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Title: Expanding Roles in Orthopaedic Care: A Comparison of Physiotherapist and Orthopaedic Surgeon Recommendations for Triage

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Running Title: Expanding Role of Physiotherapists in Orthopaedics

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ABSTRACT

Rationale, aims and objectives: Innovative service delivery models are emerging using physiotherapists in the assessment and management of patients referred for orthopaedic consultation. The primary objective of this study was to compare the clinical recommendations of specially trained physiotherapists to those of an orthopaedic surgeon on: 1) appropriateness to be seen by an orthopaedic surgeon; and 2) candidacy and willingness to undergo total joint replacement (TJR) for patients with hip or knee problems. A secondary objective was to examine their recommendations for non-surgical management and agreement on clinical diagnosis.

Methods: Physiotherapists and orthopaedic surgeons independently assessed patients with hip and knee problems referred for consideration for TJR and completed a standardized form on treatment recommendations. Agreement between providers was determined using the kappa coefficient and percent agreement.

Results: Two physiotherapists and three orthopaedic surgeons participated in the study that included 45 and 17 patients with knee and hip problems, respectively. In 91.8% (56/61) of cases, physiotherapists and orthopaedic surgeons agreed on the recommendation of appropriateness for the patient to see a surgeon (kappa 0.69). In discordant cases, the physiotherapists tended to refer for consultation. There was 85.5% (53/62) agreement on whether a patient was a candidate and willing to have TJR (kappa 0.70). The physiotherapists commonly recommended exercise and education for non-

surgical patients. Orthopaedic surgeons most commonly referred patients to rehabilitation services.

Conclusions: Patients with hip or knee pain referred to orthopaedic surgeons can be appropriately referred for orthopaedic consultation by physiotherapists working in extended roles. Further research is required to evaluate the value-added and the most appropriate use of extended role physiotherapists.

INTRODUCTION

With the increasing prevalence of chronic diseases such as arthritis¹⁻¹⁰ and the concomitant shortages of health human resources¹¹⁻¹⁷, providing timely access to quality care is a mounting challenge. The demand for total joint replacement (TJR) has brought this issue to the forefront in Canada and other countries with publicly funded health care systems. As the rates of TJR have increased, so have waiting times for the procedure.^{4;18-20} While orthopaedic surgeons strive to cope with the demand for surgery, research indicates inefficiencies in the system where musculoskeletal referrals are frequently misdirected to orthopaedic surgeons when non-surgical intervention may be warranted.²¹⁻²³ In addition to initiatives aimed at reducing waiting times for TJR through wait list management strategies, such as prioritization, and increasing access to operating rooms,²⁴⁻³¹ new models of care have emerged in orthopaedics focusing on increasing capacity in the system by expanding the clinical roles of other health care providers. One such model, initially developed in the United Kingdom (UK), uses specially trained rehabilitation professionals, physiotherapists (PTs) or occupational therapists (OTs), in the assessment and management of patients referred for orthopaedic consultation. This role is often referred to as triage.

With the shift in professional boundaries where a specially trained rehabilitation professional can be the first point of contact for orthopaedic referrals, clinical decision making is critical. Previous studies have shown that specially trained PT's can accurately diagnose musculoskeletal problems^{32;33} with some studies demonstrating

comparable or greater diagnostic accuracy than other health care providers, including physicians.^{33,34} The key question for effectiveness in triaging patients is whether patients who need to see a surgeon are referred to the surgeon. Research in this area is limited. In the UK, Hattam³⁵ found that 70.6% of patients were appropriately referred by PTs by examining the subsequent actions of the orthopaedic surgeons; however, patients who were not referred to the consultant were not included in the study. More recently, in a prospective study from Australia, Oldmeadow et al³⁶ found that PTs identified the same patient management plans as the surgeon in 74% of musculoskeletal patients. As the role of PTs in Canada extends into triage in orthopaedic clinics, examination of PTs' clinical decision making is warranted to ensure that patients who require consultant intervention are appropriately identified. The primary objective of this study was to compare the clinical recommendations of specially trained PTs to orthopaedic surgeons on appropriateness to be seen by an orthopaedic surgeon, and candidacy and willingness to undergo TJR for patients with hip and knee problems referred for consideration of TJR. Secondly, we examined PT and orthopaedic surgeon agreement on clinical diagnosis and examined their recommendations for non-surgical management of patients.

METHODS

Study Design

This study examined the inter-rater agreement on clinical recommendations between specially trained PTs and orthopaedic surgeons at a teaching hospital in Toronto, Canada. This study was integrated into the routine clinical practice in the orthopaedic clinic as part of a new model of care to expedite access to TJR.

Two PTs with special training in arthritis management, and an average of 17.5 years of clinical experience (range 10-25), took part in the study. Three orthopaedic surgeons, two of whom had subspecialty practices in joint replacement and one who was a general orthopaedist, also participated in the study. The three participating orthopaedic surgeons had practiced for a mean of 11.7 years (range 3-22). For the purposes of examining provider agreement, PTs and orthopaedic surgeons were grouped by profession rather than individual clinician. To ensure that the clinical decision making of the two PTs was similar, a pilot study was conducted where the PTs independently assessed and completed the standardized form on 10 patients. Percent agreement was calculated at 90% (9/10) for the recommendation for orthopaedic surgeon consultation as well as candidacy for total joint replacement. This was deemed to be satisfactory for the study.

The study sample consisted of patients recruited from the office clinics of participating orthopaedic surgeons between October 2006 and April 2007. Patients were eligible for the study if they were referred with hip or knee problems, had a diagnosis of arthritis, were fluent in spoken and written English and consented to participate. Patients were excluded if they were referred from another orthopaedic surgeon, were a follow-up patient for the surgeon, were referred for revision total joint replacement, had evidence of acute musculoskeletal injury or recurrent trauma with no mention of arthritis or had evidence of meniscal/ligamentous injury in patients under age 45. Patients were excluded if they were referred from other orthopaedic surgeons or for revision surgery for pragmatic reasons as these patients would be referred directly to the surgeon in the implementation of this model of care. Patient charts were screened by the Research Associate prior to the clinic visit to ascertain potential eligibility for the study.

Potentially eligible patients were provided with a study letter upon arrival at the clinic and written consent to participate in the study was obtained by a Research Associate. Prior to their assessment, patients completed a battery of questionnaires including the Knee Injury and Osteoarthritis Outcome Score (KOOS) for knee patients, the Hip Dysfunction and Osteoarthritis Outcome Score (HOOS) for hip patients, a demographic form and a patient satisfaction survey. The KOOS and HOOS are validated questionnaires with five subscales that examine pain, other symptoms, function in activities of daily living, function in sports and recreation, and hip/knee related quality

of life.³⁷⁻³⁹ Study patients were first independently assessed by a PT, who completed a standardized form recording their recommendations for the patient and sealed it in an envelope. The patient was then independently assessed by an orthopaedic surgeon who completed the same form. Patients who were deemed inappropriate for consultation by the orthopaedic surgeons were defined as those who could have been managed without surgeon assessment including by a PT alone.

New patients scheduled for visits to see the orthopaedic surgeons during the study period were screened for eligibility, and 208 of 589 new patients were excluded based on chart screening. The majority of exclusions were referrals from other orthopaedic surgeons (n=76), musculoskeletal problems other than hip or knee joints (n=50), and evidence of meniscal injury in patients under age 45 years or other injury (n=40). Of those who were potentially eligible, it was feasible in the clinic to approach 116 patients to participate in the study. Twenty-eight of these patients were deemed ineligible for participation when approached by the Research Associate, and 25 patients declined to participate in the study. Sixty-three eligible patients agreed to participate in the study. Significant data were missing for one patient resulting in a total sample size of 62 patients.

Analysis

Descriptive statistics, including means, medians, standard deviations and proportions, were calculated to examine demographic and functional characteristics of the study sample. A normalized score was calculated for each of the HOOS and KOOS 5 subscales (100 indicating no symptoms and 0 indicating extreme symptoms). The kappa coefficient was the primary measure used to assess the level of agreement between PTs and orthopaedic surgeons in their recommendation for orthopaedic consultation. Observed agreement (proportion of cases for which the assessors agreed) was also calculated.

Sample Size

A power calculation was completed to determine sample size based on the goodness of fit approach for kappa statistic significance testing proposed by Donner and Eliasziw.⁴⁰ Prior to the study, our data on the standard model of care showed almost half of hip and knee patients referred to the orthopaedic surgeons were not surgical candidates at their initial consultation. Based on 50% of people referred to the surgeons being candidates for hip or knee replacement, it was estimated that data on 126 participants would be required to ensure a minimum level of agreement of 0.60 based on a kappa statistic of 0.80 (almost perfect agreement according to the criteria of Landis and Koch⁴¹ with 80 power and $\alpha=0.05$). We used data on TJR for our sample size calculation as these were the only historical data available. An interim analysis was planned at

approximately 60 participants in order to minimize burden on the patients, surgeons and clinic processes if possible. Based on the results of the interim analysis, where greater than 80% of patients were deemed to be appropriate for surgeon assessment, recruitment was stopped.

RESULTS

Study Sample

Of the 62 participants in the study, 45 patients were referred for knee problems while 17 patients were referred for hip problems. Patients in the study sample were, on average, 60 years of age, predominantly female (59%), and two thirds reported at least one comorbid condition for which they had seen a doctor or were receiving treatment. The majority of the sample had university or college education and about half were still working (Table 1). Using the HOOS and KOOS, we examined patient symptoms and physical function in usual activities. Patients had lower mean scores in the subscales of sports and recreation and quality of life compared to other subscales (Table 1.).

Comparison of Physiotherapist and Orthopaedic Surgeon Recommendations

The orthopaedic surgeons recommended that 50 of 61 patients (82.0%), for whom complete data were available, were appropriate for orthopaedic consultation and PTs 53 of 61 (86.9%) patients. This represented agreement between the surgeon and PT on 91.8% (56/61) of cases. The kappa statistic was 0.69 indicating good agreement (Table

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2). In all but one instance where there was lack of agreement, the PTs were more conservative and recommended orthopaedic consultation. In the one case where the orthopaedic surgeon recommended that the patient was appropriate for orthopaedic surgeon consultation but the PT did not, the orthopaedic surgeon indicated that the patient's level of disability did not warrant TJR.

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The orthopaedic surgeons recommended that 27 (43.5%) patients were candidates and willing to undergo TJR. The corresponding data for PTs was 20 (32.3%). The percent agreement between the orthopaedic surgeons and PTs was 85.5% (53/62) with a kappa statistic of 0.70 indicating good agreement (Table 2). In 8 of the 9 cases where the orthopaedic surgeon and PT disagreed, the orthopaedic surgeon recommended that the patient was a candidate and willing to have a TJR. The reasons for the PTs indicating the patients were not candidates and willing to have TJR were because they were unwilling to have surgery (n=1), the patient wanted the surgeon's opinion (n=2), the patient was a candidate for arthroscopy (n=3), and the PT recommended conservative management (n=2). In the one instance that the PT recommended TJR and the orthopaedic surgeon did not, the surgeon documented that the patient was a candidate for another type of surgery. In all discordant cases, the PTs recommended that the patient was appropriate for consultation with the surgeon indicating that these patients would have been referred to the appropriate health provider.

Clinical Diagnostic Accuracy

The orthopaedic surgeons and PTs agreed on the type of hip or knee complaint for 69% of cases with complete data (n=60). These included osteoarthritis (n=29), meniscal or ligamentous injuries (n=11) and other (n=2). Among the cases where there was not agreement, the most common discrepancies were between a primary diagnosis of osteoarthritis or meniscal tear/ligamentous injury (six cases) and osteoarthritis versus inflammatory arthritis (three cases).

Management of Non-surgical Patients

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For non-surgical patients, it is also critical to ensure the appropriate management steps are taken. PTs made an average of 1.3 recommendations for conservative management per patient. The majority of these were for exercise and education (Table 3). Orthopaedic surgeons most commonly referred to rehabilitation services (e.g. physiotherapy and/or occupational therapy).

DISCUSSION

Our aim was to compare the clinical recommendations of PTs to orthopaedic surgeons for patients referred for consideration of TJR. To our knowledge, no other studies have examined appropriateness of triage by PTs in Canada using this methodology. Other research has examined the effectiveness of triage by PTs in other settings^{35;36} as well as evaluated other aspects of the role such as ability to make a clinical diagnosis^{33;34;36} and

patient management.⁴²⁻⁴⁹ Previous studies support our findings indicating that specially trained PTs appropriately triage musculoskeletal patients in orthopaedic clinics^{35;36} and provide patients with more support for conservative management.^{43;50}

We have shown that specially trained PTs make similar clinical recommendations to orthopaedic surgeons regarding appropriateness to see a surgeon and TJR. In general, our results showed PTs made appropriate recommendations in a higher proportion of patients than other studies. Oldmeadow et al³⁶ used a similar prospective methodology to our study to compare PTs to surgeons on diagnosis and management decisions (non-surgical versus surgical). In 38 patients, there was 74% agreement on patient management (Kappa=0.38). In other research, Hattam³⁵ used a cross-sectional examination of chart data based on the outcome of the initial consultation with the surgeon (e.g. surgery or investigations) to examine appropriateness of PT referrals and found that 70.6% of patients were appropriately referred. In the same study, Hattam³⁵ reported that 79% of PT referrals specifically for surgery were considered by the consultant to have an operable diagnosis. This is comparable to the 85.5% agreement on candidacy and willingness for TJR in our study. Hattam³⁵ suggested their findings may have been an underestimate given the reliance on cross sectional chart data. Although our study was also cross-sectional in design, it was prospective and took into account the providers' clinical decision of appropriateness, which might be more complex than can be ascertained from the clinical chart.

In our study, agreement between the PT and surgeon was not perfect. However, in discordant cases, patients were recommended for surgeon consultation indicating that the patients would have been seen by the surgeon without delays in treatment. It is unlikely that perfect agreement is achievable given the absence of standardized guidelines or criteria for appropriateness of TJR and probable variability in clinical decision making amongst surgeons themselves. In this regard, it has also been suggested that PTs need to adapt to the working methods of the consultant orthopaedic surgeons involved, making our methodology a pragmatic approach to measuring appropriateness.^{43;45}

Research has shown that PTs can independently manage a substantive proportion of patients in orthopaedic clinics varying from 55% to 85%.^{44-47;49} Other studies have shown that specially trained PTs working in orthopaedic clinics provide more advice and reassurance to patients compared to consultants,⁴³ and that postoperative patients are more likely to receive education and exercise prescription when seen by a PT compared to the orthopaedic surgeon.⁵⁰ Similarly, our results indicate that PTs made more recommendations for conservative management than orthopaedic surgeons and were more likely to recommend education and exercise in the clinic. This is not surprising as these skills are integral to PT practice. These findings suggest that there is more to understand about the benefits and added value of the PT role in the orthopaedic

clinic in providing comprehensive chronic disease management for non-surgical patients in addition to expediting access to care for patients.

Strengths of our study were the prospective design and use of clinicians' recommendations in a real life clinical context. However, our study also had potential limitations. It was conducted in an urban academic tertiary referral hospital and the wider applicability of the findings is unknown. In general, our patient sample was similar in characteristics to other studies of patients waiting for TJR.^{37;38;51-54} However, our sample was slightly younger and patients generally had slightly higher HOOS and KOOS scores indicating lower levels of impact in usual activities compared to other studies.^{37;38} This may be explained by the fact that fewer than half of patients were recommended for TJR. In addition, limiting the study to English speaking patients may have affected the representativeness of the sample in our urban multicultural setting.

Overall, there was an unexpectedly high proportion of patients recommended to be seen by the orthopaedic surgeon although the proportion recommended for TJR was similar to our prior assumptions. Due to this lack of variability in our primary outcome, an increase in sample size would not have altered the kappa statistic for our primary outcome of recommendations for orthopaedic consultation. Thus, recruitment was halted to reduce burden on health providers and patients. Although the sample size was too small to test for statistical differences in agreement between PTs and individual

surgeons, comparison of each surgeon to the PTs appeared to be similar. Given the gap between the proportion of patients recommended for TJR and those recommended for orthopaedic consultation, further research is required to explore what factors predict who needs consultation with the surgeon.

The results of this study indicate that the clinical recommendations of specially trained PTs are similar to orthopaedic surgeons for patients who are potential TJR candidates. PTs also made more recommendations for conservative management, particularly exercise and education in clinic. Given the current shortages of physicians, growing burden of arthritis, and high proportion of patients inappropriately referred to orthopaedic surgeons in Canada and other countries, changes to health care delivery are needed to ensure timely access to care. Shifting professional boundaries and roles is one method of re-designing the health care system to ensure patients receive the right care from the right provider at the right time. Ongoing research to examine the effectiveness of new models of care for patients as well as the health care system is paramount.

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TABLES

Table 1. Sample demographics and function scores

Patient Characteristics	Number	
<i>Demographics</i>		
Age: mean (range)	62	59.7 (33-85)
Female	61	36 (59.0%)
Comorbidity	62	40 (64.5%)
1		13 (21.0%)
2 or more		27 (43.5%)
Education	62	
Less than high school		3 (4.8%)
High school		11 (17.7%)
Trades certificate/Diploma/College		17 (27.4%)
University		31 (50.0%)
Living arrangement	61	
Lives alone		13 (21.3%)
Lives with another person		47 (77.1%)
Other		1 (1.6%)
Employment	62	
Working		34 (54.8%)
Homemaker		5 (8.1%)

Retired		17 (27.4%)
Not working		6 (9.7%)
Supplemental Health Insurance	59	45 (76.3%)

Patient Function ***Mean (SD)***

KOOS Subscale (n=45)

Pain	44	50.5 (23.6)
Symptoms	45	51.3 (19.4)
Activities of Daily Living	43	56.6 (26.4)
Sport and Recreation	43	30.0 (29.6)
Knee Related Quality of Life	44	30.0 (20.9)

HOOS Subscale (n=17)

Pain	16	47.2 (18.2)
Symptoms	17	48.2 (19.3)
Activities of Daily Living	16	50.8 (19.8)
Sports and Recreation	16	34.0 (22.9)
Hip Related Quality of Life	16	27.7 (19.2)

Table 2. Recommendations by Profession

		Appropriate to be seen by an orthopaedic surgeon			Candidate for, and willing to have, TJR		
		Physiotherapists					
		Yes	No	Total	Yes	No	Total
Orthopaedic Surgeons	Yes	49	1	50	19	8	27
	No	4	7	11	1	34	35
	Total	53	8	61	20	42	62
Percent agreement		91.8% (56/61*)			85.5 (53/62)		
Kappa		0.69			0.70		

*Data were missing for 1 patient

Table 3. Non-surgical Recommendations by Profession

Recommendations/Referrals	Orthopaedic Surgeon (n=20)	Physiotherapist (n=24)
Rehabilitation Services (physiotherapy and/or occupational therapy)	8	4
Refer back to the primary care physician	3	3
Follow-up in 6 months	1	6
Education and/or exercise in clinic	1	18