

# Evaluation of an advanced-practice physiotherapist in triaging patients with lumbar spine pain: surgeon–physiotherapist level of agreement and patient satisfaction

Susan Robarts, PT, MSc  
 Paul Stratford, PT, MSc  
 Deborah Kennedy, PT, MSc  
 Barry Malcolm, MD, MBA  
 Joel Finkelstein, MD, MSc

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## Correspondence to:

S. Robarts  
 Holland Orthopaedic and Arthritic Centre  
 43 Wellesley St East  
 Toronto ON M4Y 1H1  
 susan.robarts@sunnybrook.ca

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**Background:** Surgery for lumbar spine pain is indicated for specific etiologies. Given the majority of individuals referred to spine surgeons are not surgical candidates, care delivery is inefficient, with consultations being of limited value for most. Using specially trained physiotherapists in triage is a human resource strategy that may optimize surgeons' time and the patient experience.

**Methods:** An advanced-practice physiotherapist (APP) and a surgeon assessed consecutive patients with lumbar spine pain presenting at an academic health centre's spine surgery clinic. The second assessor was blinded to the outcome of the first. We used the  $\kappa$  statistic to evaluate surgeon–APP level of chance-corrected agreement concerning patients' need for a surgical consultation. To assess satisfaction with the APP, patients completed a modified version of the validated Visit-specific Questionnaire.

**Results:** The sample included 102 participants (54 women) with a mean age of  $54.3 \pm 14.3$  years and a mean Oswestry Disability Index score of  $35.4 \pm 16.6$ . The assessors' overall agreement was 86%. The  $\kappa$  coefficient for the need for a surgical consultation was 0.69 (95% confidence interval 0.54–0.84). The APP identified that 77% of patients did not require a surgical consultation. Twenty-one patients underwent surgery. Satisfaction scores for the APP were very high (mean score 92 out of 100).

**Conclusion:** In triaging patients with lumbar spine pain, the APP and surgeon had a high level of agreement. An APP performing triage at a surgical centre can effectively reduce wait lists by 70%, reserving surgical consultations for those patients in whom they are indicated.

**Contexte :** La chirurgie pour douleur lombaire est indiquée pour certaines étiologies spécifiques. Étant donné que la majorité des patients adressés à des orthopédistes spécialistes de la colonne vertébrale ne sont pas candidats à la chirurgie, la prestation des soins s'en trouve inefficace, les consultations se révélant pour la plupart d'une utilité restreinte. Le recours à des physiothérapeutes spécialement formés à l'étape du triage est une stratégie axée sur les ressources humaines qui pourrait libérer les chirurgiens et améliorer l'expérience des patients.

**Méthodes :** Un chirurgien et un physiothérapeute ayant suivi une formation avancée (FA) ont évalué des patients consécutifs atteints de douleur lombaire à la clinique de chirurgie pour la colonne vertébrale d'un centre hospitalier universitaire. Le deuxième examinateur n'était pas au courant de l'évaluation du premier. Nous avons utilisé la statistique  $\kappa$  pour évaluer le degré de concordance corrigée pour tenir compte de la concordance due au hasard entre chirurgien et physiothérapeute (FA) quant à la nécessité de faire voir le patient en chirurgie. Pour évaluer leur satisfaction à l'endroit du physiothérapeute (FA), on a administré aux patients une version modifiée du questionnaire VSQ-9 (validé et spécifique à une visite donnée).

**Résultats :** L'échantillon incluait 102 participants (54 femmes) âgés en moyenne  $54,3 \pm 14,3$  ans et ayant un score de  $35,4 \pm 16,6$  au questionnaire Oswestry sur l'incapacité. La concordance globale entre les évaluateurs a été de 86 %. Le coefficient  $\kappa$  pour ce qui est de la nécessité d'une consultation en chirurgie a été de 0,69 (intervalle de confiance de 95 %, 0,54–0,84). Le physiothérapeute (FA) a jugé que 77 % des patients n'avaient pas besoin d'une consultation en chirurgie. Vingt et un patients ont subi une chirurgie. Les scores de satisfaction à l'endroit du physiothérapeute (FA) ont été très élevés (score moyen 92 sur 100).

**Conclusion :** Au moment du triage des patients atteints de douleurs lombaires, les évaluations du physiothérapeute (FA) et du chirurgien ont étroitement concordé. Un physiothérapeute (FA) effectuant le triage dans un centre chirurgical peut efficacement réduire les listes d'attente de 70 %, en limitant les consultations en chirurgie aux patients chez qui elles sont indiquées.

Cost containment in health care and waiting list management are top priorities in our public health system. Two sources of rising health care costs are the excessive use of diagnostic imaging and the overuse of specialty services. In recent years care delivery for patients with low back pain has come under scrutiny because of these inherent inefficiencies and long waits to receive care.

Wait times for a consultation with a neurosurgeon or orthopedic spine surgeon are the longest among 12 medical specialties at 15.6 and 15.2 weeks from referral, respectively.<sup>1</sup> A common situation is the inability to prioritize a patient appropriately with the information provided in the referral letter. Referral letters often lack clarity concerning the patient's main concern and physical findings, which makes it difficult to determine if a surgical assessment is required.<sup>2</sup> A recent survey showed that at least 20% of patients referred to a Canadian surgeon for spine-related concerns are never seen after having undergone the requisite and costly diagnostic imaging.<sup>3</sup> Of the patients seen, the surgical yield is typically low, with less than 20% requiring a surgical solution.<sup>4,5</sup> In regions where wait times are long, timely clinical triage and prioritization have potential to redirect patients who are inappropriately referred to surgeons and improve access for surgical candidates, making effective use of limited and costly resources.

An effective triage system for patients with lumbar spine conditions should make use of medical personnel who perform similarly to physician specialists and who, through complementary clinical interests and expertise, add value to the patient experience. The challenge lies in reliably identifying patients with surgical indications. Spinal conditions that are most amenable to surgery involve leg-dominant pain (claudication, radiculopathies) of at least 6 weeks' duration with concordant imaging.<sup>6-9</sup> If patients with back pain who do not require surgery can be reliably distinguished from patients with surgical indications by appropriate medical personnel, the surgically appropriate patient could be fast-tracked for surgical assessment; those without surgical indications could be provided with appropriate education to help understanding, alleviate fears and guide treatment strategies. The presence of red flags for rare and potentially more sinister medical conditions need to be identified, which is mainly done through a focused history.<sup>10-12</sup>

There is a growing body of international research supporting the use of specially trained physiotherapists in musculoskeletal triage roles. In the United States, experienced physiotherapists have shown greater knowledge in managing musculoskeletal conditions than medical resi-

dents and physician specialists (other than orthopedic surgeons).<sup>13,14</sup> In several countries, physiotherapists trained by orthopedic surgeons have shown high clinical diagnostic accuracy, making similar triage recommendations to those of surgeon colleagues.<sup>15-18</sup> In the United Kingdom, care teams using physiotherapists with an extended scope of practice have reduced wait times, lowered direct hospital costs owing to a reduction in diagnostic tests, provided more advice and reassurance than physician counterparts, and had high levels of patient satisfaction.<sup>19,20</sup> At our centre, we have employed advanced-practice physiotherapists (APPs) in the arthroplasty program for 10 years and in the shoulder clinic for 5 years, with reliable triage and high levels of patient satisfaction.<sup>18,21,22</sup>

Using physiotherapists to perform spinal triage is not a new concept. In 1994, Hourigan and Weatherley<sup>23</sup> described the role of a physiotherapist in assessing 100 consecutive patients together with a surgeon. A small proportion (24%) required the surgeon's opinion. Although the physiotherapist performed the majority of the assessment, each case was reviewed with the surgeon, and as such the level of agreement was not assessed. Retrospective studies of spinal triage have shown promise with respect to patient and referrer satisfaction, with the majority of patients (ranging from 67% to 93%) deemed nonsurgical.<sup>24-29</sup> Patients referred for a surgeon's opinion from a triage service were more likely to have leg-dominant pain and to be surgical candidates, giving the model of care credence.

Establishing a high level of agreement between surgeons and physiotherapists on clinical decisions is important for the widespread adoption of a nonphysician care provider in spinal triage. Our study had 2 objectives: to estimate the chance-corrected agreement ( $\kappa$ ) of triage status (surgeon referral appropriate v. not appropriate) between an APP and orthopedic spine surgeon in patients presenting to a spine surgeon's clinic with lumbar spine pain and to measure patient satisfaction with the APP's role.

## METHODS

This study was a cross-sectional prospective design of consecutive patients referred for lumbar spine problems to surgeons at an academic health centre's outpatient surgical spine clinic. The centre's institutional review board approved our study.

### Study setting

Patients are referred to spinal surgeons at our tertiary care centre by general practitioners or nonsurgical specialists.

The usual triage process requires all patients to undergo magnetic resonance imaging (MRI) or computed tomography (CT) of the lumbar spine. The report on the test results must be included with the referral, along with information regarding the patient's concerns and pertinent clinical findings. Patient examinations occur in a closed room in the outpatient spine clinic.

### *Study population*

The first 100 patients scheduled in the outpatient clinic who complied with the inclusion criteria were selected and approached by a research assistant to obtain written informed consent. We included patients referred to the spine surgeons with lumbar spine conditions and back and/or leg pain based on the information provided in the referral. Patients were excluded if they were referred for spinal tumour, spinal metastases, fracture, or infection; if they had previous spinal surgery; if they had work-related injuries with an active compensation claim; if they did not understand English; or if they did not wish to participate in the study.

### *Surgeon assessors*

Two spinal surgeons participated in the study (J.F. and B.M.). Each was fellowship-trained and held academic appointments; 1 had been practising for 20 years and the other for 38 years.

### *Physiotherapist assessor*

A physiotherapist with a masters degree and 10 years' experience as an APP in an arthroplasty program (S.R.) was trained by the spine surgeons over a 4-month period. During the training period the physiotherapist spent 1–2 days per week in the spine clinic and followed the usual medical practice of obtaining the patient's history, performing the physical examination and correlating the results of diagnostic tests. During the training period the physiotherapist presented key findings to the surgeon, and the physiotherapist's proposed recommendations were either validated or modified. Once trained, the APP began to perform independently.

### *Procedure*

Patients scheduled in the outpatient clinic were required to bring all diagnostic tests to the clinic visit and were asked to complete the standard symptom questionnaire. Demographic data, along with the referral date and date of initial assessment, were collected on all consenting patients who were then assessed separately and consecutively by the APP and surgeon, both blinded to the outcome of the other's assessment. Outcomes were docu-

mented on a standard form and provided to the research assistant, who placed the forms in a sealed envelope.

The 2 independent assessors were required to document the outcome of the clinic visit and select reasons for that outcome from a list. Under the selection "Does not require consultation with surgeon" were the following reasons: back-dominant pain pattern/chronic pain not amenable to surgery, symptoms improved to the point of not wanting an operation, patient wanting a second opinion only, patient not wanting an operation, inadequate conservative treatment (patient given a follow-up appointment), mechanical back pain appropriate for referral to physiotherapy, medico-legal case, and symptoms related to a body system or joint other than the spine. For patients wanting a second opinion only (without clinical indicators), the team decided that the APP should be equipped to provide the opinion, nonsurgical management plan and answers to the patient's questions; therefore, "patient wanting a second opinion only" was included as a reason for not requiring consultation with a surgeon.

Under the selection "Requires consultation with surgeon/appropriate for consultation" were the following reasons: leg-dominant pain pattern with or without objective neurologic loss and concordant imaging, structural deformity (spondylolisthesis with or without instability), presence of red flags/possible serious pathology, patient considering surgery, and investigations needing review by surgeon. The final selection, "Patient offered surgery," was available only to the surgeons. The surgeon assessors also selected the most appropriate diagnoses from a list of common conditions presenting to the spine clinic. In addition, the independent assessors were required to document the presence of red flags and make selections from a list.

The APP was responsible for the final discussion with the patient regarding the results of the assessment, diagnostic test results, need for further tests and treatment recommendations and for dictating a detailed letter to the referrer. In order to ensure appropriate information was communicated to the referral source, prior to the final discussion with the patient the surgeon and APP discussed the patient findings and salient points.

### *Study measures*

Participants completed the Oswestry Disability Index (ODI) to describe the level of their disability.<sup>30</sup> The ODI ranges from 0 to 100, with higher scores indicating more severe symptoms. To measure patient satisfaction, participants completed the modified version of the 9-item Visit-specific Questionnaire (VSQ-9).<sup>31</sup> The VSQ-9 is a validated instrument that measures satisfaction with a specific medical encounter.<sup>32,33</sup> Each of the 9 items is scored using a 5-choice evaluation response scale ranging from excellent to poor.<sup>31</sup> The items are closely aligned with what is most important to patients for a spinal screening service as

described by Reeve and May<sup>34</sup>: information about the screening process; information about test results and outcome of assessment; professional competence to assess, diagnose and determine a management plan; interpersonal skills (courteous and respectful manner); and an efficient process of care. Minor modifications were made to the VSQ-9 to improve relevance for our study (see Appendix 1, available at canjsurg.ca). Items 2 and 3 (convenience of office location and getting through to the office by phone) were replaced with 2 new items (information about the APP screening service and information about the outcome of the assessment). In 3 of the original items (time spent, technical skills, personal manner), patients are asked to rate the “physician/health care professional” they saw. We replaced “physician/health care professional” with “advanced-practice physiotherapist” for clarity. The remaining items (how long you waited to get an appointment, explanation of what was done for you, visit overall) were the same as the original items.

### Patient sample

We estimated the requisite sample size to be approximately 100 patients based on the following expectations and assumptions: proportion of observed agreement of 0.90, proportion of expected agreement of 0.40 and a 2-tailed 95% confidence interval (CI) with a lower confidence width of 0.10.<sup>35</sup>

### Statistical analysis

Descriptive statistics were calculated as means and standard deviations for continuous data and counts or proportions for categorical data. We calculated surgeon and APP agreement on the patient’s need for a surgical consultation as a percentage agreement and as a  $\kappa$  statistic that indicates agreement beyond chance.<sup>36</sup> For our purposes, agreement on the need for a surgical consultation was the most important parameter. The subcategories were used to guide decision-making; their analysis was not practical owing to sample size limitations.

The responses on the modified VSQ-9 were linearly transformed to a scale of 0–100, with excellent scored as 100 and poor scored as 0, as recommended by the original instrument’s developers.<sup>31</sup> With the 9 items transformed to a score out of 100, an overall score was obtained by averaging scores across all items.

All analyses were conducted using STATA software version 13.1 (StataCorp).

## RESULTS

Of the 102 patients included in the sample, 54 (53%) were women, and the sample’s mean age was  $54.3 \pm 14.3$  years. The median wait time was 271 days (interquartile range

[IQR] 81–341 d). The sample’s mean Oswestry score was  $35.4 \pm 16.6$ . Consistent with our eligibility criteria, no serious underlying pathologies (fracture, malignancy) were identified in this sample.

Table 1 summarizes the APP–surgeon agreement on the necessity for a surgical consultation. The observed agreement was 86.3% (95% CI 78.0–92.3) and  $\kappa$  was 0.69 (95% CI 0.54–0.84).

Of the 9 disagreements where the APP judged that no surgical consultation was necessary and the surgeon deemed one was required, 2 patients had surgery (the surgeon diagnosed radiculopathy in both of them). The remaining 7 patients were not offered surgery, and the surgeon ordered no further diagnostic tests. Two of these patients were offered a return visit but did not attend.

Of the 5 patients for whom surgeons judged a consultation was not necessary but the APP considered a surgeon consultation to be required, 2 patients had surgery (the surgeon diagnosed spondylolisthesis in 1 and mechanical back pain in the other). Two patients required further diagnostics (electromyography for peripheral neuropathy and flexion–extension radiographs to assess mobility). One patient required a return visit.

In our cohort, a surgical consultation was judged unnecessary in 71 of 102 (70%) of patients; 21 of the remaining patients underwent surgery.

Table 2 summarizes the ODI scores by rater and consultation status. The ODI scores were significantly higher (all  $p < 0.03$ ) for patients deemed to require surgical consultation by both the APP and surgeons. Moreover, the 21 patients undergoing surgery had significantly higher mean ODI scores than patients not undergoing surgery ( $48.3 \pm 12.1$  v.  $33.8 \pm 16.1$ ,  $p = 0.001$ ; Table 3).

We had complete data on 102 participants for the modified VSQ-9 (Table 4). Most of the satisfaction scores for

**Table 1. APP–surgeon agreement on need for consultation with a surgeon**

APP	Surgeon		Total
	No surgical consultation	Surgical consultation	
No surgical consultation	62	9	71
Surgical consultation	5	26	31
Total	67	35	102

APP = advanced-practice physiotherapist.

**Table 2. ODI summary scores by rater and consultation status**

Rater	ODI score, mean $\pm$ SD	
	Surgical consultation	No surgical consultation
APP	43.0 $\pm$ 14.2	33.5 $\pm$ 16.9
Surgeon	41.7 $\pm$ 15.1	33.5 $\pm$ 16.8

APP = advanced-practice physiotherapist; ODI = Oswestry Disability Index; SD = standard deviation.



**Table 3. Patient characteristics by surgery status**

Characteristic	Surgery offered; no. or mean ± SD		p value
	Yes	No	
Sex, female:male	11:10	36:44	0.63
Age, yr	55.8 (17.2)	53.9 (13.6)	0.58
ODI score	48.3 (12.1)	33.9 (16.1)	0.001

ODI = Oswestry Disability Index; SD = standard deviation.

**Table 4. Patient satisfaction scores on the modified VSQ-9**

Modified VSQ-9 Items	Score, mean ± SD
1: Wait time for appointment	55.1 ± 39.6
2: Wait time in clinic	80.8 ± 25.8
3: Information about APP screening	92.6 ± 12.9
4: Time spent	92.8 ± 13.7
5: Explanation of what was done	92.1 ± 14.9
6: Information about outcome	86.7 ± 18.8
7: Technical skills	91.6 ± 13.7
8: Personal manner	95.0 ± 11.1
9: Visit overall	90.6 ± 14.8

APP = advanced-practice physiotherapist; SD = standard deviation; VSQ-9 = modified Visit-specific Satisfaction Instrument.

items pertaining to the APP (Q3–Q9) were above 90/100, with a mean score of 91.7. The mean score for the 2 process-related items (wait time to appointment and wait in clinic) was 68.0.

**DISCUSSION**

Surgical consultations should be reserved for patients who have surgically relevant symptoms and concordant pathology on diagnostic imaging, but determining who needs to see a spine surgeon and who does not is challenging. Wai and colleagues<sup>37</sup> described the low reliability of patient-reported symptoms and the tendency of patients to give conflicting responses between 2 clinic visits. Adding to the challenge is the level of reliability of many of the physical signs that routinely make up the clinical evaluation of patients with lumbar spine pain. For example, McCombe and colleagues<sup>38</sup> established a  $\kappa$  coefficient of 0.4 as the cut-off point for reliability between surgeon assessors ( $n = 50$ ). The identification of back-dominant pain was unreliable, as were common signs of nerve root compression: buttock wasting, toe standing, heel standing and knee jerk. The ankle jerk was marginally reliable ( $\kappa = 0.39$ ). In contrast, reliable tests included straight leg raising ( $\kappa = 0.66$  for causing leg pain and  $\kappa = 0.55$  for causing back pain) and extensor hallucis longus power ( $\kappa = 0.65$ ). The reliability of guidelines for surgical appropriateness has been determined by Vader and colleagues.<sup>39</sup> For theoretical cases of sciatica, agreement between expert panels was considered substantial ( $\kappa = 0.63$ ); when 2 series of actual cases of sciatica were introduced, reliability between

the expert panels decreased to moderate ( $\kappa = 0.46$ ;  $n = 181$ ) and fair ( $\kappa = 0.30$ ;  $n = 149$ ).<sup>39</sup>

In this context, our study shows substantial reliability between the surgeons and APP ( $\kappa = 0.69$ ) in determining who needs to see a surgeon and who does not. In addition, we found that 70% of patients referred to the spine clinic did not require a surgical consultation. For most patients this would have been their first experience with a non-physician provider when referred for surgical assessment; patients were highly satisfied with the APP in a triage role.

We identified 3 important sources for disagreement within this interprofessional team. First, we had 2 patients identified by the surgeon as having radiculopathy; in these 2 cases the surgeon and APP disagreed as to the need for a surgical consultation. Identifying leg-dominant pain is an important element in the decision to refer to a surgeon and for determining appropriateness for surgery. Reliability in these cases may have been improved with the clinician-administered percent question as described by Wai and colleagues.<sup>37</sup> Second, we had 2 patients who required diagnostic tests, and for that reason the APP judged a consultation to be necessary but the surgeon disagreed. Understanding and making provisions for limitations to scope of practice is an important aspect of interprofessional collaboration. Third, 7 patients were judged to need a surgical consultation, but in the end these patients were managed effectively by the APP. Gaining confidence in the APP’s skill set has been part of the team’s development process.

Our study shows that with training, an experienced physiotherapist can effectively triage patients with lumbar spine pain referred to surgeons at an academic surgical centre, the majority of whom do not require surgical intervention. This pathway seems to have surgeon buy-in, as a recent survey of 85 Canadian spine surgeons found that the majority of respondents (77.6%) would be open to working with nonphysicians in spinal triage.<sup>40</sup>

Although it was not the purpose of this study, we agree that in the absence of an appropriate clinical syndrome and without any red flags, diagnostic imaging for screening surgical candidates is not a step that adds value. In this situation routine use of MRI contributes to the significant overuse of MRI and adds to wait times.<sup>41,5,42</sup> Given average surgical wait times of 20.5 weeks, Canadian patients with spinal pain wait longer to see a specialist than they do to receive treatment.<sup>1</sup> Furthermore, referral to a spine surgeon and knowledge of test results that may have no clinical significance can create fear, anxiety and activity avoidance and be a barrier to functional recovery.<sup>43</sup> An alternate route to an experienced care provider who makes similar decisions to the surgeon and who has timely access to surgical consultation is a more patient-centred approach. With clinical expertise in the management of musculoskeletal conditions, APPs can add value to the patient experience and facilitate a patient’s return to function.

## Limitations

This study has some potential limitations. First, we did not collect baseline measures of pain, chronicity or results of psychological measures; several authors have demonstrated their value in spinal triage.<sup>26,27,29</sup> Our study was designed to quantify the between-examiner agreement in a standard orthopedic spine surgeon's practice using the information typically available to surgeons for clinical decision-making. To improve triage effectiveness, multiple tools should be used to elucidate the multidimensional nature of lumbar spinal pain.<sup>37,44</sup> Second, the APP in our study had previous experience triaging patients with musculoskeletal conditions in a tertiary care setting. The results may not be generalizable to physiotherapists in a traditional clinical practice. Third, our CI width was larger than assumed in the sample size calculation. Applying the observed and expected proportions from our study and the prevalence of surgeon referrals of 34%, a sample size of approximately 212 patients would be required to achieve a lower 1-tailed 95% CI width of 0.10.

## CONCLUSION

Fundamental changes are needed to curb the health system's dependence on specialty care while ensuring patients receive the care they need. In our universal public health care system we cannot expect to find more dollars, but solutions can be found with innovative models of care and triage pathways. In countries where there are alternatives to publicly funded health care, spinal triage is relevant for cost containment, efficiency and improving value. We have shown the viable and safe role that an APP can provide in spinal triage. Professional resistance should not be viewed as a barrier or affect decision-making. These strategies should be scaled up with supporting professional regulations, appropriate training and development of decision aids to encourage nontraditional collaborations to sustain high-quality affordable health care.

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**Affiliations:** From the Department of Rehabilitation, Sunnybrook Holland Orthopaedic and Arthritic Centre, Toronto, Ont. (Robarts, Kennedy); the School of Rehabilitation Science, McMaster University, Hamilton, Ont. (Stratford, Kennedy); the Department of Surgery, Sunnybrook Health Sciences Centre, Toronto, Ont. (Malcolm, Finkelstein); and the Department of Surgery, Faculty of Medicine, University of Toronto, Ont. (Finkelstein).

**Competing interests:** None declared.

**Contributors:** All authors designed the study. S. Robarts, D. Kennedy, B. Malcolm and J. Finkelstein acquired and analyzed the data, which P. Stratford also analyzed. S. Robarts, B. Malcolm and J. Finkelstein wrote the article, which all authors reviewed and approved for publication.

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