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FACILITATING UNEQUIVOCAL AND DURABLE DECISIONS IN WORKERS' COMPENSATION PATIENTS ELIGIBLE FOR ELECTIVE ORTHOPEDIC SURGERY

Emily Brede, Ph.D., RN*, Tom G. Mayer, M.D.** , Margareta Shea, RN, MS, FNP*, Cristina Garcia, RMA*, and Robert J. Gatchel, Ph.D., ABPP***

*PRIDE Research Foundation, Dallas, TX

**Department of Orthopedic Surgery, University of Texas Southwestern Medical Center at Dallas, Dallas, TX

***Department of Psychology, College of Science, University of Texas at Arlington, Arlington, TX

Abstract

Timely intervention and recovery is beneficial to patients with chronic disabling occupational musculoskeletal disorders (CDOMD). Therefore a Surgical Option Process (SOP) was developed for use in a functional restoration program (FRP) to allow CDOMD patients who were undecided about elective orthopedic surgery to participate in interdisciplinary rehabilitation, rather than suspending treatment, until the surgical option could be resolved. A consecutive cohort of 295 CDOMD patients with an unresolved surgical option was admitted to a FRP, and determined their surgical preference at FRP midpoint. The majority of patients declined surgery (DS, N=164) and were invited to complete the FRP. The remainder elected to pursue surgery and either underwent surgery (US, N=43) or had their surgical request denied (RSD, N=38). In the post-FRP year, only 0.8% of patients reversed their original decision and underwent surgery. Patients whose surgical preferences were accommodated (i.e., the DS/US groups) demonstrated significant psychosocial improvement and excellent socioeconomic outcomes; which were similar to those of FRP patients without a surgical option. RSD patients had poorer outcomes than the other groups, but still outperformed FRP dropouts. This suggests that the addition of a formal SOP to an interdisciplinary FRP facilitated the surgical decision-making process and helped prevent delayed recovery.

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Corresponding Author: Tom G. Mayer, M.D., 5701 Maple Ave. #100, Dallas, TX 75235, Phone: (214) 351-6600, Fax: (214) 351-3026, tgmaye@pridedallas.com.

DISCLOSURES

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Keywords

surgical option; functional restoration; workers' compensation; chronic disabling occupational musculoskeletal disorders; orthopedic surgery

INTRODUCTION

In patients with chronic disabling occupational musculoskeletal disorders (CDOMD), an important treatment goal within Workers' Compensation (WC) systems is to avoid delayed recovery. Delayed recovery may contribute to physical deconditioning as a result of prolonged inactivity,^{25–27,30, 31, 38} and longer delays in recovery are associated with poorer functional and socioeconomic outcomes in CDOMD patients.^{22,39} Delayed recovery in the WC system may be the result of factors such as difficulty accessing treatment or delays in pre-authorization. However, in CDOMD patients who have been offered elective surgery, surgical uncertainty on the part of the patient or indecision due to disagreements among providers and/or insurance carrier utilization review teams can be important factors delaying recovery.

Participation in WC systems is specific to the work-related injury, and the primary system goal is care coordination to facilitate timely resolution of the injury and related disability, known as Maximum Medical Improvement (MMI). Then, financial compensation is determined and the patient exits the WC system. However, in the case of surgical uncertainty, other forms of medical care are frequently suspended, pending resolution of the surgical decision. This delay may allow additional physical deterioration to occur, impeding the patient's successful treatment response and ability to return to work.^{16,22,24,39} Further complicating matters, surgical requests may be partially motivated by secondary gain because a WC claim surgical procedure can lead to higher payments for permanent partial impairment/disability. Thus, conflicting financial motives pit patients against insurance carriers, creating incentives to pursue surgery or resist its approval, respectively.

Most patients with work-related injuries can be successfully treated in primary and secondary care (with medications and/or exercise, etc.). Other patients have injuries that unquestionably require surgery. However, some patients with ambiguous surgical indications will fail to reach MMI within 4–6 months after injury, progressing into chronic disability. Some of these patients may become candidates for elective surgical procedures when nonoperative care has failed to resolve pain and functional deficits. For these CDOMD patients, already experiencing delayed recovery, indecision about undergoing elective surgery, and lengthy pre-authorization disputes can be particularly damaging. Multiple studies have found that a longer time between injury and surgery is related to poorer treatment outcomes, such as less return to work, more permanent disability, and higher rates of opioid use, particularly in lumbar fusion or carpal tunnel release.^{9–11,23,33}

To prevent treatment delays and to promote earlier recovery in WC patients with CDOMD, a surgical option process (SOP) was developed and implemented.⁵ The goal of this SOP was to allow patients with an unresolved surgical option to enter a structured, intensive rehabilitation program and make a surgical decision based on the response to rehabilitation.

The SOP pilot study was conducted at a functional restoration program (FRP) that has been extensively discussed in the literature.^{19,25,27,28,30,40} After completing half the recommended FRP, the patient made a final surgical determination. Most patients chose not to pursue surgery at FRP midpoint and opted to complete the FRP. These patients demonstrated substantial benefits in resolving disability. However, the pilot study was quite small (N=44). Therefore, the purpose of the present study was to validate the pilot study over a longer period of time, by examining the effect of SOP participation on treatment outcomes, relative to a matched comparison group lacking a surgical option. We also wanted to examine the effect of SOP decisions on patient-reported outcomes, and the responsiveness of those outcomes to the combined SOP/FRP. Our hypothesis was that patients who declined or underwent surgery as a part of the SOP would have outcomes similar to the comparison group, but that patients whose surgical requests were denied would have poorer outcomes.

MATERIALS AND METHODS

Participants: Surgical Option Process

The current prospective cohort study identified 295 consecutive patients with an elective orthopedic surgical option, who were admitted to an interdisciplinary regional referral center providing a functional restoration program (FRP) between January 2004 and May 2011. This facility has been awarded a Center of Clinical Excellence designation by the American Pain Society, and its published outcomes are included in the major national treatment guidelines applied to WC claims for CDOMD patients.^{6, 12, 18} All patients were referred by treating providers for rehabilitation of CDOMDs under WC insurance and consented to participate. The SOP was part of the standard FRP care, and all patients with an elective surgical opportunity were offered participation in this program as a component of their care. The study was granted an exemption from review by the Institutional Review Board, as data was collected from standard medical records. Inclusion criteria were as follows: (1) total or partial disability of at least four months, (2) failure of prior non-operative and surgical care to resolve disability, (3) persistent severe pain with functional limitations, (4) unresolved surgical option (study group only), and (5) able to communicate in English or Spanish. An unresolved surgical option was defined in four ways: (1) surgery was requested by the surgeon but denied by the insurance carrier, (2) the patient was undecided about the surgical option presented by the surgeon, (3) surgery was presented to the patient as a treatment option by one or more surgeons, but patient/surgeon shared decision-making was ambivalent on benefits vs. risks, and (4) the treating surgeon's authorization request was withdrawn due to disagreement with a second opinion or utilization review surgeon (see Table 1).

Participants: Non-Surgical Option Comparison Group

During the study period, there were 1758 additional patients admitted to the FRP without an unresolved surgical option, from which a comparison group was selected (COMP, $n=272$). Although these patients may have had surgery prior to FRP admission, additional surgery was no longer an option. Patients with prior surgery were included in the comparison group because roughly half of the patients with an unresolved surgical option had also undergone surgery prior to participation in the SOP. We believed that excluding all patients with pre-

rehabilitation surgery would decrease the validity of the comparison group. Figure 1 illustrates the exclusion factors (FRP non-starters or drop-outs prior to the surgical decision meeting, N=50) that led to the final SOP cohort (N=245).

The comparison group was matched to the SOP group for year of discharge to avoid cohort effects, as there were significant economic changes during the study period that may have changed the overall likelihood of certain socioeconomic outcomes, such as return to work. For each discharge year, a percentage of non-SOP patients, comparable to the total SOP cohort, was randomly selected from the full non-SOP cohort. There were no significant differences between the total SOP cohort and the comparison group in demographic characteristics, medical history, or psychosocial patient-reported outcome measures.

Procedure: Surgical Option Process (SOP)

After undergoing a comprehensive evaluation including a complete medical examination, functional capacity evaluation, and psychosocial assessment, as required by national WC guidelines, the SOP patients began the FRP.^{12, 18} At the midpoint of treatment, averaging 10 full day sessions, the patient met with the attending physician to decide if they wished to pursue the elective surgery option discussed at time of referral. Patients declining surgery at this point (DS group, $n=164$) proceeded with the FRP, generally completing it within 4–6 weeks. If the patient decided to pursue surgery, he or she was referred to an appropriate surgical provider for evaluation, while the FRP was temporarily suspended. If the surgeon recommended surgery, a formal utilization review authorization request for surgery was made to the insurance carrier. When it was thought safe for patients from the US group ($n=43$) to resume intensive physical training post-operatively, they were given the opportunity to return to complete the remaining FRP sessions. If the surgeon did not recommend surgery, or the authorization was denied (RSD group, $n=38$), the patient was also offered the opportunity to complete the remaining FRP sessions. Figure 2 diagrams the Surgical Option Process.

Procedure: Functional Restoration Program (FRP)

The FRP consisted of a medically-supervised, quantitatively-directed exercise progression administered by physical and occupational therapists as one treatment component, and described frequently in the scientific literature.²⁵ The program also utilized a multi-modal disability management program, which included cognitive-behavioral therapy, medical case management, vocational reintegration, and educational sessions.²⁵ Program length was usually 20 full-day sessions (or equivalent part days), as recommended by commonly used national WC practice guidelines.^{12, 18} Patients completed a battery of patient-reported assessments at admission to the FRP that included validated instruments (described later). At discharge from the program, the same patient-reported assessments were administered. One year after discharge from the FRP, patients were contacted for a structured interview (face-to-face if possible, alternatively by telephone) to assess healthcare utilization and work outcomes. Additional information regarding these outcomes was obtained from the WC insurance carrier. The success of this specific FRP in promoting desirable functional and socioeconomic outcomes has been well-documented over the last three

decades,^{4, 8, 19, 22, 27, 29, 30, 40} and positive results have been found in several similar international trials.^{2, 3, 14, 34, 36, 37}

Measures

Measures of one-year work status outcomes included return to work at any point in the year after discharge and work retention (i.e., if employment was maintained) one year after discharge. Other relevant outcomes included receipt of federal disability benefits such as Supplemental Security Income (SSI) or Social Security Disability Insurance (SSDI). Measures of healthcare utilization included: surgery to the original injured body part(s), seeking treatment from new healthcare providers, and number of visits to new providers. New surgeries were deemed particularly relevant if they involved the surgery initially considered as part of the SOP.

Validated patient-reported outcome (PRO) measures were obtained at program admission and discharge. A 10-point visual analog scale (VAS) was used to measure pain intensity. Perceived disability was measured using the Pain Disability Questionnaire (PDQ).¹ These measures have been found to be reliable, valid, and responsive to change in chronic pain populations.^{1, 15, 21, 32}

Statistical analysis

Differences among groups were evaluated using either independent chi-square tests or one-way ANOVAs, with Cohen's w (categorical) and partial eta-squared (continuous) as effect size measures.⁷ A repeated-measures ANOVA was used to evaluate the PRE-to-POST change in psychosocial measures for each SOP subgroup. Because the study included multiple outcomes, we chose to determine power based on standard effect sizes.⁷ The power analysis indicated that the sample size was adequate to detect small-to-medium effect sizes ($w=0.175$ and $\eta_p^2=0.03$) with power $\beta=0.80$ and probability $\alpha=.05$.¹³

RESULTS

As shown earlier, out of the 245 patients in the SOP group at the start of treatment, three subgroups emerged at the midpoint of the FRP. The DS group ($n=164$) declined surgery and were invited to proceed to FRP completion. The other 81 patients decided to pursue surgery, and were placed on medical hold from the FRP temporarily, ultimately forming two other subgroups who underwent surgery (US, $n=43$) or who requested surgery, but were denied (RSD, $n=38$). After surgery was either performed or denied again after relevant consultation and utilization review efforts, patients were invited to resume and complete the FRP. The demographic and occupational characteristics of the four subgroups (COMP, DS, US, and RSD) are shown in Table 2. The RSD patients were more likely to fail to complete the FRP (i.e., they abandoned care by dropping out prematurely) compared to the US, DS, and COMP groups ($OR=3.1, 7.0, 3.1$, respectively). The four subgroups were not significantly different on most measures of demographic and occupational variables. Of particular note is that the subgroups did not differ in duration of disability or number of pre-admission surgeries. Most patients who received surgery prior to participating in the SOP were seeking a similar surgery and/or surgery to the same body part as a part of the SOP. The surgical

procedures received by the US group in the course of the SOP are shown in Table 3. The most common procedures received were lumbar and cervical spine procedures, which represent the majority of body parts involved in CDOMDs. Table 3 also contains the elective surgical procedures declined by the DS group and the procedures requested but denied by the RSD group.

After discharge, most DS patients adhered to their SOP decision, and only 0.8% of patients ($n=2$) underwent the surgery that was previously declined during the SOP (a knee replacement and a lumbar fusion; Table 4). It is noteworthy that, for the US and RSD groups, no patients had a reoperation (US group) or were able to reverse the surgeon- or insurance carrier-mandated denial (RSD group) in the year after FRP discharge. There were significant differences found among groups in rates of additional surgical procedures unrelated to the SOP. The RSD group was more likely to have additional surgery compared to the DS and COMP groups ($OR=7.6$ and 10.0 , respectively), and the US group was more likely to have additional surgery than the COMP group ($OR=5.4$). There were no differences in the rates of treatment-seeking behavior or number of visits to new providers.

Significant differences were found among the SOP sub-groups in measures of work status based on one-year post-FRP interviews (Table 5). Results are presented for program completers only, as the contact rate for FRP non-completers was only 56%, compared to a 97% contact rate for FRP completers. These contact rates are similar to the findings of previous FRP studies.^{20, 35} As can be seen in Table 4, RSD patients were substantially more likely to fail to return to work compared to the US, DS, and COMP groups ($OR=6.5$, 11.1 , and 4.5 , respectively), despite completing the FRP. In addition, the RSD patients were more likely to fail to retain work at one year compared to the DS and COMP groups ($OR= 5.0$ and 3.3 , respectively). Surprisingly, the DS group was significantly more likely to return to work compared to the COMP group ($OR= 2.4$). There were no subgroup differences in post-FRP disability benefits among program completers. Patients who failed to complete the FRP had poorer socioeconomic outcomes than FRP completers, as has been shown in other studies,^{20, 35} irrespective of their SOP subgroup. Of the program non-completers who could be contacted, only 32% returned to work and 21% retained employment throughout the follow-up period. In addition, 55% of the non-completers were receiving SSI or SSDI at the one-year follow-up.

Table 6 shows the results of the pain and disability PRO measures at admission (PRE) and at discharge (POST) from the FRP and includes only program completers due to high rates of missing POST measures for non-completers (less than 36% of non-completers had PRE and POST data). There were no significant differences in PRO measures among the groups at PRE ($p = .657$ and $.830$ for pain and disability, respectively) or POST ($p = .353$ and $.747$ for pain and disability, respectively). In addition, the interaction between SOP subgroup and time was not significant ($p = .193$ and $.467$, for pain and disability, respectively). However, an exploratory simple effects analysis found that the COMP group, the DS group, and the US group all improved significantly from PRE-to-POST in pain intensity (VAS) and perceived disability (PDQ). The RSD group did not show significant improvement in either of these measures, and maintained high levels of patient-reported pain and functional disability at POST.

DISCUSSION

The goal of this study was to evaluate the use of a formal surgical option process (SOP) within an interdisciplinary functional restoration program (FRP) for a very chronically disabled group of workers' compensation patients, averaging about two years of disability. It was expected that introducing the SOP program would enable CDOMD patients to make more informed and decisive determinations about whether or not to undergo elective orthopedic surgery and thereby prevent delayed recovery. The results of participating in the SOP program were striking, with 83% (245/295) of those initially provided with a surgical option deciding which treatment they wanted, and 84% (207/245) receiving the surgical choice they were unable to achieve (non-surgical treatment for the DS group and surgery for the US group) prior to the FRP.

For those in the SOP, 67% declined surgery and nearly 20% received the requested surgery. Over half of patients opting to pursue surgery ultimately underwent the desired procedure, suggesting that the program may also prevent delays in treatment by identifying the patients most likely to benefit from surgery. The vast majority of DS patients adhered to the treatment decision made during the SOP, with only 0.8% reversing the SOP decision in the post-FRP year. This finding attests to the surprising durability of a decision made by a patient halfway through an FRP, when the ultimate outcome in dealing with their prolonged disability was still unknown. Furthermore, none of the SOP subgroups had post-discharge healthcare utilization rates significantly different from the COMP group. This suggests that the SOP served its function in assisting patients to make an unequivocal and informed decision about pursuing surgery, and that ambivalence towards healthcare utilization could be resolved.

The dropout (non-completion) rate for the COMP group (34%) was somewhat higher than in previous studies of functional restoration.^{20, 35} However, DS patients were significantly more likely to complete the FRP ($p = .01$) than the COMP group, possibly as a result of seeing substantial improvements in their physical and psychosocial condition that allowed them to turn down the elective orthopedic surgery; the US group had dropout rates identical to the COMP group. In contrast, the RSD group dropped out of treatment at more than double the rate of the COMP and US groups. In fact, of the 38 patients whose surgical requests were denied, only 45% ultimately completed the FRP, even after being given an opportunity to return to the FRP after surgical re-assessment and utilization review denial.

No differences were found in the length of disability (range = 18–27 months for subgroups) or pre-admission surgery (unrelated to the SOP procedure) among the groups, indicating that these factors (previously recognized as risk factors for extended disability^{10, 11, 23}) were unlikely to have been important in determining the outcome of the SOP decision-making process. More patients from the US group were receiving SSI or SSDI at the one-year follow-up, compared to the DS group (32% vs. 13%) suggesting a link between undergoing elective surgery in the WC system and greater inclination to pursue (and receive) federal disability benefits. However, despite this finding, US patients returned to work and retained work at the same rate as COMP patients, suggesting that the outcomes of the previously unavailable surgery were as good as or better than those of other pre-rehabilitation surgeries.

Although we do not know the outcomes of SOP patients not participating in FRPs, the extremely poor outcomes among the FRP non-completers suggest that the DS and US patients may have had poorer outcomes had they not participated in the SOP/FRP.

The RSD group was less likely to return to work after discharge from the program and was less likely to retain work throughout the follow-up period, despite completing rehabilitation. In comparison, the DS and US groups had work status similar to or better than that of the COMP group. The RSD patients also failed to improve in patient-reported pain and disability from program admission to discharge, while all other groups did improve significantly. Furthermore, the RSD group was more likely to have additional surgery (although not the SOP specific procedure) after discharge from the FR program, suggesting that they continued to pursue surgery of *any type* after discharge. This failure to improve as much as the other patients groups suggests that RSD patients need extra attention during the treatment program or more intensive follow-up care to maximize their treatment outcomes. However, it should be noted that although the outcomes for the RSD patients were not as good as those of the other three subgroups, the RSD patients who completed the FRP still had substantially better outcomes than those who dropped out of the FRP. This suggests that participation in the SOP/FRP was beneficial to the RSD patients, despite their lesser improvement and poorer one-year outcomes.

One limitation of the present study was the uneven distribution of the subgroups after the SOP determination midway through the FR program. Although the sample size as a whole was adequate to detect small-to-medium effects, particular analyses may have been underpowered. In addition, because group distribution was determined by patient choice, random assignment to conditions was not possible. Furthermore, the study design did not include an untreated control group, because we did not believe that the purposes of the study ethically justified withholding treatment proven beneficial from CDOMD patients. It should also be noted that the FRP setting included only claims in the WC system, where surgeons must receive utilization review pre-authorization, and national evidence-based guidelines aid in determining if and when proposed treatments are recommended. Prior research has identified the FRP used in the present study as having outcomes of merit to the WC system.^{2-4, 8, 14, 17, 19, 25, 27, 29, 30, 34, 36, 37} However, the findings of the present study may not generalize to other, less intensive rehabilitation programs or to non-WC settings. Finally, the present study did not include an in-depth analysis of each individual patient's circumstances and the rationale on the part of each patient and provider that led to the SOP decision to decline or pursue surgery. Future studies could benefit from exploring the modifiers and predictors of surgical decisions at the individual level, leading to a better understanding of the cognitive and motivational aspects of the surgical decision-making process.

In conclusion, the addition of a formal surgical option process to an interdisciplinary FR program was found to be beneficial in facilitating the surgical decision-making process. The majority of the patients who completed both the SOP and FRP made a personal decision to avoid additional surgery (DS group). These patients demonstrated the highest levels of improvement in pain/disability measures and socioeconomic outcomes, superior or equivalent to the non-SOP comparison group (COMP). The majority of the patients who

decided to pursue surgery subsequently underwent surgery (US), and had similar program completion rates, improvement in patient-reported outcome measures, and rates of socioeconomic success compared to the DS and COMP groups. The remaining 16% of patients who chose to pursue surgery but had their requests denied (RSD) showed higher drop-out rates, less improvement in pain and disability measures, and poorer socioeconomic outcomes relative to the DS, US, or COMP patients, although the RSD patients did have better outcomes than patients who dropped out of the FRP. Overall, only 0.8% reversed their decision and had the SOP-specific surgery after discharge, demonstrating durability of the patient's SOP decision. Improving the surgical decision-making process may help prevent delayed recovery in CDOMD patients considering surgical interventions by resolving ambiguity about surgery and facilitating the WC system health goal of Maximum Medical Improvement earlier in the treatment process.

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Perspective

This study introduces a surgical option process (SOP) to improve outcomes for patients with chronic disabling occupational musculoskeletal disorders who are undecided about elective orthopedic surgery. The addition of an SOP to interdisciplinary rehabilitation may resolve surgical indecision, improve outcomes, promote psychosocial recovery, and facilitate progression to Maximum Medical Improvement.

Figure 1.
Progression of patients through the selection criteria

Figure 2.
Surgical Option Process

Table 1

Reason for Entering the SOP Program (N = 245)

Variable	SOP subgroup		
	Declined surgery (DS) N = 164	Underwent Surgery (US) N = 43	Requested surgery but denied (RSD) N = 38
Surgery was requested by the surgeon but denied by the insurance carrier	29 (17.7%)	8 (18.6%)	10 (26.3%)
Patient was undecided about the surgical option presented by the surgeon	5 (3.0%)	0 (0%)	1 (2.6%)
Surgery was presented as a treatment option, but patient/surgeon shared decision-making was ambivalent on benefits vs. risks	128 (78.0%)	35 (81.4%)	25 (65.8%)
Treating surgeon's authorization request withdrawn due to disagreement with a second opinion or utilization review surgeon	2 (1.2%)	0 (0%)	2 (5.3%)

Table 2

Demographics at admission (N = 517)

Variable	SOP subgroup				Test statistic	p	Effect size
	Non-SOP comparison (COMP) N = 272	Declined surgery (DS) N = 164	Underwent Surgery (US) N = 43	Requested Surgery but Denied (RSD) N = 38			
Program completion, n (%)	179 (65.8%)*†	127 (77.4%)*	29 (67.4%)*	17 (44.7%)	$\chi^2 = 16.8$	.001	$w = 0.18$ ‡
Age (years), mean (SD)	45.6 (9.6)	47.0 (9.6)	49.7 (9.0)*	43.7 (10.2)	$F = 3.32$	.020	$\eta_p^2 = 0.02$ ‡
Gender, n (% male)	163 (59.9%)	115 (70.1%)	28 (65.1%)	26 (68.4%)	$\chi^2 = 4.98$	.174	
Race, n (%)					$\chi^2 = 11.3$	.503	
Caucasian	136 (50.4%)	83 (50.6%)	27 (65.9%)	18 (47.4%)			
African-American	59 (21.9%)	35 (21.3%)	4 (9.8%)	9 (23.7%)			
Hispanic	63 (23.3%)	44 (26.8%)	10 (24.4%)	10 (26.3%)			
Asian	5 (1.9%)	1 (0.6%)	0 (0%)	1 (2.6%)			
Other	7 (2.6%)	1 (0.6%)	0 (0%)	0 (0%)			
Injury claim n (%)					$\chi^2 = 17.1$	.313	
cervical spine only	8 (3%)	5 (3%)	1 (2.3%)	1 (2.6%)			
thoracic/lumbar spine only	82 (30.6%)	58 (35.4%)	11 (25.6%)	15 (39.5%)			
multiple spinal only	30 (11.2%)	8 (4.9%)	2 (4.7%)	4 (10.5%)			
extremity only	61 (22.8%)	47 (28.7%)	16 (37.2%)	11 (28.97%)			
multiple musculoskeletal	82 (30.6%)	46 (28.0%)	12 (27.9%)	7 (18.4%)			
other	5 (1.9%)	0 (0%)	1 (2.3%)	0 (0%)			
Length of disability (months) mean (SD)	27.7 (33.8)	23.4 (27.1)	25.9 (40.7)	18.0 (17.2)	$F = 1.41$	.239	
Number of pre-treatment surgeries (n, %)					$\chi^2 = 9.95$	.620	
0	133 (51.8%)	81 (49.4%)	18 (41.9%)	23 (60.5%)			
1	67 (26.1%)	50 (30.5%)	12 (27.9%)	9 (23.7%)			
2	35 (13.6%)	18 (11%)	6 (14%)	2 (5.3%)			
3	22 (8.6%)	15 (9.1%)	7 (16.3%)	4 (10.5%)			
Type of pre-treatment surgery (n, %)	N/A						
No surgery		81 (49.4%)	18 (41.9%)	23 (60.5%)	$\chi^2 = 8.39$	.078	
Unrelated to current injury		18 (11%)	2 (4.7%)	0 (0%)			
Similar procedure and/or body part		65 (39.6%)	23 (53.5%)	15 (39.5%)			

Variable	SOP subgroup					Test statistic	p	Effect size
	Non-SOP comparison (COMP) N = 272	Declined surgery (DS) N = 164	Underwent Surgery (US) N = 43	Requested Surgery but Denied (RSD) N = 38				
Pre-FR disability benefits (SSI or SSDI) n (%)	26 (10%)	12 (7.7%)	4 (9.8%)	2 (5.4%)		$\chi^2 = 1.26$	.739	

* Different from RSD group,
† Different from DS group,
‡ small effect

Table 3

Surgeries declined, undergone, and denied during the SOP (N=245).

Surgery requested, <i>n</i> (%)	SOP subgroup		
	Declined surgery (DS) <i>N</i> = 164 (67%)	Underwent Surgery (US) <i>N</i> = 43 (18%)	Requested surgery but denied (RSD) <i>N</i> = 38 (15%)
Lumbar fusion	49 (29.9%)	8 (18.6%)	13 (34.2%)
Lumbar decompression	22 (13.4)	3 (7.0%)	7 (18.4%)
Lumbar hardware removal	4 (2.4%)	4 (9.3%)	0
Cervical fusion or decompression	22 (13.4%)	4 (9.3%)	3 (7.9%)
Spinal cord stimulator	7 (4.3%)	1 (2.3%)	2 (5.3%)
Shoulder rotator cuff or labrum repair	9 (5.5%)	2 (4.7%)	1 (2.6%)
Shoulder decompression	9 (5.5%)	1 (2.3%)	1 (2.6%)
Other shoulder surgery	5 (3.0%)	2 (4.7%)	1 (2.6%)
<i>Shoulder arthroplasty</i>	2	1	1
<i>Other shoulder procedure</i>	3	1	
Hand, wrist, or elbow surgery including nerve release	10 (6.1%)	4 (9.3%)	0
<i>Nerve release</i>	4	2	
<i>Hardware removal</i>		1	
<i>Wrist fusion</i>	4		
<i>Elbow debridement</i>	1		
<i>Hand tendon release</i>	1	1	
Knee meniscectomy	5 (3.0%)	5 (11.6%)	2 (5.3%)
Total knee replacement	9 (5.5%)	2 (4.7%)	2 (5.3%)
Other knee surgery	6 (3.7%)	1 (2.3%)	6 (15.8%)
<i>Ligament or cartilage repair</i>	3		4
<i>Patella surgery</i>	1		1
<i>Other knee surgery</i>	2	1	1
Ankle, heel, or foot surgery	6 (3.7%)	4 (9.3%)	0
<i>Subtalar fusion</i>		1	
<i>Ankle arthroplasty</i>		1	
<i>Hardware removal</i>	2		
<i>Tarsal tunnel release</i>	1	1	
<i>Other (including BK amputation revision)</i>	3	1	
Surgery to other body parts	1 (0.6%)	2 (4.7%)	0
<i>Facial fracture repair</i>	1	1	
<i>Hernia repair</i>		1	

Table 4

One-year healthcare utilization outcomes (N = 460) *

Variable	SOP subgroup					p	Effect size
	Non-SOP comparison (COMP) N = 217	Declined surgery (DS) N = 164	Underwent Surgery (US) N = 42	Requested Surgery but Denied (RSD) N = 37	Test statistic		
Received originally requested SOP surgery n (%)	N/A	2 (1.2%)	0 (0%)	0 (0%)	N/A		
Post-discharge surgery: non-SOP procedure n (%)	3 (1.4%) [‡]	3 (1.9%) [‡]	3 (7.1%) [‡]	3 (12.5%)	$\chi^2 = 13.6$	.004	$w = 0.18^{\S}$
Seeking treatment from new provider, n (%)	28 (12.9%)	17 (10.4%)	4 (9.5%)	5 (13.5%)	$\chi^2 = 0.89$	.827	
Number of additional healthcare visits, n (%)					$\chi^2 = 3.00$	.809	
0	189 (87.1%)	147 (90.2%)	38 (92.7%)	31 (86.1%)			
1 to 5	17 (7.8%)	8 (4.9%)	2 (4.9%)	2 (5.6%)			
> 6	11 (5.1%)	8 (4.9%)	1 (2.4%)	3 (8.3%)			

* Note: 57 patients had missing data.

[‡] different from RSD group.

[‡] different from COMP group.

[§] small effect

Table 5

One year work related outcomes, FR completers only (N = 340) *

Variable	SOP subgroup					p	Effect size
	Non-SOP Comparison (COMP) N = 177	Declined Surgery (DS) N = 121	Underwent Surgery (US) N = 25	Requested Surgery but Denied (RSD) N = 17	Test statistic		
Return to work, n (%)	148 (83.6%) ^{‡‡}	112 (92.6%) [‡]	22 (88.0%) [‡]	9 (52.9%)	$\chi^2 = 20.1$	<.001	w = 0.24 [§]
Work retention n (%)	114 (74.0%) [‡]	85 (81.0%) [‡]	17 (73.9%)	6 (46.2%)	$\chi^2 = 7.89$	.048	w = 0.16 ^{//}
Post-FR disability benefits (SSI or SSDI), n (%)	11 (7.2%)	9 (8.7%)	4 (18.2%)	1 (7.7%)	$\chi^2 = 2.98$	.394	

* Note: 12 patients had missing data;

[‡] different from RSD group,

^{‡‡} Different from DS group,

[§] medium effect,

^{//} small effect

Table 6

Psychosocial testing, admission (PRE, N = 340) to discharge (POST, N = 312) changes*

Measure	SOP subgroups	PRE score mean (SD)	POST score mean (SD)	Significance of PRE-to-POST change	Effect size of PRE-to-POST change
Pain intensity VAS (0–10)	Non-SOP comparison (COMP)	7.28 (1.9)	4.99 (2.4)	<.001	$\eta_p^2 = 0.30^{\S}$
	Declined surgery (DS)	7.24 (1.6)	4.73 (2.4)	<.001	$\eta_p^2 = 0.26^{\S}$
	Underwent surgery (US)	7.60 (1.8)	5.27 (1.9)	.001	$\eta_p^2 = 0.05^{\ddagger}$
	Requested surgery but denied (RSD)	6.77 (1.4)	5.92 (1.8)	.237	$\eta_p^2 = 0.01^{\ddagger}$
Pain disability questionnaire (0–150)	Non-SOP comparison (COMP)	98.5 (24.5)	68.6 (32.1)	<.001	$\eta_p^2 = .35^{\S}$
	Declined surgery (DS)	99.4 (23.1)	65.8 (29.2)	<.001	$\eta_p^2 = .32^{\S}$
	Underwent surgery (US)	105.9 (21.9)	74.0 (33.5)	<.001	$\eta_p^2 = .09^{\ddagger}$
	Requested surgery but denied (RSD)	98.9 (18.1)	80.9 (25.8)	.020//	$\eta_p^2 = .02^{\ddagger}$

* Note: Analysis includes program completers only, 12 patients had missing psychosocial test data at PRE, 40 patients had missing psychosocial test data at POST;

[†] small effect,

[‡] medium effect,

[§] large effect,

// ns after correction for multiple comparisons.