

The Impact of Patient Expectations on Outcome Following Treatment for Spinal Trauma

Part 1: What Are Spine Surgeons Telling Their Patients?

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Study Design. Surgeon completed questionnaire.

Objective. To determine information provided by spine surgeons to patients, part of a 4-part study determining the impact of patient expectations on outcome following spinal trauma.

Summary of Background Data. An important goal of treatment is patient satisfaction, which may be influenced by patient expectations. Impact of patient expectations on outcome has been demonstrated in various elective orthopedic populations. It is anticipated that there will be similar, if not greater, impact on outcome in a trauma setting.

Methods. A questionnaire was developed, in a case-based format, to determine the information provided by spine surgeons to their patients. There were 3 questionnaires, each consisting of 5 cases and grouped by cervical spine trauma, thoracolumbar spine trauma, and spinal cord injury. These questionnaires were distributed to members of the Spine Trauma Study Group and our division. Statistical analysis consisted of a single-factor random effects model. In this analysis, the degree of variability was quantified as the ratio of surgeon induced variance over total variance for the questions.

Results. Questionnaires were distributed to 54 surgeons and 31 responses received (57%). There was substantial variability in responses ranging from a ratio of 9% [95% confidence interval (CI): 0–26] for the regaining range of motion 1 year following cervical spine trauma domain to a ratio of 84% (95% CI: 69–92) for the early postoperative spasticity following spinal cord injury domain.

Conclusion. This study demonstrated substantial variability in the information provided by spine surgeons to spine trauma patients and the need to improve the quality of information provided, allowing patient expectations to be more appropriate, potentially maximizing their outcome. Further areas for study include, assessment of the best available evidence on which to base information provided to spinal trauma patients, determination of what information spinal trauma patients view as relevant and the effect appropriate expectations have on outcome.

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One of the primary goals of treatment for any condition, surgical or nonoperative, is to maximize patient satisfaction and health related quality of life (HRQOL). Many factors can potentially influence the perception of satisfaction, including patient expectations. It has been demonstrated that the success of treatment is, to some extent, related to the patient's expectation of the outcome.^{1–6} This may be, in part, because of the finding that satisfied patients are more likely to be compliant with instructions and participate in rehabilitation programs, thereby maximizing recovery.⁷ Conversely, patients may have unrealistic expectations of outcome and this may lead to lower satisfaction with the results of treatment and poor outcomes in both spinal decompression surgery⁸ and total joint arthroplasty.⁹ Jamison *et al*¹⁰ further recommended that patients with expectations of complications be considered for “. . . psychological support and patient education . . .” because of an increased risk of poor outcomes because of the anticipation of experiencing a complication.

Spinal trauma, particularly if associated with a spinal cord injury, can have a life altering impact on patients. Recovery from such injuries is multifactorial in part related to the underlying injury and ability for recovery of neurologic function, but is, at least in part, related to the ability of the patient to rehabilitate and mentally and physically adapt to the sequelae of the injury. It is reasonable to infer that the extent of recovery is due partly to the expectations a patient may have regarding recovery from the injury. Most spine trauma patients are not aware of the anticipated outcome following specific injury patterns and indeed perceive most spine injuries as severe and life altering, the primary source of information which will be used in the development of patient expectations is that which is provided by the treating surgeon. Given this, the degree to which the information provided by different surgeons is similar can have a substantial impact on the larger population of patient expectations and, as a result, outcome.

It was the purpose of this study to estimate the magnitude of variability between spine surgeons, with an interest in trauma care, regarding the information provided to patients concerning the prognosis of specific types of injury. Ideally, there would be low variability in this information since the literature on which the prognosis is based is the same for all surgeons. In addition, in order for the larger population of spine trauma patients

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I. 22 year old male construction worker with stable Jefferson Fracture. Treated with cervical orthosis followed by gradual mobilization.

1. How long will it take for patient to return to work (heavy labor) job?

- a. less than 4 weeks
- b. 4–8 weeks
- c. 9–16 weeks
- d. 17–26 weeks
- e. greater than 26 weeks

Figure 1. Example of a question from the cervical spine questionnaire.

to have similar expectations, given the same injury, the provided information should be similar. It is anticipated that this data will be used as part of a multiphased approach to investigating the impact of patient expectation on outcome.

Materials and Methods

Design

This study consisted of a qualitative analysis of questionnaire results which were developed for the purpose of this study. Three questionnaires were developed by spine experts from surgery, nursing, and physiotherapy. Each questionnaire covered an area related to spine trauma; cervical spine, thoracolumbar spine, and spinal cord injury (Figures 1–3). Five cases were developed for each area, for a total of 15 cases. For each case, questions were asked related to the expected prognosis for the specified injury and patient. Within each area, the questions were grouped according to topic, for example range of motion or pain. These questionnaires were then distributed to academic spine surgeons throughout North America who all had a subspecialty interest and significant practice in spine trauma. The surgeons, and consequently the centers represented, were all members of the Spine Trauma Study Group and therefore were felt to be representative of a group of experts in spine trauma.

Statistical Analysis

The results of the questionnaires were collected. Statistical analysis consisted of a separate analysis conducted for each type of injury: thoracolumbar, cervical, and neurologic. Within each injury type, domains of recovery, such as pain or range of motion were identified. Within each domain, a random effects model was applied in which the surgeon was treated as random factor with 31 levels, the total number of respondents, and pooled cases were treated as replicates. Total variance of the domain and the variance introduced from the surgeons were estimated. The ratio of the surgeon induced variation to the total variance, with the accompanying 95% confidence interval (CI), was determined. Using this analysis, a greater magnitude of variation which was because of surgeon induced variation indicated greater differences between surgeons regarding the information provided to patients.

III. 30 year old lawyer with an L2 flexion distraction injury treated with ORIF L1–L3 with successful fusion.

1. What are the chances of being free of back pain and stiffness 1 year after my injury?

- a. no chance (0%)
- b. small chance (less than 25%, greater than 0%)
- c. moderate chance (25–75%)
- d. big chance (greater than 75%, but not certain)
- e. certain (100%)

Figure 2. Example of a question from the thoracolumbar spine questionnaire.

II. 22 year old female C6 (no motor or sensory activity distal to C6 and wrist extensors) ASIA A secondary to C5-6 fracture dislocation treated with anterior posterior stabilization.

1. In emergency, prior to operative intervention (BCR absent) what do you tell the patient and/or family are the chances for any functional recovery in her lower extremities?

- a. no chance (0%)
- b. small chance (less than 25%, greater than 0%)
- c. moderate chance (25–75%)
- d. big chance (greater than 75%, but not certain)
- e. certain (100%)

Figure 3. Example of a question from the spinal cord injury questionnaire.

Results

The questionnaire was distributed to a total of 53 surgeons and was completed by 31 (57%) representing 20 centers across North America. Overall, there was a large amount of variation in the responses. The domain with the lowest amount of variation, which was because of differences between the surgeons, was improvement in range of motion at 1 year following cervical spine trauma. For this domain, 9% of the total variation in responses was because of variation between surgeons (95% CI: 0–26). The domain with the greatest variability was the likelihood of spasticity in the immediate postoperative period following spinal stabilization after spinal cord injury. The amount of variability which was attributed to the surgeons’ responses for this domain was 84% (95% CI: 69–92). The results of the analysis of variability among each domain is listed in Table 1. The data were arranged in this fashion in order to group similar clinical concerns, such as neurologic function or pain. For statistical considerations, in order to facilitate the analysis the questions regarding neurologic function were grouped together.

Discussion

The purpose of this study was to estimate the extent of variability in the information a spine trauma surgeon is

Table 1. Variability in Surgeons Response to Spinal Trauma Questionnaires

Questionnaire	Domain	Proportion of Variability Because of Surgeon Differences (95% Confidence Interval)
Cervical spine	Pain free 1 yr after injury	38% (22–57)
	Regaining range of motion 1 yr after injury	9% (0–26)
Thoracolumbar spine	Pain free 1 yr after injury	45% (29–63)
	Regaining range of motion 1 yr after injury	40% (22–56)
Spinal cord injury	Neurologic pain immediately postoperatively	48% (32–65)
	Normal quality of life	33% (10–51)
	Regaining functional motor strength	10% (0–28)
	Spasticity in early postoperative time	84% (69–92)
	Recovery of bowel, bladder, and sexual function	14% (0–32)

likely to provide to a patient following injury. This study has provided evidence that there is a relatively high degree of variability between surgeons regarding the information which would be provided to patients. This is based on the relatively high degree of variability in the responses to the questions, which were designed to represent typical cases encountered by a spinal trauma surgeon. The extent to which patient expectations are based on the information provided by surgeons as well as the true impact of different information provided by different surgeons on development of patient expectations and subsequent impact on outcome remains to be determined and will be examined in subsequent studies within this series.

The impact of patient expectations on the outcome following treatment has been studied in the psychotherapy and internal medicine literature and, more recently, the orthopedic literature, particularly among arthroplasty populations^{9,11} and in the management of lumbar spine degenerative disorders.^{1,2,4,8,12,13} A systematic review of the impact of patient expectations on outcome across a wide range of clinical topics included 16 studies, of which fifteen reported an association between positive expectations and better outcomes.⁶ The results were presented qualitatively because the high degree of heterogeneity among included studies precluded pooling of results and subsequent statistical analysis. Similarly, it was necessary to present our results in a predominantly qualitative fashion because of heterogeneity between the cases on the questionnaire. There have been no previous studies in the spine literature, either in elective or trauma populations, which have investigated the variability between surgeons regarding the information provided to patients.

One of the clinical areas within Orthopedic practice which has been most extensively investigated regarding the role of patient expectations in outcome has been lumbar spine pathology. Kalauokalani *et al*⁴ reported the results of a secondary analysis of patients enrolled in a randomized controlled trial of massage, acupuncture, and self-care on the outcome of low back pain. They noted that patients with higher expectations demonstrated a clinically important improvement on the Roland Disability Scale¹⁴ compared with those with lower expectations. The relative risk for improvement of patients with a higher expectation, compared with those with lower expectations, was 5.3 (95% CI: 1.9–15.4). Ronnberg *et al*¹² studied 172 patients treated with lumbar spine discectomy and reported that higher patient expectations regarding improvement in symptoms and function were associated with better self-reported outcomes following surgery. These studies demonstrate the impact of patient expectations on outcome following treatment of chronic lumbar spine disorders.

The impact of preoperative expectations on postoperative outcome in patients surgically treated for lumbar spine pathology was studied by de Groot *et al*¹³ who investigated 120 patients treated with lumbar discectomy or decompression for lumbar stenosis.

Preoperative patient expectations were determined *via* open-ended questions in structured interviews and postoperative satisfaction using a 4-point Likert scale. Those patients who expected to have postoperative pain demonstrated the greatest dissatisfaction with outcome. This suggested that anticipation of an outcome, in this instance pain, may contribute to a greater experience of that expectation. These findings were also reported by Wallace.³ Flood *et al*¹⁵ reported that positive expectations of postoperative improvement, in the setting of urologic surgery, was associated with higher self-reported improvements.

Further study of the impact of patient expectations was performed by McGregor and Hughes⁸ in 84 patients with nerve root compression, of whom 77 underwent surgical management. The outcome was determined using the SF-36¹⁶ and Oswestry Disability Index.¹⁷ Their analysis revealed that patients expected results which were substantially higher than the actual postoperative results. Similar results have been reported in arthroplasty populations.^{9,18}

The largest study of this topic was reported by Lutz *et al*¹ in a sample of 273 patients treated for sciatica with discectomy. They reported that patients with expectations for shorter length of recovery had higher levels of self-reported satisfaction 1 year after surgery, with an odds ratio of 2.2 (95% CI: 1.1–4.4) using the Roland back disability scale¹⁴ and the SF-36.¹⁶

Iversen *et al*² studied 228 patients 6 months following surgery for lumbar spinal stenosis. Preoperative expectations were determined with structured interviews and functional outcomes measured with the Sickness Impact Profile.¹⁹ They reported that preoperative expectations, related to improvement in function, were significantly associated with improved postoperative function at 6 months, however, greater expectations regarding pain relief were associated with higher levels of dissatisfaction after surgery. The explanation for this discrepancy was unclear, but may have resulted from differences in conceptualization of pain and function.

The true impact of patient expectation on outcome following traumatic disorders is unknown. However, it is reasonable to infer that since such an association has been demonstrated in patients undergoing elective spine surgery, then an association between expectations and outcome likely exists among spinal trauma patients. It is possible that the sudden and unanticipated nature of traumatic disorders and the lay population's faint perception of life altering impairment secondary to spine trauma, may maximize this association. This concept along with our study's finding of substantial variability in what surgeons tell patients about critical outcomes such as pain (45% and 48%) and spasticity (84%) after trauma, establishes the need for a more consistent evidence based approach on what spine surgeons tell patients. It is important to emphasize that standardizing the information provided to patients does not suggest

that an attempt be made to either overstate or understate the anticipated outcome, but rather provide the best available information, on the basis of the best available literature.

There are limitations inherent within this study. A significant limitation of the study is the low response to the survey, as only 57% of surgeons completed the questionnaire. The impact of differences between those who did and did not return the questionnaire is unknown. The eligible cohort however, was the Spine Trauma Study Group, a group of academic neurosurgical and orthopedic spine surgeons with subspecialty interest in spine trauma. A group of experts would tend to bias toward the null hypothesis and therefore the response rate is probably acceptable.

Another limitation is that the cases from the questionnaires were developed by the authors for use in this study and, consequently, have not been validated for ability to determine variability in responses. As there is no questionnaire model in existence for use in this manner, it was necessary to develop such a questionnaire. It is, however, possible that the variability in responses was due, in part, to elements of the questionnaire. This was statistically controlled to the greatest possible extent by estimating the proportion of the total variability which was because of differences between the surgeons. The questionnaires were developed to cover the most common forms of spinal trauma and neurologic injury. It is possible that the most relevant pieces of information, from the patient's perspective, were not incorporated into the questionnaire as it was developed by experts in the care of spine trauma. The impact of this limitation on the results, and in particular the implications of the high variability of information provided by surgeons, is unknown. However, the high variability in information which would be provided to patients, encountered in this study, suggests that more emphasis may be warranted to standardize the information provided to patients. Furthermore if the information surgeons thought was important is conveyed to patients in a highly variable manner, it is likely that information that patients deem relevant may be explained with even more variability by surgeons.

A final limitation to this study is the bias incurred by assuming that the responses which were provided by the surgeons represented a valid surrogate for the information which would be provided in the context of clinical care. It is difficult to address this possible bias and therefore it was accepted.

The relevance of this study relates to the importance between patient expectations and outcome following treatment. There is a relatively large body of literature demonstrating the association between patient expectations and outcome following treatment. Spinal trauma, in particular spinal cord injury, represents a potentially life altering event. Optimal outcome following such injuries are dependent on many physical and psychosocial factors. Since patient expectations have been demonstrated to impact the outcome following treatment in an elective setting, it is rea-

sonable to anticipate that there will be a similar, if not greater, impact on outcome in a trauma setting. Despite the fact that spinal trauma represents a potentially life altering state and rehabilitation from such injuries is highly dependent on patient compliance and involvement, the impact of patient expectations on outcome has not yet been studied in this population.

It is likely that there are numerous factors which contribute toward the development of patient expectations. Concerns regarding the type, likelihood, and outcome of complications may impact overall results following management of spine trauma. The development of patient expectations is likely based on several factors, including the content of the information, the manner in which it is provided, patient factors, such as previous experiences and coping skills, and the consistency with which information is provided by the entire health care team to the patient and family. These aspects, though important, were not the purpose of this study but do warrant future study. Given the lack of study of this topic in the literature, the true impact of patient expectations in this area is largely unknown. It is for these reasons, that we believe that further study is important. It is important to emphasize that the purpose of this study was to estimate the variability regarding the information provided by spine surgeons to their trauma patients. Further study is necessary to determine if there is an impact on the outcome, on the basis of the information provided to the patients. The first step in the process of studying this association was felt to be determination of a better understanding of the variability in the information provided to patients because this is thought to be a large component of the knowledge used by the patient in the development of expectations.

■ Conclusion

This study has demonstrated that there is a high degree of variability, up to 84% in some domains, in the information which experienced spinal trauma surgeons provide to their patients regarding prognosis. This variability becomes highly relevant in the context of the well-documented phenomenon regarding the impact of patient expectations on outcome. Though further study of this association in the trauma setting is required, it would seem that standardization, on the basis of available literature and consensus expert opinion, of the information provided by surgeons to patients regarding prognosis and outcome is necessary.

With variability among spine surgeons in what they tell their injured patients established, the final 3 phases of the study will be initiated. Phase 2 will include determination of the best available information, on the basis of systematic reviews, which should be provided to patients about their injury. A third study will answer the question about what information patients most want to be provided after spinal injury. Finally the impact or results of providing accurate, appropriate, and desired informa-

tion to allow patients to develop realistic expectations on patient outcome following treatment will be determined.

■ Key Points

- There is substantial variability in the information provided by spine surgeons to their trauma patients.
- It is necessary to improve the quality of information provided to spinal trauma patients, thereby allowing their expectations to be more appropriate, potentially maximizing their outcome.
- Further study will require assessment of the best available evidence with which to base the information to be provided, determination of what information patients view as being relevant following spinal trauma and the effect appropriate expectations has on outcome.

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References

1. 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.
2. 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.
3. Wallace LM. Surgical patients' expectations of pain and discomfort: does accuracy of expectations minimise post-surgical pain and distress? *Pain* 1985;22:363-73.
4. Kalauokalani 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.
5. Nettleman MD. Patient satisfaction—what's new? *Clin Perform Qual Health Care* 1998;6:33-7.
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. *CMAJ* 2001;165:174-9.
7. Carr-Hill RA. The measurement of patient satisfaction. *J Public Health Med* 1992;14:236-49.
8. 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.
9. Haddad FS, Garbuz DS, Chambers GK, et al. The expectations of patients undergoing revision hip arthroplasty. *J Arthroplasty* 2001;16:87-91.
10. Jamison RN, Parris WC, Maxson WS. Psychological factors influencing recovery from outpatient surgery. *Behav Res Ther* 1987;25:31-7.
11. Noble PC, Condit MA, Cook KF, et al. The John Insall Award: patient expectations affect satisfaction with total knee arthroplasty. *Clin Orthop Relat Res* 2006;452:35-43.
12. 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.
13. de Groot KI, Boeke S, Passchier J. Preoperative expectations of pain and recovery in relation to postoperative disappointment in patients undergoing lumbar surgery. *Med Care* 1999;37:149-56.
14. Roland M, Morris R. A study of the natural history of back pain. Part I. Development of a reliable and sensitive measure of disability in low-back pain. *Spine* 1983;8:141-4.
15. Flood AB, Lorence DP, Ding J, et al. The role of expectations in patients' reports of post-operative outcomes and improvement following therapy. *Med Care* 1993;31:1043-56.
16. Brazier JE, Harper R, Jones NM, et al. Validating the SF-36 health survey questionnaire: new outcome measure for primary care. *BMJ* 1992;305:160-4.
17. Fairbank JC, Couper J, Davies JB, et al. The Oswestry low back pain disability questionnaire. *Physiotherapy* 1980;66:271-3.
18. Aarons H, Hall G, Hughes S, et al. Short-term recovery from hip and knee arthroplasty. *J Bone Joint Surg Br* 1996;78:555-8.
19. Follick MJ, Smith TW, Ahern DK. The sickness impact profile: a global measure of disability in chronic low back pain. *Pain* 1985;21:67-76.