Review

A Policy Brief; An Evidence-Based Approach in Pain Medicine

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Review

A Policy Brief; An Evidence-Based Approach in Pain Medicine

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Abstracts:

Background: Chronic non-cancer pain (CNCP) affects approximately 20% of the global population, presenting significant challenges across health systems worldwide. Despite its high prevalence and impact on quality of life, CNCP remains inadequately addressed in health policy, particularly in low- and middle-income countries. **Objectives:** This policy paper critically analyses global management of chronic pain, identifies key barriers to effective care, and proposes evidence-based, equity-focused strategies for improvement. **Methods:** A critical synthesis of recent literature, including systematic reviews registered under PROSPERO protocol CRD42021235384, was undertaken. The analysis incorporated pharmacological, non-pharmacological, and medical device interventions, evaluations of current clinical guidelines and healthcare system constraints. **Results:** The evidence reveals limited long-term efficacy of opioid-based treatments and highlights the promise of non-pharmacological approaches, including cognitive behavioural therapy and physiotherapy. Barriers to implementation include regulatory constraints, undertrained workforces, fragmented services, and disparities in access based on geography, gender, and socioeconomic status. Clinical guidelines often lack contextual adaptation and fail to support personalised care. **Conclusion:** A global shift is needed towards multimodal, patient-centred pain management strategies. This includes equitable access to care, stronger clinical guidance, improved outcome measurement, and integration of personalised medicine. Coordinated policy and system-level reforms are essential to address the current inequities and improve outcomes for individuals living with chronic pain.

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Introduction

The Global Burden of Chronic Pain

Chronic non-cancer pain significantly affects approximately 20% of the global population, negatively impacting not only on individuals but also on families and societal structures [1]. The prevalence of this condition escalates with age and varies according to biological gender and lifestyle factors such as diet and alcohol consumption, with notable increases among women, individuals with mental health conditions, and those from lower socioeconomic backgrounds [2]. The manifestations of chronic pain extend include physical symptoms such as myalgia and fatigue, which impair mobility, and adverse effects on mental health, exemplified by issues such as poor sleep, anxiety, and depression. The persistent nature of chronic pain leads to substantial socioeconomic consequences, including financial strain, social isolation, and emotional distress for both the sufferers and their

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families [3] with growing evidence of the significant role of pain and its comorbidities as major contributors to global disability and health burdens leading to a negative economic impact, affecting health and social care expenditure, attributing to reduced productivity and increase sickness absenteeism. This in turn adversely impact upon national GDPs [4]. The Global Burden of Disease study (2016) highlights. the massive financial costs of chronic pain on major economies amounting to several hundred billion dollars annually. Despite this the allocation of resources in healthcare systems across the globe for the timely and appropriate management of chronic pain remains insufficient. This discrepancy underscores the need for a more coherent strategy for improving research and resource distribution to address the complexities of managing chronic pain at a national and international level.

Issues of availability, regulation, and inconsistent care are exacerbated by the stigma and misunderstanding that surrounds chronic pain. These contribute to insufficient empathy and support often from society, and influence policy decisions and resource allocation. The latter are further inhibited by a lack of robust research and data on pain management, particularly regarding long-term treatment efficacy and safety. The absence of robust policies on pain medicine use globally presents several critical issues. In low- and middle-income countries (LMICs), inadequate policies often result in limited availability of essential pain medications, such as opioids, due to regulatory barriers, high costs, and insufficient healthcare infrastructure. This leads to significant pain undertreatment, affecting patients' quality of life and overall health outcomes[5]. Conversely, in high-income countries (HICs), overly stringent regulations aimed at curbing substance abuse can inadvertently restrict access to pain relief. In the United States, for instance, stringent opioid regulations intended to combat misuse can result in patients experiencing inadequate pain management due to complex prescription protocols and medico-legal concerns [6]. Thus, global pain management policies must strike a balance, ensuring that access to pain relief is both equitable and safe, addressing both the issue of undertreatment in LMICs and the risk of overregulation in HICs.

Current Pain Management

Chronic pain management spans pharmacological and non-pharmacological approaches. While analgesics, including NSAIDs and opioids, are effective for acute pain, their long-term use in chronic conditions is limited by adverse effects, tolerance, and dependence. The global opioid crisis has underscored these risks, with opioid-related deaths rising significantly between 2001 and 2013. Consequently, reliance on pharmacological treatments has declined, especially outside cancer care. In response, there is increasing emphasis on non-pharmacological strategies such as medical devices and combination therapies. This shift recognises the need for personalised, multimodal interventions to effectively manage chronic pain and minimise the harms associated with drug-based treatments.

Barriers to Consistent Pain Management

Barriers to obtaining effective pain management has been a long-standing issue globally. Key factors linked to barriers have been reported in Table 1.

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Table 1. Key factors linked to barriers to obtaining effective pain management.

Barriers	LMIC setting	HIC setting
Accessibility	In LMICs, inadequate access to essential pain medications, such as opioids, stems from insufficient availability, prohibitive costs, and regulatory barriers. This results in significant undertreatment of pain, often leaving patients to suffer needlessly.	Conversely, in HICs like the United States, overprescription of opioids has led to widespread misuse and addiction, culminating in a public health crisis. This dichotomy underscores the need for balanced pain management strategies that ensure equitable access to pain relief in LMICs while curbing overprescription in HICs. Policy reform, guided by evidence-based practices, is crucial to address these issues, ensuring that pain relief is both accessible and safe globally [5,18].
Regulation	In LMICs, stringent controls on opioid distribution often result in limited access to essential pain relief due to cumbersome regulations and scarcity of resources.	In HICs, such as the United States, stringent prescription regulations intended to prevent abuse can lead to overly restrictive practices. These regulations sometimes create a paradox where legitimate patients face under-treatment due to complex prescription processes and medico-legal risks.

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Care delivery	In LMICs, chronic pain care is frequently limited by poor healthcare infrastructure, lack of specialist services, and insufficient access to analgesics due to regulatory or supply barriers. Socioeconomic inequalities and gender biases further restrict access to appropriate pain relief, particularly in rural or underserved areas. Non-pharmacological treatments such as physiotherapy and counselling are rarely available or affordable. Pain management is often fragmented, uncoordinated, and dependent on out-of-pocket payments. The economic impact stemming from both treatment costs and lost productivity is significant, yet rarely prioritised in health policy, creating a cycle of under-treatment and disability with long-term public health implications	Despite better resourced systems, disparities in chronic pain care persist in HICs. Ethnic minorities, women, and lower-income or rural populations are often under-prescribed pain relief or offered less effective treatment. While multimodal pain management options exist, insurance or funding constraints can limit access to physiotherapy or psychological support. Care delivery is often siloed between providers, reducing continuity and effectiveness. The economic burden of chronic pain including healthcare costs and lost workforce participation remains substantial. Policymakers face challenges balancing cost control with equitable and comprehensive pain management, particularly in the context of rising demand and heightened awareness of opioid misuse and its consequences

Current Clinical Guidelines for Managing Chronic Pain

Global bodies like WHO, IASP, EFIC, and ESRA provide evidence-based guidelines for chronic pain management, promoting multidisciplinary care and cost-effective strategies. High-income countries (HICs) have established national guidelines such as those from NICE [7], CDC [8], and CPS (Canada) which support structured, tailored approaches to treatment. In contrast, low- and middle-income countries (LMICs) often lack specific national guidelines due to limited resources, regulatory challenges, and poor data availability. Many rely on WHO frameworks, though implementation varies. Addressing these disparities requires adapting international guidelines to local contexts, improving healthcare infrastructure, and investing in provider training to enhance pain care globally.

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For example, in the UK, NICE guideline NG193 offers comprehensive, evidence-based guidance for chronic primary pain management [9]. It emphasises holistic, person-centred care: individualised assessment and non-pharmacological treatments such as supervised exercise programmes, cognitive–behavioural therapy and limited acupuncture [9]. This approach reduces reliance on medications; notably, NG193 advises against initiating opioids, NSAIDs or even paracetamol for chronic primary pain [9]. From a policy perspective, such recommendations improve safety and cost-effectiveness by curbing ineffective drug use. In practice they foster shared decision-making and self-management, potentially improving patient quality of life. However, the guideline has notable limitations in evidence and implementation. Some experts argue it oversimplifies the complex nature of chronic pain and imposes overly restrictive rules on analgesics [9]. Many recommended therapies have only short-term benefits, with limited long-term outcome data [10], creating uncertainty about sustained effectiveness. This "drug-light" approach also represents a radical shift requiring significant time, resources and training to implement, and it may face resistance from patients used to medication-focused care [9]. Policymakers must expand pain services (physiotherapy, psychological support) to realise the guideline's aims; otherwise, it risks remaining aspirational. Although clinicians are urged to be culturally sensitive, the evidence base comes from trials largely conducted in white, English-speaking populations [11]. This limits its applicability for minority ethnic patients or those from low- and middle-income country (LMIC) backgrounds. Moreover, low-resource healthcare systems emulating these guidelines may lack the resources to deliver non-drug therapies, highlighting the need for more inclusive and globally relevant pain management guidance.

The Need for Evidence-Based Clinical Guidelines

Clinical guidelines from global authorities help standardise pain management by providing evidence-based protocols and educational support for healthcare providers. Regular updates are essential to reflect emerging research and inform effective policymaking. Guidelines also raise awareness about the risks of medication misuse, especially opioids, by promoting balanced prescribing. However, their effectiveness depends on high-quality, context-relevant evidence and consistent implementation across diverse healthcare systems. Variability in adherence remains a challenge, highlighting the need for robust guideline development processes. When informed by strong evidence and tailored to local realities, guidelines can support safer, more effective, and equitable pain care while optimising health system resources

Critical Analysis of the Evidence

The Need for High Quality Analysis of the Existing Evidence

High-quality analysis of existing evidence in pain medicine is crucial to address the diverse and complex needs of patients globally. Rigorous evaluation helps identify effective pain management strategies and optimises treatment protocols, ensuring they are evidence-based and tailored to specific patient populations. This is especially important in guiding policy and clinical practice amidst evolving challenges, such as the opioid crisis and disparities in medication access [5]. Comprehensive reviews also aid in reducing variability in treatment outcomes and improving overall patient care standards.

Methodological Issues

Critical appraisal of the available evidence was well examined by Shetty et al (Table 2). The evidence synthesis in medical devices and pharmaceutical interventions for chronic pain in particular collectively highlight the pressing need to reconfigure clinical pain management strategies based on robust, comparative, and patient-centred evidence. The findings offer valuable insight into the relative effectiveness of both non-pharmacological and pharmacological options but simultaneously expose fundamental gaps in research design, long-term efficacy data, and equitable application.

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Shetty et al identified the use of numerous pain assessment tools for diagnosing, assessing severity, and tracking the progression of chronic pain, such as the Visual Analogue Scale [12], Numeric Rating Scale (NRS), Brief Pain Inventory (BPI) interference scale, McGill Pain Questionnaire-Short Form (MPQS), Verbal Rating Scale (VRS), National Institutes of Health Chronic Prostatitis Symptom Index (NIH-CPSI), and a 20-point pain intensity scale. Challenges with any assessment tool include subjectivity, which is a wider issue in pain medicine. However, current pain tools have not been validated in wider populations, and among non-English speakers. To standardise these tools, which often use an 11-point numeric rating scale, a standardisation formula was applied. Psychological assessments used among pain patients primarily cover depression and anxiety, with depression measured by instruments such as the Patient Reported Outcomes Measurement Information System (PROMIS), Beck Depression Inventory (BDI), Centre for Epidemiological Studies Depression Scale (CES-D), and Hospital Anxiety and Depression Scale (HADS), where higher scores indicate greater levels of psychological morbidity. A range of assessment tools was employed for the assessment of efficacy of medical devices, such as the Visual Analogue Scale [12], Numeric Rating Scale (NRS), and various others.

Systematic Review and Meta-Analysis of Pharmacological Interventions for Chronic Pain

Shetty et al. presents a comprehensive evaluation of pharmacological treatments for chronic pain, particularly low back pain, using data from 17,708 participants across 119 studies. By employing both conventional and network meta-analysis (NMA), the study offers a nuanced understanding of drug efficacy. NSAIDs showed modest but statistically significant pain reduction, while agents such as botulinum toxin A, ketamine, and gabapentin demonstrated slightly higher mean differences. However, many commonly used drugs, including amitriptyline, lidocaine, and morphine, exhibited inconsistent effects with high heterogeneity, raising concerns about their real-world utility [13].

The NMA's finding that most interventions did not outperform placebo is particularly striking and calls into question the robustness of current prescribing practices. Age emerged as a moderating factor, with older adults experiencing greater relief, although this raises concerns about age-related bias and generalisability. The study commendably incorporates sensitivity and subgroup analyses, adding rigour, but the variability in trial design and outcome reporting continues to hinder conclusive recommendations.

Importantly, the review supports cautious opioid prescribing, aligning with global efforts to mitigate opioid-related harm. Gabapentinoids remain controversial, with continued guideline inclusion despite limited supporting evidence, highlighting the inertia within clinical guideline development. This reinforces the need for continual reassessment of evidence bases. Clinically, these findings compel a shift away from default opioid prescribing towards multimodal, tailored management strategies that incorporate both effective pharmacological agents and non-drug interventions. The adoption of a personalised care model, supported by continuous monitoring and real-world outcome data, would improve patient safety and therapeutic outcomes. This underscores the limitations of current pharmacological options for chronic pain and advocates for more personalised, demographically sensitive approaches. It also highlights the pressing need for better-quality, well-powered trials to guide safe, effective, and equitable pain management across diverse populations.

Systematic Review and Meta-Analysis of Complex Interventions for Chronic Pain

Shetty et al. conducted a robust meta-analysis of 168 studies involving 21,305 participants to evaluate the efficacy of non-pharmacological interventions exercise, acupuncture, cognitive behavioural therapy (CBT), and massage for chronic pain and related disability. Of these, 46 studies were included in detailed meta-analyses. Exercise-based interventions (e.g. yoga, Pilates, Qigong) demonstrated significant effects on pain reduction across two sub-networks, despite marked heterogeneity ($I^2 > 93\%$) [14]. Similar findings were observed in networks evaluating disability

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outcomes, suggesting a meaningful yet inconsistent impact of exercise on chronic pain-related disability.

The acupuncture network (36 studies) also showed notable pain intensity improvements in four comparisons but was marred by high heterogeneity (I^2 = 92.6%) and evidence of publication bias, particularly in trials comparing acupuncture with control treatments [15]. The largest RCT (Witt et al.) suggested that patients with more severe baseline pain experienced greater benefits, although this effect was more prominent in non-randomised groups [16]. CBT-based interventions (23 studies) targeting pain intensity and depression showed significant improvements, especially in psychological outcomes, though high heterogeneity (I^2 = 94.8%) limited the generalisability of findings. Similarly, massage therapies, including cupping and muscle relaxation, revealed significant pain reduction in eight of eleven studies but again exhibited substantial heterogeneity.

Patient preferences for minimally invasive, cost-effective treatments like physiotherapy and yoga were clearly identified. These interventions addressed both physical and emotional needs, improving quality of life. However, for certain conditions (e.g. severe spondylolisthesis), more invasive approaches may still be necessary. The potential synergy of combining exercise with CBT, especially in fibromyalgia, warrants further exploration through longitudinal, high-quality trials.

Systematic Review and Meta-Analysis of Medical Devices for Chronic Pain

Shetty et al. conducted a systematic review and meta-analysis of 13 studies (n = 875) to evaluate the efficacy of medical devices in managing chronic pain, particularly chronic low back pain (CLBP). The studies employed diverse designs, including RCTs, crossover trials, and case series. Interventions ranged from nerve stimulation and mobile health applications to pulsed electromagnetic therapy (PEMT), transcutaneous electrical nerve stimulation (TENS), and extracorporeal shockwave therapy. Six studies (n = 173) were included in the meta-analysis, which reported a modest but statistically significant reduction in pain (mean difference = 0.7 on a 0–10 scale) and a more substantial improvement in disability (mean difference = 7.44 on the Oswestry Disability Index) [17].

While certain interventions, such as TICT and PEMT, were notably effective in CLBP populations, other devices yielded mixed results. High heterogeneity was observed, largely due to inconsistent outcome measures (e.g. VAS, FPRS), varied definitions of CLBP, and differing trial methodologies. Subgroup and sensitivity analyses suggested robustness in results, particularly for CLBP, though findings varied by demographic and geographic factors.

The methodological limitations identified, including small sample sizes, lack of multidisciplinary trial teams, inconsistent adherence to research standards, and potential publication bias. The limited evaluation of sleep quality outcomes and neglect of comorbid conditions such as insomnia further constrain the findings. Notably, mobile health applications showed promise in symptom monitoring and medication tracking, though their classification as regulated medical devices varied. Overall, while medical devices offer potential for pain and disability reduction, the evidence base remains fragmented and requires more rigorous, large-scale research.

Discussion

The comprehensive analyses conducted by Shetty et al. (1, 2, 3) across various systematic reviews and meta-analyses highlight several pivotal recommendations for advancing the management of chronic pain [13,14,17].

The use of non-pharmacological treatments has shown promise, particularly in enhancing patient quality of life and reducing pain and disability. Exercise interventions, including yoga and Pilates, and various forms of massage therapy like cupping and progressive muscle relaxation have demonstrated significant improvements in pain intensity and disability. These findings advocate for the integration of these non-pharmacological treatments into standard pain management protocols, emphasising the need for healthcare systems to support such modalities through better access and coverage. The robustness of results concerning medical devices indicates their positive role in managing chronic pain, particularly in conditions like chronic low back pain. Devices such as nerve

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stimulation and transcutaneous electrical nerve stimulation have shown significant efficacy in reducing pain and disability levels. This suggests that medical devices can be a viable option for patients who might not respond well to traditional pharmacological treatments or who are seeking less invasive treatment alternatives.

The benefits of more robust evidence, and the integrated use of pharmacological and non-pharmacological interventions can all be maximised through the greater use of personalised medicine. This has proven successful in a range of other conditions. Given the diverse responses to pharmacological interventions and the influence of demographic factors such as age, a shift towards more personalised treatment plans is essential. This approach should consider individual patient characteristics, pain profiles, and specific needs to optimise therapeutic outcomes. The effectiveness of Gabapentin and non-opioid medications in the pharmacological studies suggests a potential framework for tailoring treatments based on individual response patterns and tolerability. Personalised medicine is pivotal in chronic pain management for several crucial reasons. Chronic pain is a complex condition characterised by its heterogeneity, stemming from varied underlying causes such as neuropathic conditions, musculoskeletal disorders, and inflammatory diseases. These different types of pain often require distinct therapeutic approaches. Generic treatment models can fall short, as they fail to consider individual differences in pain mechanisms and patient characteristics, which are essential for effective treatment.

Genetic variations significantly influence pain perception, drug metabolism, and response to treatments. For instance, differences in genes related to drug-metabolising enzymes, pain receptors, and neurotransmitter systems can impact both the efficacy and safety of pain medications. Personalised medicine leverages this genetic information to predict the most effective treatments and potential side effects for individual patients. Additionally, biomarkers, which serve as biological indicators of disease, are invaluable in diagnosing pain types and severity, monitoring treatment responses, and making necessary adjustments to therapy. These biomarkers can also identify patient subgroups that are more likely to respond to specific therapies, thus enhancing treatment precision and effectiveness.

By accounting for individual differences and tailoring treatments accordingly, personalised medicine not only aims to provide better pain relief and improved quality of life but also enhances patient satisfaction. This approach reduces the often lengthy and inefficient trial-and-error process associated with conventional treatment methods, leading to faster, more effective pain management. Moreover, personalised treatment strategies can decrease the frequency of hospital visits, reduce the need for multiple medications, and lower the incidence of treatment-related complications, thereby reducing overall healthcare costs. Ultimately, by optimising therapy from the outset, personalised medicine aims to lessen the economic burden associated with chronic pain management.

Developing and using robust scientific research to is vital for optimising pain management practices. There is an urgent need for further well-designed trials that can provide robust, reproducible results using standardised methodologies. Currently heterogeneity in study design is reflected in inconsistent treatment outcomes.

Conclusions

The management of chronic pain presents complex challenges, underscored by significant gaps in the current evidence base and limitations in the scope of existing research studies. The effectiveness of clinical guidelines is inherently linked to the quality of the underlying evidence. In many cases, particularly concerning newer and emerging treatments, this evidence is not robust enough to guide clinical practices confidently. Addressing these issues demands a comprehensive approach that includes the design and implementation of well-constructed clinical trials, the adoption of personalized medicine strategies, and the increased utilisation of non-pharmacological treatments and medical devices. These strategies are essential for developing more refined, effective, and patient-centred pain management protocols.

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Looking forward, it is crucial that ongoing and future research not only fills the existing gaps in knowledge but also ensures that the development of pain management strategies is scientifically robust and tailored to meet the diverse needs of individuals affected by chronic pain. This focused approach will better support the evolution of pain management practices and enhance the quality of life for patients globally.

Author Contributions: AS and GD conceptualised the POP project. AS and GD planned and designed the manuscript. AS, GD and AB wrote the first draft. GD, AS, IL and SE furthered the paper. All authors critically evaluated the paper and provided intellectual input. AS, AB and SE provided clinical practice-based expertise within the context of the manuscript.

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