) observed improved functionality and reduced reliance on opioids among patients who participated in structured physical therapy programs (Kligler et al., 2018).

Empirical data support the capacity of non-pharmacological approaches to reduce opioid dependence. Pandey et al. noted that approximately 30% of patients completing CBT protocols decreased their opioid use within six months. Similarly, Katta et al. (2022) demonstrated that mindfulness interventions led to meaningful reductions in pain perception and facilitated lower use of analgesics, thereby enhancing patients' quality of life (Katta et al., 2022). Gibson et al. (2019) reported that structured exercise reduced muscle tension and inflammation, enhanced range of motion, and contributed to a lower demand for opioid medications (Gibson et al., 2019). These findings collectively endorse the integration of such approaches into standard pain management protocols.

Multimodal pain management models have increasingly been adopted in clinical guidelines and hospital protocols. The National Institute for Health and Care Excellence (NICE) in the UK recommends combining pharmacological and non-pharmacological interventions for chronic pain. Khoirunnisa et al. (2022) highlighted that therapies such as physiotherapy, CBT, and psychosocial support are now foundational to managing pain in both primary and tertiary care (Khoirunnisa et al., 2022). Hartinah et al. (2023) noted the implementation of healthcare provider training programs aimed at incorporating acupuncture, physical therapy, and relaxation techniques into clinical practice (Hartinah et al., 2023). This transition reflects a broader trend toward interprofessional collaboration and the standardisation of multimodal protocols.

Nonetheless, several barriers inhibit the widespread adoption of non-pharmacological therapies. Systemically, many national policies still lack explicit frameworks for implementing non drug

interventions, often defaulting to pharmacological solutions. Financially, the cost of training staff and acquiring necessary infrastructure remains prohibitive, especially in underfunded health systems. Sulistiana et al. (2024) and Ernawati & Askar (2024) observed that investment priorities often exclude non drug therapies, limiting their availability (Sulistiana et al., 2024; Ernawati & Askar., 2024). In terms of human resources, Supriyanti & Kustriyani (2023) found that many clinicians are not adequately trained in alternative modalities and thus are reluctant to implement them (Supriyanti & Kustriyani, 2023). Hartinah et al. (2023) reiterated the need for dedicated educational programs to address these gaps (Hartinah et al., 2023).

The global perspective reveals substantial disparities. In countries with universal health coverage, such as Canada, Sweden, and the Netherlands, chronic pain management is more integrated and equitable. Ariyibi et al. (2025) and Calvo Lobo (2023) noted that multimodal approaches, including physical therapy, psychological support, and patient education, are widely accessible (Ariyibi et al., 2025; Calvo-Lobo, 2023). In contrast, the United States, characterised by fragmented insurance systems, exhibits considerable disparities in access to care. Rop et al. (2022) documented that patients with limited insurance coverage often face significant barriers to non-opioid therapies, perpetuating opioid reliance despite recognised risks (Rop et al., 2022).

Differences between high and low income countries are also stark. While opioids are widely available in many high income settings, their use is often regulated alongside growing access to non-pharmacological therapies. Calvo Lobo (2023) reported increased integration of physical therapy and CBT into clinical pathways (Calvo-Lobo, 2023). In contrast, in low and middle income countries (LMICs), access to both opioid and non-opioid pain treatments is often restricted. Kim (2025) described systemic deficiencies in healthcare infrastructure and limited training among health professionals as key challenges (Kim, 2025). Furthermore, in LMICs, sociocultural beliefs and limited awareness may constrain patient uptake of non-drug therapies.

The cultural dimension is crucial. Sultan et al. (2025) and Ahmad et al. (2023) emphasised that local beliefs and traditions significantly influence pain perception and treatment seeking behaviour (Sultan et al., 2025; Zainuddin et al., 2023). In many societies, biomedical interventions are preferred over behavioural therapies due to entrenched perceptions of medical authority. This underscores the need for culturally tailored interventions and public health campaigns to promote broader acceptance of alternative modalities.

Taken together, the findings underscore the limitations of long term opioid use and highlight the efficacy of non-pharmacological therapies in chronic pain management. Successful integration of multimodal strategies requires not only clinical evidence but also policy reforms, resource allocation, and education. Addressing disparities across regions and health systems is essential to ensuring equitable access and improved outcomes worldwide.

Policy Driven Shifts in Analgesic Practice

The present synthesis confirms that regulatory interventions have acted as powerful levers in redirecting chronic pain care away from opioid centric models toward safer, multimodal strategies. The 2016 CDC Guideline precipitated a measurable contraction in U.S. prescribing volumes, a pattern mirrored in Australia after state mandated real time prescription monitoring and in several European jurisdictions that adopted tight dose thresholds (Dowell et al., 2016; Karanges et al., 2016; Shen et al., 2021). Cohort analyses indicate that the post guideline era coincided with a 23 % year on year increase in referrals to physical and psychological services, underscoring the catalytic effect of policy nudges on clinician behaviour (Hincapie-Castillo et al., 2021). Yet the data also reveal a transitional burden: abrupt dose reductions, when not paired with alternative support, have been associated with withdrawal related emergency visits and heightened mental health consultations (Lin et al., 2018). These unintended consequences illustrate that regulation alone is insufficient; it must be scaffolded by reimbursement reforms and structured tapering frameworks that maintain therapeutic continuity while curbing hazardous exposure.

Divergent Uptake of Non Pharmacological Therapies Across Income Settings

Accessibility emerges as the principal determinant of treatment heterogeneity between high income countries (HICs) and low and middle income countries (LMICs). Integrated pain programmes in Canada, Sweden and the Netherlands routinely embed cognitive behavioural therapy, graded exercise and patient education within publicly funded pathways, contributing to the observed 15 30 % decline in long term opioid use over the past decade (Martel et al., 2016; Gomes et al., 2022). Conversely, LMIC data reveal that fewer than one in five tertiary centres offer structured non drug services, and waiting times can exceed six months, propelling patients toward informal pharmacotherapy or untreated pain (Cheung et al., 2019). Where opioids remain scarce because of import restrictions or cost, clinicians often substitute with non-evidence based analgesics, exposing patients to toxicity without substantive relief (Bandara et al., 2022). Cultural perceptions further modulate uptake; qualitative work in South East Asia shows that family expectations of "strong medicine" can dissuade acceptance of behavioural interventions, whereas in Nordic contexts patient advocacy groups actively lobby for reduced opioid exposure (Gomes et al., 2022). These contrasts suggest that successful knowledge transfer must accompany capacity building initiatives that address workforce shortages, financing, and sociocultural beliefs simultaneously.

Economic Rationale for Multimodal Models

The cost utility profile of non-pharmacological therapies increasingly underpins guideline endorsements. Micro costing analyses demonstrate that six weeks of supervised exercise combined with mindfulness yields incremental cost effectiveness ratios below USD 10,000 per quality adjusted life year, substantially lower than chronic opioid therapy once monitoring, adverse event management and productivity loss are incorporated (Puspitasari et al., 2023). Comparable figures emerge for

acupuncture and combined CBT education protocols, driven by the absence of dose escalation and the durability of functional gains (Nareswari et al., 2023). Importantly, hospital systems that embedded multimodal pathways reported 12 % reductions in readmissions for uncontrolled pain within twelve months, translating into savings that offset the initial training and staffing costs (Kligler et al., 2018). These economic signals resonate with payer priorities and explain the proliferation of value based reimbursement schemes that reward opioid sparring care. Nevertheless, cost benefits remain sensitive to adherence: attrition rates exceeding 30 % attenuate savings and underscore the necessity of engagement strategies, such as digital coaching and community partnerships, to sustain participation.

Limitation

This review is constrained by the heterogeneity of outcome measures across included studies, limiting direct quantitative comparison and precluding meta analytic pooling. Publication bias towards positive trials may overstate the apparent advantage of certain non-pharmacological modalities. Resource constraints in LMIC contexts contributed to under representation of data from rural and underserved populations. Finally, the reliance on observational evidence for real world policy impacts introduces confounding that cannot be fully adjusted without individual patient data. Addressing these limitations will require coordinated multicentre trials, standardized reporting frameworks and greater investment in low resource research infrastructure to enhance external validity and equity.

Implication

Future investigations should prioritise longitudinal designs that track patient centred outcomes over multiple years to resolve persisting uncertainty about sustainability, especially in diverse socioeconomic settings. Implementation science approaches are needed to unpack how payment models, workforce competencies and cultural attitudes intersect to influence adoption of non-drug therapies. Rigorous economic evaluations that incorporate indirect societal costs will better inform policy deliberations. Expanding digital and community based delivery platforms could mitigate access gaps, but their scalability and clinical equivalence warrant empirical validation. Ultimately, a granular understanding of context specific facilitators and barriers will be essential for tailoring multimodal pain strategies that are both clinically effective and systemically feasible across global health landscapes.

CONCLUSION

This review has highlighted a global shift in chronic pain management, away from opioid centric approaches toward multimodal, non-pharmacological interventions. While opioids remain effective for short term analgesia, accumulating evidence demonstrates that long term use is associated with tolerance, dependency, and diminished efficacy. In contrast, cognitive behavioural therapy, mindfulness, physical therapy, and integrative strategies offer comparable or superior long term

outcomes with significantly fewer adverse effects. These findings are reinforced by policy driven changes in prescribing practices, particularly in countries where guidelines have incentivised non opioid pathways. However, disparities in access between high and low income countries underscore systemic and economic barriers to equitable pain management. Addressing these barriers requires targeted reforms in health policy, reimbursement models, and provider training. Further research is needed to evaluate the long term effectiveness of multimodal therapies in diverse clinical and cultural contexts. Implementation studies should explore how contextual factors including patient attitudes, provider competencies, and resource availability shape uptake and adherence. Investing in integrated pain care, particularly in under resourced settings, is essential to reducing the global burden of chronic pain and achieving more sustainable, patient centred outcomes.

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