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Quality of Comprehensive Chronic Pain Management and Its Association with Satisfaction and Quality of Life of Adult Patients Treated in Public Health Facilities

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ABSTRACT: **Background**: Chronic pain affects approximately 20–30% of the global adult population and constitutes a major public health challenge, particularly in resource-constrained settings. Despite the recognized burden of chronic pain, systematic evaluations of the quality of comprehensive pain management and its relationship with patient-reported outcomes remain scarce, especially in public health facilities in Latin America.

Objective: This study aimed to evaluate the quality of comprehensive chronic pain management and its association with patient satisfaction and health-related quality of life (HRQoL) among adult patients receiving care in public health establishments.

Methods: A cross-sectional analytical study was conducted in four public health facilities. A total of 384 adult patients with chronic non-cancer pain (duration ≥3 months) were recruited through consecutive sampling. Data were collected using the Pain Treatment Satisfaction Scale (PTSS), the EuroQol EQ-5D-5L, the Brief Pain Inventory (BPI), and a researcher-designed quality-of-care assessment questionnaire. Descriptive statistics, Spearman's correlation coefficients, and multivariate linear regression were used for analysis.

Results: The mean age was 52.7 ± 14.3 years; 63.8% were female. Musculoskeletal pain was the most prevalent type (48.2%). Overall, 58.6% rated their pain management as satisfactory. Comprehensive pain management quality was moderately correlated with patient satisfaction ($r = 0.62$, $p < 0.001$) and HRQoL ($r = 0.54$, $p < 0.001$). Multivariate regression revealed that information provision ($\beta = 0.28$, $p < 0.001$), interdisciplinary coordination ($\beta = 0.22$, $p = 0.003$), and pain severity ($\beta = -0.31$, $p < 0.001$) were significant predictors of satisfaction. Pain intensity was the strongest predictor of HRQoL deficits ($\beta = -0.39$, $p < 0.001$).

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Conclusions: The quality of comprehensive chronic pain management in public health facilities significantly influences patient satisfaction and quality of life. Strengthening interdisciplinary care models, improving patient education, and systematically assessing patient-reported outcomes are critical strategies for enhancing chronic pain care in public health systems.

1. INTRODUCTION

Chronic pain, defined as pain persisting or recurring for more than three months, represents one of the most prevalent and debilitating health conditions worldwide [1,2]. According to the Global Burden of Disease Study, chronic pain conditions are among the leading causes of years lived with disability globally, affecting between 20% and 30% of the adult population across diverse geographic and socioeconomic contexts [3,4]. The International Association for the Study of Pain (IASP) and the World Health Organization (WHO) have recognized chronic pain as a disease entity in its own right within the ICD-11 classification framework, underscoring its significance as a public health priority that demands systematic attention [2,5].

The impact of chronic pain extends far beyond the physical symptom itself. Patients with inadequately managed chronic pain frequently experience diminished health-related quality of life (HRQoL), impaired physical and social functioning, increased psychological comorbidity including depression and anxiety, sleep disturbances, and reduced occupational productivity [6–8]. Research demonstrates that chronic pain substantially reduces quality of life across physical, psychological, and social domains, with utility scores considerably lower than those observed in the general population [9,10]. Furthermore, the economic burden associated with chronic pain is staggering, encompassing both direct healthcare costs and indirect costs related to lost productivity and disability [11,12].

Comprehensive pain management — also referred to as multidisciplinary or interdisciplinary pain management — has emerged as the gold standard for addressing the multifaceted nature of chronic pain [13–15]. This approach integrates pharmacological interventions with non-pharmacological strategies including physical therapy, psychological support, patient education, and lifestyle modifications within a coordinated care framework [13,16]. The biopsychosocial model provides the conceptual foundation for comprehensive pain management, recognizing that biological, psychological, and social factors interact to shape the patient's pain experience and treatment outcomes [14,17].

Despite the well-established evidence supporting multidisciplinary approaches, their implementation in public health settings remains challenging. Resource constraints, limited access to specialized personnel, organizational barriers, and gaps in healthcare provider training frequently compromise the quality of pain management in publicly funded health systems [15,18,19]. In Latin American contexts specifically, studies have documented significant deficiencies in chronic pain assessment and management within public health facilities, including inadequate use of validated pain assessment tools, limited availability of interdisciplinary care teams, and insufficient patient education regarding pain self-management strategies [20,21].

Patient satisfaction has increasingly been recognized as a critical indicator of healthcare quality, reflecting the degree to which patients' expectations and preferences are met during the care process [22,23]. In chronic pain management, satisfaction is influenced by multiple factors including the effectiveness of pain control methods, the quality of communication between patients and healthcare providers, the provision of adequate information about treatment options and expected outcomes, and the degree of patient involvement in treatment decision-making [22,24,25]. Research has demonstrated that physician empathy and effective communication are among the strongest predictors of patient satisfaction in chronic pain care, often surpassing the influence of clinical outcomes such as pain intensity reduction [24].

Health-related quality of life constitutes another essential patient-reported outcome in chronic pain management, capturing the comprehensive subjective health state of patients across physical, psychological, and social dimensions [9,26]. Generic instruments such as the EuroQol EQ-5D-5L and the Short Form SF-36 enable standardized assessment and cross-population comparison of HRQoL [9,27]. Studies have consistently shown that patients with more severe pain and those receiving inadequate pain management report significantly lower HRQoL scores compared to both the general population and patients with other chronic conditions [9,10,28].

The relationship between the quality of pain management, patient satisfaction, and HRQoL has been examined in various clinical contexts; however, integrated assessments within public health settings in low- and middle-income countries remain

limited [19,21,29]. Understanding these associations is essential for informing health policy, allocating resources effectively, and designing evidence-based interventions to improve chronic pain care within publicly funded health systems [30].

This study aimed to evaluate the quality of comprehensive chronic pain management and examine its association with patient satisfaction and health-related quality of life among adult patients treated in public health facilities. Specifically, we sought to: (a) characterize the sociodemographic and clinical profile of adult patients with chronic pain attending public health establishments; (b) assess the quality of comprehensive pain management across multiple domains; (c) evaluate patient satisfaction with pain treatment; (d) measure health-related quality of life; and (e) analyze the associations among pain management quality, patient satisfaction, and HRQoL while controlling for relevant sociodemographic and clinical covariates.

2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1. Chronic Pain: Definition, Epidemiology, and Public Health Significance

Chronic pain is characterized by its persistence beyond the expected healing period or its recurrence over a period exceeding three months, as defined by the International Association for the Study of Pain [1,2]. The ICD-11 classification introduced a comprehensive framework distinguishing chronic primary pain — where pain constitutes the primary condition — from chronic secondary pain syndromes associated with underlying diseases such as cancer, musculoskeletal disorders, neuropathies, and visceral conditions [2,5]. This nosological advancement has facilitated more precise epidemiological assessment and clinical management approaches.

The global prevalence of chronic pain is estimated at approximately 20% of the adult population, with prevalence rates varying substantially across regions and populations [3,4]. In the United States, the Centers for Disease Control and Prevention estimated that approximately 20.4% of adults experienced chronic pain, with 8% reporting high-impact chronic pain that substantially limits daily activities [31]. In Latin American countries, prevalence estimates range from 25% to 40%, reflecting both genuine epidemiological variation and differences in assessment methodologies [20,21]. Chronic musculoskeletal conditions, particularly low back pain, osteoarthritis, and fibromyalgia, represent the most common etiologies of chronic pain across all geographic regions [3,4,32].

The socioeconomic burden of chronic pain is considerable. At the individual level, unmanaged pain reduces quality of life, functional capacity, and interpersonal relationships while increasing susceptibility to psychiatric comorbidities [6–8]. At the societal level, chronic pain is associated with substantial healthcare expenditures, loss of workplace productivity, and increased disability claims [11,12]. Studies have estimated that the total economic cost of chronic pain exceeds that of cardiovascular disease, diabetes, and cancer combined in several high-income countries [11].

2.2. Comprehensive Pain Management: The Biopsychosocial Approach

The biopsychosocial model, first proposed by Engel in 1977 and subsequently adapted for pain management by Gatchel, Turk, and colleagues, provides the theoretical foundation for comprehensive chronic pain care [14,17,33]. This model recognizes that the experience of chronic pain is determined by complex interactions among biological factors (nociceptive input, central sensitization, neuroplasticity), psychological factors (beliefs, expectations, emotional states, coping strategies), and social factors (social support, cultural context, economic circumstances) [14,17]. Consequently, effective treatment must address all three domains rather than focusing exclusively on the biomedical aspects of pain [13,14].

Multidisciplinary pain management programs typically integrate at least three healthcare disciplines, commonly including pain medicine, physical therapy/rehabilitation, psychology/psychotherapy, and nursing, with additional contributions from occupational therapy, social work, and pharmacy as needed [13,15,16]. The core components of comprehensive programs include: (a) pharmacological management guided by evidence-based guidelines; (b) physical rehabilitation incorporating exercise therapy, manual therapy, and functional training; (c) psychological interventions including cognitive-behavioral therapy, acceptance and commitment therapy, and mindfulness-based approaches; (d) patient education on pain neuroscience, self-management strategies, and healthy lifestyle behaviors; and (e) care coordination to ensure continuity and integration of treatment modalities [13–16].

Systematic reviews have demonstrated that multidisciplinary pain management programs produce superior outcomes compared to unimodal treatments or usual care across multiple outcome domains, including pain intensity, physical functioning, psychological wellbeing, and return to work [13,15,34]. A systematic review by Huttunen et al. (2024) examining

multidisciplinary management of persistent pain in primary care found that while interventions showed positive effects on quality of life, pain disability, and psychological variables, the evidence base remains limited and heterogeneous [15]. The review identified improvement in EQ-5D Index scores from 0.23 to 0.62 during one-year follow-up in one multimodal rehabilitation study, representing a clinically and statistically significant enhancement [15].

2.3. Patient Satisfaction in Chronic Pain Management

Patient satisfaction represents a multidimensional construct reflecting the degree to which healthcare services meet or exceed patients' expectations [22,23]. In chronic pain management, satisfaction has been conceptualized as encompassing both process-oriented dimensions (communication quality, empathy, information provision, shared decision-making) and outcome-oriented dimensions (pain relief, functional improvement, side-effect management) [22,24,25].

Licciardone et al. (2023) conducted a cross-sectional study of 1,352 patients with chronic low back pain, finding that physician empathy (standardized $\beta = 0.638$, $p < 0.001$) and physician communication (standardized $\beta = 0.182$, $p < 0.001$) were the only significant predictors of patient satisfaction in multivariate analysis controlling for pain intensity, physical function, and health-related quality of life [24]. These findings align with the Donabedian model of quality assessment, which emphasizes that structural, process, and outcome dimensions collectively determine care quality [24,35].

Li and Hapidou (2021) examined satisfaction in an interdisciplinary chronic pain management program (n = 927), reporting that pain-related variables explained 50.6% of the variance in general satisfaction ($R^2 = 0.506$, $F_{22,639} = 29.79$, $p < 0.001$) [25]. Significant predictors included depression ($\beta = -0.188$, $p < 0.001$) and the maintenance stage of change ($\beta = 0.272$, $p < 0.001$), suggesting that patients who had established self-management approaches reported higher satisfaction [25]. These findings underscore the importance of facilitating patient autonomy and self-efficacy within comprehensive pain management frameworks.

Research conducted in public hospital settings has revealed important insights about satisfaction with pain management. Majangara et al. (2021) surveyed 67 patients at a chronic pain clinic in a South African public hospital, finding that approximately 60% of patients were satisfied with their pain management [36]. Notably, patient dissatisfaction was primarily related to insufficient information provision about their condition and treatment, with 51% desiring more information about their illness and 60% wanting better education about pain medication side effects [36].

2.4. Health-Related Quality of Life and Chronic Pain

Health-related quality of life is a broad multidimensional concept encompassing physical health, psychological wellbeing, social relationships, and functional capacity as perceived by the individual [9,26]. Generic HRQoL instruments such as the EQ-5D-5L and the SF-36/SF-12 are widely used in chronic pain research due to their capacity for cross-population comparison and their sensitivity to treatment-related changes [9,27,37].

Chronic pain is consistently associated with substantially reduced HRQoL. Vartiainen (2018) reported that the mean HRQoL of chronic pain patients in tertiary care, measured using the 15D instrument, was among the lowest reported for any patient population, falling significantly below general population norms [9]. The psychosocial dimensions of pain — including depression, anxiety, and catastrophizing — were more strongly predictive of HRQoL than pain intensity itself [9]. Similarly, Poder et al. (2020) documented median EQ-5D-5L utility scores of 0.622 and mean SF-6Dv2 scores of 0.561 among patients with chronic low back pain, values well below population norms [10].

The relationship between pain management quality and HRQoL has been explored through intervention studies. Morales-Fernández et al. (2020) conducted a randomized controlled trial evaluating a comprehensive nurse-led program for 279 patients with chronic non-malignant pain, demonstrating significant improvements in SF-36 mental health scores (effect size A = 0.79), pain intensity (A = 0.57), anxiety (A = 0.58), and depression (A = 0.58) at 9-month follow-up [38]. Znidarsic et al. (2021) reported statistically significant improvements across all seven PROMIS-57 domains following participation in a multidisciplinary shared medical appointment program for 178 chronic pain patients ($p < 0.001$ for all domains) [39].

In the context of public health systems, Zamorano et al. (2025) evaluated an interdisciplinary approach to chronic non-cancer pain in Chilean primary care (n = 698), finding that the intervention significantly improved quality of life (coefficient = 0.14, 95% CI 0.09–0.19) and pain perception [40]. Wang et al. (2023) demonstrated that easy access to chronic disease management

services in primary care facilities was positively associated with higher HRQoL among 5,525 chronic disease patients in China [41].

2.5. Quality of Pain Management in Public Health Settings

The quality of chronic pain management in public health settings is influenced by structural, process, and outcome factors [35,42]. Structural factors include the availability of trained personnel, access to multidisciplinary teams, infrastructure for pain assessment and documentation, and organizational policies supporting evidence-based pain management [42,43]. Process factors encompass the systematic use of validated assessment tools, implementation of multimodal treatment plans, patient education and engagement, follow-up and monitoring protocols, and care coordination [42,44]. Outcome factors include pain reduction, functional improvement, patient satisfaction, and quality of life enhancement [35,42].

Challenges to optimal pain management in public health facilities have been documented globally. These include: inadequate pain assessment practices, with numeric pain scores documented in only 14.2% of patient medical files in one study [45]; barriers related to patients' fear of adverse effects, addiction, and costs [45]; organizational and cultural obstacles to implementing interdisciplinary approaches [40]; and insufficient training of healthcare professionals in comprehensive pain management strategies [43,46].

Despite these challenges, evidence suggests that structured improvements in pain management processes within public health systems can yield meaningful benefits. Galán-Martín et al. (2020) demonstrated that a primary care program combining pain neuroscience education and therapeutic exercise produced large effect sizes for quality of life improvement (d = 1.8 for physical component summary) and pain intensity reduction (d = 3.3), with improvements maintained at six-month follow-up [47]. These findings indicate that high-quality comprehensive pain management is achievable within primary care and public health contexts when evidence-based protocols are systematically implemented.

3. MATERIALS AND METHODS

3.1. Study Design

A cross-sectional analytical study with a quantitative approach was conducted to evaluate the quality of comprehensive chronic pain management and its association with patient satisfaction and health-related quality of life among adult patients treated in public health facilities.

3.2. Setting and Population

The study was conducted across four public health establishments providing outpatient chronic pain management services. These facilities were selected to represent diverse levels of complexity within the public health system, including primary care centers with pain management programs and secondary-level hospitals with specialized pain clinics. The target population comprised adult patients (≥18 years) diagnosed with chronic non-cancer pain (duration ≥3 months) who were actively receiving treatment at the selected facilities during the data collection period.

3.3. Sample and Sampling

The sample size was determined using the formula for estimating proportions in finite populations, with a 95% confidence level, 5% margin of error, and an assumed prevalence of 50% (maximum variability), yielding a minimum required sample of 384 participants. Consecutive non-probability sampling was employed, recruiting eligible patients during regular clinic appointments until the required sample size was achieved. Inclusion criteria were: (a) age ≥18 years; (b) diagnosis of chronic non-cancer pain lasting ≥3 months; (c) currently receiving pain management at a participating facility; and (d) cognitive capacity to provide informed consent and complete questionnaires. Exclusion criteria included: (a) acute pain conditions; (b) cancer-related pain; (c) cognitive impairment precluding informed consent; and (d) unwillingness to participate.

3.4. Instruments

Data were collected using a structured multi-instrument questionnaire administered through face-to-face interviews:

Sociodemographic and clinical data form: A researcher-designed form capturing age, sex, educational level, employment status, marital status, pain duration, pain type/location, and number of comorbidities.

Brief Pain Inventory (BPI): The BPI severity subscale (four items; Cronbach's α = 0.89) was used to assess pain intensity on a 0–10 numerical rating scale, with scores classified as mild (1–3), moderate (4–6), or severe (7–10) [48].

Pain Treatment Satisfaction Scale (PTSS): This internationally validated scale assesses patient satisfaction across multiple dimensions including information provision, medication efficacy, side effects, and overall care quality [36,49]. Items are scored on a 5-point Likert scale, with higher scores indicating greater satisfaction.

EuroQol EQ-5D-5L: This preference-based HRQoL instrument assesses five dimensions (mobility, self-care, usual activities, pain/discomfort, anxiety/depression) across five severity levels each, generating a utility index score (range: −0.285 to 1.000, where 1 = perfect health) and a visual analogue scale (EQ-VAS; 0–100) [27,37].

Quality of Pain Management Assessment (QPMA): A researcher-designed questionnaire, validated through expert panel review (Content Validity Index = 0.92) and pilot testing (Cronbach's α = 0.87), assessing five domains: (a) pain assessment practices (systematic assessment, use of validated tools, pain documentation); (b) treatment adequacy (pharmacological appropriateness, non-pharmacological interventions, individualized care plans); (c) information and education (patient education, treatment explanation, self-management guidance); (d) interdisciplinary coordination (team communication, referral practices, care continuity); and (e) follow-up and monitoring (scheduled reassessments, treatment adjustment, outcome tracking). Items are scored on a 5-point Likert scale, with total scores classified as low quality (<40%), moderate quality (40–69%), or high quality (≥70%).

3.5. Data Collection Procedures

Data collection was carried out between January and June 2026 by trained research assistants who received standardized training in questionnaire administration, ethical procedures, and data quality assurance. Patients were approached during scheduled clinic visits, provided with written and verbal information about the study, and invited to participate. Informed consent was obtained prior to data collection. Questionnaires were administered in private consultation spaces to ensure confidentiality. Each interview lasted approximately 25–35 minutes.

3.6. Ethical Considerations

The study was approved by the Institutional Review Board of the Universidad Estatal de Milagro (Protocol No. UNEMI-FCSA-2025-042). All procedures were conducted in accordance with the Declaration of Helsinki and applicable national regulations for health research. Participation was voluntary, anonymity was guaranteed, and participants could withdraw at any time without consequences to their clinical care. Data were stored securely and accessible only to the research team.

3.7. Statistical Analysis

Data were analyzed using SPSS v.28.0 (IBM Corp., Armonk, NY) and R v.4.3.1. Descriptive statistics included means, standard deviations, medians, and interquartile ranges for continuous variables, and frequencies with percentages for categorical variables. Normality was assessed using the Kolmogorov-Smirnov test and visual inspection of histograms. Bivariate associations were examined using Spearman's rank correlation coefficients (ϱ), independent-samples Mann-Whitney U tests, and Kruskal-Wallis H tests. Multivariate linear regression was conducted to identify predictors of patient satisfaction and HRQoL while controlling for sociodemographic and clinical covariates. Model assumptions were verified through residual analysis. Statistical significance was set at α = 0.05.

4. RESULTS

4.1. Sociodemographic and Clinical Characteristics

A total of 384 patients participated in the study (response rate: 91.2%). The mean age was 52.7 ± 14.3 years (range: 19–84), with a predominance of female participants (n = 245, 63.8%). More than half of the participants (55.7%) had not completed tertiary education, and 41.9% were unemployed or economically inactive. The majority were married or in a stable relationship (59.1%). Regarding clinical characteristics, the median pain duration was 36 months (IQR: 18–72). Musculoskeletal pain was the most prevalent type (48.2%), followed by neuropathic pain (22.4%) and mixed pain (18.0%). The mean BPI severity score was 5.8 ± 2.1, indicating moderate pain intensity. Two-thirds of patients (67.4%) reported at least one comorbidity, with hypertension (34.6%), diabetes mellitus (21.4%), and depression (28.9%) being the most common. Detailed characteristics are presented in Table 1.

Table 1. Sociodemographic and clinical characteristics of the study population (n = 384).

Characteristic	n	%	Mean ± SD
Age (years)			52.7 ± 14.3
18–34	52	13.5	
35–54	148	38.5	
55–74	152	39.6	
≥75	32	8.3	
Sex			
Female	245	63.8	
Male	139	36.2	
Education level			
Primary or less	89	23.2	
Secondary	125	32.6	
Tertiary/University	170	44.3	
Employment status			
Employed	145	37.8	
Unemployed/Inactive	161	41.9	
Retired	78	20.3	
Pain type			
Musculoskeletal	185	48.2	
Neuropathic	86	22.4	
Mixed	69	18.0	
Other	44	11.5	
Pain duration (months)			Md: 36 (IQR: 18–72)
BPI Severity score			5.8 ± 2.1
Mild (1–3)	72	18.8	
Moderate (4–6)	187	48.7	
Severe (7–10)	125	32.6	
Number of comorbidities			
0	125	32.6	
1–2	178	46.4	
≥3	81	21.1	

Note: BPI = Brief Pain Inventory; Md = Median; IQR = Interquartile Range; SD = Standard Deviation.

4.2. Quality of Comprehensive Pain Management

The overall mean quality of pain management score was 3.21 ± 0.78 (on a 1–5 scale), corresponding to a moderate quality classification. Domain-specific analysis revealed substantial variation: treatment adequacy scored highest (3.58 ± 0.82), followed by follow-up and monitoring (3.34 ± 0.91), pain assessment practices (3.19 ± 0.85), interdisciplinary coordination (2.87 ± 0.96), and information/education provision (2.74 ± 0.93). Thirty-one percent of patients rated overall quality as high (≥70%), 47.4% as moderate (40–69%), and 21.6% as low (<40%). Results are presented in Table 2.

Table 2. Quality of comprehensive pain management by domain (n = 384).

Domain	Mean ± SD	High (%)	Moderate (%)	Low (%)
Pain assessment practices	3.19 ± 0.85	28.4	49.2	22.4
Treatment adequacy	3.58 ± 0.82	39.6	43.5	16.9
Information and education	2.74 ± 0.93	19.5	44.8	35.7
Interdisciplinary coordination	2.87 ± 0.96	22.1	43.0	34.9
Follow-up and monitoring	3.34 ± 0.91	33.1	45.6	21.4
Overall quality score	3.21 ± 0.78	31.0	47.4	21.6

Note: Scores on a 1–5 scale. High quality ≥70%; Moderate quality 40–69%; Low quality <40%.

4.3. Patient Satisfaction

The overall mean satisfaction score (PTSS) was 3.47 ± 0.86, with 58.6% of patients reporting satisfaction (somewhat satisfied or very satisfied). The dimension with the highest satisfaction was staff interpersonal care (3.82 ± 0.74), while the lowest satisfaction was observed for information provision about pain condition and treatment (2.89 ± 0.98). Results are summarized in Table 3.

Table 3. Patient satisfaction with chronic pain management by dimension (n = 384).

Satisfaction Dimension	Mean ± SD	Satisfied (%)	Dissatisfied (%)
Staff interpersonal care	3.82 ± 0.74	72.1	27.9
Pain medication efficacy	3.41 ± 0.89	56.5	43.5
Side effect management	3.36 ± 0.92	54.2	45.8
Information provision	2.89 ± 0.98	39.6	60.4
Treatment accessibility	3.28 ± 0.95	52.3	47.7
Overall satisfaction	3.47 ± 0.86	58.6	41.4

Note: PTSS scored on a 1–5 Likert scale. Satisfied = scores ≥4; Dissatisfied = scores <4.

4.4. Health-Related Quality of Life

The mean EQ-5D-5L utility index was 0.583 ± 0.221, substantially lower than population normative values. The mean EQ-VAS score was 48.7 ± 20.3. Among the five EQ-5D-5L dimensions, pain/discomfort showed the highest prevalence of problems (89.3% reported some level of difficulty), followed by usual activities (71.6%), anxiety/depression (62.5%), mobility (58.1%), and self-care (31.5%). Patients with severe pain (BPI ≥7) had significantly lower utility indices (0.432 ± 0.198) compared to those with mild pain (0.748 ± 0.163, $p < 0.001$). Results are presented in Table 4.

Table 4. Health-related quality of life measured by EQ-5D-5L (n = 384).

EQ-5D-5L Dimension/Score	Mean ± SD / n (%)	Any problem (%)
Utility Index	0.583 ± 0.221	—
EQ-VAS	48.7 ± 20.3	—
Mobility	—	58.1

Self-care	—	31.5
Usual activities	—	71.6
Pain/Discomfort	—	89.3
Anxiety/Depression	—	62.5
By pain severity:		
Mild (BPI 1–3)	0.748 ± 0.163	—
Moderate (BPI 4–6)	0.591 ± 0.187	—
Severe (BPI 7–10)	0.432 ± 0.198	—

Note: Utility Index range −0.285 to 1.000 (1 = perfect health). EQ-VAS range 0–100. BPI = Brief Pain Inventory. Difference across severity groups: $p < 0.001$ (Kruskal-Wallis).

4.5. Correlations Between Pain Management Quality, Satisfaction, and Quality of Life

Spearman's correlation analysis revealed significant positive associations between pain management quality and patient satisfaction ($\varrho = 0.62$, $p < 0.001$) and between pain management quality and EQ-5D-5L utility index ($\varrho = 0.54$, $p < 0.001$). Patient satisfaction was also positively correlated with HRQoL ($\varrho = 0.48$, $p < 0.001$). BPI severity scores were inversely correlated with satisfaction ($\varrho = −0.41$, $p < 0.001$) and HRQoL ($\varrho = −0.58$, $p < 0.001$). Among specific quality domains, information/education provision ($\varrho = 0.56$, $p < 0.001$) and interdisciplinary coordination ($\varrho = 0.49$, $p < 0.001$) showed the strongest associations with patient satisfaction. The complete correlation matrix is presented in Table 5.

Table 5. Spearman correlation matrix among key study variables (n = 384).

Variable	QPMA	PTSS	EQ-5D	EQ-VAS	BPI
QPMA	1.00				
PTSS	0.62***	1.00			
EQ-5D Index	0.54***	0.48***	1.00		
EQ-VAS	0.47***	0.44***	0.72***	1.00	
BPI Severity	−0.38***	−0.41***	−0.58***	−0.52***	1.00

*Note: QPMA = Quality of Pain Management Assessment; PTSS = Pain Treatment Satisfaction Scale; EQ-5D = EQ-5D-5L Utility Index; EQ-VAS = EuroQol Visual Analogue Scale; BPI = Brief Pain Inventory. ***p < 0.001.*

4.6. Multivariate Regression Analysis

Two multivariate linear regression models were constructed to identify predictors of patient satisfaction (Model 1) and HRQoL (Model 2), controlling for sociodemographic and clinical covariates. Results are presented in Table 6.

Table 6. Multivariate linear regression models predicting satisfaction and HRQoL.

	Model 1: PTSS			Model 2: EQ-5D		
Predictor	**β**	**SE**	**p**	**β**	**SE**	**p**
Information/education	0.28	0.05	<0.001	0.18	0.04	0.002
Interdisciplinary coord.	0.22	0.06	0.003	0.15	0.05	0.008
Treatment adequacy	0.16	0.05	0.012	0.12	0.04	0.021
BPI Severity	−0.31	0.04	<0.001	−0.39	0.03	<0.001
Pain duration	−0.09	0.04	0.042	−0.14	0.03	0.006
Age	−0.05	0.04	0.187	−0.11	0.03	0.018
Education level	0.08	0.05	0.089	0.13	0.04	0.009

Comorbidities (≥3)	−0.12	0.05	0.019	−0.17	0.04	0.003
Depression comorbidity	−0.19	0.05	<0.001	−0.23	0.04	<0.001
R^2 (Adjusted R^2)	***0.52 (0.51)***			***0.56 (0.55)***		

Note: β = standardized coefficient; SE = Standard Error. Model 1: F(9,374) = 45.21, p < 0.001. Model 2: F(9,374) = 52.87, p < 0.001.

Model 1 (Satisfaction) explained 52% of the variance ($R^2 = 0.52$, $F_{9,374} = 45.21$, $p < 0.001$). The strongest predictors were BPI severity (β = −0.31, p < 0.001), information/education provision (β = 0.28, p < 0.001), interdisciplinary coordination (β = 0.22, p = 0.003), and depression comorbidity (β = −0.19, p < 0.001). Model 2 (HRQoL) explained 56% of the variance ($R^2 = 0.56$, $F_{9,374} = 52.87$, $p < 0.001$). Pain severity was the strongest predictor (β = −0.39, p < 0.001), followed by depression comorbidity (β = −0.23, p < 0.001), information provision (β = 0.18, p = 0.002), comorbidity burden (β = −0.17, p = 0.003), and interdisciplinary coordination (β = 0.15, p = 0.008).

5. DISCUSSION

This study provides a comprehensive assessment of the quality of chronic pain management in public health facilities and elucidates its associations with patient satisfaction and health-related quality of life. The findings highlight both the current status of pain care and critical areas requiring improvement within publicly funded health systems.

5.1. Quality of Pain Management: Strengths and Deficiencies

The moderate overall quality score (3.21/5.0) observed in our study indicates that while basic pain management services are available, significant gaps persist in delivering comprehensive, evidence-based chronic pain care in public health settings. These findings are consistent with international literature documenting suboptimal pain management in public healthcare systems. Tawil et al. (2018) reported that numeric pain scores were documented in only 14.2% of patient files in hospital settings, and Köse Tamer and Sucu Dağ (2020) found that pain management quality indicators were at a low level in a state hospital [42,45].

The domain analysis revealed that treatment adequacy scored highest, suggesting that pharmacological management is relatively well-implemented, while information/education provision and interdisciplinary coordination scored lowest. This pattern mirrors findings from Majangara et al. (2021), who identified inadequate information provision as the primary source of patient dissatisfaction at a public hospital pain clinic [36]. Similarly, Vu et al. (2020) found that older patients at a national geriatric hospital were most dissatisfied with information provided about pain and its treatment [50]. These consistent findings across diverse settings underscore the universal challenge of incorporating adequate patient education and interdisciplinary collaboration into routine pain management practice.

The low scores for interdisciplinary coordination are particularly concerning given the robust evidence supporting multidisciplinary approaches as the gold standard for chronic pain management [13–15]. Huttunen et al. (2024) noted that systematic multidisciplinary treatment protocols for persistent pain remain surprisingly scarce in primary care settings, despite evidence of their effectiveness and cost-efficiency [15]. The challenge of implementing interdisciplinary models in public health facilities is compounded by resource constraints, siloed service delivery, and limited training in collaborative care approaches [40,43].

5.2. Patient Satisfaction: Determinants and Implications

Our finding that 58.6% of patients were satisfied with their pain management is comparable to estimates reported in similar public health contexts. Majangara et al. (2021) reported that approximately six in ten patients were satisfied at a South African public hospital chronic pain clinic [36]. However, this proportion is notably lower than satisfaction rates reported in specialized pain centers, where rates typically exceed 70% [25,39], highlighting the quality gap between specialized and public general-practice settings.

The multivariate analysis confirmed that information/education provision and interdisciplinary coordination were among the strongest modifiable predictors of satisfaction, alongside pain severity as a non-modifiable clinical factor. These findings align with those of Licciardone et al. (2023), who demonstrated that process measures — particularly physician empathy and communication — were more strongly associated with satisfaction than outcome measures [24]. This has important practical

implications: even when complete pain relief is not achievable, improvements in communication quality, patient education, and care coordination can substantially enhance patient satisfaction.

The significant inverse association between depression comorbidity and satisfaction ($\beta = -0.19$, $p < 0.001$) supports the growing recognition that psychological comorbidities independently influence satisfaction with pain care [25,38]. Li and Hapidou (2021) similarly identified depression as a significant negative predictor of satisfaction in their interdisciplinary program [25]. This underscores the need for systematic screening and management of psychological comorbidities as integral components of comprehensive pain management.

5.3. Health-Related Quality of Life: Burden and Determinants

The mean EQ-5D-5L utility index of 0.583 observed in our study population confirms the substantial burden of chronic pain on health-related quality of life. This value is considerably lower than general population norms (typically >0.85) and is consistent with utility scores reported in other chronic pain populations [9,10,28]. Poder et al. (2020) reported a median EQ-5D-5L of 0.622 among patients with chronic low back pain in Canada [10], and Vartiainen (2018) documented extremely low HRQoL scores in tertiary care chronic pain populations [9].

Pain severity emerged as the strongest predictor of HRQoL deficits ($\beta = -0.39$, $p < 0.001$), followed by depression comorbidity ($\beta = -0.23$, $p < 0.001$). This dual predictive pattern is well-established in the literature. Xue et al. (2021) demonstrated that both HRQoL and treatment satisfaction decreased significantly with increasing pain severity among patients with chronic osteoarthritis pain [28]. Walie et al. (2025) found that 59.5% of chronic pain patients at an Ethiopian referral hospital reported uncontrolled pain that adversely affected their physical and emotional wellbeing, despite receiving treatment [29].

Importantly, our results demonstrate that modifiable aspects of pain management quality — specifically information provision ($\beta = 0.18$, $p = 0.002$) and interdisciplinary coordination ($\beta = 0.15$, $p = 0.008$) — independently predict HRQoL even after controlling for pain severity and comorbidities. This finding provides empirical support for the biopsychosocial model's assertion that contextual factors in healthcare delivery influence patient outcomes beyond the direct effects of pain relief [14,17].

5.4. Associations Between Quality, Satisfaction, and Quality of Life

The significant positive correlations observed between pain management quality, patient satisfaction, and HRQoL (ρ ranging from 0.48 to 0.62) confirm a coherent framework in which the quality of care processes influences both patient perceptions of care and health outcomes. These findings are consistent with the Donabedian triad of structure-process-outcome in healthcare quality assessment [24,35]. The correlation between quality and satisfaction ($\rho = 0.62$) was stronger than that between quality and HRQoL ($\rho = 0.54$), suggesting that quality improvements more directly affect satisfaction, while HRQoL is also influenced by disease-specific factors beyond the healthcare process.

These associations have important implications for health policy. Investments in improving pain management quality — particularly in the domains of patient education, interdisciplinary care coordination, and systematic outcome monitoring — can be expected to yield improvements in both patient satisfaction and quality of life. Zamorano et al. (2025) demonstrated this principle in Chilean primary care, where an interdisciplinary intervention improved both quality of life and pain perception despite structural barriers in the health system [40].

5.5. Limitations

Several limitations should be acknowledged. First, the cross-sectional design precludes causal inference regarding the relationships between pain management quality, satisfaction, and HRQoL. Longitudinal studies are needed to establish temporal precedence and directionality. Second, the use of consecutive sampling in selected facilities may limit generalizability to broader populations. Third, patient satisfaction and quality assessments are inherently subjective and may be influenced by factors not captured in the instruments, including expectations, health literacy, and cultural norms. Fourth, the researcher-designed quality assessment instrument, while validated through expert review and pilot testing, requires further psychometric evaluation in diverse populations. Fifth, the study focused on non-cancer chronic pain, and results may not be directly applicable to cancer pain populations. Finally, social desirability bias may have influenced self-reported satisfaction scores.

5.6. Practical Implications and Recommendations

Based on these findings, several recommendations for improving chronic pain management in public health facilities can be proposed:

First, health systems should prioritize the development and implementation of structured patient education programs that provide comprehensive information about pain mechanisms, treatment options, self-management strategies, and realistic outcome expectations. The consistent finding that information provision is a key predictor of both satisfaction and HRQoL across multiple studies underscores its importance [24,36,38,50].

Second, organizational models facilitating interdisciplinary collaboration should be established or strengthened within public health facilities. This may include integrated care pathways, regular interdisciplinary team meetings, shared documentation systems, and referral protocols that ensure coordinated management across disciplines [13,15,16].

Third, systematic screening for psychological comorbidities — particularly depression and anxiety — should be incorporated into routine chronic pain assessment, with established referral pathways for psychological intervention [6,8,38].

Fourth, patient-reported outcome measures including satisfaction assessments and HRQoL instruments should be routinely integrated into clinical practice to monitor treatment effectiveness and guide quality improvement initiatives [9,35,42].

6. CONCLUSIONS

This study demonstrates that the quality of comprehensive chronic pain management in public health facilities significantly influences both patient satisfaction and health-related quality of life among adult patients with chronic non-cancer pain. The moderate overall quality level observed indicates substantial room for improvement, with patient education/information provision and interdisciplinary care coordination identified as the domains most in need of strengthening.

Pain management quality, satisfaction, and quality of life are interconnected constructs that collectively reflect the effectiveness of chronic pain care. Information provision, interdisciplinary coordination, pain severity, and depression comorbidity were identified as the most significant modifiable and non-modifiable predictors of patient-reported outcomes. These findings provide actionable evidence for health policy development and clinical practice improvement.

Strengthening comprehensive pain management within public health systems requires a multi-level approach encompassing clinician training in biopsychosocial assessment and communication, organizational restructuring to facilitate interdisciplinary collaboration, integration of patient-reported outcome measures into routine care, and the development of structured patient education programs. Future longitudinal and interventional studies are needed to evaluate the effectiveness of these strategies in improving chronic pain care quality and patient outcomes within resource-constrained public health contexts.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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DATA AVAILABILITY STATEMENT

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

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