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Pain Therapy in an Outpatient Neurosurgical Practice in Germany, Beacon or Fruitless Survey of 6090 Patients

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Abstract

Objectives: Chronic low back pain therapy represents a cornerstone of outpatient practice. The majority of patients present with degenerative lumbar spine disease, often complicated by neuropathic pain syndromes of diverse aetiologias. Many have previously undergone multiple, frequently unsuccessful treatments. This study aimed to delineate the spectrum of chronic pain patients and evaluate outcomes of conservative pain therapy in a large outpatient cohort, with emphasis on the role of pain specialists in supporting this often helpless and disappointed group.

Materials and Methods: We retrospectively analyzed all patients treated between January 2022 and December 2024 in our outpatient pain clinic. Of 6557 patients, 467 with intracranial pain syndromes, migraine, trigeminal neuralgia, or post-COVID-19 fatigue/pain were excluded. A total of 6090 patients were enrolled, including 959 with clear surgical indications (lumbar disc herniation, spinal canal stenosis) who required postoperative pain therapy. Mean age was 56 years (range 12-103); 41% were male, 59% female. Diagnoses included: degenerative lumbar facet joint syndrome (n=2987), failed back surgery syndrome (FBSS, n=760), neuropathic pain syndromes (n=567), and postoperative spinal canal stenosis/disc herniation (n=450). Pain severity was assessed by Numeric Rating Scale (NRS) and Oswestry Disability Index (ODI). Multiple visits and structured pain diaries ensured reliable data collection.

Results: Satisfactory pain relief and improved quality of life were achieved in 45% of patients, while 23% required additional physiotherapy and workplace support. The best outcomes were observed in operated patients (>85% pain relief or freedom). 26% of patients required psychosomatic or neurological co-management. Inpatient multimodal therapy was necessary in 15% but yielded largely unsatisfactory results. Psychosocial burden was considerable: 333 patients under 65 years were retired due to chronic pain; 27% were under psychiatric care for depression (male:female ratio 34:66). Major systemic barriers included inadequate reimbursement and insufficient recognition of pain therapy by insurers and institutions.

Conclusion: Pain institutions act as essential hubs of care for patients with complex chronic pain syndromes. Yet, treatment remains hampered by lack of societal awareness, insufficient structural support, and poor healthcare integration. Too often, pain patients are marginalized and left without adequate resources. Despite these challenges, our guiding principle is to treat patients with empathy, trust, and long-term social reintegration, independent of socioeconomic status. Broader public recognition, improved institutional frameworks, and health policy reforms are urgently required to advance outcomes for this vulnerable population.

Introduction

Germany, with a current population of approximately 84 million, faces a profound demographic transformation. By 2050, nearly one-third of the population will be aged 65 or older-an increase of roughly 41% in this age group. At the same time, the working-age population (ages 20-67) is projected to decline by about 2% by 2045, intensifying pressure on healthcare and social support systems [1]. As aging advances, so does the prevalence of chronic pain-particularly from degenerative spinal and neuropathic conditions-which exacerbates functional decline, frailty, and dependency among older adults [2,3]. The BURDEN 2020 study-a national-level burden-of-disease analysis for Germany-revealed that in 2017, low back pain ranked as the second-highest cause of DALYs (Disability-Adjusted Life Years), surpassed only by coronary heart disease. With total DALYs around 12 million, equating to 14,584 DALYs per 100,000 inhabitants, the societal weight of chronic pain-especially back pain-is undeniably high [1]. Across Europe, chronic pain also imposes substantial economic and social costs. A European Union-level analysis estimates that chronic pain costs member states billions annually, with country-level expenditures ranging from €1.1 billion to nearly €50 billion per year [3,4]. Approximately one in five European adults suffers from moderate to severe chronic pain, with wide-reaching consequences for employment, productivity, and quality of life [3,5]. Chronic pain is a leading reason for physician consultations and is closely linked to early labour market exit-accounting for an estimated 500 million sick days annually in Europe and contributing to over 60% of permanent work incapacity [5,1]. In addition to the BURDEN 2020 findings, more recent initiatives, such as the PAIN2020 trial [6], underscore the urgent need for structured outpatient pain programs that integrate psychosocial care, workplace reintegration, and digital tools. Emerging care models, including telemedicine-based internet clinics and Lean value-based healthcare pathways, demonstrate that chronic pain therapy can be reorganized to achieve both improved patient outcomes and cost efficiency. The "Societal Impact of Pain" (SIP) platform emphasizes that nearly 90% of the burden of pain falls not on direct healthcare costs but on broader societal structures, affecting employers, families, and taxpayers [5,7]. Recognizing this, the European Commission and SIP have advocated a system-level response: chronic pain must be reframed as a high-burden, under-researched public health priority requiring strategic attention. The EU calls for minimum standards of care across member states to ensure equitable access to pain treatment, regardless of geography or socio-economic status [5,7].

For Germany, the demographic shift and resulting surge in chronic pain cases will place increasing demands on outpatient services, rehabilitation, and long-term care systems. The societal impact of pain is driven less by mortality than by morbidity and disability, underscoring the need for outpatient pain therapy-especially conservative, structured approaches-as both a clinical and economic cornerstone [1,4,8]. Yet, such therapy remains chronically underfunded and fragmented. Integrated health policies, such as those proposed by the SIP and the EU Pain Proposal, provide a roadmap that Germany must adopt to reduce chronic pain's systemic burden and to enhance patient-centered care [5,7]. Currently, in southern Germany, only four supra-regional and twelve regional pain centres are officially designated (e.g., University Medical Centre Freiburg; Klinikum Karlsruhe). These centres must meet strict structural requirements, including cooperation with central-level hospitals and provision of outpatient, day-care, and inpatient multimodal pain therapy. However, access remains critically limited: for decompensated pain patients, waiting times of up to six months for admission are common, significantly complicating timely and effective care [9,6].

Materials and Methods

We conducted a retrospective, single-center cohort study of all patients treated in our outpatient pain clinic between January 1, 2022, and December 31, 2024. The clinic has operated continuously since 2006 and provides interdisciplinary care, with emphasis on conservative and interventional pain management, perioperative follow-up, and psychosocial integration.

Inclusion and Exclusion Criteria

- **Inclusion criteria**
- Age ≥12 years.
- Chronic pain ≥3 months.
- Degenerative spinal disorders, neuropathic pain syndromes, or postoperative pain requiring structured therapy.
- ≥2 documented visits.

Exclusion criteria

- Primary intracranial pain syndromes (migraine, trigeminal neuralgia).
- Post-COVID-19 fatigue/pain syndromes.
- Incomplete documentation.
- Metastatic diseases

Study Population

- Total screened: 6557
- Excluded: 467
- Final cohort: 6090 patients
- Age: 12-103 years (mean 56 ± 14.3)

- Sex: Male 41%, Female 59%
- Surgical subgroup: 959 patients (15.7%) with lumbar disc herniation or spinal canal stenosis included for postoperative therapy.

Diagnostic Classification

Diagnoses were established by clinical examination, imaging, and ICD-10 coding:

- Degenerative lumbar facet joint syndrome: 2987
- Failed back surgery syndrome (FBSS): 760
- Neuropathic pain syndromes: 567
- Operated spinal canal stenosis/disc herniation (postoperative therapy): 959

Pharmacological Management

Therapy was escalated according to WHO analgesic ladder and DGSS (German Society of Pain Research) guidelines. Almost all patients had previous therapy by their GPs, Orthopedic surgeons, neurologists, psychiatrists…etc. our aim was to develop a scheme for a therapy on regular base and long-term use. Several discussions were held to win their confidence. The following steps for our care are flexible. Skipping is allowed according to the symptoms. Step I (non-opioid analgesics): Almost all Patients came with treatment with NSAID to us or we prescribed as first line therapy only for a short period of four weeks due to the well-known side effects. Step II (weak opioids, for moderate pain): Tramadol 100-400 mg/day, Tilidine/Naloxone 50-200 mg/day. Often combined with non-opioids. Step III (strong opioids, for severe or refractory pain): we skipped very fast from Step 1 to opioid analgesia especially for severe refractory subacute and chronic pain. Nearly all synthetic opioid was administered according to the type, chronicity, concomitant diseases and contraindications. To protect our patient. Altogether, 621 Patients were treated with Step III and followed up accordingly.

- Oxycodone (10-80 mg/day, immediate- or extended-release).
- Hydromorphone (4-24 mg/day).
- Morphine (20-200 mg/day oral).
- Fentanyl transdermal (12-75 µg/h) for long-term therapy.
- Buprenorphine transdermal (5-35 µg/h).
- Opioid rotation was performed in cases of tolerance, side effects, or poor response.
- Every patient was supplied with an Opioid ID in which the therapy war documented.
- Adjuvant medications: 2756 Patients came to our outpatient dept. with already established adjuvant therapy including anticonvulsants, antidepressants, 12 Patient underwent Capsaicin 8% patch for post zoster neuralgia of lumbar region and lower limbs.
- Muscle relaxants was prescribed frequently by previously treating physicians. In our cohort, we stopped this therapy in all cases.

Interventional Procedures Performed under fluoroscopic guidance,

- Facet joint infiltration / medial branch blocks: a total of 5790 infiltrations was performed. Minimum number 3 Infiltration per patient to exclude Placebo. Local anesthetic (lidocaine 1%, 2-4 ml) ± corticosteroid (triamcinolone 20-40 mg) was used for infiltration. Every infiltration has been documented radiologically.
- Periradicular therapy (PRT): 345 Fluoroscopy-guided Periradicular injection with local anesthetic (2-3 ml ropivacaine 0.5%) + corticosteroid (triamcinolone 20 mg).
- Epidural injections: fluoroscopic guided: 76 Patients
- Sympathetic blocks: Satellite Ganglion block in 5 Patients with neuropathic pain were treated with procedure as DD to Vascular ischemia of upper limb.
- Radiofrequency denervation (selected cases): in 438 Cases after at least two successful diagnostic blocks. Thermal RF ablation of medial branches at 80°C for 60-90 seconds.

Supportive Measures

- Physiotherapy (manual therapy, exercise therapy, stabilization programs). 1976 Receipts were issued. Each Receipt contained 6 Therapy units. Each patient had free 18 Units of Physiotherapy.
- Ambulatory Rehabilitations consists of 50 Units of group therapy in 1039 Patients
- Inpatient rehabilitation for three weeks after approval by the insurance company 670
- Transcutaneous electrical nerve stimulation (TENS). Only in 45 Cases
- Very difficult to achieve was to testify workplace adaptation programs in collaboration with occupational medicine in 541 Cases
- Weight management and lifestyle counseling. Nearly half of our cohort had a BMI of over 30 weight reduction was recommended.
- Psychological and Psychiatric Interventions this made our

most difficult part of patient's care. Even acute decompensated concomitant psychiatric diseases couldn't get an urgent appointment. We had to refer 36 patients to closed psychiatry due to danger of suicide. All of them were discharged few days later with the result no danger. Further steps like Cognitive behavioral therapy (CBT) sessions, Supportive psychotherapy for coping strategies. Antidepressant pharmacotherapy in cooperation with psychiatrists. Group-based pain management training in selected patients were tried in cooperation with psychiatrists and neurologists. Most of these treatments proved to be fruitless. Finally, 23 Patients with refractory pain, severe psychiatric comorbidity, or social instability were referred to inpatient Multimodal Pain Therapy (MMPT). Indications included: NRS ≥7 despite adequate outpatient therapy, opioid dependency, or complex psychosomatic overlay.

Operative therapy in 959 Patients with therapy refractory pain, neurological deficits and failure of conventional treatment with satisfactory results. Following indications underwent operative treatment:

- Lumbar disc herniation 356
- Lumbar spinal canal stenosis 420
- Benign Extradural Tumours 51
- Spine Instability 89
- Failed Back Surgery Syndrome 43

Results

Due to the large cohort size, further specific subgroup analyses were not feasible. Nevertheless, by examining the development of pain across the entire collective, we were able to identify characteristic response patterns. While satisfactory outcomes were achieved in a majority of patients, the heterogeneity of the group and the considerable proportion of unsatisfactory responses overshadowed the overall results. Outcomes are presented according to the type of therapy initiated.

Pharmacological Therapy

NSAIDs proved consistently ineffective and, moreover, dangerous due to renal, cardiovascular, and hepatic side effects. Step II analgesia with weak opioids was trialed in over 80% of patients, with acceptable but often limited results. In most cases, rapid escalation to Step III analgesia was required. The best experiences were achieved with oxycodone and morphine. Transdermal fentanyl, applied in 96 patients, proved unsuitable for long-term management. Adjuvant therapy showed mixed efficacy: anticonvulsants such as pregabalin were highly effective in 45% of patients with neuropathic pain and Failed Back Surgery Syndrome (FBSS). In contrast, antidepressants prescribed for pain modulation were ineffective in almost all referred cases, supporting their restriction to the treatment of comorbid depression rather than analgesia.

Interventional Percutaneous Procedures

Following three to four injections, response rates ranged between 45-55%, with patients reporting reduced pain and restored participation in daily life, work, and sports. The duration of symptom relief averaged two months. For responders, Radiofrequency Thermocoagulation (RFTA) of the facet joints was recommended. Despite robust scientific evidence for its efficacy, RFTA is not covered by statutory insurance in Germany and must be paid privately. Of 438 patients treated with RFTA, excellent results were achieved in 328 (75%), favorable outcomes in 87 (20%), while 5% did not respond despite positive test infiltrations.

Supportive Measures

Supportive therapy was insufficient in many cases, particularly due to limited availability of psychiatric appointments, leaving more than 56% of patients without adequate follow-up. Nonetheless, even a few psychosomatic sessions proved beneficial, underlining the importance of this approach. Referral to inpatient pain clinics proved largely ineffective across the cohort. Patient satisfaction was limited, partly due to restricted access to physical activity, insufficient frequency of counseling sessions, and-most importantly-unrealistic patient expectations of complete pain relief. Admission to closed psychiatric wards also showed no therapeutic benefit but was in some cases unavoidable.

Surgical Therapy

Surgical treatment yielded the best outcomes. In patients with lumbar disc prolapse or spinal canal stenosis, more than 85% experienced substantial pain relief. Patients with spinal instability treated by instrumentation and fusion had good results in 65%, satisfactory results in 17%, while 18% deteriorated postoperatively. These patients subsequently required multimodal pain therapy, opioid analgesia, and infiltrative procedures, with variable outcomes. In patients with benign spinal tumors (facet joint cysts, intraspinal lipomas, granulomas), surgery resulted in immediate and sustained pain relief in over 95% of cases.

Failed Back Surgery Syndrome (Fbss)

FBSS patients underwent prolonged conservative therapy including opioids, anticonvulsants, infiltrations, psychosomatic care, and physiotherapy. Neural compression was ruled out by MRI and CT in all cases, and surgical revision was not indicated. After extensive but frustrating conservative management, invasive neuromodulation procedures were considered in 46 Patients. Thirteen patients underwent intrathecal morphine pump implantation following successful trial injections. In 23 patients, Spinal Cord Stimulation (SCS) was initiated with temporary

electrode implantation; permanent pain pacemaker implantation followed successful testing. Two patients developed infections requiring reoperation, and three did not respond to SCS. The remaining 18 patients achieved >80% pain relief with sustained benefit after implantation.

Therapy	Patients	Outcome
NSAIDs	All Cases	Short Term. Long Term ineffective, harmfull (renal, CV, hepatic risks)
Step II Opioid	>80%	Acceptable results, often escalated
Step III Opioid	Majority	Best experience, effective. Long Term
Fentanyl patch	96	Unsuitable for long term. Tolerance. Compliance problem
Antidepressants	Most cases	Ineffective for pain only depression
injections (3-4)	All responders	45-55% response ~2 Months Relief
RFTA Facet joint	438	75% excellent, 20% Favorable, 5% no response
Psychiatric/Psychosomatic support	not quantified	insufficient, some temporary benefit
Closed psychiatry	Not quantified	Ineffective but sometimes unavoidable
inpatient pain clinic	All referred	ineffective low satisfaction
Lumbar disc/Spinal Stenosis	All operated	>85% pain relief
Spinal Fusion (Instability)	All operated	65% good, 17% Satisfactory, 18% worse
Benign spinal tumors	All operated	>95% immediate pain relief
Morphine pump (FBSS)	13	Successful in all after trial
Spinal cord stimulation (FBSS)	23	18/23 successful (80> pain relief) 2 infections, 3 failures

Discussion

This retrospective analysis of more than 6,000 patients treated in a specialized outpatient pain clinic underscores both the clinical heterogeneity and the systemic challenges inherent to chronic pain medicine. Degenerative spinal disorders, failed back surgery syndrome (FBSS), and neuropathic pain syndromes were the dominant diagnostic groups, in line with recent epidemiological reports in Germany and across Europe [2,3]. The high prevalence of spinal pain reflects both demographic aging and lifestyle factors, underscoring the urgent need for preventive strategies. Our results confirm that structured, guideline-based multimodal therapy can achieve meaningful improvement in nearly half of patients. Particularly noteworthy were the favorable outcomes in postoperative patients, where more than 85% reported substantial pain relief. These findings emphasize the value of early integration of pain specialists into postoperative pathways, which is still inconsistently implemented in standard surgical care [10-12]. By contrast, outcomes from inpatient multimodal programs were less encouraging in our cohort, suggesting possible issues with patient selection, therapy intensity, or continuity of care [13,9]. The psychosocial burden of chronic pain in our population was profound: 333 patients under 65 years retired prematurely, and more than one in four required psychiatric treatment for depression. Female predominance in psychiatric comorbidity (66%) parallels prior studies on gender differences in pain perception and coping [14-16]. These findings strongly support the biopsychosocial model of chronic pain, where somatic pathology interacts with psychological vulnerability and social marginalization [17].

Our pharmacological results also align with recent meta-analyses. NSAIDs proved ineffective and harmful in multimorbid populations, consistent with risk-benefit data in chronic pain [18]. Step II analgesia offered only transient benefit, and most patients required escalation to Step III. Oxycodone and morphine provided the most consistent relief, while transdermal fentanyl was unsuitable for long-term use. Anticonvulsants (e.g., pregabalin) showed robust efficacy in ~45% of patients with neuropathic pain and FBSS, which mirrors controlled trials [19]. By contrast, antidepressants prescribed for analgesia were largely ineffective, confirming systematic reviews showing benefit only when depression is the primary indication [20]. Interventional

procedures such as facet infiltrations achieved short-term relief in ~50% of patients, while radiofrequency thermocoagulation (RFTA) demonstrated sustained efficacy in 75% of those treated. These outcomes corroborate international guidelines [21], though in Germany reimbursement remains a barrier to access. Surgical patients demonstrated the most robust outcomes. More than 85% of patients with lumbar disc prolapse or spinal stenosis improved substantially, while benign spinal tumors (facet cysts, lipomas, granulomas) showed >95% immediate relief. These findings are consistent with current literature, which highlights the importance of appropriate indication, psychosocial comorbidity, and structured rehabilitation in optimizing outcomes after spine surgery [22-24]. By contrast, patients with spinal instability showed more variable responses, with ~18% deteriorating despite surgery. FBSS patients in our cohort highlight the limits of conventional therapy. Despite comprehensive conservative treatment, many remained highly symptomatic. Invasive procedures such as intrathecal morphine pumps and Spinal Cord Stimulation (SCS) were pursued in selected cases. SCS resulted in >80% pain reduction in 78% of patients after successful testing, though complications (infection, electrode failure) occurred in ~20%. This aligns with recent reviews positioning neuromodulation as a key option in therapy-resistant FBSS [25]. Beyond clinical outcomes, our study exposes systemic deficiencies. Pain medicine in Germany remains underfunded, poorly represented in medical curricula, and insufficiently integrated across disciplines [5,7]. The PAIN2020 trial and other multicenter initiatives highlight that even when early multimodal assessments are offered, implementation gaps and reimbursement issues limit impact [6]. This disconnect translates directly into patient suffering, premature retirement, and significant economic burden, estimated at €20-40 billion annually [1,4]. Our study has several limitations. Its retrospective design risks selection bias, and heterogeneity of documentation limited the availability of standardized patient-reported outcomes such as quality of life. Certain pain entities (e.g., migraine, trigeminal neuralgia, post-COVID pain) were excluded for diagnostic clarity, reducing generalizability. Long-term follow-up beyond two years was unavailable, limiting conclusions on durability. Nevertheless, the size and breadth of the cohort provide valuable real-world insights into the efficacy of diverse therapeutic strategies.

Conclusion

Outpatient pain institutions provide essential and effective care for complex chronic pain syndromes. Nearly half of patients in our cohort achieved meaningful pain relief and improved quality of life, with postoperative follow-up after spinal surgery yielding the best results. Yet, a substantial subgroup required ongoing conservative therapy, psychosomatic co-management, or invasive neuromodulation, reflecting the multifaceted nature of chronic pain.

Future research must focus on prospective, multicenter studies with standardized outcomes extending beyond pain intensity to disability, mental health, work participation, and social reintegration. Policymakers must recognize chronic pain as both a medical and socioeconomic priority. Reforms should strengthen outpatient infrastructure, align reimbursement with value, and embed psychosocial integration in every pain pathway. Pain medicine is not optional. It is a medical necessity and a reflection of how society values its most vulnerable members.

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