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Clinical Study

Improving postoperative patient reported benefits and satisfaction following spinal fusion with a single preoperative education session

Donna Eastwood, RN, MN, ONC[b], Neil Manson, MD, FRCSC[a,b,c,*], Erin Bigney, BA, MA[a], Mariah Darling, BSc[a], Eden Richardson, BA[a], Richard Paixao, PT[b], Tracy Underwood, OT Reg[b], Kate Ellis, BA[a], Edward Abraham, MD, FRCSC[a,b,c]

[a] *Canada East Spine Centre, Saint John Regional Hospital, 400 University Ave, PO Box 2100, Saint John, New Brunswick, Canada, E2L 4L4*

[b] *Saint John Regional Hospital, Horizon Health Network, 400 University Ave, PO Box 2100, Saint John, New Brunswick, Canada, E2L 4L4*

[c] *Department of Surgery, Dalhousie University, 100 Tucker Park Rd, Saint John, New Brunswick, Canada, E2K 5E2*

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Abstract

BACKGROUND CONTEXT: Patient expectations have been demonstrated to influence recovery following spine surgery. Addressing patient expectations specifically in regards to pain and postsurgical healing is an important factor in improving recovery patterns. Presurgical education can potentially help manage patient expectations.

PURPOSE: The primary objective was to determine if participation in a single preoperative multidisciplinary educational session would result in reduced patient dissatisfaction with surgical expectations. A secondary objective was to determine if participation resulted in improvements in postsurgical pain, disability, and reductions in emergency room visits following surgery.

STUDY DESIGN: A retrospective cohort study utilizing data from the Canadian Spine Outcomes and Research Network (CSORN) registry and hospital electronic medical records.

PATIENT SAMPLE: Participants were patients receiving elective spinal fusion for 2–5 levels (N=206). Cohort 1 included patients who participated in preoperative multidisciplinary education (n=103). Cohort 2 included patients who opted out of the educational session (n=103).

OUTCOME MEASURES: Outcomes measured included the Oswestry Disability Index (ODI), NRS scales for back and leg pain (NRS-B/NRS-L), CSORN questions pertaining to patient satisfaction with surgery and whether or not the surgery met expectations. Electronic chart review quantified emergency room visits following surgery.

METHODS: Spinal fusion patients are encouraged to attend a one time, two-hour education session 3–6 weeks prior to their surgery. The education session includes interactive discussions with nursing, physiotherapy, and occupational therapy staff concentrating on what patients should expect, how to best prepare for surgery and proper care postsurgery. A one-way ANOVA was conducted for continuous variables of interest (age, number of levels operated on, ASA score, and number of visits to the emergency room following surgery). Chi-squared analysis was conducted for categorical variables of interest (pathology, gender, patient satisfaction, and patient expectations). A two (Cohort; education: no education) × 2 (Time; baseline: follow-up) repeated measure ANOVA was conducted for NRS-B, NRS-L, and ODI. Significance was set at $p<.05$.

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* Corresponding author: Neil Manson, Canada East Spine Centre, Saint John Regional Hospital, 400 University Ave, PO Box 2100, Saint John, New Brunswick, Canada, E2L 4L4.

E-mail address: CESCresearch@gmail.com (N. Manson).

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RESULTS: Patients (n=103) who took part in the presurgical education sessions were significantly more satisfied with their surgery compared to the control cohort (p=.014). Patients (n=103) who did not participate in the education session failed to have their expectations met in terms of improvement in daily activities (p=.03), improvement in walking capacity (p=.03) and their expectation of back pain reduction (p=.001). There was a statistically significant effect of participation in the educational session reducing postoperative back pain (p=0.03), although this improvement did not reach a minimally clinically important difference. Number of visits to the emergency room in the 12 weeks following spine surgery was significantly lower (p=.04) for patients in the education cohort.

CONCLUSIONS: Reduced emergency room utilization, improved patient satisfaction, achievement of expected improvements and alleviation of back pain were documented with greater success following participation in a single 2-hour educational session prior to surgery. A single education session is a viable tool for improving patient outcomes due to its low administrative burden.

Keywords: Multidisciplinary preoperative education; Spinal fusion surgery; Patient expectations; Satisfaction.

Introduction

Preoperative education has been defined as providing patients with health-related information and teaching them skills aimed to reduce discomfort, complications, and providing psychosocial support [1]. Patients with more access to health information resources prior to surgery feel more prepared and have lower readmission rates [2]. The goal of education sessions is to mitigate risk, give patients realistic expectations for postsurgery, minimize surgical dissatisfaction, and maximize patient reporting of postoperative improvement [3,4]. Presurgical education has been shown to be effective in both managing patient expectations and improving outcomes, particularly in cardiac, and hip surgery patients [5–9]. In these populations, multidisciplinary education sessions led by healthcare professionals were found to be most beneficial [5,6,8]. However, there are limitations in the literature. Very few papers go into detail about the education session in terms of structure [5,6,8] making it exceedingly difficult to replicate and validate findings. It also makes it difficult to apply the concepts to different populations of surgical patients. Furthermore, some studies are limited by small sample sizes and a failure to consider measurement of both physical and psychosocial factors for the patient preoperatively. Other limitations include the need to measure both physical and psychosocial measures when evaluating preoperative education programs, the small number of studies, and sample sizes [5,6].

Research specific to the effect of preoperative patient education in relation to spinal fusion surgery is scarce. To both patients and physiotherapists [10], there is a need for preoperative education focused on patient's abilities postsurgery and pain education in the preoperative period for spine surgery patients. Papanastassiou et al. [8] found an effect of education in regard to patient satisfaction concerning pain management at a 1-week follow-up.

The primary aim of this study was to determine if a single 2-hour preoperative multidisciplinary education session positively impacts postoperative spinal fusion patient satisfaction and patient expectations. A secondary goal was to determine if preoperative education reduces pain, disability, and frequency of emergency department (ED) visits postsurgery.

Materials and methods

A retrospective cohort study of patients with data that was prospectively collected and entered into the Canadian Spine Outcomes and Research Network (CSORN) registry from 2014–2017. Additional information was obtained through electronic in-hospital records.

Patient demographics

Participants were adults (18+) who underwent elective thoracolumbar spinal fusion surgery by one of two fellowship-trained spine surgeons from a single tertiary-level institution and consented to be a part of the CSORN registry. Exclusion criteria were previous spine surgery and involvement in spine-related litigation. Participants were free to withdraw participation at any point during the study. This study was approved by the institutional Research Ethics Board.

Cohort 1 included 103 consecutively enrolled patients who participated in the CSORN registry and had complete follow-up data for 12 weeks following surgery. Cohort 1 patients participated in the optional, single, and multidisciplinary 2-hour education session 3–6 weeks prior to their fusion surgery.

Cohort 2 included randomly selected patients who contributed data to the CSORN registry and had complete 12-week surgical follow-up data. These patients declined

Part 2: Satisfaction with Surgery

1. Are you satisfied with the results of your spine surgery?

- ☐ Extremely satisfied
- ☐ Somewhat satisfied
- ☐ Neither satisfied nor dissatisfied
- ☐ Somewhat dissatisfied
- ☐ Extremely dissatisfied

Fig. 1. Satisfaction question as presented to the patient

participation in the education session, accepted participation but failed to attend, or were unable to participate due to geographic limitations. This cohort was randomly selected from the CSORN registry (n=103).

Education session

The education session consists of a one-time 2-hour session 3–6 weeks prior to surgery. The session includes interactive discussions with nursing, physiotherapy, and occupational therapy staff and concentrates on what to expect from surgery, how to best prepare, proper care following surgery, and the importance of the role a patient plays in their recovery. A more detailed description of the education session is included in Appendix A.

Materials of interest

Collected at baseline were patient demographics (age and gender), Initial clinical assessment (pathology details), the numerical rating scale for back pain (NRS-B), the numerical rating scale for leg pain (NRS-L), and the Oswestry Disability Scale (ODI).

Follow-up assessment occurred at 12 weeks following surgery and included the NRS-B, NRS-L, ODI, patient satisfaction (see Fig. 1), patient expectations on eight aspects of life (see Fig. 2) and quantification of emergency room visits.

Statistical analysis

A one-way ANOVA was conducted for continuous variables of interest (age, number of levels operated on, ASA score, and number of visits to the emergency room

4. Did the surgery fulfill your expectations?

#		Yes completely	Somewhat	No not at all	I do not know
1	Surgery prevented worsening				
2	Maintained independence				
3	Improved performance - daily activities				
4	Improved walking capacity				
5	Reduced leg pain				
6	Reduced back pain				
7	Resumed recreational activities				
8	Improved mental well-being				

Fig. 2. Question of expectations as presented to the patients.

Table 1
Baseline patient demographics by cohort

	Cohort 1 education	Cohort 2 no education	p value
n	103	103	———-
Gender			.104*
Male	61	51	
Female	42	52	
Mean age + SD	58.98 + 14.28	58.98 + 12.61	1.0†
# of levels operated on	2.96 +1.55	2.72 + 1.19	.229†
ASA	1.95 + .60	2.1 + .70	.073†
Missing	7 (6.8%)	0 (0.0%)	
MCS	52.0923	52.1433	0.689‡
Exercise behavior			0.551*
Never	49	56	
Once or less/ week	12	11	
Twice or more/ week	40	31	

* chi squared
† Anova
‡ t-test

Table 2
Patient pathology by cohort

Pathology	Cohort 1 education # %	Cohort 2 no education # %
Disc herniation	15 (14)	24 (23.30)
Degenerative disc disease	4 (3.8)	7 (6.79)
Stenosis	21 (20.39)	22 (21.36)
Spondylolisthesis	50 (48.52)	37 (35.92)
Deformity	13 (12.62)	13 (12.62)

following surgery). Chi-squared analysis was conducted for categorical variables of interest (pathology, gender, patient satisfaction, and patient expectations). A 2 (Cohort; education: no education) × 2 (Time; baseline: follow-up) repeated measure ANOVA was conducted for NRS-B, NRS-L, and ODI. Significance was set at $p<.05$.

Results

Cohorts did not differ significantly at baseline on gender (χ^2 [1, N = 206] = 1.957, p = .104), age, surgical levels, or ASA score (see Table 1). Patient pathology was not significantly different between cohorts (χ^2 [4, N = 206] = 4.86,

Table 3
Effect of time independent of cohort

Measures	Time of collection		
	Baseline *M SEM*	12 week follow-up *M SEM*	p value
ODI	47.22 .92	37.21 1.29	.001
Missing	0 (0.0%)	0 (0.0%)	
NRS-B	7.36 .01	3.23 .15	.001
Missing	2 (1.0%)	0 (0.0%)	
NRS-L	7.34 .15	3.51 .21	.001
Missing	1 (0.5%)	0 (0.0%)	

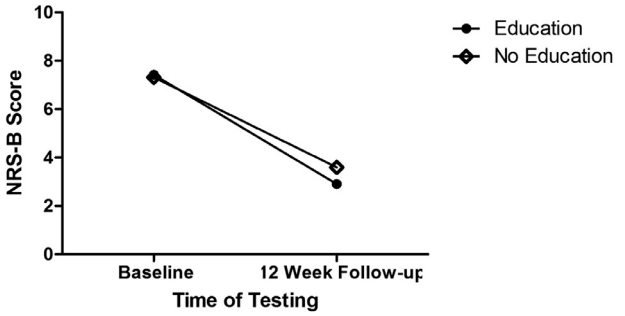

Fig. 3. NRS-B pain scores interaction between cohort and time.

p = .302). Breakdown of pathologies is presented in Table 2. The ANOVA found no significant differences on the main effect of cohort (F [3,200] = .793, p = .499) for NRS-B, NRS-L, or ODI scores. There was a significant difference on the main effect of time (F [3,200] =194.90, p=.001). All participants, independent of cohort, 12 weeks following surgery showed a significant reduction in reported NRS-B pain (F[1, 202] = 504.12, p<.001), NRS-L pain (F[1, 202] = 255.67, p < .001) and ODI scores (F[1, 202] = 64.106, p < .001; see Table 3). There was a significant interaction between cohort and time (F [3,200] = 3.546, p = .016). The time x cohort interaction was significant for NRS-B pain scores (F [1,202] = 3.99, p<.05; see Fig. 3). While the cohort that received the education session demonstrated statistically significantly lower NRS-B pain scores at follow-up, the difference did not meet the minimal clinical important difference (change of 2). The time x cohort interaction was not significant for ODI scores (F [1,202] =.937, p = .334) or NRS-L pain scores (F [1,202] = .574, p = .450).

Number of visits to the emergency room in the 12 week following spine surgery was significant (F [1,204] = 4.09, p = .044). The education cohort visited the emergency room significantly less often. Only 13.59% of patients within the education cohort visited the emergency room, and of that, 85.71% visited the emergency room one time for a complaint related to their back surgery, and 14.29% visited two times. In the cohort that did not receive an education session, 19.6% of patients went to the emergency room during the 12 weeks following surgery, 50% of those went one time 35% went two times and 15% went three times. The no education cohort had more than double the ER visits (33) compared to the education cohort (16).

Patient satisfaction was significantly different depending on the cohort (χ^2 [3, N = 206] = 17.12, p = .001). Participants who did not receive an education session were more likely to report being dissatisfied with their surgery (5.8% compared to 0%), and more likely to report being neither satisfied nor dissatisfied (11.7% compared to 1%).

There was no significant effect of cohort on managing patient expectations in preventing symptoms from getting worse (χ^2 [3, N = 206] = 1.89, p = .30), maintaining independence (χ^2 [3, N = 206] = 1.78, p = .31), reducing leg pain (χ^2 [3, N = 206] = 5.82, p = .06), resuming recreational activities (χ^2 [3, N = 206] = 1.32, p = .362), and for improving mental well-being (χ^2 [3, N = 206] = 5.81, p = .06). There was a significant effect of cohort in meeting patient expectation in regards to improved performance of daily activities (χ^2 [3, N = 206] = 7.18, p = .03). The no education cohort (18.0%) failed to meet expectations in regards to improved performance of daily activities expectations, more frequently than the education cohort (8.7%). There was a significant effect of cohort in meeting patient expectation for improved walking capacity (χ^2 [3, N = 206] = 9.87, p = .01) with the no education cohort (22.3%) more likely to report their expectations were not at all met, compared to the education cohort (11.7%). There was a significant effect of cohort in meeting patient expectation for reducing back pain (χ^2 [3, N = 206] = 14.13, p = .001). The no education cohort (11%) reported not meeting expectations for reduced back pain, compared to no patients in the education cohort.

Discussion

There is limited research addressing the utility of education on postsurgical outcomes within the spine population [11]. The current study adds valuable information and indicates patients who participated in a single 2-hour multidisciplinary education session 3–6 weeks prior to surgery had improved patient satisfaction and had their expectations met (improved daily activity, walking capacity, and back pain). Further, reduced utilization of the ED postoperatively was seen, as were statistically significant reductions in patient-reported back pain compared to the control cohort. These findings were all evident 12 weeks postsurgery.

Low patient satisfaction is linked to incongruities between patient's expectations for surgical outcomes and the reality of spine surgery outcomes [12,13]. There have been noted differences between patient and surgeon indications for undergoing surgery [14]. A surgeon may complete a technically perfect operation to alleviate neurologic dysfunction but, if the patient goes into surgery with the expectation of improved back pain with no improvement in this area postoperatively, surgical dissatisfaction can be expected. Having an information session in which realistic expectations are laid out for recovery resulted in managing patient expectations and increasing patient satisfaction in the current study. Most notably, all patients in the education cohort had their expectations met in regards to back pain. In general, prehabilitation/education programs that incorporate both physiotherapy and education typically report significant improvement in presurgical health status and postsurgical outcomes following major surgery [15–22]. Indeed, these programs should be sought after. However, these programs are often lengthy, costly, and involve high administrative burden [16–22]. The current study presents an alternative to use in the interim as it had significant results.

The advantages of the current education session include low cost and ease of implementation. Material costs include only the printed handouts making it a more viable option for a wide range of hospitals. Operational costs are mitigated as educational sessions with patients may be considered to be within the scope of practice of these multidisciplinary healthcare professionals. The potential direct-cost impact on the health care system must also be considered, as those who participate in preoperative education may be less likely to present to the ED postoperatively. In the current study, the difference (44.83%) between cohorts in the total number of ED visits within the 12 weeks following surgery represents a potential costs savings, and may impact ED staff/physician burden positively. In an over-taxed Medicare system, the potential for a low cost, low- administrative burden and education session to improve patient satisfaction is an important avenue to pursue.

A limitation of the current study is that it is retrospective cohort study as such intrinsic differences between those who chose to participate in the education session and those who did not are possible. For example, patients who participate in the education session could reflect a higher level of self-engagement or activation. While patient activation was not measured within these cohorts, no differences were seen in preoperative exercise behavior which is indicative of self-engagement or on mental health variables as measured by the Mental Component Summary (MCS) of the Short-Form 12 Health Survey (SF-12). Ideally to control for this, a randomized control trial would be conducted. Although, there were no cohort differences in pathology; it is possible the benefits that can be derived from participation in the education session would be mediated by pathology. The limited number of patients per pathology made an analysis of this effect impossible, but it is a potential confounding factor.

Conclusion

A single presurgical multidisciplinary education session is a reasonable, low-cost approach to improving elective thoracolumbar spine fusion (2−5 levels) patient's outcomes at 12 weeks postsurgery.

Appendix A

Education session

The education session takes place in the hospital amphitheater. When the patients arrive, they sign in, and receive a nursing handout, physiotherapy, and occupational therapy handout.

All participants are encouraged to bring someone to class with them.

The class being a safe space is emphasized to the participants, and they are also encouraged to move around as needed during the session.

Part 1: Orthopedic Nurse

- Team introduction
- Emphasis on health care team: Patient is important part of team; emphasis on patient responsibility
- Smoking cessation Information
- Events associated with hospitalization
  - Length of stay
  - Mobilization
  - Routine nursing care
  - Discharge Info
  - Back brace
- On two separate occasions a phone number is provided for patient to contact with any questions

Part 2: Physiotherapist

- Emphasis on everyone's back surgery being different—some things will not apply to everyone
- Pain management—Patient roles and impact on mobilizing and functioning
- Emphasis on functional activities (ie, transfers, walking, stairs) rather than formal inpatient exercise sessions
  - Importance of sitting and walking highlighted
  - Balancing bed rest with progressive activity
- Need for postoperative therapies—can be discussed with surgeon postop
- Mobility aides if needed (ie, cane, walker)
- Discharge planning
  - Finding a buddy
  - Level of assistance needed
  - Returning Home & Length of Stay
- Exercises review—patients encouraged to participate in home exercise/ activity program prior to surgery
- Patients provided with opportunity to ask questions

Part 3: Occupational Therapist

- Assist with ADL (activities of daily living)
  - Dressing, preparing meals, showering, etc.
- Emphasis on patients being as prepared as possible for safe discharge home
  - Precautions following spine surgery
  - List of homework items to prepare their home
- Ex: re-arranging furniture, removing area rugs
  - Ways to modify activities
- Adaptive aids ex: reacher
- Doing activities differently ex: log rolling
  - Arrange necessary rehabilitation equipment
  - How to safely get in/out of car
  - Patients encouraged to arrange for help postsurgery
- Pet care
- Grocery shopping, etc.

Encourage patients to do as much for themselves as possible postsurgery

- Maximizes recovery.

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