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The effect of feedback regarding coping strategies and illness behavior on hand surgery patient satisfaction and communication: a randomized controlled trial

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Abstract
Background Patients and surgeons can feel uncomfortable discussing coping strategies, psychological distress, and stressful circumstances. It has been suggested that patient-reported outcome measures (PROMs) facilitate the discussion of factors associated with increased symptoms and disability. This study assessed the effect of providing feedback to patients regarding their coping strategy and illness behavior on patient satisfaction and patient-physician communication in orthopedic surgery.
Methods In a prospective study, 136 orthopedic patients were randomly assigned to either receive feedback about the Patient-Reported Outcomes Measurement Information System (PROMIS) Pain Interference computer-adaptive test (CAT) prior to the visit with the hand surgeon or not. The primary outcome was patient satisfaction with the consultation and secondary outcomes involved patient-physician communication. Bivariate and multivariable analyses were performed to determine the influence of the feedback on patient satisfaction and communication.
Results There was no significant difference in patient satisfaction between patients who received feedback and patients who did not (P=0.70). Feedback was associated with more frequent discussion of coping strategies (P=0.045) in bivariate analysis but was not independently associated: in multivariable analysis, only PROMIS Pain Interference CAT and age were identified as independent predictors (odds ratio (OR) 1.1; 95 % confidence interval (CI) 1.0–1.1, P=0.013, and OR 0.97, 95 % CI 0.94–0.99, P=0.032, respectively). No factors were associated with discussion of stressors. Discussion of circumstances was independently associated with increased PROMIS Pain Interference CAT, marital status, and work status.
Conclusion We found that feedback regarding coping strategies and illness behavior using the PROMIS Pain Interference CAT did not affect patient satisfaction. Although feedback was associated with increased discussion of illness behavior in bivariate analysis, less effective coping strategies and personal factors (age, marital status, and work status) were more important factors.

Keywords Hand surgery · Feedback · Satisfaction · Communication · Coping strategies · Illness behaviour

Introduction

Psychological and sociological factors are important in the human illness experience, but biomedical factors are the focus of most office visits [16, 20]. Both patients and surgeons can feel uncomfortable discussing emotions, stress, and coping strategies. It has been suggested that patient-reported outcome measures (PROMs) are useful in patient-physician communication, facilitating the discussion of factors associated with increased symptoms and disability [8, 13, 48–51, 57].

For instance, Detmar et al. [13] randomized patients to receive feedback from PROMs regarding health-related quality-of-life (HRQL) or not during office visits in an oncology practice. They observed that feedback of the PROMs assessment improved patient-physician communication, perceived emotional support, and physicians' awareness of health issues. In a similar randomized trial, also in oncology, Velikova et al. [50] found that feedback based on PROMs improved both the interaction between patient and physician and the patient's well-being compared to a control group. In another study, Velikova et al. [51] found that feedback of

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PROMs questionnaires increased discussion of daily activities, emotional problems, and work-related issues; however, this did not increase satisfaction with the communication. Taenzer et al. [48] reported similar results and showed that after feedback of PROMs data, quality-of-life issues were more likely to be addressed during the medical visit. The feedback provided did not influence patient satisfaction and decision making of physicians.

The Patient-Reported Outcomes Measurement Information System (PROMIS), supported by the National Institutes of Health, was initiated to improve the use of PROMs across medical specialties [18, 44]. Since the PROMIS questionnaires became available, there is growing interest in their use, both in research and in clinical practice [10, 15, 22–30, 36].

The PROMIS Pain Interference computer-adaptive test (CAT) measures the degree to which pain interferes with achieving ones goals [1, 31, 36]. This measures the same construct as measures of adaptive (e.g., self-efficacy) or maladaptive (e.g., catastrophic thinking or kinesiophobia) coping strategies [32]. In other words, the PROMIS Pain interference CAT is the PROMIS version of the Pain Catastrophizing Scale or Pain Self-Efficacy Questionnaire. Ineffective coping strategies and symptoms of depression explain a large part of the variation in symptom intensity and disability in patients with musculoskeletal illness—usually much more than diagnosis or impairment [2–7, 9, 11, 12, 14, 33, 35, 37–43, 47, 52–56, 58–61]. Feedback to the patient regarding the effectiveness of their coping strategies in response to pain compared to the average person in the US population might make it easier to discuss this aspect of health and well-being during the office visit. There is, however, a risk that the patient will not respond well to this information and patient satisfaction will decrease.

This randomized (1:1) controlled parallel group study is designed to assess the effect of providing feedback to patients regarding their coping strategy and illness behavior, using PROMIS Pain Interference CAT, on patient satisfaction and patient-physician communication in orthopedic surgery. We tested the null hypotheses that s there was no difference in patient satisfaction with the consultation between patients who received feedback about their coping strategy and illness behavior and patients who did not, and (2) that there was no difference in discussion of psychosocial factors (i.e., coping strategies, stressors, and circumstances) between patients that did and did not receive feedback.

Methods

Subjects

After approval by our institutional review board, new and follow-up patients who presented to one surgeon at our orthopedic outpatient clinic were invited to participate in this study between November 2013 and July 2014. Patients were enrolled one morning or afternoon clinic a week depending on the availability of research fellows. Inclusion criteria were patients aged 18 years or greater with English fluency and literacy and the ability to provide informed consent. Our institutional review board required that we exclude pregnant patients. Eligible patients were provided both oral and written information about the study before obtaining their written informed consent. One hundred forty-nine eligible patients were asked to participate in this study. Thirteen patients (8.7 %) declined participation and therefore a total of 136 patients were enrolled. Three patients, one in the control and two in the intervention group, could not start or complete the initial assessment, due to technical issues with https://www.assessmentcenter.net, and were excluded from analyses. The intervention and control groups were well balanced in terms of demographic, condition-specific, and psychosocial characteristics (Table 1).

Study Design

In this randomized, controlled, parallel designed study, patients were randomly assigned (1:1) to the control or intervention group by computer-generated random numbers and using a permuted block approach.

Patients in the intervention group were asked to complete demographic, condition-specific, and psychosocial questionnaires immediately upon signing the informed consent form. Subsequently, before the consultation, patients and physician received the intervention. During and directly after the consultation, primary and secondary outcome variables were obtained in both groups. After obtaining the outcome variables, patients in the intervention group were dismissed and patients in the control group were asked to stay in order to complete the demographic, condition-specific, and psychosocial questionnaires.

Description of Intervention

Patients in the intervention group completed the PROMIS Pain Interference CAT questionnaire, as part of the initial assessment, before the consultation. PROMIS Pain Interference is a CAT instrument used to measure self-reported consequences of pain on relevant aspects of everyday life. This includes the degree to which pain limits or interferes with patient's physical, mental, and social activities [1]. PROMIS Pain Interference CAT consists of 40 questions and, using CAT, the number and type of questions are selected based on the patient's response to previously administered questions [1, 18]. A PROMIS Pain Interference CAT score of 50 represents the average for the US general population, with a standard deviation of 10 points

Table 1 Demographics

Characteristics	Control (n=67)	Intervention (n=66)	P value*
Age, median (range) (years)	51 (23–81)	54 (22–91)	0.42
Sex, *n* (%)			0.80
Men	38 (57)	36 (55)	
Women	29 (43)	30 (45)	
Duration of education, median (range) (years)	16 (10–23)	16 (8–25)	0.45
Marital status, *n* (%)			0.32
Single	18 (27)	25 (38)	
Living with partner	1 (1.5)	4 (6.1)	
Married	41 (61)	32 (48)	
Separated or divorced	6 (9.0)	4 (6.1)	
Widowed	1 (1.5)	1 (1.5)	
Pain VAS score, median (range)	2.0 (0.0–8.0)	2.0 (0.0–10)	0.97
Duration since pain onset, median (range) (months)	2.3 (0.0–174)	1.7 (0.0–324)	0.82
Other pain conditions, *n* (%)			0.75
Yes	21 (31)	19 (29)	
No	46 (69)	47 (71)	
Prior surgery, *n* (%)			0.97
Yes	15 (22)	15 (23)	
No	52 (78)	51 (77)	
Smoking status, *n* (%)			0.37
Yes	5 (7)	8 (12)	
No	62 (93)	58 (88)	
Prior treatment, *n* (%)			0.90
Yes	46 (69)	46 (70)	
No	21 (31)	20 (30)	
Diagnosis, *n* (%)			0.15
Wrist fracture	14 (21)	13 (20)	
Hand fracture	8 (12)	14 (21)	
Carpal tunnel or cubital tunnel	10 (15)	2 (3.0)	
Trigger finger	4 (6.0)	8 (12)	
Osteoarthritis	5 (7.5)	6 (9.1)	
Tumor, lump, cyst, or nodule	5 (7.5)	3 (4.6)	
Sprain, rupture, or dislocation	5 (7.5)	1 (1.5)	
Amputation, crush, or laceration	4 (6.0)	2 (3.0)	
Nonspecific arm pain	2 (3.0)	2 (3.0)	
All other diagnoses	10 (15)	15 (23)	
Working status, *n* (%)			0.20
Full-time	39 (58)	30 (45)	
Part-time	4 (6.0)	11 (17)	
Homemaker	2 (3.0)	2 (3.0)	
Retired	15 (22)	12 (18)	
Unemployed, able to work	4 (6.0)	3 (4.5)	
Unemployed, unable to work	3 (4.5)	8 (12)	
Health-related outcomes, median (range)			
PROMIS-Pain Interference CAT	54 (39–72)	56 (39–72)	0.35
PROMIS-Upper Extremity CAT	38 (15–56)	39 (20–56)	0.99

VAS visual analogue scale, *PROMIS* Patient-Reported Outcomes Measurement Information System, *CAT* computer-adaptive testing

*P<0.05, level of significance

[31]. A higher score indicates more of what the questionnaire measures. For example, a score of 64 points indicates that the level of pain interference is worse than 89 % of the population [36].

The patients' PROMIS Pain Interference CAT score were graphically displayed using Profile Instruments reports provided by https://www.assessmentcenter.org (Fig. 1). Printed copies of the reports were handed over to the patients and physician before the start of the consultation. Patients received an explanation of the results from research fellows involved in this study, which was focused on patients' coping strategies and illness behavior. It was emphasized that the PROMIS Pain Interference CAT score did not indicate the degree of pain intensity, but rather how patients handle experienced pain, and that the score might be used as a measure of protectiveness: high scores indicate more protectiveness, and low scores indicate less protectiveness. The one participating physician in this study did not receive any form of education since previous and extensive experience with the PROMIS Pain Interference CAT questionnaire [15, 36].

Study Measures

The primary outcome measure was patient satisfaction with the consultation. The patient satisfaction was measured directly after the consultation using an 11-point ordinal scale.

Secondary outcome variables involved the patient-physician communication. Research fellows observed all medical consultations, without interfering, and assessed with the aid of a checklist and based on predefined criteria whether three items were discussed: coping strategies, stressors, and circumstances. Coping strategies were defined as efforts to master stressful events (e.g., positive belief or catastrophizing), circumstances as social and economical conditions and the psychological state of a person, and stressors as a stimulus that causes stress (e.g., an activity or event) [17, 34, 45]. Only items explicitly discussed by patients or physician during the consultation were rated as such.

Statistical Analysis

An a priori power analysis based on a two-tailed unpaired two-sample *t* test estimated the need to include 64 patients in each group in order to detect a medium (0.50) difference in patient satisfaction with the consultation between patients that did or did not receive the intervention with a power of 80 % (alpha 0.05), resulting in a total of 128 patients. Accounting for 5 % dropouts and incompletes, we chose a total sample size of 136 patients.

Patient characteristics were summarized with frequencies and percentages for categorical variables and with median and range for continuous variables. Nonparametric statistics were used since all continuous variables, except one (duration of education), did not meet the normality assumption as assessed with the Shapiro-Wilk test. In bivariate analysis, the Spearman rank correlation for continuous variables, the Wilcoxon rank sum test for dichotomous, and the Kruskall-Wallis test for multiple categorical variables were used to assess association between patient satisfaction and explanatory variables. In addition, the Wilcoxon rank sum test for continuous variables and chi-squared or Fisher exact test for categorical variables were used to assess association between items discussed (i.e., coping strategies, stressors, and circumstances) and

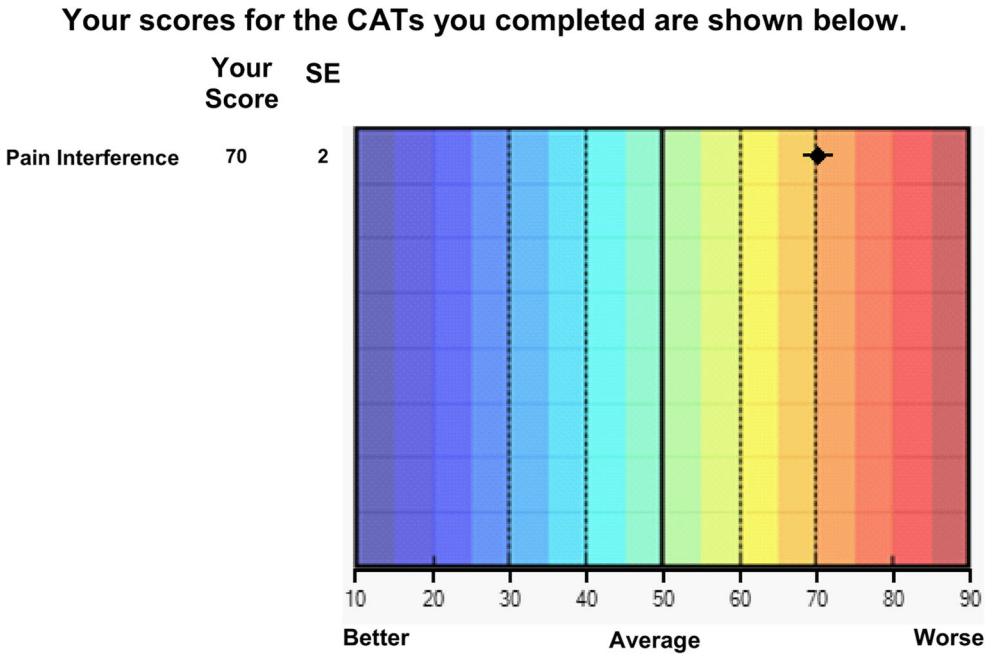

Fig. 1 PROMIS Pain Interference CAT score graphically displayed using Profile Instruments reports provided by https://www.assessmentcenter.org [19]

explanatory variables. The level of significance was set at $P<0.05$ for all statistical tests. Multivariable linear and logistic regression analyses were used to identify predictors independently associated with patient satisfaction and the discussion of coping strategies, stressors, and circumstanced. The area under the receiver operating characteristic curve and Hosmer-Leme show test were used to assess the discrimination and goodness-of-fit, respectively. The criterion for entry to the models was set at $P<0.10$ for explanatory variables in bivariate analyses.

Results

There was no significant difference in median patient satisfaction with the consultation between patients who received feedback about their coping strategy and illness behavior and patients who did not ($P=0.70$) (Table 2). No demographics, condition-specific, or psychosocial variables were associated with patient satisfaction in bivariate analysis (Table 3). No multivariable linear regression analysis was performed to identify predictors independently associated with patient satisfaction since only one variable, prior treatment, met the criterion for entry to the model.

More frequent discussion of coping strategies during the consultation was found in patients who received feedback compared to patients who did not get feedback ($P=0.045$) (Table 2). The intervention variables (PROMIS feedback or not), age, PROMIS Pain Interference CAT, and marital status met the criterion for entry into a multivariable logistic regression model of the outcome coping strategies, discussed or not discussed. The multivariable model determined that higher PROMIS Pain Interference CAT scores and age were independently associated with discussion of coping strategies (odds ratio (OR) 1.1, 95 % confidence interval (CI) 1.0–1.1, $P=0.013$, and OR 0.97, 95 % CI 0.94–0.99, $P=0.032$, respectively), but the feedback intervention was not (Tables 4 and 5).

The specific stressors and circumstances discussed were comparable in the intervention and control group (Table 2). There were two variables marginally associated with discussion of stressors; however, a multivariable logistic regression analysis to identify independent predictors associated with discussion of stressors could not be performed because of low number of events (i.e., stressors discussed) (Tables 2 and 4).

Variables associated with discussion of circumstances were PROMIS Pain Interference CAT, prior surgery, marital status, and working status (Table 4). For the outcome circumstances, discussed or not discussed, increased PROMIS Pain Interference CAT was an independent predictor (OR 1.1, 95 % CI 1.0–1.1; $P=0.042$). Furthermore, married patients had higher odds of discussion of circumstances compared to patients who were single (OR 2.8, 95 % CI 1.1–7.3, $P=0.039$), patients who work part-time had higher odds for discussion of circumstances compared to full-time working patients (OR 6.8, 95 % CI 1.1–39, $P=0.032$), and retired patients had lower odds for discussion of circumstances compared to the reference group (OR 0.35, 95 % CI 0.12–0.98, $P=0.046$) (Table 5).

Table 2 Outcome variables

Characteristics	Control ($n=67$)	Intervention ($n=66$)	P value*
Patient satisfaction, median (range)	10 (7–10)	10 (4–10)	0.70
Patient physician communication[a], n (%)			
Coping strategies			0.045
Discussed	41 (61)	51 (77)	
Not discussed	26 (39)	15 (23)	
Stressors			0.76
Discussed	7 (10)	8 (12)	
Not discussed	60 (90)	58 (88)	
Circumstances			0.94
Discussed	31 (46)	31 (47)	
Not discussed	36 (54)	35 (53)	

*$P<0.05$, level of significance

[a] Items discussed by physician or patients during the consultation

Table 3 Bivariate analysis: patient satisfaction

	Patient satisfaction ($n=133$)	
Spearman correlation	Correlation	P value*
Age	0.11	0.22
Duration of education	0.0025	0.98
Pain VAS score	−0.087	0.32
Duration since pain onset	0.060	0.49
Health-related outcomes		
PROMIS-Pain Interference CAT	−0.027	0.76
PROMIS-Upper Extremity CAT	−0.079	0.36
Wilcoxon rank sum test	z value	P value
Sex	−0.28	0.78
Other pain conditions	−0.64	0.52
Prior surgery	1.2	0.24
Smoking status	−0.14	0.89
Prior treatment	−1.8	0.065
Kruskal-Wallis test	H value	P value
Marital status	1.5	0.68
Diagnosis	1.5	0.99
Working status	4.2	0.38

VAS visual analogue scale, *PROMIS* Patient-Reported Outcomes Measurement Information system, *CAT* computer-adaptive testing

*$P<0.05$, level of significance

Table 4 Bivariate analysis: patient physician communication

	Patient physician communication (n=133)					
	Coping strategies		Stressors		Circumstances	
Wilcoxon rank sum test	z value	P value*	z value	P value	z value	P value
Age (years)	2.3	0.024	0.34	0.74	0.56	0.57
Duration of education (years)	0.31	0.75	0.051	0.96	−0.61	0.54
Pain VAS score	−1.5	0.15	−1.3	0.19	−1.2	0.21
Duration since pain onset, mo	−0.63	0.53	0.47	0.64	0.99	0.32
Health-related outcomes						
PROMIS-Pain Interference CAT	−2.2	0.025	−1.8	0.079	−2.0	0.043
PROMIS-Upper Extremity CAT	−0.29	0.77	1.5	0.14	1.1	0.29
Chi-squared or Fisher exact test	Chi-squared[a]	P value	Chi-squared	P value	Chi-squared	P value
Sex	0.0050	0.94	1.70	0.20	0.031	0.86
Other pain conditions	0.075	0.78	0.093	0.76	1.90	0.17
Prior surgery	0.62	0.43	–	0.74	4.30	0.038
Smoking status	–	0.22	–	0.64	0.0012	0.97
Sought treatment before	0.44	0.50	–	1.00	2.10	0.14
Marital status	–	0.0070	–	0.054	–	0.0020
Diagnosis	–	0.29	–	0.13	–	0.92
Working status	–	0.17	–	0.15	–	<0.001

VAS visual analogue scale, *PROMIS* Patient-Reported Outcomes Measurement Information System, *CAT* computer-adaptive testing

*P<0.05, level of significance

[a] Only chi-squared value is reported. Fisher exact test does not have a test statistic

Discussion

The role of psychosocial factors in musculoskeletal illness is important but are often not addressed during office visits. Discussion of coping strategies, psychological distress, and stressful circumstances requires good communication skills to avoid offending patients. We assessed whether the feedback of PROMIS CAT questionnaire data regarding the effectiveness of coping strategies in response to pain facilitated patient and physician discussion of psychosocial aspects of health and well-being during the office visit and its effect on satisfaction. We found that feedback regarding coping strategies and illness behavior using the PROMIS Pain Interference CAT did not affect patient satisfaction. Although feedback was associated with increased discussion of coping strategies in bivariate analysis, less effective coping strategies and younger age were the only factors independently associated with discussion of coping strategies.

There are several limitations to consider while interpreting the findings of this study. First, the study involved a single surgeon and the results might be different for other surgeons. For instance, coping strategies were discussed in 92 (69 %) of the consultations, which is likely higher than the average hand surgeon. Second, research fellows that have evaluated the patient-physician communication were aware of the allocation of intervention. This might have influenced the assessment of items discussed during the consultation, despite the use of a checklist and predefined criteria. Third, patient and physician were not blinded to the assignment of intervention. As in all unblinded studies, this could have been a source of bias. Finally, the study was performed in a single hospital at a department specialized in hand and upper extremity surgery and therefore results might be less applicable to other patient populations. Specifically, we might see a greater effect in a study restricted to patients with greater pain intensity or less effective coping strategies on average.

In our study, the intervention had no effect on patient satisfaction with the consultation. Previous studies that evaluated the impact of feedback of individual quality-of-life measurements showed similar results [48, 50, 51, 57]. One study demonstrated significant improvement in patient satisfaction, in particular in perceived emotional support received from physicians, after providing feedback of PROMs data to patients and physicians [13]. However, this study did not show differences on four other measures of patient satisfaction.

Feedback about coping strategies did not result in more frequent discussion of psychosocial factors during

Table 5 Multivariable analysis: patient physician communication

Dependent variable	Pseudo R^2	Independent variable	Coefficient (β)	Odds ratio	95 % confidence interval	*P* value*
Coping[a]	0.14	Intercept	−2.00			
		Age	−0.033	0.97	0.94–0.99	0.032
		PROMIS-Pain Interference CAT	0.069	1.1	1.0–1.1	0.013
		Marital status (ref: single)				
		Living with partner	[b]			
		Married	0.77	2.2	0.75–6.3	0.15
		Separated or divorced	−1.2	0.3	0.054–1.6	0.16
		Widowed	[b]			
		Intervention(PROMIS feedback)	0.83	2.30	0.95–5.6	0.064
Circumstances[c]	0.17	Intercept	−3.7			
		PROMIS-Pain Interference CAT	0.063	1.1	1.0–1.1	0.042
		Prior surgery	−1.1	0.34	0.11–1.0	0.052
		Marital status (ref: single)				
		Living with partner	[b]			
		Married	1.0	2.8	1.1–7.3	0.039
		Separated or divorced	1.0	0.36	0.035–3.6	0.38
		Widowed	[b]			
		Working status (ref: full-time)				
		Part-time	1.9	6.8	1.1–39	0.032
		Homemaker	−0.098	0.38	0.040–3.5	0.39
		Retired	−1.1	0.35	0.12–0.98	0.046
		Unemployed, able to work	[b]			
		Unemployed, unable to work	[b]			

PROMIS Patient-Reported Outcomes Measurement Information System, *CAT* computer-adaptive testing

*$P<0.05$, level of significance

[a] Hosmer-Lemeshow $\chi^2 = 16$, $P=0.046$; the area under the receiver operating characteristic (ROC) curve was 0.72 (95 % CI 0.61–0.83)

[b] Coefficient and OR could not be calculated because of low number of cases. Observations have been dropped and not used in order to not bias the remaining coefficients in the model

[c] Hosmer-Lemeshow $\chi^2 = 5.3$, $P=0.73$; the area under the receiver operating characteristic (ROC) curve was 0.61 (95 % CI 0.51–0.71)

the consultation, after adjusting for other factors. In contrast, other studies that assessed the impact of feedback of PROMs scores to patients and physician demonstrated improvement in the interaction between patient and physician [13, 21, 48–51]. This difference could reflect the nature of feedback provided in the studies. In this study, patient and physician received feedback about coping strategy and illness behavior using PROMIS Pain Interference CAT in orthopedic outpatient setting, while other studies used health-related quality-of-life PROMs questionnaires to provide feedback about physical, role, cognitive, emotional, and social functioning and common symptoms in routine oncology practice.

Feedback of PROMs data might only stimulate the discussion if PROMs directly address the items interest [46]. The feedback provided in this study, for example, did not address stressors and circumstances directly and apparently not increase the awareness of these items, which would lead to more discussion. On the other hand, coping strategies were directly addressed and were more likely to be discussed after the intervention, although not independently associated. Other studies support this observation as they reported only improvement of discussion of items directly addressed in the PROMs questionnaires [13, 48–50].

In conclusion, our findings did not demonstrate that feedback of coping strategies and illness behavior, using PROMIS Pain Interference CAT, had an effect on satisfaction with the consultation among orthopedic patients in outpatient setting. Furthermore, after accounting for other factors, we found no effect of feedback of PROMs data on discussion of psychosocial factors during the consultation. Feedback might prove useful and future efforts will concentrate on more compelling presentation of the data and how these personal factors impact symptom intensity and magnitude of disability. In addition, serial feedback over time might prove more impactful as patients might understand these relationships better over time.

Author contributions This study represents a great deal of effort, resources and dedication on the part of the authors in reviewing and reconstructing all cases, reviewing the literature and performing statistical analyses. All authors have participated in a material way to the elements as follows:

Study design: CLO, MGH, and DR
Gathered data: JJM and CMO
Analyzed data: JJM
Initial draft: JJM, CMO, CLO, MGH, and DR
Ensured accuracy of data: JJM, CMO, CLO, MGH, and DR

Conflict of Interest Each author certifies that he or she has no commercial associations (e.g., consultancies, stock ownership, equity interest, and patent/licensing arrangements) that might pose a conflict of interest in connection with the submitted article.

Statement of Human and Animal Rights All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

Statement of Informed Consent Informed consent was obtained from all subjects, and all identifying details have been omitted from publication.

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