

A Physiotherapy Triage Service for Orthopaedic Surgery: An Effective Strategy for Reducing Wait Times

Christopher Napier, MPT, DipSportPhysio;* Robert G. McCormack, MD, FRCSC, DipSportMed;†
Michael A. Hunt, PT, PhD;* Alexandra Brooks-Hill, MD, FRCSC, DipSportMed†

ABSTRACT

Purpose: To investigate the effectiveness of a physiotherapy triage service for orthopaedic surgery referrals from primary-care physicians. **Methods:** A prospective, observational design was used with patients referred to an orthopaedic surgeon based out of two small urban centres in British Columbia. The level of agreement between the physiotherapist and surgeon was determined using a weighted kappa statistic (κ_w) with 95% CI. A patient satisfaction questionnaire was administered, and the surgical conversion rate (SCR) was calculated to assess the level of appropriate referrals. **Results:** The analysis found substantial agreement ($\kappa_w = 0.77$; 95% CI, 0.60–0.94) between surgeon and physiotherapist for surgical management decisions. All patients reported being “satisfied” or “very satisfied” with the overall care they received from the physiotherapist. The SCR of patients referred by the physiotherapist to the surgeon was 91%, versus 22% among patients referred by a general practitioner or emergency physician. **Conclusion:** More than three-fourths of patients referred by primary-care physicians did not need to see a surgeon and were able to be managed by an experienced orthopaedic physiotherapist. This triage model could have considerable impact on orthopaedic wait times in Canada by minimizing unnecessary referrals; the model could also promote timely and conservative management of non-surgical conditions by physiotherapists.

Key Words: gatekeeping; orthopaedics; practice guidelines as topic; physical therapy specialty; waiting lists.

RÉSUMÉ

Objectif : Étudier l'efficacité d'un service de triage en physiothérapie pour aiguillages vers la chirurgie orthopédique provenant de médecins de premier recours. **Méthodes :** On a utilisé un concept d'observation prospective des patients référés à un chirurgien orthopédiste dans deux petites localités urbaines de la Colombie-Britannique. On a déterminé le niveau d'entente entre le physiothérapeute et le chirurgien en établissant une statistique kappa pondérée (*weighted kappa*, κ_w) comportant un IC à 95%. On a administré aux patients un questionnaire sur leur satisfaction et calculé un taux de conversion chirurgicale (TCC) afin d'évaluer le niveau des références appropriées. **Résultats :** L'analyse a révélé une convergence importante ($\kappa_w = 0,77$; IC à 95%, 0,60 à 0,94) entre le chirurgien et le physiothérapeute sur le plan des décisions relatives à la prise en charge chirurgicale. Tous les patients se sont dits « satisfaits » ou « très satisfaits » des soins généraux qu'ils ont reçus du physiothérapeute. Le TCC des patients référés par le physiothérapeute au chirurgien s'est établi à 91% contre 22% chez les patients référés par un généraliste ou un urgentiste. **Conclusion :** Plus de trois quarts des patients référés à un chirurgien orthopédiste par des médecins de premier recours n'ont pas eu à consulter un chirurgien et ont été pris en charge par un physiothérapeute orthopédiste chevronné. Ce modèle de triage pourrait avoir un effet considérable sur les temps d'attente en orthopédie au Canada en réduisant au minimum les aiguillages inutiles. Le modèle pourrait aussi promouvoir une prise en charge rapide et conservatrice de problèmes non chirurgicaux par des physiothérapeutes.

Long wait times for elective surgical procedures in Canada are a major concern and have broad economic consequences.¹ Total wait times are higher for elective orthopaedic surgeries than for procedures from any other specialty except plastic surgery; in 2011, the average total wait for these surgeries was 39.1 weeks,² which represents

a 100% increase from 1993.² Governments, physicians, and the public have all agreed that current wait times are unacceptable, but strategies developed to reduce wait times continue to fall short. A 2008 Fraser Institute report found that wait times for elective orthopaedic surgeries actually fell from 2007 to 2008,³ but the most

From the: *Department of Physical Therapy and †Department of Orthopaedic Surgery, Faculty of Medicine, University of British Columbia, Vancouver.

Correspondence to: Chris Napier, Department of Physical Therapy, Faculty of Medicine, University of British Columbia, 21–2177 Wesbrook Mall, Vancouver, BC V6T 1Z3; c.napier@alumni.ubc.ca.

Contributors: All authors designed the study; collected, analyzed, and interpreted the data; drafted or critically revised the article; and approved the final draft.

Competing interests: None declared.

Christopher Napier was partially supported by a grant from LifeMark Health. Michael A. Hunt acknowledges funding support from the Michael Smith Foundation for Health Research.

recent report (in 2011) confirmed that they had risen once again.² Delays in receiving treatment remain unacceptably long, and innovative changes to the system are urgently needed to effect more permanent change. More money does not seem to be the answer, as provinces that spend more on health care per capita do not have shorter wait times than those that spend less.³ In fact, a 2010 Fraser Institute analysis found that increased health spending were positively correlated with increased wait times, except where increases were targeted directly to physicians.⁴

Wait times can be broken down into two categories: first, the wait between visiting a general practitioner and attending a consultation with a specialist; and, second, the wait between seeing the specialist and having surgery. In 2011, Canadians waited an average of 19.7 weeks to see an orthopaedic surgeon after referral from a general practitioner—143% longer than the 1993 average of 8.1 weeks—and an average of 19.4 weeks for surgery after that.² This increase in wait times since 1993 is concerning, and they continue to remain higher in Canada than in many other countries.² Wait times impose both monetary and non-monetary costs, including lost work time, decreased productivity, and physical and psychological suffering. Many of these costs are not recognized by health care budgets and are instead borne by society, or by those affected by illness and injury.

Potential evidence-based solutions can be drawn from research in other high-income countries. In a successful strategy developed in the United Kingdom, physiotherapists screen patients referred by general practitioners (GPs) before consultation with an orthopaedic surgeon.^{5,6} This strategy has reduced the number of unnecessary referrals to orthopaedic surgeons, resulting in more timely interventions for patients for whom surgery is not indicated and, in turn, shorter wait times for those requiring surgical interventions.^{7,8} A similar physiotherapist-as-gatekeeper model has been studied in Australia; the effectiveness of this approach is supported by a growing body of evidence.^{9–11}

To our knowledge, previous studies investigating the use of physiotherapists to triage referrals for elective orthopaedic surgery in the Canadian health care system were either retrospective designs or have only examined patient satisfaction.^{12,13} The primary purpose of our study, therefore, was to investigate the effectiveness of having a physiotherapist triage patients referred to orthopaedic surgeons for knee or shoulder injuries by either a GP or an emergency physician. Specifically, our study aimed to examine (1) the level of agreement between orthopaedic surgeons and orthopaedic physiotherapists in management decisions, (2) the potential impact of physiotherapy triage in terms of averting inappropriate referrals and reducing overall wait times (as determined by surgical conversion rate [SCR]), and (3) patient satisfaction with physiotherapy triage.

METHODS

Study design

Patients who were referred to the orthopaedic surgeon at Sea to Sky Orthopaedics in Whistler and Squamish, British Columbia, by a GP or emergency physician were considered eligible to participate in this prospective observational study if they had either shoulder or knee complaints and were at least 19 years old. Patients were excluded if the injury was attached to an ongoing insurance claim resulting from a motor vehicle or work accident, if their history suggested any disorder requiring urgent medical attention (as determined by the orthopaedic surgeon based on the referral letter), or if they were unable to provide informed consent. The study was approved by the University of British Columbia Clinical Research Ethics Board.

Participants and procedure

From May 1 to June 30 2011, all new referrals who met the eligibility criteria were invited to participate in the study. Sample-size calculations determined that 45 participants would be needed to produce a significant result ($\alpha < 0.05$, $\beta = 0.80$) for inter-rater agreement. Among the first 45 referrals, 100% agreed to participate.

The research coordinator obtained written informed consent from participants before their first visit to the surgeon. Demographic data were collected from all study participants before the assessment. Patients were seen as out-patients by the orthopaedic surgeon and physiotherapist on the day of assessment (see Figure 1). Each participant was first assessed by the physiotherapist and categorized as *surgical* (appropriate for surgical intervention), *non-surgical* (could be managed conservatively and did not need to see a surgeon), or *needing further investigation* (required further diagnostics such as imaging or blood tests). Following this assessment, patients were immediately seen by the surgeon, who classified them using the same categories. The physiotherapist and the surgeon were blinded to each other's diagnoses and management decisions. It was not possible, given the study design, for patients to be blinded, but they were asked not to inform the surgeon of the physiotherapist's decisions. Patients were booked for follow-up visits with the surgeon, as needed; if patients required physiotherapy rather than surgical management, the physiotherapist referred them on to a local, qualified practitioner. Immediately following their visit with the surgeon, patients completed a survey rating their satisfaction with the advice given to them by the physiotherapist, the thoroughness of the physiotherapy exam, and their overall satisfaction with the physiotherapist. This survey was designed to assess the patients' level of acceptance of this triage model. There was no loss to follow-up at this stage, as the physiotherapist and surgeon assessed all patients sequentially.

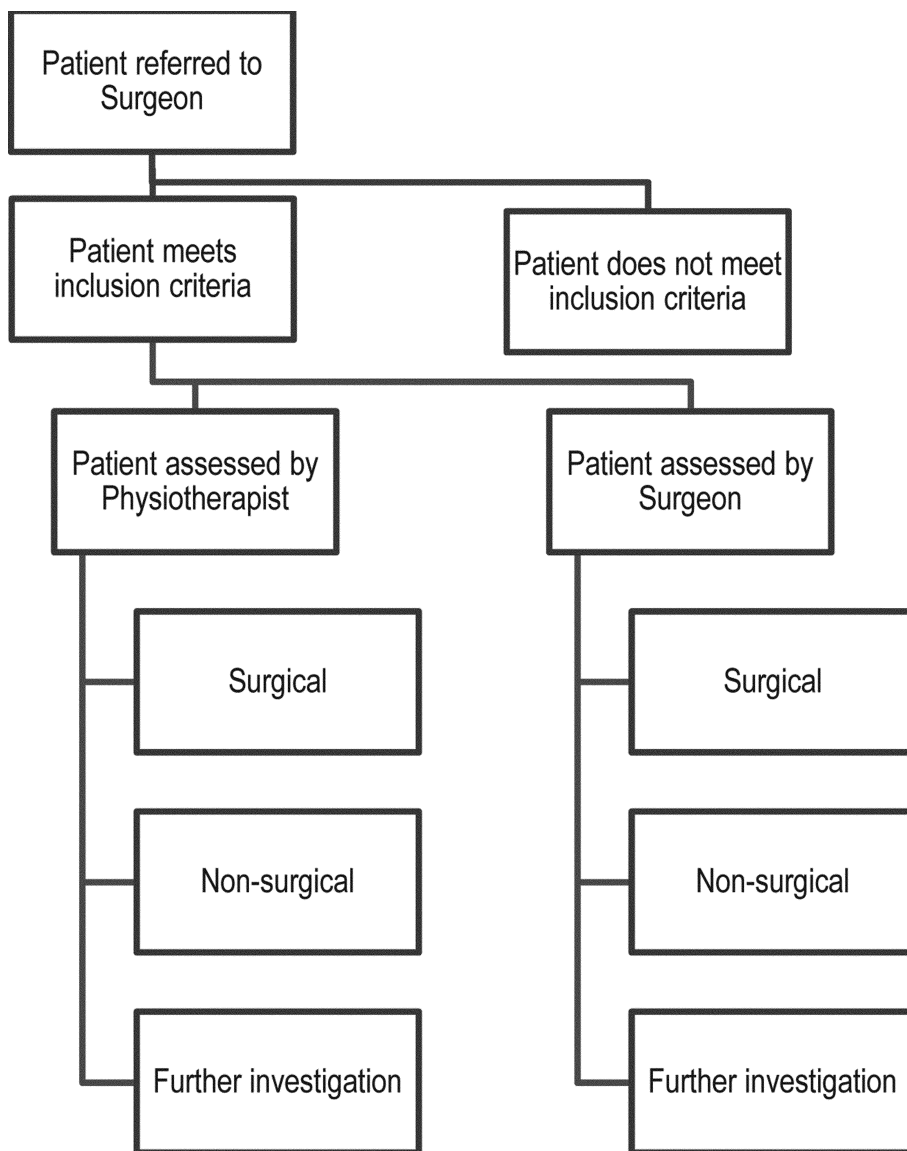


Figure 1 Flowchart of Patient Pathway.

The surgical conversion rate (SCR) is defined as the percentage of patients seen by the orthopaedic surgeon who were subsequently booked for surgery.¹⁴ The SCR of primary-care physician referrals was calculated as the percentage of all 45 patients referred who were booked for surgery (i.e., those who were categorized as *surgical* by the surgeon); the SCR of physiotherapist referrals was calculated as the percentage of patients categorized as *surgical* by the physiotherapist who were subsequently categorized the same way by the surgeon. The latter rate reflects the appropriateness of the physiotherapist’s referrals.

The orthopaedic surgeon and physiotherapist in this study had 6 and 8 years of post-graduation experience, respectively. The surgeon had fellowship training in two kinds of shoulder and knee reconstruction (arthroscopic

and open), while the physiotherapist had post-graduate training in sports and orthopaedic physiotherapy. Prior to the study the physiotherapist spent 3 days shadowing the surgeon in order to better understand the surgeon’s decision-making paradigm.

Statistical analysis

We conducted our analyses using the Statistical Package for the Social Sciences, version 21.0 for Mac (SPSS Inc., Chicago, IL). The proportion of patients accurately triaged by the physiotherapist was analyzed using descriptive statistics and bivariate analysis; the level of agreement on surgical management decisions between physiotherapist and orthopaedic surgeon was determined using percentage agreement and a weighted kappa statistic (κ_w), reflecting the differential risks of disagreement between the three categories (*surgical*, *non-surgical*, and

Table 1 Demographic Characteristics of Study Participants

	Total	Shoulder	Knee
Participants (n)	45	31	14
Sex			
Female (n)	26	20	6
Male (n)	19	11	8
Median age (range) (yr)	47 (21–75)	48 (21–72)	45 (25–75)

Table 2 Agreement between Physiotherapist and Orthopaedic Surgeon on Surgical Management of Participants (Overall)

	Orthopaedic surgeon			Total
	Surgical	Non-surgical	Further investigation	
Physiotherapist				
Surgical	9	2	0	11
Non-surgical	0	20	3	23
Further investigation	1	1	9	11
Total	10	23	12	45

Percent agreement: 84.4 (38/45).

κ_w : 0.77 (95% CI, 0.60–0.94).

Surgical conversion rate (physiotherapist): 0.91 (10/11).

Surgical conversion rate (all referrals): 0.22 (10/45).

further investigation), with a 95% CI. The heaviest weight was assigned to the cell corresponding to a patient designated as *non-surgical* by the physiotherapist and *surgical* by the surgeon, which represents the poorest clinical outcome. Landis and Koch have suggested that κ_w values >0.81 represent *almost perfect* agreement; >0.61, *substantial* agreement; 0.41–0.60, *moderate* agreement; and <0.40, *poor to fair* agreement.¹⁵

RESULTS

Patient demographics are presented in Table 1. As noted, more people were referred for shoulder than knee injuries, and more were women than men.

Inter-rater agreement

Inter-rater agreement between surgeon and physiotherapist overall and for each area of injury is presented in Tables 2–4. The physiotherapist and surgeon agreed on surgical management decisions in 84.4% of cases ($\kappa_w = 0.77$; 95% CI, 0.60–0.94); this represents *substantial* to *almost perfect* agreement in both areas of injury, with weighted kappa values ranging from 0.73 (95% CI, 0.57–1.00) for shoulder injuries to 0.85 (95% CI, 0.52–0.94) for knee injuries.

Patient satisfaction

One hundred percent (45/45) of patients reported being “satisfied” (score 4) or “very satisfied” (score 5) with the overall care they received from the physiotherapist (mean 4.87, range 4–5); 98% (44/45) reported being “satisfied” or “very satisfied” with the amount of advice/education they received (mean 4.67, range 3–5).

Table 3 Agreement between Physiotherapist and Orthopaedic Surgeon on Surgical Management of Participants (Shoulder)

	Orthopaedic surgeon			Total
	Surgical	Non-surgical	Further investigation	
Physiotherapist				
Surgical	6	2	0	8
Non-surgical	0	13	3	16
Further investigation	0	0	7	7
Total	6	15	10	31

Percent agreement: 83.9 (26/31).

κ_w : 0.73 (95% CI, 0.52–0.94).

Table 4 Agreement between Physiotherapist and Orthopaedic Surgeon on Surgical Management of Participants (Knee)

	Orthopaedic surgeon			Total
	Surgical	Non-surgical	Further investigation	
Physiotherapist				
Surgical	3	0	0	3
Non-surgical	0	7	0	7
Further investigation	1	1	2	4
Total	4	8	2	14

Percent agreement: 85.7 (12/14).

κ_w : 0.85 (95% CI, 0.57–1.00).

Proportion effectively triaged by physiotherapist

The physiotherapist accurately triaged 84.4% (38/45) of referrals ($\kappa_w = 0.77$; 95% CI, 0.60–0.94; see Table 2). Two patients were unnecessarily categorized as *surgical* by the physiotherapist (i.e., were categorized as *non-surgical* by the surgeon). Three patients categorized as *non-surgical* by the physiotherapist were categorized as *further investigation* by the surgeon, but of the three, two were not booked for surgery after imaging results were returned; the third was referred for a magnetic resonance arthrogram but did not attend the appointment and was lost to follow-up. The SCR of patients referred by the physiotherapist to the surgeon was 91%; in contrast, the SCR of all patients referred by a GP or emergency physician was 22%.

DISCUSSION

Our results demonstrate substantial agreement between physiotherapist and orthopaedic surgeon on surgical management decisions for patients with knee and shoulder injuries. Moreover, patients were very satisfied with this service overall. The physiotherapist was able to effectively triage the majority of the referrals to the surgeon, thus vastly improving the SCR compared to GP and emergency physician referral.

The finding that SCR was higher among patients assessed by the physiotherapist than the total group of

referrals from primary-care physicians demonstrates the physiotherapist's ability to triage patients effectively. While there is some potential for error and possible harm should the physiotherapist fail to refer a patient for necessary surgical care, our findings suggest that the risk level is low. No patients in our study were categorized by the surgeon as *surgical* while being categorized as *non-surgical* by the physiotherapist; furthermore, of the three patients who were categorized as *non-surgical* by the physiotherapist but sent for further investigation by the surgeon, none went on to be booked for surgery.

The triage system described here has the potential to reduce the wait time for patients who need to see an orthopaedic surgeon by screening out those who do not. This could also improve quality of life by providing timely conservative care for those triaged by the physiotherapist as not needing surgery. Further investigation into physiotherapists' managing of orthopaedic referrals is needed to confirm these findings.

While similar studies have been conducted previously in other countries, to our knowledge this is the first study to investigate the level of agreement between Canadian physiotherapists and orthopaedic surgeons regarding the management of common elective orthopaedic referrals. Research from the United Kingdom has found that physiotherapists and junior surgeons have equally effective orthopaedic assessment skills;¹⁶ however, the physiotherapists in that study have specialist training and work within an extended scope of practice that includes ordering and interpreting imaging and blood work, administering injections, and booking patients for surgery.¹⁶ Physiotherapists in British Columbia, in contrast, cannot perform any of these duties, and they must therefore be managed by the patient's GP, with referrals to either an orthopaedic surgeon or a sports medicine physician. In our study, 12 patients were referred on for further investigation by the surgeon; these patients could potentially have been managed by a physiotherapist with an extended scope of practice that included referral for imaging, further reducing the burden on orthopaedic surgeons. The physiotherapist in our study did not have any formal extended scope of practice, but had 8 years of experience in orthopaedic and sport physiotherapy, with post-graduate training in both fields. The short training period before the screening program was likely important in standardizing management decisions for the conditions seen. Further investigation into the role and benefit of extended-scope physiotherapists in Canada is warranted, as it may be a sound way to improve access to health care.

Given the unacceptable wait times for health care in Canada, and the lack of significant improvement resulting from recent funding interventions, novel approaches such as the one described here need to be further evaluated.² More than three-fourths of patients in our study could be (and were) adequately managed by a physio-

therapist, yet they occupied a position on the wait list ahead of others who may have needed surgical care. This finding echoes research from the United Kingdom and Australia that has found rates of inappropriate referral for orthopaedic surgery in excess of two-thirds.^{8,9} Inappropriate referrals are most commonly due to a minimal level of orthopaedic training among GPs and a lack of access to local sports medicine physicians for non-surgical interventions.¹⁰ The delisting of physiotherapy services under the Medical Services Plan in BC, coupled with physiotherapists' current limited scope of practice, also reduces GPs' ability to use physiotherapists' specialized skills effectively.

One limitation of our study was that it did not include referrals from sport medicine physicians (unless they were acting as emergency physicians) or other specialists (e.g., other orthopaedic surgeons, rheumatologists, etc.), and therefore may not be representative of typical incoming referrals to orthopaedic surgeons. However, our goal was to determine the effectiveness of a physiotherapist at managing orthopaedic surgery referrals from primary-care physicians, whereas sport medicine physicians and other specialists have already triaged a primary-care referral. The study design prevented us from assessing patient satisfaction with the physiotherapy consultation without influence from the consultation with the surgeon, since all patients saw the two practitioners consecutively.

CONCLUSIONS

This study demonstrates substantial inter-rater agreement between an orthopaedic surgeon and an experienced orthopaedic physiotherapist on surgical management decisions. More than three-fourths of patients referred to an orthopaedic surgeon by a GP or an emergency physician could have been triaged to non-surgical management by an experienced orthopaedic physiotherapist. This physiotherapy triage model could have considerable positive impact on wait times in Canada for treatment for some of the most common orthopaedic injuries, and could also promote timely conservative management of non-surgical conditions by physiotherapists. However, larger studies assessing the cost-effectiveness of physiotherapy triage systems should be conducted to further evaluate this approach. Evaluating the impact of an extended scope of practice for physiotherapists on health economics would also be beneficial.

KEY MESSAGES

What is already known on this topic

Studies of physiotherapy triage for patients referred to orthopaedic surgery in the United Kingdom and Australia have shown that more than two-thirds of referrals from GPs and emergency physicians are inappropriate, and that most of these patients have conditions that can be managed by a physiotherapist. Physiotherapists in these countries operate under an extended scope of practice.

This triage model has not been well studied in the Canadian context.

What this study adds

An orthopaedic surgeon and an experienced orthopaedic physiotherapist demonstrated substantial agreement in their surgical management decisions. More than three-fourths of patients referred to an orthopaedic surgeon by General Practitioners and emergency physicians did not need to see a surgeon and were appropriately managed by an orthopaedic physiotherapist. This physiotherapy triage model could considerably reduce wait times in Canada for treatment of some of the most common orthopaedic injuries, as well as promote timely conservative management of non-surgical conditions by physiotherapists.

REFERENCES

1. British Columbia Medical Association. Turning the tide part I—saving medicare for Canadians [Internet]. Vancouver: The Association; 2000 Jun [cited 2013 Jan 12]. Available from: <https://www.bcma.org/files/TurningTheTide.pdf>
2. Barua B, Rovere M, Skinner BJ. Waiting your turn: wait times for health care in Canada, 2011 Report. Vancouver: Fraser Institute; 2011. Report.
3. Esmail N, Hazel M, Walker MA. Waiting your turn: hospital waiting lists in Canada, 2008 Report. Vancouver: Fraser Institute; 2008. Report.
4. Barua B, Esmail N. Spend more, wait less? Fraser Forum. 2010 Feb [cited 2012 Oct 12]; 16–7. Available from: <http://www.fraserinstitute.org/research-news/research/display.aspx?id=11095>
5. Durrell S. Expanding the scope of physiotherapy: clinical physiotherapy specialists in consultants' clinics. *Man Ther.* 1996;1(4):210–3. <http://dx.doi.org/10.1054/math.1996.0271>. Medline:11440510
6. Hockin J, Bannister G. The extended role of a physiotherapist in an out-patient orthopaedic clinic. *Physiotherapy.* 1994;80(5):281–4. [http://dx.doi.org/10.1016/S0031-9406\(10\)61050-4](http://dx.doi.org/10.1016/S0031-9406(10)61050-4)
7. Hattam P, Smeatham A. Evaluation of an orthopaedic screening service in primary care. *Clin Perform Qual Health Care.* 1999;7(3):121–4. Medline:10848384
8. Hourigan PG, Weatherley CR. Initial assessment and follow-up by a physiotherapist of patients with back pain referred to a spinal clinic. *J R Soc Med.* 1994;87(4):213–4. Medline:8182677
9. Oldmeadow LB, Bedi HS, Burch HT, et al. Experienced physiotherapists as gatekeepers to hospital orthopaedic outpatient care. *Med J Aust.* 2007;186(12):625–8. Medline:17576177
10. Hattam P. The effectiveness of orthopaedic triage by extended scope physiotherapists. *Clin Gov.* 2004;9(4):244–52. <http://dx.doi.org/10.1108/14777270410566661>
11. Dickens V, Ali F, Gent H, et al. Assessment and diagnosis of knee injuries: the value of an experienced physiotherapist. *Physiotherapy.* 2003;89(7):417–22. [http://dx.doi.org/10.1016/S0031-9406\(05\)60075-2](http://dx.doi.org/10.1016/S0031-9406(05)60075-2)
12. Bath B, Grona SL, Janzen B. A spinal triage programme delivered by physiotherapists in collaboration with orthopaedic surgeons. *Physiother Can.* 2012;64(4):356–66. <http://dx.doi.org/10.3138/ptc.2011-29>
13. Kennedy DM, Robarts S, Woodhouse L. Patients are satisfied with advanced practice physiotherapists in a role traditionally performed by orthopaedic surgeons. *Physiother Can.* 2010;62(4):298–305. <http://dx.doi.org/10.3138/physio.62.4.298>. Medline:21886368
14. Maddison P, Jones J, Breslin A, et al. Improved access and targeting of musculoskeletal services in northwest Wales: targeted early access to musculoskeletal services (TEAMS) programme. *BMJ.* 2004;329(7478):1325–7. <http://dx.doi.org/10.1136/bmj.329.7478.1325>. Medline:15576743
15. Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics.* 1977;33(1):159–74. <http://dx.doi.org/10.2307/2529310>. Medline:843571
16. Daker-White G, Carr AJ, Harvey I, et al. A randomised controlled trial. Shifting boundaries of doctors and physiotherapists in orthopaedic outpatient departments. *J Epidemiol Community Health.* 1999;53(10):643–50. <http://dx.doi.org/10.1136/jech.53.10.643>. Medline:10616677