North American Spine Society Journal (NASSJ) 21 (2025) 100584

Contents lists available at ScienceDirect

North American Spine Society Journal (NASSJ)

journal homepage: www.elsevier.com/locate/xnsj

Clinical Studies

Health care utilization patterns of patients enrolled in an interdisciplinary program for back pain

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ARTICLE INFO

Keywords:
Chronic back pain
Physical therapy
Cognitive behavioral therapy
Multidisciplinary treatment
Interdisciplinary treatment
Healthcare utilization
Cost-effectiveness

ABSTRACT

Background: Chronic low back pain is a costly condition and the leading cause of disability worldwide. A recent call to action identified the overuse of low-value health care as ineffective and potentially harmful in the context of back pain. Interdisciplinary pain programs (IPPs) incorporate physical therapy and behavioral pain treatments with the goal of empowering patients to actively use skills to self-manage pain, decreasing stress, disability, and reliance on low-value care. While IPPs are deemed "cost-effective," few studies elaborate upon the patterns of healthcare utilizations among patients who complete IPPs with attention to valued-based care. The aim of this study was to describe healthcare patterns of patients participating in a interdisciplinary pain program (IPP) for chronic low back pain.

Methods: This observational cohort study describes the healthcare utilization of a group of adult patients (N=143) who participated in an IPP for chronic back pain compared to patients who did not complete the entire program (N=112), and those who were eligible for the program but chose not to participate (N=76). Patterns of healthcare utilization were evaluated in a 12-month period before and after IPP participation. Healthcare utilization categories included outpatient resources, specialist visits, imaging, pain interventional procedures, and acute care utilization. Opioid use was also extracted based on inpatient and outpatient orders, as well as days on opioids within 2 weeks following an emergency department visit or hospitalization. Utilization was defined as a health care visit in which the primary or secondary diagnosis or procedure reason was back pain related. Relative value units (RVUs) measure value used in Medicare reimbursement for physician services.

Results: Overall, healthcare utilization was not markedly different in the 12 months before and after IPP across the 3 groups (graduates, drop-outs, or no participation). However, sub-grouping analyses revealed significant reductions in opioid prescriptions, x-rays, and ED visits in the IPP group for the 12 months after the program, as well as an increased utilization of behavioral pain management.

Conclusions: Adult patients who participated in an IPP for chronic low back pain demonstrated significant reductions in utilization in opioid prescriptions, x-rays and ED visits, while also showing increased participation in active therapies such as behavioral pain management. These findings suggest that participation in a IPP could influence future value-based healthcare decisions, in turn also influencing cost.

FDA device/drug status: Not applicable.

Author disclosures: ***SD:*** Speaking and/or Teaching Arrangements: Empowered Relief Faculty/Certifiation Workshop; Stanford Unviersity (B). ***BL:*** Nothing to disclose. ***BU:*** Nothing to disclose. ***SR:*** Nothing to disclose. ***NRT:*** Nothing to disclose. ***RY:*** Nothing to disclose. ***AM:*** Stock Ownership: Enspire (4%), Ceraxis (3%); Consulting: Abbott (B); Scientific Advisory Board/Other Office: Enspire (4%), Ceraxis (3%); Research Support (Investigator Salary, Staff/Materials)^: NIH (None); Grants: NIH (None). ***ILK:*** Scientific Advisory Board/Other Office: CSL Behring (member of IDMC of treatment for dermatomyositis) (B), Scientific Advisory Board/Other Office: ICON Clinical Research (member of DSMB of atrial shunt device trial) (B).

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https://doi.org/10.1016/j.xnsj.2025.100584
Received 22 September 2024; Received in revised form 26 December 2024; Accepted 11 January 2025
Available online 14 January 2025

Introduction

Back pain is the most common pain complaint globally [1]. While most spine pain is self-limiting, a subset of patients will develop chronic pain and have limited response to specialty treatments, including medications, surgeries, and injections. Of the 30% of individuals who have chronic pain [2], 8% have high-impact chronic pain [3], characterized by significant restriction in daily activities and related suffering. Societal and individual costs of high impact chronic pain are staggering. The economic burden of chronic low back pain in the United States is estimated between $84.1 billion to $624.8 billion, with primary indirect costs attributable to lost work productivity [4].

Value-based care refers to a consideration of patient outcomes from a given treatment relative to costs [5]. When pain is refractory to treatments such as surgeries, and injections, further utilization of these services can unintentionally contribute to a patient's sense of suffering and helplessness. In these circumstances, certain pain treatment may not contribute value to the patients' overall well-being. A recent call to action proposed steps to decrease the global burden of low back pain included developing new clinical pathways focused on prevention, teaching self-management of the condition, and assisting patients to focus on managing the impact of the condition as opposed to focusing on a "cure [6]."

Especially in the case of high-impact pain, interdisciplinary pain programs (IPPs) are often recommended as the most cost-effective and high-value approach, with therapeutic and cost-reducing benefits such return to work and decreased disability. Prior work by our group demonstrated significant improvement in physical function, fatigue, and quality of life after completing a IPP for individuals with spine pain [7], however did not elucidate long term impact on relevant outcomes such as healthcare utilization. While there have been several studies that demonstrate reductions in opioid use, pain clinic visits, pain related hospitalizations and surgeries post IPP [8], there are no studies to our knowledge that provide descriptive information on healthcare patterns in patients with chronic pain before and after IPP treatment within the context of value-based care. This paper addresses these gaps in the literature. We describe healthcare utilization patterns in the year prior to and the year following participation in an IPP and explore how treatment choices fit within a value-based care framework.

Objectives

The primary objective was to describe patterns of healthcare utilization in the year before, during, and the year following completion of an IPP for low back pain. The secondary objectives were to compare healthcare utilization during the periods before and after the IPP intervention in patients who completed an IPP to those who were eligible and enrolled but either did not participate or dropped out prior to completion.

Materials and methods

Study design

This was a retrospective observational study, approved by the Cleveland Clinic Institutional Review Board. Because the study involved analyzing preexisting data, the requirement for patient-informed consent was waived.

IPP program description

The IPP started in August 2016 and is a 3-month program designed to help patients with chronic low back pain. The "interdisciplinary" program involved regular coordinated treatment planning between the primary disciplines of physical therapy, behavioral and spine medicine.

Patients eligible for the program were those with medium or high risk for prolonged disability from back pain as measured by the Keele STart Back Screening Tool [9], 18 years and older, ≥3 months of back pain, and willing to commit to a 3-month pain program. Patients identified as low risk by the STarT Back Screening Tool were enrolled if a clinical need was identified. Exclusion criteria included severe psychiatric instability, severe addictive disorder, and current active workman's compensation claim pending adjudication. The IPP consisted of weekly behavioral pain group sessions grounded in cognitive behavioral therapy for pain. Participants also participated in group and individual physical therapies for chronic pain ~2 times per week during the 3-month program. Behavioral therapists and physical therapists were the primary providers, with coordination of care with spine medicine providers as needed. Participants were not required to taper opioids or cease marijuana use during the program; however, education was provided on these topics to assist patients in making informed decisions about their self-care. Upon completion of the IPP, behavioral pain providers provided follow-up care recommendations, which encouraged the use of psychology "booster" sessions to reinforce learned coping strategies.

Our study included participants if they had an initial evaluation and agreed to participate in the program between August 2016 and December 2018. Participants were excluded from our study if they did not have a primary care provider (PCP) in the health system, with the thought that these patients were unlikely to receive all their care at the clinic and had incomplete healthcare utilization information in the electronic health record (EHR).

Healthcare utilization data

Demographics and healthcare utilization were extracted from the EHR one year before the IPP enrollment date and one year after the IPP graduation date. For those eligible, healthcare utilization was pulled from the year prior to the determination of IPP eligibility through one year following that date. Healthcare utilization categories included outpatient resources (primary care appointments, urgent care visits), specialist visits (physical therapy, behavioral health, medical specialist, neurologist, pain clinic, spine, and surgery specialist), imaging (MRI, CT, x-ray), procedures (injection, surgery) and acute care utilization (emergency department, hospitalization). Opioid use was also extracted based on inpatient and outpatient orders, as well as days on opioids within 2 weeks following an emergency department visit or hospitalization.

Utilization was defined as a health care visit in which the primary or secondary diagnosis or procedure reason was back pain related.

Relative value units (RVUs) measure value used in Medicare reimbursement for physician services [10]. Based on CPT codes, visit types, and calendar year, RVUs were estimated using the CMS online calculator [11] by utilization category and summed across time periods per patient (Supplemental Table 1).

Statistical analyses

Demographics and utilization were compared across IPP participation groups (graduates, drop-outs, or no participation) using the chi-square test for categorical variables and ANOVA for continuous variables. Utilization was expressed as the number of visits or procedures per 100 patients. For patients who graduated from the program, utilization was compared across time (prior year, during IPP, and year following IPP) using mixed effects regression models. Utilization was additionally compared across participation groups using ANOVA with Tukey's posthoc test. The change in utilization from the year before IPP versus the year following IPP was compared within participation group using a paired t-test. Statistical significance was set at $p<.05$, and all analyses were conducted using R version 4.3.1 [12].

Results

530 patients had an initial evaluation and agreed to participate in IPP in the study window, and 331 (62.5%) had a primary care provider in

Table 1
Patient characteristics overall and by group.

	All patients *n*=331	IPP graduates, *n*=143	IPP drop-outs, *n*=112	IPP No participation, *n*=76	p-value
Age, mean (SD)	50.7 (12.4)	53.1 (11.9)	49.6 (11.8)	47.7 (13.6)	.005
Female	228 (68.9%)	94 (65.7%)	83 (74.1%)	51 (67.1%)	.33
Race					
White	145 (43.8%)	70 (49.0%)	40 (35.7%)	35 (46.1%)	.20
Black	91 (27.5%)	41 (28.7%)	30 (26.8%)	20 (26.3%)	
Other	93 (28.1%)	31 (21.7%)	41 (36.6%)	21 (27.6%)	
Missing	2 (0.6%)	1 (0.7%)	1 (0.9%)	0 (0.0%)	
Marital status					
Married	133 (40.2%)	69 (48.3%)	36 (32.1%)	28 (36.8%)	.24
Single	148 (44.7%)	56 (39.2%)	58 (51.8%)	34 (44.7%)	
Divorced	35 (10.6%)	13 (9.1%)	13 (11.6%)	9 (11.8%)	
Widowed	14 (4.2%)	4 (2.8%)	5 (4.5%)	5 (6.6%)	
Missing	1 (0.3%)	1 (0.7%)	0 (0.0%)	0 (0.0%)	
Primary language					
English	294 (88.8%)	129 (90.2%)	96 (85.7%)	69 (90.8%)	.69
Spanish	35 (10.6%)	13 (9.1%)	15 (13.4%)	7 (9.2%)	
Somali	1 (0.3%)	0 (0.0%)	1 (0.9%)	0 (0.0%)	
Missing	1 (0.3%)	1 (0.7%)	0 (0.0%)	0 (0.0%)	
Median income by ZIP code (x $1,000), mean (SD)	44.7 (19.0)	46.2 (19.6)	43.5 (19.2)	43.9 (17.7)	.49

p-values were based on one-way analysis of variance (ANOVA) for continuous variables and chi-square test for categorical variables.

Table 2
Healthcare utilization prior to, during, and following IPP in patients who graduated (N = 143).

Utilization per 100 Patients	Prior Year	During IPP	Following Year	p-value
Outpatient resources				
Primary care appointments	83.22	30.07	65.03	<.001
Express care visits	2.10	0.70	0.00	.64
Specialist visits				
Physical therapy	293.71	1729.37	195.10	<.001
Behavioral health	13.29	1059.44	83.92	<.001
Medical specialist	14.69	9.09	15.38	.30
Neurologist	89.51	9.09	3.50	<.001
Pain clinic	54.55	15.38	75.52	<.001
Spine	92.31	38.46	81.82	<.001
Surgery specialist	13.29	7.69	12.59	.37
Imaging				
MRI	32.87	18.88	20.28	.059
CT	9.09	3.50	6.99	.074
X-ray	62.94	16.78	44.06	<.001
Procedures				
Injection	37.76	14.69	41.26	.059
Surgery	2.10	0.00	2.80	.69
Acute care utilization				
Emergency department visits	32.87	2.80	13.29	<.001
Any hospitalization	23.08	11.89	25.87	.15
Planned hospitalization	11.89	9.79	20.28	.11
RVU, mean (SD)	20.3 (19.6)	22.7 (12.5)	14.8 (19.5)	<.001
Opioid data				
Inpatient order, N (%)	43 (30.1%)	-	35 (24.5%)	.25
Outpatient order, N (%)	71 (49.7%)	-	58 (40.6%)	.061
Days on opioids from ED visit to 14 days after, mean (SD)	0.45 (1.21)	-	0.37 (1.10)	.40
Days on opioids from inpatient admission to 14 days after, mean (SD)	0.35 (1.58)	-	0.48 (2.09)	.49

Except for the RVU and opioid rows, results are expressed as number of visits, procedures, etc. per 100 patients. P-values for outpatient resources, specialist visits, imaging, procedures, acute care utilization, and RVU were based on mixed effects linear regression models. p-values for inpatient and outpatient opioid orders were based on mixed effects logistic regression. p-values for days on opioids from ED visit and admission to 14 days after were based on paired t-test.

the health system and were included in our study. Of these, 143 (43.2%) graduated from IPP, 112 (33.8%) participated in at least one appointment, and 76 (23.0%) did not participate after the initial evaluation. Patients who graduated from IPP were older than those who dropped out or did not participate (mean (SD) age: 53.1 (11.9) vs 49.6 (11.8) and 47.7 (13.6), respectively) (Table 1). Overall, the patients initially enrolled in IPP were 68.9% female, 43.8% White race, and 40.2% married, which did not differ significantly by participation in IPP.

For patients who graduated from IPP, Table 2 presents the healthcare utilization in the year before, during IPP, and year following IPP (n=143). Utilization is expressed as the number per 100 patients. Compared to the other periods, the year before IPP had significantly more healthcare utilization for PCP appointments (83.2/100), neurology visits (89.5/100), spine visits (92.3/100), X-rays (62.9/100), and emergency department visits (32.9/100). Physical therapy and behavioral health appointments were the highest during IPP, as expected as these disciplines are the cornerstones of interdisciplinary pain care. As demonstrated in Table 2, the trend in utilizing PT and behavioral health increased significantly during the IPP and decreased significantly thereafter although these disciplines continued to be utilized for the

Table 3
Healthcare utilization in patients by attendance in IPP.

Utilization per 100 Patients	IPP Graduates, *n*=143			IPP Drop-Outs, *n*=112			IPP No Participation, *n*=76		
	Pre-IPP	Post-IPP	p-value	Pre-IPP	Post-IPP	p-value	Pre-IPP	Post-IPP	p-value
Outpatient resources									
Primary care appointments	83.22	65.03	.066	106.2	71.43	.006	101.3	80.26	.017
Express care visits	2.10	0	.15	11.61	0.89	.005	0	0	-
Specialist Visits									
Physical therapy	293.7	195.1	.029	244.6	146.43	.004	123.7	127.63	.79
Behavioral health	13.29	83.92	<.001	11.61	8.04	.99	1.32	7.89	.12
Medical specialist	14.69	15.38	.61	7.14	9.82	.68	5.26	1.32	.23
Neurologist	89.51	3.50	<.001	87.5	3.57	<.001	93.42	13.16	<.001
Pain clinic	54.55	75.52	.82	58.93	36.61	.28	76.32	76.32	.95
Spine	92.31	81.82	.20	100.9	64.29	.005	92.11	39.47	.006
Surgery specialist	13.29	12.59	.99	10.71	10.71	.85	11.84	13.16	.88
Imaging									
MRI	32.87	20.28	.11	25.00	19.64	.41	28.95	21.05	.36
CT	9.09	6.99	.49	5.36	2.68	.35	3.95	1.32	.35
X-ray	62.94	44.06	.047	74.11	50.00	.043	51.32	47.37	.73
Procedures									
Injection	37.76	41.26	.64	46.43	63.39	.15	28.95	17.11	.26
Surgery	2.10	2.80	.82	0	5.36	.020	0	1.32	.99
Acute care utilization									
Emergency department visits	32.87	13.29	.001	42.86	19.64	.003	55.26	25.00	.006
Any hospitalization	23.08	25.87	.65	20.54	46.43	.023	30.26	21.05	.38
Planned hospitalization	11.89	20.28	.23	16.96	41.07	.018	7.89	9.21	.76

p-values were based on paired t-test.

long-term management of pain care (PT Pre: 293.71/100, During IPP 1729.37/100, Post IPP: 195.1/100; Behavioral Health: Pre: 13.24/100, During IPP 1059/100, Post IPP 83.92/100). In the year following IPP, there were significant reductions in neurology visits, X-rays, and emergency department visits and a nonsignificant decrease in PCP appointments, express care visits, spine appointments, and MRI/CT. Compared to the year before IPP, there were also slight but nonsignificant increases in pain clinic visits and procedures in the year following IPP. RVUs significantly changed over the course of IPP, starting at 20.3 for the year prior, increasing slightly to 22.7 during IPP, and decreasing to 14.8 in the year following IPP. More patients were prescribed opioids while inpatients and outpatients in the year prior to IPP compared to the following year, although the differences were not statistically significant (inpatient: 30.1% vs. 24.5%, $p = 0.25$; outpatient: 49.7% vs. 40.6%, p=.06).

When comparing utilization between IPP participation groups, Table 3 presents healthcare utilization in the year before and following IPP. While there were significant reductions in physical therapy, neurology visits, X-rays, and emergency department visits in patients who graduated, significant reductions were also demonstrated in 7 categories for IPP drop-outs and 4 categories for patients who did not participate. Specifically, the IPP drop-outs showed significant decreases in PCP appointments, specialist visits (neurology and spine), x-rays, physical therapy, ED visits and planned hospitalizations. The no participation group showed significant decreases in PCP appointments, specialist visits (neurology and spine) and ED visits. Compared to the IPP completers and drop-out group, the no participation group showed minimal change in PT visits and minimal change in x-rays. Additionally, while the IPP completers showed remarkable increases in pain related behavioral therapies, the drop-out and no participation groups showed minimal and nonsignificant change.

RVUs decreased significantly within all 3 participation groups from prior to following IPP (Table 4), however there were no differences in RVUs across the 3 groups. IPP inpatient and outpatient opioid prescriptions decreased from the year before the year following IPP in IPP graduates and IPP drop-outs (Table 5). At the same time, rates were stable or increased in those who did not participate in IPP. In the year following IPP, IPP graduates had the lowest amount of outpatient opioid orders, compared to IPP drop-outs and those who did not participate (40.6% vs 50.0% and 57.9%, respectively, p=.042)

Table 4
Healthcare utilization in patients by attendance in IPP.

RVUs	IPP graduates, *n*=143	IPP drop-outs, *n*=112	IPP no participation, *n*=76	p-value
Prior 12-month RVUs, mean (SD)	20.3 (19.6)	20.0 (17.9)	17.6 (16.7)	.45
Post 12-month RVUs, mean (SD)	14.8 (19.5)	14.6 (20.5)	11.9 (19.2)	.39

p-values were based on one-way analysis of variance (ANOVA). All within-group p-values for change from pre-IPP to post-IPP significant at p<.001 and were based on paired t-test.

Discussion

Interdisciplinary pain programs (IPPs) are well known to be the most cost-effective approach for chronic pain, and there is an abundance of evidence supporting their effectiveness [13]. Despite this knowledge there is a scarcity of investigations on the relation between IPP participation and healthcare utilization patterns. Our study demonstrated that individuals who completed an IPP showed significant reductions in several key areas that are considered “low-value care” for chronic pain, including x-rays, emergency room visits, and specialty visits in the areas of spine and neurology. While not statistically significant, there was also less MRI and CT scans in those completing IPP in the year following treatment. The statistically significant increases in pain related behavioral health visits in the year following IPP, likely representing a healthy utilization of high-value care to reinforce self-management of pain and healthy coping skills. There was a statistically significant increase in pain clinic visits in IPP completers in the year following treatment. It is important to note that visits with pain clinic providers do not necessarily equate to delivery of pain interventional procedures, especially considering the finding that there were not significant changes in injections in this group. Also of interest is the finding that more patients were prescribed opioids as outpatients in the year before IPP compared to the year after treatment. However, it did not reach statistical significance (49.7% vs 40.6%, p=.061). Inherent in the goal of IPP treatment is to teach the patient self-management skills for their chronic pain condition, in turn, to reduce reliance upon the healthcare system in a way that may foster their disability. IPPs may work to assist patients in choosing high-

Table 5
Opioid utilization in patients by attendance in IPP.

Opioids	IPP graduates, *n*=143	IPP drop-outs, *n*=112	IPP no participation, *n*=76	p-value
Prior 12 month: inpatient order, N (%)	43 (30.1%)	39 (34.8%)	29 (38.2%)	.45
Post 12 month: inpatient order, N (%)	35 (24.5%)	28 (25.0%)	29 (38.2%)	.071
Prior 12 month: outpatient order, N (%)	71 (49.7%)	67 (59.8%)	38 (50.0%)	.22
Post 12 month: outpatient order, N (%)	58 (40.6%)	56 (50.0%)	44 (57.9%)	.042
Prior 12 month: days on opioids from ED visit to 14 days after, mean (SD)	0.45 (1.21)	0.57 (1.40)	0.75 (1.83)	.53
Post 12 month: days on opioids from ED visit to 14 days after, mean (SD)	0.37 (1.10)	0.43 (1.74)	0.86 (2.87)	.13
Prior 12 month: days on opioids from inpatient admission to 14 days after, mean (SD)	0.35 (1.58)	0.31 (1.32)	0.46 (1.44)	.46
Post 12 month: days on opioids from inpatient admission to 14 days after, mean (SD)	0.48 (2.09)	0.47 (1.93)	0.54 (2.97)	.83

p-values were based on chi-square test for categorical variables and one-way analysis of variance (ANOVA) for continuous variables. Within-group p-values for opioid variables for IPP graduates are shown in Table 2. For the "IPP drop-outs" group, there was significant change pre-IPP to post-IPP for inpatient order opioid (p<.001) but all other variables were not statistically significant (all p>.05). For the "No IPP Participation" group, none of the opioid variables had significant within-group change (all p>.05).

value care for their condition, including advocating for themselves, and establishing a useful and trusting relationship with medical providers. Certainly, exclusion of any pain related medical providers post IPP is unrealistic as many individuals with chronic pain may experience periods of acute pain flares or relapse in which medical reassurance and evaluation can be useful and necessary.

An understudied yet important question relates to the broader pattern of healthcare utilization in patients who do and do not participate in IPPs. Our study addresses this gap by highlighting several important trends in healthcare participation in patients who completed and did not complete an IPP. Participants who either did not participate or dropped out of the IPP had less utilization in a handful of common categories, including primary care, specialist visits (neurology and spine), and ED visits. This could suggest these patients may be seeking less care in the healthcare system overall and therefore be less engaged in all treatments. Interestingly, the no participation group was the only group that did not show a decrease in x-rays and physical therapy visits. This finding may suggest that the no participation group was continuing to seek out care with little value. While physical therapy is generally considered a high-value pain treatment, successful treatment is categorized by short-term increases in therapy that provide benefit and then do not require ongoing care. That is – patients learn to use the skills they obtained in physical therapy to adapt to a home exercise program. It is possible that the no participation group continued to engage in physical therapy without added value; like the analogy of continued imaging/x-rays with little new knowledge gained. Certainly, categorization of patients who drop out of treatment or decline to engage in treatment is imperative yet greatly limited when patients disengage from treatments; thus, follow up in the healthcare system may be difficult to ascertain.

We do know from prior work in our IPP sample that drop-out is a significant barrier and can be as high as 60% of patients [14]. Ideally, identification of these factors prior to IPP participation could work to lessen likelihood of drop-out. Several prior factors that were identified as predictors of drop-out in the IPP from prior investigations were: high level of pain related fear and helplessness, mood, anxiety and substance use disorders, younger age and lower SES. Of note, marijuana use during the IPP was also a strong predictor of drop-out (p=.0001); while opioid use during the program was not a predictor of drop out [14]. In the present study, in the year following IPP, IPP graduates had the lowest amount of outpatient opioid orders, compared to IPP drop-outs and those who did not participate (40.6% vs 50.0% and 57.9%, respectively, p=.042). These findings are also consistent with a prior observational retrospective study from our group (*N*=362) that demonstrated that even without a forced opioid taper up to 33% of IPP participants stopped opioids voluntarily during the IPP. This study also showed that opioid resumption was more likely in patients that withdrew from the IPP [15]. Taken together, this suggests that patients who have completed IPP may be successfully using active pain self-management strategies and avoiding the well-documented harms of chronic opioid therapy (COT). It is important to note that our IPP did not actively reduce or force opioid tapering or require cessation of other substance such as marijuana, but rather took an indirect approach by providing education to participants on the risks of COT or other substance use, while arming patients with other active pain-coping strategies.

Multiple national healthcare agencies have emphasized the need for a cultural shift and transformation in pain care [16,17]. Soaring healthcare costs, the opioid epidemic, and the marked rise in new cases of chronic pain all support the imperative need to change the model of pain care globally. One possible informant of a new model of care uses the concept of value-based care.

The American College of Physicians (ACP) sees high-value care as efforts that "improve health, avoid harms, and eliminate wasteful practices" and directly identifies routine imaging for low back pain as an example of low-value healthcare [18]. The International Association for the Study of Pain (IASP) identifies the overuse of diagnostic imaging, opioids, spinal injections, and surgery to be of low value in pain care [19]. Others specify high-value care examples, including education, addressing unhelpful beliefs, providing reassurance, reducing distress, graded functional activities, supporting return to work, behavioral therapy, and nutritional support [20]. Despite these calls to action, changing the culture of pain care has been challenging. A 2015 report suggested that rates of imaging and low-value services remained high [21]. A follow-up analysis in 2019 reviewed administrative claims of patients with low back pain over a 9-year period and found meaningful reductions in low-value services as defined by the IASP (surgery, opioids, imaging) [22]. In our study, participation in an IPP resulted in a reduction in opioid use and imaging, with a significant reduction in x-rays.

Comparative effectiveness research is one avenue to support the determination of high-value care when comparing different therapies specifically referenced by the ACP. A previous comparative effectiveness trial performed by our team comparing our IPP to physical therapy alone in chronic low back pain patients demonstrated significantly greater improvements in functioning and quality of life for individuals who completed the IPP, compared to similar patients utilizing PT alone – thus suggesting that IPP is a high-value treatment option for individuals with chronic low back pain [7]. Despite these findings, which are consistent with the literature on IPP effectiveness in general, access and engagement in high-value pain care is limited, nonadherence/drop-out is high and the biomedical model of pain treatment continues to dominate [23,24].

Findings from our study suggest that participation in a IPP could influence future healthcare decisions, specifically engagement in high versus low-value care, in turn also influencing cost. Participants in our IPP did have fewer opioid prescriptions, imaging and specialty visits up to a year after treatment. IPP participants did engage more readily in high value care such as behavioral health visits which are considered low cost, high value treatments for chronic pain. An important consider-

ation is that access and participation in an IPP are limited nationally and may be best utilized when created within a systems-level framework.

Patients who were referred to our IPP were stratified by risk screening (Keele Back Start) and referred into the program by front-line physical therapists and back pain physicians associated with the program. This model of care is like one proposed by Mardian and colleagues [25] with the specific goal of driving participation in high-value care. The primary elements of the program include: 1) PCPs trained in chronic pain as the initial entry point for patients with chronic pain into the healthcare system; 2) a whole-person care plan with pain psychologists as primary drivers of high-value care; 3) patients are referred to pain interventional treatments only if determined to be appropriate by evidence-based guidelines and a high-value treatment option; 4) passive therapies, which rely on the physician/surgeon as the driver of care, are deemphasized over active therapies (such as psychology and movement) which empower the patient to self-manage pain. The authors propose that this model may be used to increase high-value care.

Our study points to the possible benefit of using high and low-value care models to analyze further health care trends in patients with chronic refractory pain. While this is a promising area, there is still no clear consensus in the literature on what defines "high" and "low" value, and significant challenges exist in doing so given the complexity and changing nature of a chronic pain condition. The idea of dichotomizing all care into high- and low-value makes sense conceptually. Still, it can be difficult in real-world care of patients with chronic pain: relapses happen, new pain issues arise, and sometimes it is appropriate for patients to seek more specialty treatment. Development of a more comprehensive categorization of high vs low-value care for patients with chronic back pain and how different clinical scenarios may affect these categorizations are needed.

Although IPPs are considered the "gold standard" in chronic pain treatment, many opportunities exist to understand how these programs shape longer-term health care utilization and decisions. For example, in our study, there was a high number of dropouts in patients who chose to participate in the IPP as well as those who declined altogether. This reinforces the need for more checks and balances to ensure participants stay on track and a comprehensive evaluation to determine a patient's readiness to participate in an IPP. Consideration of alternative ways to engage patients in pain psychology may be needed before the IPP, such as introductory psychoeducation on chronic pain or self-management skills training. There is evidence that such interventions are effective [26], although it is unknown how the timing of these introductory psychoeducation groups facilitates engagement with more comprehensive programming.

Findings from this study reinforce the need for broader strategies to drive changes in pain care and may inform the development of models in other healthcare systems. Possible future directions include 1) development of targeted education for patients on the appropriate use of healthcare when they have a chronic pain condition; 2) further application and testing of models that use a chronic pain-trained PCP so that patients have an appropriate healthcare "quarterback" when symptoms worsen, and 3) longer-term (>12 months) clinical and research follow up on patients post-IPP treatment.

Study strengths and limitations

Our study has many strengths, including historical and follow-up utilization data on 331 patients eligible for an IPP, an RVU comparison to standardize comparison of utilization, a representative sample of patients enrolled in an IPP at a large healthcare system, and 2 comparison groups for patients who either did not start or did not complete an IPP.

There are a few limitations that should be noted, most of which are inherent in the challenges of pragmatic studies initiated in real-world clinical systems. First, it is difficult to attribute our findings fully to participation in the IPP. There could be other factors influencing patients' healthcare decisions before, during, and after treatment, which we could not account for in this study, and that applies as well to the IPP drop out and no participation groups. Healthcare utilization for back pain was limited to the categories presented, which may not represent all utilization. These challenges are inherent in pragmatic studies of pain care. Costs were not calculated independently or based on RVUs, as any calculated estimates would be rough approximations. This manuscript focuses on high versus low-value care. Costs, like utilization, would need to be classified as 'value adding' versus 'value subtracting' to be relevant to the study aims. Lastly, patients could have received healthcare outside our health system, which this analysis would not capture. However, our sample was limited to those with a PCP in the health system to account for this this potential limitation.

In conclusion, our study of 331 patients with chronic low back pain enrolled in an IPP found a reduction in low-value care, such as imaging and opioids, and increases in high-value care, such as behavior health and pain clinic visits, in the year before the year following enrollment. This study extends upon the national imperative to explore factors that drive treatment decisions from a broad systems-level perspective. Future work is necessary to inform strategies to drive improvements in pain care.

Declaration of competing interest

One or more of the authors declare financial or professional relationships on ICMJE-TSJ disclosure forms.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.xnsj.2025.100584.

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