

Clinical Pain Research

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Healthcare utilization and resource distribution before and after interdisciplinary pain rehabilitation in primary care

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Abstract

Objectives – Most patients with chronic pain are identified and managed in primary care (PC). Chronic pain management is challenging, which is manifested by increased healthcare utilization (HCU) in this patient group. The interdisciplinary pain rehabilitation program (IPRP) is the gold standard treatment for patients with chronic pain but is scarcely used in PC. The aim of this study was to evaluate the HCU of patients with chronic pain in PC 1 year before and 1 year after an IPRP by examining the distribution of costs and resources.

Methods – This retrospective cohort study combined data from a national pain registry and HCU data from regional administrative registries, including 146 patients who participated in an IPRP in PC. The outcome measure was the number of outpatient healthcare contacts. Costs and the distribution of resources were compared across the two measurement intervals using paired *t*-tests. HCU costs were described from a healthcare provider perspective.

The study results have been presented as a poster at the EFIC pain conference in Lyon in April 2025.

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Results – HCU decreased by 16% in the year following IPRP compared to the year before. Costs for outpatient visits dropped by 12% or €434 per participant. Visits to physiotherapists and general practitioners decreased the most, by 31% ($p = 0.048$) and 23% ($p < 0.001$) respectively. Visits to nurses, occupational therapists, and psychologists/social workers in turn increased marginally (6%, 5% vs 10%).

Conclusions – IPRP in PC may lead to reduced HCU, freed resources, and streamlined chronic pain management. The study offers valuable insights into expected changes in HCU for chronic pain patients after an IPRP and how these changes may impact daily activities at the PC center.

Keywords: chronic pain, primary care, interdisciplinary pain rehabilitation, healthcare utilization, healthcare economics

1 Introduction

Pain is one of the most frequent reasons for seeking primary care (PC), accounting for 30–40% of visits. Of these visits, around 40% are elicited by chronic pain [1–3], defined as pain that persists > 3 months [4]. The prevalence of moderate to severe chronic pain in Europe has been estimated to be 19% [5], exceeding the prevalence of diabetes, heart disease, and cancer all together [6].

Chronic pain is complex since it affects all areas of life; sleep, daily function, social and family life, work ability, and leisure time [7,8]. Together with musculoskeletal disorders, chronic pain has a large negative impact on health-related quality of life [9,10] and is one of the main contributors to years lived with disability [11].

Time to medical diagnosis and appropriate treatment is often prolonged for patients with chronic pain [12]. Studies have shown that patients report feelings of being misunderstood, not getting their pain affirmed and not being listened to by healthcare providers, which in turn may maintain or at worst reinforces the pain and elicit continued care-seeking [13–15]. Chronic pain is associated with greater healthcare utilization (HCU) than individuals without pain [16–18].

Nevertheless, approximately 40% of chronic pain sufferers report inadequate pain treatment [5]. The total yearly costs for chronic pain, including direct costs such as medications and HCU and indirect costs such as productivity loss due to sickness absence and disability pension, have been estimated as 3–10% of the gross domestic production [1,18,19], excluding costs due to the reduced quality of life and informal care [20].

The interdisciplinary pain rehabilitation program (IPRP) is an evidence-based treatment for the management of chronic pain [21,22]. It is a complex intervention with a biopsychosocial perspective that considers the interaction of physical, mental, and social factors in chronic pain [6]. An interdisciplinary team conducts IPRP and it entails different activities [22].

IPRP has been practiced for decades in specialist care but is scarcely applied in PC, although most patients with chronic pain are identified and managed there [23,24]. Many general practitioners (GPs) consider chronic pain to be difficult to treat [25] and are uncomfortable with its management [26–28]. Comparable experiences have been reported by interdisciplinary teams in PC [29]. Furthermore, many GPs seem to lack appropriate pain education and understanding of the complexity of chronic pain and may therefore fail to acknowledge the need for a biopsychosocial approach [20,23,27]. Another factor that impedes the implementation of IPRP in PC is that it is initially both time and resource consuming in an already pressured context [30]. The impact and potential benefits of IPRP for the individual PC center have been scarcely studied. Hence, this study aims to evaluate HCU of patients with chronic pain by describing the distribution of costs and resources, from a healthcare-provider perspective, during 1 year before and 1 year after IPRP.

2 Methods

2.1 Study design

This was a retrospective cohort study where patient clinical data from the Swedish Quality Registry for Pain Rehabilitation for primary care (SQRP-PC) (www.ucr.uu.se/en) and HCU data from regional administrative registries were combined. One hundred forty-six participants were evaluated with respect to their HCU 1 year before and 1 year after completion of an IPRP in PC in two Swedish regions. Distribution of resources and costs was described across the two measurement intervals from a healthcare-provider perspective using within-group analysis.

2.2 Data sources

Patient clinical data were collected via comprehensive questionnaires including patient-reported outcome measures

(PROMs) concerning pain, physical and emotional functioning, coping, health-related quality of life, life and work satisfaction, etc. Questionnaires were filled in by the patients at baseline, immediately after IPRP and at 1-year follow-up. The standardized and validated instruments used in the questionnaires are described in detail in Table S1 (Supplementary material) [31–40]. The clinical data subsequently formed the start of the SQRP-PC at the end of 2015.

Individual data on HCU in terms of physical visits, telephone contacts, and administrative items were retrieved by linking personal identification numbers of the participants to data from medical registers of the region. Data were retrieved for two time intervals: 1 year before IPRP (between October 2011 and August 2014) and 1 year after the termination of IPRP (between January 2013 and November 2015). One-year intervals were chosen since register data were available for a 1-year follow-up. All outpatient healthcare contacts, irrespective of the reason for seeking care, were included. IPRP duration was approximated to be 3 months for all patients. HCU data were not collected during this time. HCU data were retrieved for the following professionals: GPs, specialists, PC nurses, specialist nurses, physiotherapists, occupational therapists, psychologists, and social workers. Contacts with dental and maternal care, as well as dietitian and vaccination services, were considered irrelevant and were therefore excluded. Visits to orthoptists, speech therapists, audiologists, assistant nurses, hearing care technicians, and orthopedic technologists were omitted because they were not compatible with both datasets of the regions. Data concerning visits to the emergency ward and hospitalizations were not available.

Unit costs for year 2022, based on the cost per patient (CPP) method, were retrieved (September 9, 2023) from the Swedish Association of Local Authorities and Regions (SALAR) in SEK. These unit costs were the latest available at the time. The SALAR works with gathering CPP data to unify the estimation of unit costs nationally and improve comparability between regions. Nevertheless, the manner of calculating in the regions currently varies. Therefore, the unit costs for the region of Västerbotten were used to make the cost description uniform. The retrieved unit costs entailed two professional categories – physicians and other caregivers – separated into primary and specialist care levels. The unit costs are estimates of the average cost for the professional category, independent of specialty. The unit cost template included personnel costs and education, medical materials, medicines, laboratory, x-ray and other medical services, premises costs, IT and telecommunication costs, general costs such as transport, and overhead costs. Telephone calls and administrative items were included in the retrieved unit cost.

The outcome measure of this study was the number of outpatient healthcare contacts.

2.3 Participants

The participants in this study completed IPRPs in PC, including 1-year follow-up, between August 29, 2012, and September 19, 2015. All participants who completed and returned questionnaires at both the baseline and 1-year follow-up were included in the study. The inclusion criteria were (1) disabling chronic pain for >3 months, (2) age between 18 and 65 years, (3) potential for an active life change, (4) no further medical assessments needed, (5) sufficient knowledge of the Swedish language, and (6) agreement not to participate in other parallel treatments during the program. Exclusion criteria were major somatic or psychiatric disease, a history of significant substance abuse, and/or state of acute crisis. Patients were consecutively referred to the IPRP by a GP, a physiotherapist, or an occupational therapist in PC.

2.4 Settings

IPRPs were conducted at 11 PC centers in two councils (today's regions) across Sweden, one in the north (Västerbotten) and one in the south (Östergötland). The IPRPs were realized as part of the so-called Rehabilitation Guarantee, a national initiative to boost return to work and decrease and prevent sickness absence among patients with chronic musculoskeletal pain, by providing the PC center with a financial compensation of 25,000 SEK per patient who completed IPRP. The IPRPs were 6–10 weeks long and entailed 1–3 patient visits at the PC center on a weekly basis. One visit ranged from 1.5 to 3.5 h, and the total average duration was 27.8 h per program (minimum 14 h to maximum 49 h). The IPRP teams consistently involved at least one physiotherapist and one occupational therapist, but other professionals were also involved, including GPs, PC nurses, psychologists, and social workers, depending on the patient's needs. At least one team member was trained in cognitive behavioral therapy. The IPRP consisted of group intervention or a combination of individual and group activities. Most of the team professionals had earlier experience with IPRP or received training in interdisciplinary treatment by professionals from specialist care beforehand. Detailed data regarding the contents and dosages of the IPRP were not available.

Table 1: Unit costs used in the cost description

Professional categories/care level	PC	Specialist care
Physician visit (EUR)	223 (GP)	544 (Specialist physician)
Other caregiver visit (EUR)	95 ^a	290 (Specialist nurse)

^aPC nurse, occupational therapist, physiotherapist, psychologist, social worker. Care level was not specified in the provided data.

2.5 Cost description

A healthcare-provider perspective was used to evaluate the costs of HCU. The providers are defined as regional PC centers, and one private PC unit was also included. Based on the retrieved unit costs received from the SALAR, four different unit costs were outlined in the study: (1) specialist, (2) GP, (3) specialist nurse, and (4) other professionals (Table 1). One unit is equal to one visit. Costs from the two measurement intervals were compared in total and per caregiver category. All costs were accounted for in SEK and converted into EUR using an average exchange rate (EUR 1 = SEK 11.9171) provided by the Bank of Sweden (October 13, 2023). The time horizon of 1 year before and 1 year after terminated IPRP was estimated to be long enough to distinguish trends of change in HCU within the participant cohort.

2.6 Statistical analysis

Statistical analyses were conducted according to the per-protocol principle and carried out in IBM SPSS Statistics Version 28.0.1.0. HCU data were compared with paired *t*-tests, 1 year before and after IPRP, in SPSS. The paired *t*-test was also applied when comparing PROMs at baseline and at 1-year follow-up in SPSS. A confidence interval of 95% with a level of significance of $p < 0.05$ was applied. Effect sizes were calculated for differences in PROMs at baseline and 1-year follow-up using Cohen's *d*.

3 Results

3.1 Patient characteristics

In total, 146 patients were included in the study. In Figure 1, a flow diagram of the entire study population is displayed. There were no statistically significant differences at baseline between those who filled in questionnaires at follow-up and those who did not answer and were thereby excluded (65%). Descriptive data on the participants are

presented in Table 2. Most of the participants were women (85%), and the mean age was 44 years. The mean pain duration was approximately 9 years (median 6 years).

3.2 Health status

There were significant improvements in nearly all PROMs ($p < 0.001$) except satisfaction with vocation ($p < 0.072$), current pain intensity ($p < 0.237$), and pain intensity last week ($p < 0.052$), presented in Table 2.

3.3 HCU

HCU decreased from 4,710 to 3,961 contacts (Table 3), corresponding to a 16% ($p = 0.013$) decrease 1 year after IPRP

compared to 1 year before. The proportions of visits versus administrative items and telephone contacts remained the same (59 vs 41%) before and after IPRP. The total number of visits decreased by 15% ($p = 0.055$) and administrative items/telephone contacts by 17% ($p = 0.018$) during the year after IPRP.

All healthcare contacts during the year before and the year after IPRP are presented per profession in Table S2 (Supplementary material). Visits to physiotherapists (34%) and GPs (22%) were the most frequent during the year before IPRP. These professions also had the greatest drop in visits, 31% ($p = 0.048$) versus 23% ($p < 0.001$).

Telephone contacts and administrative items decreased 61% for physiotherapists ($p = 0.007$) and 35% for PC nurses ($p < 0.001$), while they decreased 15% for GPs ($p = 0.134$). Contrary to the drop in visits to the physiotherapists and GPs, visits to PC nurses increased by 6% ($p = 0.779$), as did visits to occupational therapists ($p = 0.818$) and psychologists/social workers ($p = 0.630$) (5 vs 10%). In total, 60% of participants reduced the number of visits by at least one visit ($n =$

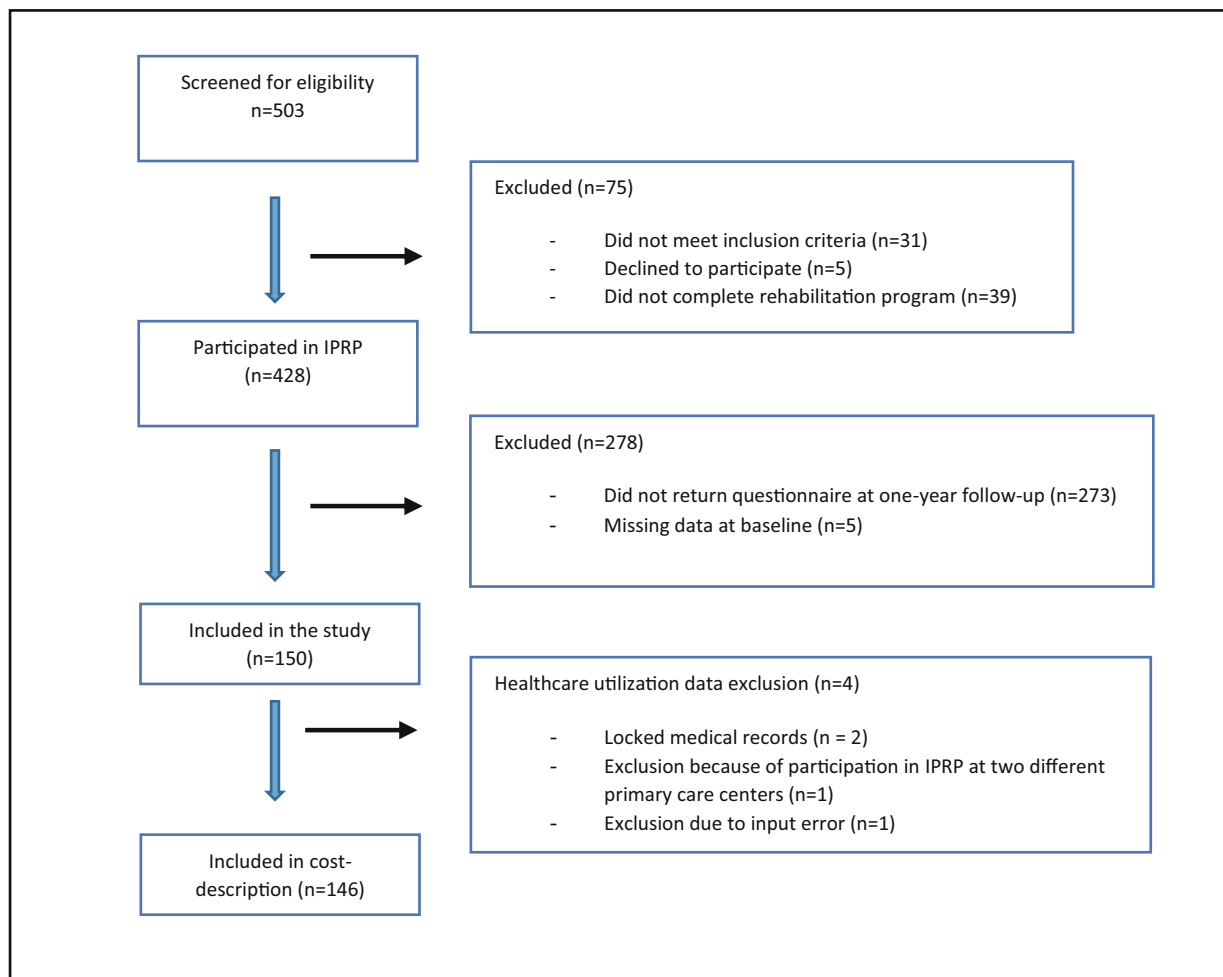


Figure 1: Study flow diagram.

Table 2: Descriptive data at baseline

Patient characteristic	All participants (n = 146)			p-value ^a	Effect size	Effect size CI 95%
	Baseline	One-year follow-up				
Women (%)	85 (58%)					
Age (n = 142)	44 (11)					
Born in Sweden	126 (86.3%)					
Education (n = 143)						
Compulsory school	27 (19%)					
Upper-secondary school	88 (61.3%)					
University/college	28 (19.7%)					
Pain duration (n = 139) (years) (median = 6.0)	9.1 (8.8)					
Pain intensity last week (n = 136)	6.5 (1.7)	6.13 (2.4)	0.052	0.168	-0.001 to 0.337	
Current pain intensity (n = 136)	6.0 (2.0)	5.7 (2.5)	0.237	0.102	-0.067 to 0.270	
Anxiety (HADS-A) (n = 142)	9.5 (4.9)	8.2 (4.9)	<0.001	0.318	0.149 to 0.486	
Depression (HADS-D) (n = 144)	6.9 (4.4)	5.7 (4.5)	<0.001	0.284	0.117 to 0.450	
Activity engagement (CPAQ) (n = 136)	28.7 (11.1)	34.1 (12.6)	<0.001	-0.475	-0.652 to -0.297	
Pain willingness (CPAQ) (n = 133)	23.2 (8.7)	26.7 (8.1)	<0.001	-0.420	-0.597 to -0.242	
Pain catastrophizing scale (PCS) (n = 137)	23.3 (10.9)	19.3 (11.7)	<0.001	0.420	0.243 to 0.591	
Disability (FRI) % (n = 140)	56.8 (16.8)	52.4 (20.6)	<0.001	0.286	0.116 to 0.454	
EQ5D Index (n = 142)	0.34 (0.32)	0.45 (0.35)	<0.001	-0.318	-0.484 to -0.149	
EQ VAS (n = 139)	47.7 (19.3)	52.5 (22.7)	<0.001	-0.203	-0.371 to -0.035	
LiSat-life (n = 135)	3.57 (1.35)	3.76 (1.34)	<0.001	-0.127	-0.296 to 0.042	
LiSat-vocation (n = 132)	2.94 (1.55)	3.23 (1.61)	0.072	-0.158	-0.328 to 0.014	
Self-reported work ability (WAI) (n = 144)	3.94 (2.75)	4.88 (2.77)	<0.001	-0.304	-0.471 to -0.139	

Please see Table 1 for explanations of the instruments. ^ap-value, paired sample *t*-test, applies for comparison of totals. CI = confidential interval. Continuous variables are reported as mean and standard deviation (SD) and categorical variables as numbers and percentages (%).

88), and 40% increased the number of visits by at least one visit (n = 52). Six patients had the same number of visits before and after.

3.4 Cost description

The distribution of costs is presented in Table 4. The cost of HCU in terms of physical visits for all participants was EUR 519,613 the year before IPRP and EUR 456,327 the year after, excluding costs for telephone contacts and administrative items. The mean annual HCU cost per patient with chronic pain amounted to EUR 3,561 (minimum EUR 233 to maximum EUR 9053) 1 year

before and EUR 3,128 (minimum EUR 0 to maximum EUR 12,424) 1 year after IPRP. The total decrease in costs was 12% (EUR 63,286) or EUR 434 per participant. The most significant costs consisted of visits to GPs (26%), specialists (37%), and physiotherapists (17%), constituting 80 vs 75% of the costs before and after IPRP. Averted visits to GPs and physiotherapists contributed to the largest percentage (93%) of the cost savings.

4 Discussion

This study aimed to evaluate the HCU of patients with chronic pain 1 year before and 1 year after an IPRP in

Table 3: An overview of healthcare contacts one year before and one year after IPRP

n = 146	Before IPRP			After IPRP			p-value ^a
	Total	Mean (SD)	Median (IQR)	Total	Mean (SD)	Median (IQR)	
All contacts	4,710	32 (26.5)	25 (31)	3,961	27 (23.9)	21 (30)	0.013
Visits	2,774	19 (14.8)	14 (16)	2,350	16 (15.1)	12 (19)	0.055
Administrative items and telephone contacts	1,936	13 (15.0)	9 (21)	1,611	11 (12.8)	6 (16)	0.018

^ap-value, paired sample *t*-test, applies for comparison of totals.

Table 4: Costs comprising physical visits across time intervals measured by caregiver category

Caregiver category	Unit cost ^a (€)	Before IPRP Total cost (€)	After IPRP Total cost (€)	Differences (€)
GP	223	133,652	102,414	-31,238 (23%)
Specialist physician	544	193,786	178,545	-15,241 (8%)
PC nurse	95	20,096	21,239	+1,143 (6%)
Specialist nurse	290	33,379	38,894	+5,515 (17%)
Physiotherapist	95	89,585	61,940	-27,645 (31%)
Occupational therapist	95	20,235	21,185	+923 (5%)
Psychologist/social worker	95	28,880	32,110	+3,230 (11%)
All caregivers in total	NA	519,613	456,327	-63,286 (12%)

(EUR 1 = SEK 11.9171). ^aper visit.

PC. It was found that HCU declined significantly at 1-year follow-up, which in turn contributed to yearly cost savings amounting to 63 345 EUR or approximately a 12% decrease, based on 146 participants who completed IPRP.

HCU declined mainly thanks to fewer visits to the GPs and physiotherapists. Similar results have been reported in previous studies [41,42]. The GPs and the physiotherapists were the most frequently consulted professions the year before as well as the year after the IPRP. Earlier research has similarly shown that patients with chronic pain most often visit GPs and/or physiotherapists in PC [16,24]. Apart from the decrease in GP and physiotherapist visits, there was a slight, but not significant, increase in visits to psychologists/social workers, PC nurses, and occupational therapists.

Comparing HCU estimates is difficult due to the heterogeneity of their context. Nevertheless, it may serve as a frame of reference for interpreting the results. In our study, the average yearly number of outpatient visits for patients with chronic pain was estimated at 14 visits, which was twice as many as in a previous Swedish study by Gustavsson *et al.* [1], who reported 7 visits per year. In another study based on self-reported HCU data by Langley *et al.* [17], which included five European countries (UK, France, Spain, Germany, and Italy), the number of outpatient visits was 16.6 visits per year. The study by Langley *et al.* [17] also found that individuals without pain had an average of 4.4 visits per year. Extending the comparison to outpatient HCU costs, the average yearly costs for a patient with chronic pain were estimated to EUR 3,128 in our study (exchange rate 2023). This is more than twice as high as the EUR 1,332 reported by Gustavsson *et al.* [1] (exchange rate 2008) and the EUR 1,407 reported in a Norwegian study by Stubhaug *et al.* [18] (exchange rate 2020). The studies are all executed in Nordic countries with similar healthcare systems, which makes it less likely that the differences are due

to differences in the healthcare system. The unit costs in our study were not inflation adjusted, which may partly explain the differences. Another explanation may be the low mean quality of life (QoL) (EQ5D index) weight 0.34 (0.32) in our cohort. The corresponding QoL weights in the study populations of Stubhaug *et al.* [18] and Langley *et al.* [17] were 0.69 (0.22) (measured with EQ5D) and 0.64 (SD not available) (measured with SF-36). Thus, the participants in these studies most likely had less severe pain and were thereby likely less prone to utilize healthcare. Pain severity and pain-related psychological impairment are associated with increased HCU [17,43].

The cost description carried out in this study did not include costs for the intervention nor indirect costs in terms of productivity loss. However, these costs have been accounted for in a cost-effectiveness analysis based on nearly the same study population as in the current study, presented elsewhere [44]. The analysis showed that IPRP may be considered cost-effective considering a commonly accepted willingness to pay threshold. Further, a 5-year extrapolation showed that IPRP gets increasingly cost-effective over time as the improvements in patient outcomes persist and the initial costs are distributed over a longer period. When comparing solely direct cost savings (EUR 434) (exchange rate 2023) to the inflation-adjusted cost for the IPRP (32 000 SEK or EUR 2700), the IPRP is a net negative investment. Hence, we need to consider not only both direct and indirect costs but also have a longer time perspective. IPRP is initially resource consuming but generates improvements in health outcomes that are generally maintained over time, which also has been shown in a recent systematic review [45].

A healthcare-provider perspective was chosen because chronic pain still has a low priority within healthcare systems, and we aimed to illustrate the impact IPRP may have on the PC center. Further, we chose to focus on resource

distribution due to the lack of resources in Swedish PC. The share of GPs in relation to other specialists and nonspecialists in Sweden (14%) is among the lowest in Europe and declining [46]. In addition, the relative share of healthcare resource allocated into Swedish PC is declining at the same time as an increasing part of healthcare responsibilities are transferred to the PC sector [47].

The implementation of IPRP in PC after the financially supported Rehabilitation Guarantee has been modest. Some PC centers succeeded in permanently reorganizing their ways of working toward a bio-psychosocial perspective, while others returned to similar routines as before. Full-scale implementation of IPRP in PC is challenging in many ways. As earlier mentioned, IPRP is initially time and resource consuming, and in addition, an implementation requires the engagement of the management level, appropriate pain education, understanding of the complexity of chronic pain among the professionals, and as our study shows, re-allocation of resources to professions may get an increased workload. Another challenge is how to further individualize IPRP balancing patient needs with potential benefits [45]. The dispersion of mean individual cost per year in our cohort ranged between minimum EUR 0 to maximum EUR 12,424. This reflects the complexity of IPRP in PC, comprising a wide range of pain severity, pain-related disability, and accompanying comorbidities among patients with chronic pain who all need healthcare to some extent.

4.1 Strengths and limitations

The strength of this study is its application of data from real-life settings and regional administrative registers. Previous HCU studies concerning chronic pain are most often based on self-reported data and are thus accompanied by the risk of recall bias. Further, HCU data are often limited to a few professionals, e.g., GPs and physiotherapists [16,24]. In our study, we included the most frequent professionals in the IPRP, which makes it possible to see its organizational impact.

This was a pragmatic clinical study, and achieving a control group was not feasible. The lack of a control group is a limitation of this study, which makes it impossible to definitely attribute the decline in HCU to the participation in the IPRP. Nevertheless, the average pain duration of the participants was 9 years, which makes it less likely that it was a natural decrease in HCU. The lack of a control group is a common challenge when evaluating real-world data [22,48]. The creation of an objection-free control group is almost impossible to attain ethically, economically, and practically [22,49].

Since the study was not initially planned to include an economic evaluation, there were limitations in the study consent and the extraction of HCU data. For example, telephone visits, which cost wise may be considered equivalent to a physical visit, were not distinguishable from reported telephone contacts, and possible telephone visits were therefore not included in the cost description. In addition, costs for medications, emergency ward visits, and hospitalizations were not available. Furthermore, due to the complexity of chronic pain conditions, this study is limited in not being able to account for comorbid illness explicitly related to chronic pain.

Unit costs were not discounted nor adjusted for inflation in the cost description, which is also a limitation. Since our aim was to compare HCU burden and distribution before and after IPRP, we focused on the percental changes over time. Another limitation is the relatively aged data used in this study. Nonetheless, chronic pain remains a prevailing societal problem, and the results would most likely be unchanged today. Finally, the results of this study should be regarded with caution due to the relatively small sample size and large drop-out, which limits their generalizability.

5 Conclusion

This study is, to our knowledge, the first to describe HCU costs and distribution specified by professionals in PC settings in Sweden. The study shows that visits to GPs and physiotherapists diminished 1 year after IPRP, freeing up resources and streamlining chronic pain management at the PC center. The study provides valuable insight into which changes in HCU of patients with chronic pain can be expected after an IPRP and how this may affect the PC center's daily activities. The results may help PC centers when planning for the introduction of IPRPs. However, there is a need for long-term and large-scale studies on IPRP in PC, which also assess the possibilities to further individualize IPRPs to achieve treatment that balances patient benefits and cost-effectiveness.

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Research ethics: The study was approved by the Regional Ethics Committee of Umeå (Ref: 2017-438-32M, supplement to 2013-192-31M). The study was performed in accordance with the principles of the Declaration of Helsinki [50].

Informed consent: A written informed consent was signed by all participants included in this study before inclusion.

Author contributions: The authors have accepted responsibility for the entire content of this manuscript and approved its submission. This study was designed by Katarina Eklund, Gunilla Stenberg, and Britt-Marie Stålnacke. The data were collected by Katarina Eklund, Britt-Marie Stålnacke, and Paul Enthoven. The data were analyzed by all authors, and the results were critically examined by all authors. Katarina Eklund had a primary role in preparing the manuscript, which was edited by all the authors. All authors approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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Artificial intelligence/Machine learning tools: Not applicable.

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