

Patient Preferences and Expectations for Care

Determinants in Patients With Lumbar Intervertebral Disc Herniation

Jon D. Lurie, MD, MS,* Sigurd H. Berven, MD,† Jennifer Gibson-Chambers, MS,*
Tor Tosteson, ScD,* Anna Tosteson, ScD,* Serena S. Hu, MD,†
and James N. Weinstein, DO, MS*

Study Design. Prospective observational cohort.

Objective. To describe the baseline characteristics of patients with a diagnosis of intervertebral disc herniation who had different treatment preferences and the relationship of specific expectations with those preferences.

Summary of Background Data. Data were gathered from the observational cohort of the Spine Patient Outcomes Research Trial (SPORT). Patients in the observational cohort met eligibility requirements identical to those of the randomized cohort, but declined randomization, receiving instead the treatment of their choice.

Methods. Baseline preference and expectation data were acquired at the time of enrollment of the patient, before exposure to the informed consent process. Univariate analyses were performed using a *t* test for continuous variables and χ^2 for categorical variables. Multivariate analyses were also performed with ANCOVA for continuous variables and logistic regression for categorical variables. Multiple logistic regression models were developed in a forward stepwise fashion using blocks of variables.

Results. More patients preferred operative care: 67% preferred surgery, 28% preferred nonoperative treatment, and 6% were unsure; 53% of those preferring surgery stated a definite preference, whereas only 18% of those preferring nonoperative care had a definite preference. Patients preferring surgery were younger, had lower levels of education, and higher levels of unemployment/disability. This group also reported higher pain, worse physical and mental functioning, more back pain related disability, a longer duration of symptoms, and more opiate use. Gender, race, comorbidities, and use of other therapies did not differ significantly across preference groups. Patients' expectations regarding improvement with nonoperative care was the strongest predictor of preference.

Conclusion. Patient expectations, particularly regarding the benefit of nonoperative treatment, are the primary determinant of surgery preference among patients with lumbar intervertebral disc herniation. Demographic, functional status, and prior treatment experience had significant associations with patients' expectations and preferences.

Key words: patient preference, patient expectation, lumbar herniated disc, surgery, nonoperative treatment.
Spine 2008;33:2663–2668

Patient expectations about treatment effectiveness have been shown to have an important—though complex—relationship with their clinical outcomes and satisfaction with treatment. Patient expectations for improvement with spine surgery have generally been shown to be quite high.^{1,2} Unrealistically high expectations have been thought to be responsible for unmet expectations and decreased patient satisfaction.^{1–5} On the other hand, the expectation of benefit is felt to result in improvement in symptoms and function through “placebo effects,” increased motivation for improvement, and increased compliance with treatment plans.^{3,6–8}

Several studies have tried to assess the relationship of treatment expectations and outcome. Lutz *et al*⁹ found that patients that expected more rapid recovery with surgery for sciatica had similar functional outcomes but were more satisfied than patients who expected a slower recovery. In a randomized placebo-controlled trial of amitriptyline for chronic pain associated with spinal cord injuries, Turner *et al*⁸ found that patients with higher expectations of pain relief with amitriptyline had better symptom relief when they actually received amitriptyline but not when they received placebo. Similarly, in a randomized trial comparing massage therapy and acupuncture for low back pain, Kalauokalani *et al*¹⁰ found that patients who had higher expectations of benefit from the treatment they received had improved outcomes compared to those who were assigned to a treatment for which they had lower expectations. General optimism for improvement had no effect on outcome in that study. Perhaps most intriguingly, Iversen *et al*³ found that for patients undergoing surgery for spinal stenosis, those patients who had higher expectations for functional improvement with surgery had better functional outcomes and better satisfaction with their functional status after surgery, whereas those patients with higher expectations for pain relief from surgery had more pain and were less satisfied with their pain relief after surgery. Thus, although expectations seem to play a significant role in mediating some aspects of patient response to, and satisfaction with, treatment for low back pain, the details of this role remain unclear.

Patient preferences for a certain treatment, which are related to, but distinct from, their expectations of the

From the *Dartmouth Medical School, Lebanon, NH; and †University of California-San Francisco, San Francisco, CA.

Acknowledgment date: October 9, 2007. First revision date: November 30, 2007. Second revision date: June 24, 2008. Acceptance date: July 3, 2008.

The manuscript submitted does not contain information about medical device(s)/drug(s).

Federal funds were received in support of this work. No benefits in any form have been or will be received from a commercial party related directly or indirectly to the subject of this manuscript.

Address correspondence and reprint requests to Jon D. Lurie, MD, MS, Department of Medicine, Dartmouth Medical School, One Medical Center Dr., Lebanon, NH 03756; E-mail: jon.d.lurie@dartmouth.edu

results of that treatment, may also play an important role in affecting treatment outcome. Understanding the therapeutic effects of patient preferences has been referred to as a “vital and formidable empirical task.”¹¹

To better understand treatment preferences, outcomes expectations, and the relationship of these factors, we investigated baseline data from a large study comparing surgery and nonoperative treatment for patients with intervertebral disc herniation (IDH). We describe the baseline characteristics of patients with different treatment preferences and the relationship of specific expectations with those preferences. We hypothesized that expectations for various different aspects of treatment would be important drivers of treatment preference, and subjects with different preferences and expectations for surgery and nonoperative care would differ in clinically important ways that would need to be accounted for in any studies looking at the relationship of preference and expectations with outcome.

■ Materials and Methods

The Spine Patient Outcomes Research Trial (SPORT) is a large multicenter clinical trial designed to compare the outcomes of surgery and nonoperative treatment for patients with IDH, SPS, and DS and is described in detail elsewhere.^{12–15} SPORT contains a randomized component and prospective cohorts in which patients met all the inclusion and exclusion criteria but were unwilling to be randomized and received the treatment of their choice. In this study, we evaluated only patients with a diagnosis of IDH enrolled in the observational cohort. We did not look at the randomized cohort because these patients often had no or only a weak preference and therefore were less likely to reveal important factors associated with preference and expectations.

All patients in the IDH arm of SPORT were over 18 years old, had radicular pain for at least 6 weeks with a positive nerve root tension sign and or neurologic deficit, and a confirmatory

cross-sectional imaging study demonstrating IDH at a level and side corresponding to their symptoms. Exclusion criteria included cauda equina syndrome, progressive neurologic deficit, malignancy, significant deformity, prior back surgery, and other established contraindications to elective surgery. All subjects had failed some nonoperative treatment and were deemed surgical candidates by the enrolling surgeon.^{14,15} Overall there were 745 such patients of whom 740 had data on preferences and expectations and were included in this analysis.

Baseline preference and expectation data were acquired at the time of enrollment of the patient, before exposure to the informed consent process, and is representative of the patients' knowledge and understanding of their condition and treatment options immediately after their initial presentation for care by a spine specialist. The specific questions used to measure patient preferences and expectations are detailed in Appendix I (available online through Article Plus).

Patient preference for operative or nonoperative care was assessed at baseline by a 5-point scale indicating strength of preference as: Definitely nonsurgery, Probably nonsurgery, Not Sure, Probably surgery, or Definitely surgery. Patient expectation was assessed using measures of expected benefit from surgery for symptoms and function, expected benefit from nonsurgery for symptoms and function, expected harm from surgery, and expected harm from nonsurgery. These expectations were quantified on a 5-point scale as: No Chance, Small Chance, Moderate Chance, Big Chance, or Certain (100%). Symptoms are defined as pain, stiffness, swelling, numbness, and weakness. Function is defined as work at usual job and pursuit of usual activities. “Expected Net Benefit” from surgery and nonsurgery is a composite measure of expectations, which added the expected benefit for symptoms and function and subtracted the expected harm. “Net Expected Advantage” from surgery was an additional composite measure defined as the Expected Net Benefit from surgery minus the Expected Net Benefit from nonoperative treatment. “Expectations Optimism” is a composite measure of the total benefit expected

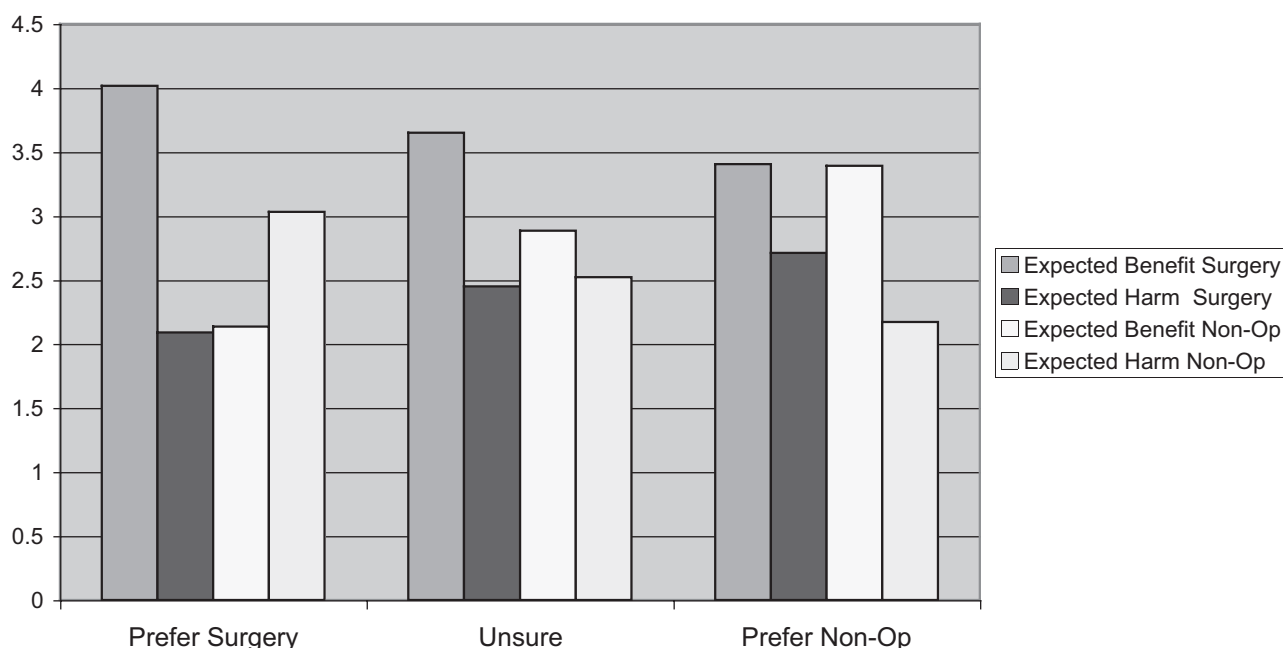


Figure 1. Expectations across preference groups.

from operative and nonoperative care minus the total harm expected from operative and nonoperative care.

Univariate analyses were performed using a *t* test for continuous variables and χ^2 for categorical variables. Multivariate analyses were also performed with ANCOVA for continuous variables and logistic regression for categorical variables. Multiple logistic regression models were developed in a forward stepwise fashion using blocks of variables entered in the following order: demographics, functional status, prior treatments, Net Expected Advantage from surgery, and stated concerns. As each block was added, age, gender, and prior covariates with a *P* value of 0.1 or less in the previous model were kept. All analyses were done using S-Plus (Insightful Corp., Seattle, WA).

Results

Preferences

At enrollment, the baseline patient preferences demonstrated that more patients preferred operative care: 67% preferred surgery, 28% preferred nonoperative treatment, and 6% were unsure. The strength of a preference was quantified as: “Definitely Prefer,” “Probably Prefer,” and “Not Sure.” The patients who preferred surgical care for their condition had a stronger (more definite) preference for their choice than the patients who preferred nonoperative care; 53% of those preferring surgery stating a definite preference, whereas only 18% of those preferring nonoperative care had a definite preference.

The characteristics of patients preferring surgery are shown in Table 1. Patients preferring surgery were younger, had lower levels of education, and higher levels of unemployment/disability. The group preferring surgery also reported higher pain, worse physical and mental functioning, more back pain related disability, had a longer duration of symptoms, and were more likely to be taking opiates. Gender, race, comorbidities, and use of other therapies did not differ significantly across preference groups.

Expectations

The relationship between expectations and patient preference is shown in Figure 1. Interestingly, patients with a preference for nonoperative care had about equal expectations for the benefit of operative and nonoperative care but anticipated higher risk from surgery. The group who was unsure of their preferences had similar expectations for harm from surgery and nonoperative care but expected greater benefit from surgery. The group preferring surgery not only had high expectations of benefit from surgery but actually considered harm from nonoperative treatment to be more likely than benefit.

The ability of reported expectations to predict preference is shown in Table 2. Each of the 4 dimensions of expectation was a significant independent predictor of treatment preference, with the best predictor being the expected benefit of nonoperative treatment. The variable “Net Advantage” for surgery, which is a composite of all 4 of the expectation parameters, is a very strong predictor of preference.

Self-Reported Influences on Preference

The factors reported by patients to be the major influences on their preferences are shown in Figure 2. For

Table 1. Characteristics of the Study Population by Preference Category

	Prefer Surgery (n = 489)	Prefer Nonsurgery/Not Sure (n = 251)	<i>P</i>
Age mean (standard error)	40.4 (0.5)	43.3 (0.8)	0.001
Female	209 (43%)	112 (45%)	0.62
Race			
White non-Hispanic	435 (89%)	218 (87%)	0.42
Hispanic	15 (3%)	6 (2%)	
Black	24 (5%)	17 (7%)	
Education – at least some college	350 (72%)	197 (78%)	0.003
Comorbidity			
Average number of comorbidities	1.0 (0.1)	1.1 (0.1)	0.35
Heart/lung disease	34 (7%)	16 (6%)	0.74
Depression/anxiety	66 (14%)	40 (16%)	0.40
Work status			
Full-/part-time employed	280 (57%)	179 (71%)	0.002
Disabled	74 (15%)	23 (9%)	
Other	136 (28%)	49 (20%)	
Baseline health status mean (standard error)			
BP	21.1 (0.7)	36.5 (1.4)	<0.001
PF	29.8 (1.0)	50.3 (1.6)	<0.001
ODI (modems version)	58 (0.8)	38 (1.3)	<0.001
PCS	28.3 (0.3)	34.4 (0.6)	<0.001
MCS	43.7 (0.5)	46.2 (0.7)	0.005
Leg pain (freq/bother) 0–6	5.2 (0.1)	4.1 (0.1)	<0.001
Symptom duration			
6 wk or less	56 (12%)	50 (20%)	<0.001
7–12 wk	100 (20%)	67 (27%)	
3–6 mo	216 (44%)	82 (33%)	
More than 6 mo	117 (24%)	52 (21%)	
Other nonoperative treatments			
Passive modalities	452 (92%)	228 (91%)	0.45
Physical therapy	360 (74%)	176 (70%)	0.31
Chiropractic/manipulation	184 (38%)	97 (39%)	0.79
Injections	251 (51%)	120 (48%)	0.36
Complementary/alternative	72 (15%)	36 (14%)	0.89
Anti-inflammatories/OTC	324 (66%)	182 (73%)	0.083
Narcotic pain medications	285 (58%)	80 (32%)	<0.001
Antidepressants/muscle relaxant	148 (30%)	64 (26%)	0.17
What people influenced preference?			
Personal physician	198 (41%)	109 (43%)	0.44
Family	52 (11%)	27 (11%)	0.96
Friends	65 (13%)	40 (16%)	0.33

both groups, ability to work and pursue usual activities was the most cited factor, and was somewhat more prevalent as a factor for patients with a preference for surgery, as was the ability to pursue leisure activities. Recommendations of the physician were also a commonly cited influence but did not differ between preference groups. The most dramatic difference between those preferring surgery and the others was in the influence of their concern about surgical risk and their assessment of their prior experience with nonoperative treatment. Patients preferring surgery were about one fifth as likely (9% vs. 50%; *P* < 0.001) to state that concern over surgical risk influenced their preference and were nearly 6 times as likely (46% vs. 8%; *P* < 0.001) to state “prior nonoperative care ineffective” as a reason for their pref-

Table 2. Expectations as Predictors of Surgical Preference

Covariate	Univariate OR (95% CI)	C Statistic	Multivariate OR (95% CI)
Expected benefit of surgery	1.99 (1.73–2.30)	0.72	2.12 (1.74–2.58)
Expected harm of surgery	0.33 (0.26–0.42)	0.70	0.57 (0.41–0.81)
Expected benefit of nonoperative	0.45 (0.39–0.51)	0.84	0.44 (0.37–0.51)
Expected harm of nonoperative	2.03 (1.72–2.39)	0.69	1.46 (1.15–1.86)
Net advantage for surgery	2.00 (1.80–2.22)	0.90	

erence. Other influencing factors were cited equally by both preference groups

Adjusted Analyses

Results of our multiple logistic regression model are shown in Table 3. In addition to expectation, independent predictors of a preference for surgery were age, disability as measured by the ODI, the frequency and bothersomeness of leg pain, and statements concerning the risk of surgery and/or the ineffectiveness of nonoperative treatment. Younger patients with greater disability,

worse leg pain, and those who stated that prior nonoperative treatment had been ineffective were more likely to prefer surgery. Those who stated concerns about surgical risk were less likely to prefer surgery. The overall predictive power of the model was good with a C statistic of 0.93.

Predictors of Expectation

Factors associated with expected advantage for surgery were evaluated with multiple linear regression. Not surprisingly, given the strong relationship between expectation and preference, significantly associated variables were very similar to those for preference: those with greater disability on the ODI, those stating that prior nonoperative treatment had been ineffective, and those who did not state a concern about surgical risk reported higher expected advantage from surgery. Additional covariates independently associated with higher expected advantage from surgery were a longer duration of symptoms, lower general physical function on the SF-36, and a stated concern about being able to pursue leisure activities (Table 4).

Factors associated with overall Expectations Optimism were also evaluated. In general, these factors tended to run in the opposite direction of those associated with higher expectation of and preference for surgery. These factors

Major Influences on IDH Patient Preferences

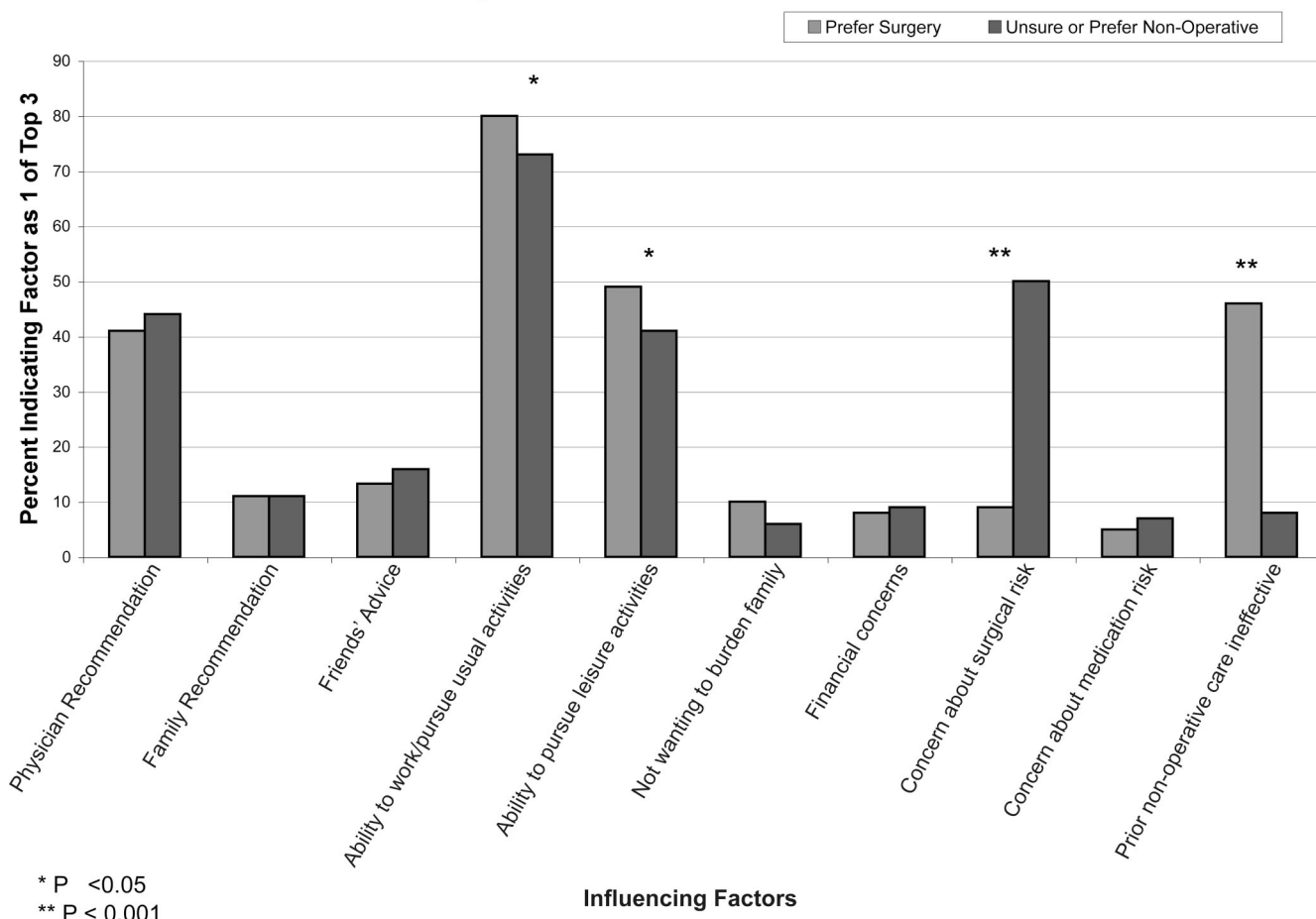


Figure 2. Major influences on IDH patient preferences.

Table 3. Factors Predicting Surgery Preference in Multiple Logistic Regression

Covariate	OR (95% CI)	P
Age (per decade)	0.72 (0.58–0.90)	0.004
ODI (modems version) per 10 pts	1.33 (1.18–1.51)	<0.001
Leg pain (freq/bother 0–6) per 1 pt	1.24 (1.05–1.46)	0.011
Net expected advantage surgery (–12 to 12) per pt	1.74 (1.55–1.96)	<0.001
Concerned about surgical risk	0.33 (0.18–0.58)	<0.001
Nonoperative treatment had not been effective	2.81 (1.53–5.13)	<0.001

were, lower levels of education; higher levels of unemployment/disability; greater disability; longer duration of symptoms; previous active physical therapy or spinal injections; strong influence of personal physician on preferences; concern about finances and about being a burden to their family; ability to pursue leisure activities; and self-reported ineffectiveness of prior nonoperative treatment, all negatively associated with expectations optimism (Table 4).

Discussion

Patient expectations are the primary determinant of preference for operative or nonoperative care among patients with lumbar intervertebral disc herniation. We found that patients in this prospective cohort study who preferred surgery tended to have a stronger, more definite preference than those preferring nonoperative treatment. In addition, we found that demographic, functional status, and prior treatment experience had significant associations with patients’ expectations and preferences. In general, less educated patients with greater disability, longer duration of symptoms, and who reported that prior nonoperative treatments had been ineffective had lower overall expectations optimism but higher relative expectations for surgery.

The strong preferences for surgery in this cohort may in part be related to the character of the centers and patients enrolling in this study. Because all patients needed to be evaluated, have had symptoms for at least 6 weeks, and considered surgical candidates, the enrollment procedures may have preferentially identified those patients having a preference for surgery; in fact greater than 80% of subjects were enrolled by surgeons. Nevertheless, a significant number preferred nonoperative treatment, and we were able to study differences between these groups.

There seemed to be a certain reluctance threshold that needed to be overcome for patients to develop a preference for surgery. When the expected benefits were equal, patients tended to prefer nonoperative treatment due to perceived higher risk of surgery. When the risks were expected to be equal and the expected benefit from surgery higher—an expressed risk/benefit ratio in favor of surgery—patients still remained uncertain in their preference. Only when both the expected benefits from surgery were higher and the expected harms were lower, and in fact when the reported expectation of harm from nonoperative care was greater than the expectation of benefit, did patients state a clear preference for surgery. It seems that some aspects of the patients risk/benefit analysis remained uncaptured by the expectations questions we asked.

It is notable that the expressed expectation of benefit from nonoperative care was the most powerful single predictor of patient preference—greater than the expectation of benefit from surgery or the expectation of harm from surgery. This has important implications for decision aids and informed choice for herniated disc surgery. It suggests that an accurate assessment of the patient’s chances of improvement with nonoperative care is critical for creating informed preferences and should be a key component of decision aids and informed consent discussions.

Table 4. Significant Predictors of Preference and Expectations in Multivariate Regression Models

	Expected Advantage for Surgery (Adj R2 = 0.39)	Prefer Surgery (C = 0.93)	Expectations Optimism (Adj R2 = 0.21)
Age (older)	—	↓	—
Education (HS or less)	—	—	↓
No. comorbidities	—	—	↓
Unemployed/disabled	—	—	↓ ↓ ↓
Physical function (SF-36)	↓	—	—
Impairment (ODI)	↑ ↑ ↑	↑ ↑ ↑	↓ ↓ ↓
Leg pain	—	↑	—
Symptoms >3 mo	↑ ↑	—	↓ ↓
Physician influenced pref.	—	—	↓
Prior treatments			
PT	—	—	↓
Injections	—	—	↓
Concerns			
Leisure activities	↑	—	↓
Burden to family	—	—	↓ ↓ ↓
Finances	—	—	↓ ↓ ↓
Surgical risk	↓ ↓ ↓	↓ ↓ ↓	—
Prior Rx ineffective	↑ ↑ ↑	↑ ↑ ↑	↓ ↓ ↓
Expected advantage for surgery	N/A	↑ ↑ ↑	N/A

Arrows indicates the direction and the number of arrows the strength of the association.

The characteristics of patients expressing a preference for surgery seem clinically sensible. Those with more severe, longer lasting symptoms and those with greater symptoms were more likely to prefer surgery; these characteristics seem intuitively obvious, and in fact, this group is probably more likely to benefit from surgery. Younger patients were more likely to prefer surgery, which may relate to an increased perception of surgical risk by older patients. The role of lower level of education and increased work disability is less clear; these characteristics do not predispose to a good surgical outcome, although they will likely do as poorly or worse with nonoperative treatments.^{16,17} One speculation is that patients with lower educational attainment may have had more strenuous work demands affecting both their work disability and their treatment preferences, but this was not directly measured.

A key finding of this investigation is the marked differences in baseline characteristics between patients with differing expectations and preferences for surgery. These differences may affect the outcomes in these 2 groups. Two recent studies have reported that IDH patients with higher expectations of improvement with surgery were more satisfied after surgery than those with lower expectations; however, these studies neither evaluated nor controlled for differences between expectation groups.^{18,19} Careful attention to controlling for clinical and demographic differences will be important in future studies of the effect of expectations and preferences on treatment outcome.

■ Key Points

- Patient expectations are the primary determinant of preference for operative or nonoperative care among patients with lumbar intervertebral disc herniation.
- Demographic, functional status, and prior treatment experience had significant associations with patients' expectations and preferences.
- The expectation for benefit from nonoperative care was the most powerful single predictor of patient preference. This has important implications for decision aids and informed choice for herniated disc surgery.

References

1. McGregor AH, Hughes SP. The evaluation of the surgical management of nerve root compression in patients with low back pain. Part 2: patient expectations and satisfaction. *Spine* 2002;27:1471-6; discussion 6-7.
2. Thomas MR, Lyttle D. Patient expectations about success of treatment and reported relief from low back pain. *J Psychosom Res* 1980;24:297-301.
3. Iversen MD, Daltroy LH, Fossel AH, et al. The prognostic importance of patient pre-operative expectations of surgery for lumbar spinal stenosis. *Patient Educ Couns* 1998;34:169-78.
4. Linder-Pelz S. Social psychological determinants of patient satisfaction: a test of five hypothesis. *Soc Sci Med* 1982;16:583-9.
5. Linder-Pelz SU. Toward a theory of patient satisfaction. *Soc Sci Med* 1982;16:577-82.
6. Mondloch MV, Cole DC, Frank JW. Does how you do depend on how you think you'll do? A systematic review of the evidence for a relation between patients' recovery expectations and health outcomes. *Can Med Assoc J* 2001;165:174-9.
7. Pollo A, Amanzio M, Arslanian A, et al. Response expectancies in placebo analgesia and their clinical relevance. *Pain* 2001;93:77-84.
8. Turner JA, Jensen MP, Warme CA, et al. Blinding effectiveness and association of pretreatment expectations with pain improvement in a double-blind randomized controlled trial. *Pain* 2002;99:91-9.
9. Lutz GK, Butzlaff ME, Atlas SJ, et al. The relation between expectations and outcomes in surgery for sciatica. *J Gen Intern Med* 1999;14:740-4.
10. Kalaoukalani D, Cherkin DC, Sherman KJ, et al. Lessons from a trial of acupuncture and massage for low back pain: patient expectations and treatment effects. *Spine* 2001;26:1418-24.
11. McPherson K, Britton AR, Wennberg JE. Are randomized controlled trials controlled? Patient preferences and unblind trials. *J R Soc Med* 1997;90:652-6.
12. Birkmeyer NJ, Weinstein JN, Tosteson AN, et al. Design of the spine patient outcomes research trial (SPORT). *Spine* 2002;27:1361-72.
13. Weinstein JN, Lurie JD, Tosteson TD, et al. Surgical versus nonsurgical treatment for lumbar degenerative spondylolisthesis. *N Engl J Med* 2007;356:2257-70.
14. Weinstein JN, Lurie JD, Tosteson TD, et al. Surgical vs nonoperative treatment for lumbar disk herniation: the spine patient outcomes research trial (SPORT) observational cohort. *JAMA* 2006;296:2451-9.
15. Weinstein JN, Tosteson TD, Lurie JD, et al. Surgical vs nonoperative treatment for lumbar disk herniation: the spine patient outcomes research trial (SPORT): a randomized trial. *JAMA* 2006;296:2441-50.
16. Atlas SJ, Chang Y, Kammann E, et al. Long-term disability and return to work among patients who have a herniated lumbar disc: the effect of disability compensation. *J Bone Joint Surg Am* 2000;82:4-15.
17. Atlas SJ, Chang Y, Keller RB, et al. The impact of disability compensation on long-term treatment outcomes of patients with sciatica due to a lumbar disc herniation. *Spine* 2006;31:3061-9.
18. Ronnberg K, Lind B, Zoega B, et al. Patients' satisfaction with provided care/information and expectations on clinical outcome after lumbar disc herniation surgery. *Spine* 2007;32:256-61.
19. Toyone T, Tanaka T, Kato D, et al. Patients' expectations and satisfaction in lumbar spine surgery. *Spine* 2005;30:2689-94.