Spine surgery referrals redirected through a multidisciplinary care pathway: effects of nonsurgeon triage including MRI utilization

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Clinical article

DANICA R. KINDRACHUK AND DARYL R. FOURNEY, M.D., F.R.C.S.C.

Division of Neurosurgery, University of Saskatchewan, Saskatoon, Saskatchewan, Canada

Object. The Saskatchewan Spine Pathway (SSP) was introduced to improve quality and access to care for patients with low-back and leg pain in the province. There is very limited data regarding the efficacy of nonsurgeon triage of surgical referrals. The objective of this early implementation study was to determine how the SSP affects utilization of MRI and spine surgery.

Methods. The authors performed a retrospective analysis of 87 consecutive patients with low-back and leg pain who were initially referred to a spine surgeon but were instead redirected to the SSP clinic between May 1, 2011, and November 30, 2011. The SSP clinic triaged patients into 2 groups: Group A (nonsurgical management) and Group B (referred back to the spine surgeon). The SSP classification was modified from the classification proposed by Hall et al. Pain and disability were scored by pain-related visual analog scale, modified Oswestry Disability Index, and EuroQol-5D.

Results. Sixty-two patients (Group A, 71.3%) were discharged after patient education, self-care advice, and referral for additional mechanical therapies. Although only 25 patients (Group B, 28.7%) were directed back to the surgeon, the final percentage (12.6%) offered surgery was similar to that of historic controls (15%). Total MRI utilization was significantly lower in Group A (25.8%) than Group B (92.0%) (p < 0.0001). Nonsurgeon triage captured all red flags detected by the surgeon. Patients in Group B were much more likely to have a leg-dominant pain (p = 0.0088) and had significantly higher Oswestry Disability Index (p = 0.0121) and EuroQol-5D mobility (p = 0.0484) scores.

Conclusions. The SSP significantly reduced MRI utilization and referrals seen by the surgeon for nonoperative care. Although this early implementation study suggests potential for cost savings, a more rigorous analysis of outcomes, costs, and patient satisfaction is required.

Key Words: • clinical care pathway • health resource • classification • quality improvement • low-back pain • surgery • magnetic resonance imaging

Despite the promotion of numerous evidence-based guidelines for the management of low-back pain (LBP),4 the transfer of these principles into practice remains limited.3,8,20 For example, it is increasingly recognized that MRI is widely overused.3,8,11,20 A recent study determined that more than half the requests (55.7%) for lumbar spine MRI were either inappropriate (28.5%) or of uncertain value (27.2%).10 Similarly, there is a growing body of evidence in the literature regarding inappropriate or unnecessary referrals to surgery for LBP. In Canada, approximately 75%–85% of patients referred to spine surgeons are not candidates for surgery.5,11,12,15

Direct and indirect costs of LBP are estimated to be $90 billion per year in the United States.5 Large variations in practice patterns for LBP, together with the significant socioeconomic burden of this condition, make it a prime target for quality improvement efforts.12

As a result, several multidisciplinary clinical care pathways for LBP are in various stages of development around the world, each with a unique approach to classification, triage of patients, and provision of care.12 None of these pathways has been comprehensively evaluated, but preliminary evidence suggests they may increase patient satisfaction, reduce cost, shorten wait times, and perhaps improve outcomes.1,14,16–18

The Saskatchewan Spine Pathway (SSP) is the first province-wide clinical pathway for the spine in Canada.12 It was the culmination of a series of interventions to the health care system over a 5-year period, intended to improve both the efficiency and effectiveness of care. Key features of the SSP include a combination of online and
live training, completed by almost 900 primary care providers as of March 2013, including the majority of Saskatchewan’s family physicians (59%), chiropractors (72%), and nurse practitioners (67%). There are online resources for patients and care providers (http://www.health.gov.sk.ca/back-pain). Physician billing incentives and access to the SSP triage clinics for expedited MRI and surgery referrals help to drive compliance.

Although SSP clinics were intended to take referrals only from primary care, during the early implementation stage, these clinics screened a backlog of patients waiting for appointments with spine surgeons. This study therefore takes advantage of a unique opportunity to assess SSP clinic triage of cases originally intended for surgical review. There are very limited data regarding the efficacy of nonsurgeon triage of lumbar spine referrals intended for surgery.

The objectives of this early implementation study were as follows: 1) determine the percentage of elective referrals to a spine surgeon for LBP which, when redirected through the SSP clinic, ultimately required surgical evaluation; 2) estimate effects of nonsurgeon triage on MRI utilization; 3) determine if nonsurgeon triage missed clinical “red flags” later detected by the surgeon; and 4) compare the SSP diagnosis and level of disability in patients determined to require surgical assessment from those not requiring surgical assessment.

Methods

The University of Saskatchewan Biomedical Ethics Board approved this retrospective medical record review. All outpatient referrals for low-back and leg pain on the waiting list of the senior author (D.F.) as well as any new nonemergency referrals were redirected to the SSP clinic between May 1st and November 30th of 2011. Patients had the option of refusing the SSP visit and continuing to wait to see the surgeon in the standard fashion, and these patients were excluded from further analysis.

The SSP clinic triaged patients into 2 groups (Fig. 1): Group A and Group B. Group A patients were discharged after education including self-care instruction, medication advice, and/or mechanical therapies. These patients had subsequent follow-up by the SSP clinic as required and were provided with contact information for further follow-up, as required, regarding their back pain. Patients in this group never saw the spine surgeon. Group B patients were triaged as appropriate for surgical consultation, either on the first visit to the SSP clinic or because nonsurgical therapies initiated by the SSP clinic failed to control symptoms.

Patient data for both groups included age; sex; date of referral to surgeon; date redirected to SSP clinic; date of initial SSP clinic assessment; MRI utilization before or after referral from the initial referring physician; presence of clinical “red flags;” SSP clinical classification (SSPc); modified Oswestry Low Back Pain Disability Index (ODI); visual analog scale (VAS) for back and leg pain; and health-related quality of life using the EuroQol-5D (EQ-5D). Imaging studies obtained more than 1 year prior to the date of the initial referral were excluded to ensure that the study focused on those images relevant to the current referral.

The chi-square test was used to determine significance of any differences in pre-referral MRI, total MRI, and SSPc patterns. The t-test was used for modified ODI scores, and the Fischer’s exact test was used for post-referral MRI. The nonparametric Wilcoxon test was used for all EQ-5D data and VAS scores.

“Red flags” were defined as follows: immunosuppression, history of cancer, current or recent infection, fever, HIV/AIDS, history of trauma, intravenous drug use, unexplained weight loss, saddle anesthesia, loss of bowel/bladder control, unexplained neurological disturbance, costovertebral tenderness, and constant or progressive pain.

The SSPc and SSP Clinic

The SSPc includes 4 clinical patterns of symptoms and signs, modified from the classification proposed by Hall et al.3,22 The patterns are essentially syndromes (that is, symptoms and signs that often occur together) and therefore are determined by history and physical examination. The SSPc patterns of mechanical pain are: Pattern 1: back-dominant pain aggravated by flexion (this pattern is divided into 2 groups: fast responders [increased pain on flexion and relief with unloaded passive lumbar extension] and slow responders [increased pain on flexion and extension]); Pattern 2: back-dominant pain aggravated by extension but not increased with flexion; Pattern 3: leg-dominant pain that is constant, associated with positive neurological findings, and aggravated by back movement; and Pattern 4: leg-dominant pain that is intermittent, aggravated by activity in extension, and relieved by rest in flexion.

Back-dominant patterns are mutually exclusive. Although the leg-dominant patterns are equally specific, they occasionally coexist. In determining the main pattern type, leg-dominant patterns (Pattern 3 or 4) took precedence. If the patient was determined to have elements of Patterns 3 and 4, then Pattern 3 took precedence.

For each pattern, the SSP has evidence-based guidelines for nonsurgical management and timelines for expected improvement. Referrals to triage clinics are recommended for nonresponders. A full description of patient flow through the SSP has been published elsewhere.12

Specialized physiotherapists, who have trained in surgical triage by working with spine surgeons, staff the SSP clinics. Clinical encounters in the SSP clinic follow the same structure as a quality directed history and physical examination by a spine surgeon, with a key focus on ruling out red flags and determining the SSPc. A detailed description of flow through the triage clinic is beyond the scope of this manuscript, but as an example, a patient with SSPc Pattern 4 (intermittent claudication) would be referred directly for MRI and surgery, based on the limited evidence that supports nonsurgical therapies (Fig. 2).22 On the other hand, a patient with back-dominant complaints and no neurological findings (SSPc Pattern 1 or 2) would be encouraged to continue with structured mechanical rehabilitation for at least 3 months before referral to the surgeon (Fig. 3). A patient with SSPc Pattern 3 (sciatica) would be referred for MRI and surgical consultation if nonsurgical management failed to resolve pain beyond 4–6 weeks, although those with a severe or progressive neurological deficit would be referred urgently.22
Nonsurgeon triage of lumbar spine referrals

Results

The study group consisted of 87 consecutive patients with nonemergency low-back and/or leg pain: 62 in Group A (71.3%) and 25 in Group B (28.7%). Group A consisted of 27 men (43.6%) and 35 women (56.5%) whose average age was 58.5 years (range 25–88 years). Group B consisted of 13 men (53.0%) and 12 women (48.0%) whose average age was 57.0 years (range 24–81 years). There were no significant differences in age (p = 0.684) or sex (p = 0.47) between groups.

Eleven Group B patients (44.0%) were offered surgery. Historical clinic and billing records prior to implementation of the SSP showed the percentage of new spine referrals that ultimately received surgery was approximately 15%. Therefore, the SSP improved the surgical yield almost 3-fold, while the total number of patients offered surgery (11 [12.6%] of 87 patients) was similar to the historical rate.

Table 1 presents a summary of MRI utilization data. Within the 1st year prior to initial referral, there was no significant difference in the number of MR images obtained between groups (p = 0.7117). In Group A, 15 patients (24.2%) had already undergone MRI within the year prior to initial referral, and only 1 (1.6%) underwent MRI through the SSP. In Group B, 7 patients (28.0%) had already undergone MRI within the year prior to initial referral, and 16 (64.0%) had MRI through SSP triage. Only 2 patients in Group B did not undergo MRI, and this was due to contraindications (claustrophobia in one and pacemaker in the other). Total MRI use was significantly lower in Group A (16 [25.8%] of 62 patients) compared with Group B (23 [92.0%] of 25 patients) (p < 0.0001).

Two patients with clinical red flags were diagnosed at the SSP clinic and sent urgently to the surgeon. One had widespread neurological weakness and was found to have cervical myelopathy. The other patient had severe pain with percussion on the spine and ribs, and further testing was performed to rule out malignancy (bone scanning, MRI, lab work). The surgeon did not detect any red flags that had not already been detected at the SSP clinic.

Table 2 compares the clinical presentation for each group. Group B patients were much more likely to have a leg-dominant (SSPc Pattern 3 or 4) versus back-dominant (SSPc Patterns 1 and 2) presentation (p = 0.0088).

Table 3 compares levels of pain, disability, and quality of life measures between groups. Group B patients had a significantly greater level of disability (ODI score of 46.0 vs 34.8, respectively; p = 0.0121) and poorer EQ-5D mobility scores (1.92 vs 1.71, respectively; p = 0.0484) than Group A patients. Differences in VAS back and leg pain scores did not achieve statistical significance.

Discussion

Lumbar spine MRI utilization has increased dramatically in recent years, and overuse of this health care resource has become an increasingly recognized problem. The correlation between lumbar spine MRI findings and clinical symptoms and signs is poor.

Fig. 1. Flow chart showing how patients are triaged into one of two groups.

Fig. 2. Sagittal (left) and axial (right) T2-weighted MR images obtained in a 61-year-old woman in Group B with neurogenic claudication (SSPc Pattern 4) who underwent an L3–4 laminectomy with microdiscectomy.
prevalence of irrelevant imaging “abnormalities” is so high that unnecessary imaging might actually be harmful if it leads to unnecessary tests, surgery, patient anxiety, dependence, or fear/avoidance behavior. The SSP triage system encourages more evidence-based referral patterns for imaging, based on a standardized approach to the severity and duration of clinical symptoms and signs.

It is common practice in Canada for spine surgeons to require MR images to accompany a referral. Had the SSP triage clinics not been in effect, it is reasonable to assume that virtually all patients would have undergone MRI at the surgeon’s request if studies had not already been obtained within a year or so of referral. Therefore, we estimate the SSP clinic prevented 46 MRI studies (62 - 16 = 46) in Group A from being obtained. For the combined cohorts, MRI utilization was reduced by approximately 52.9% (46 of 87)—all in Group A patients.

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<th>TABLE 1: Utilization of MRI</th>
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* Magnetic resonance images obtained up to 1 year before or after referral from the primary referral source.

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<th>TABLE 2: Summary of SSPc pain patterns*</th>
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<td>Pattern 1 fast responder</td>
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<td>Pattern 1 slow responder</td>
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<td>Pattern 2</td>
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<td>Pattern 3</td>
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<td>Pattern 4</td>
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<td>back-dominant (Patterns 1 &amp; 2)</td>
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<td>leg-dominant (Patterns 3 &amp; 4)</td>
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* See Methods for a description of the SSPc. One patient in Group A did not receive an SSPc as his pain was determined to arise from the hip. Two patients in Group B did not receive an SSPc as they were determined to have red flags and were sent urgently to the surgeon. Group B patients were much more likely to have leg-dominant (SSPc Pattern 3 or 4) than back-dominant (SSPc Patterns 1 and 2) pain (p = 0.0088).

<table>
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<th>TABLE 3: Summary of pain, disability, and quality of life measures</th>
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<td>Measurement</td>
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<td>ODI score</td>
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<td>VAS</td>
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* Mean scores are presented ± SD.
Nonsurgeon triage of lumbar spine referrals

In this study, 71.3% of elective referrals from physicians intended for the spine surgeon were managed without seeing the surgeon. In Canada, the wait time to see the spine surgeon may sometimes be longer than the wait for a surgery date. With the SSP clinic triage, the surgeon is presumably able to see the most appropriate candidates for surgery in a more timely fashion.

Although less than half (44.0%) of Group B patients were offered surgery, this was still almost 3 times the historic surgical yield from the spine surgery clinic, prior to implementation of the pathway. In total, 12.6% of the entire cohort (11 of 87 patients in Groups A and B combined) were offered surgery, which is slightly lower than the historic rate of 15%. Patients who refused referral to the surgeon, may have had higher levels of pain or disability and therefore were more likely to have been candidates for surgery (possibly accounting for this slight reduction). However, the most likely reason for the discrepancy is that urgent and emergency referrals were excluded from this study, while they would have been included in the historic rate.

Since physiotherapists rather than physicians staff the SSP clinic, one concern is that red flags such as cancers, infections, or serious neurological problems may be missed. The surgeon did not detect any red flags that had not already been found by the physiotherapists at the SSP clinic. However, the number of patients in Group B was small, and since Group A patients were never evaluated by the spine surgeon, our study does not fully evaluate this concern. The SSP system is designed to be inclusive for all types of mechanical back pain, but it is important to note that patients with significant red flags are not appropriate for SSP triage and should be directed to the on-call spine surgeon (Table 4).

The classification by Hall et al. has previously been shown to be effective in improving outcomes for nonoperative care. Our study is the first to suggest that it may be useful in predicting surgical candidacy, although one may argue that this is intuitive since evidence for the effectiveness of surgery is strongest for conditions that present with leg-dominant pain.

There are many dimensions to health care quality including the 3 classic pillars as described by Donabedian: structure, process, and outcome. The present study was not able to address all of these. Deyo has argued that changes to a health care system that result in cost savings may be seen as improvements, as this theoretically frees up resources that may then be used for other purposes. As the majority of patients in our study were not candidates for surgery, it follows that having them seen at the SSP clinic may provide better value than a surgery consultation.

Spine surgeons in the United States have told us that they are interested in implementing tools to reduce over-utilization of MRI and streamline more appropriate surgical referrals; however, they feel that medicolegal reform is required first. The SSP was developed by Canadian spine surgeons after systematic review of all aspects of diagnosis and management of LBP referrals. The goal of the SSP was to improve the quality of care, including timely access to MRI and surgeon consultation. The SSP facilitates more appropriate use of these resources through a standardized clinical pathway structured on evidence-based guidelines. At the time of this writing, we are not aware of any medicolegal cases arising related to SSP triage. However, we recognize that clinical pathways are, to a significant degree, the product of societies in which they develop: they reflect the history, values, and expectations of the populations they serve. It may be more difficult to initiate such reforms in the United States given the complexities of the health care system and medicolegal issues.

Conclusions

In this preliminary study of nonsurgeon triage, the SSP reduced MRI utilization and nonsurgical referrals seen by the spine surgeon. Patients triaged to surgery were more likely to have a leg-dominant pain and disability. This study is inadequate to determine the cost or benefit of implementing such a system. To fully assess the value of the SSP, a more rigorous comparative analysis to routine care is required, including long-term follow-up. Issues of patient and surgeon satisfaction with the referral process also need to be addressed.
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Disclosure

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Author contributions to the study and manuscript preparation include the following. Conception and design: Fourney. Acquisition of data: both authors. Analysis and interpretation of data: both authors. Drafting the article: both authors. Critically revising the article: both authors. Reviewed submitted version of manuscript: both authors. Approved the final version of the manuscript on behalf of both authors: Fourney. Statistical analysis: Kindrachuk. Administrative/technical/material support: Fourney. Study supervision: Fourney.

References


D. R. Kindrachuk and D. R. Fourney