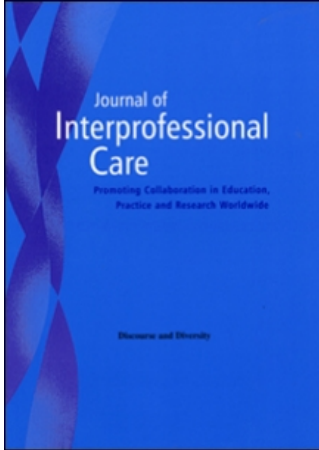


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Diagnostic and treatment concordance between a physiotherapist and an orthopedic surgeon – A pilot study

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Abstract

Musculoskeletal impairments affect one-third of the adult population, are one of the major contributors to lost time from work, and account for one-third of a general practitioner's caseload. These injuries respond well to physiotherapy, but access can be limited in a publicly funded health care system. Improved access to physiotherapy occurs in a collaborative model of care in orthopedic clinics however the extent to which the patient receives similar diagnoses and treatment recommendations has not been reported. The purpose of this study was to determine diagnostic concordance and accuracy, and treatment concordance between a physiotherapist and orthopedic surgeons. Twenty-five subjects in an orthopedic clinic were assessed by a physiotherapist and an orthopedic surgeon. Diagnosis and treatment recommendations were made by each separately. These were compared for concordance between professionals and diagnostic accuracy. The physiotherapist and the orthopedic surgeon had 90% concordance in diagnoses of knee and shoulder impairments, and 75% accuracy when compared to definitive diagnostic methods. They had 87% agreement in treatment recommendations, however, the physiotherapist gave three treatment recommendations per patient where the surgeon gave two. In a collaborative care context therefore, this study suggests, that physiotherapists have similar diagnostic capabilities to orthopedic surgeons, and they will enhance the conservative treatment options offered to orthopedic patients.

Keywords: *Physiotherapy, orthopedic clinics, collaborative care, diagnostic concordance*

Introduction

Musculoskeletal health problems affect approximately one third of the adult population, are one of the major contributors to lost time from work, and account for approximately one third of a family physician's caseload (Grahn et al., 1998; Lock et al., 1999; Marklund et al., 1999; Rekola et al., 1993). The burden of direct and indirect costs related to musculoskeletal impairments on both the health care system, and the overall economy is significant, with estimates placing such costs third behind heart disease and cancer in Canada (Canadian Institute for Health Information, 2006; Wigle, 1995). In the USA, those with chronic musculoskeletal problems are estimated to double the cost and utilization of all health care services, not just those related to their musculoskeletal problem (Mapel et al., 2004). However, the mechanisms to deal with these impairments are limited.

More than 60% of the people who suffer from musculoskeletal impairments will seek attention from their family physician (Sundararajan et al., 1998) who has three treatment options: to personally treat the patient, to refer the patient for specialist care in the public health system (by an orthopedic surgeon or a physiotherapist), or to refer the patient for privately-funded health care (with a physiotherapist, a chiropractor, or another practitioner).

However, there are problems with each of these options. If patients are managed by the family physician, conservative options are limited to medications and advice about rest and ice (Freedman & Bernstein, 1998; Freedman & Bernstein, 2002). If patients are referred to the publicly funded system, they are likely to be subjected to inordinately long wait times to see a health professional with musculoskeletal expertise, or they may end up seeing a surgeon for a non-surgical problem (Fraser Institute, 2006). If patients are referred to a professional in the private system, only those with financial means can access the service. Therefore, while all these options may offer some benefit, there are potential gaps in access to service, inequities, and inefficiencies in the care of persons with musculoskeletal impairments

In order to address access issues for health care, many countries have begun to examine interdisciplinary, collaborative models of care. Improved use of non-physician health-care providers can have a positive impact on the cost of health care (Cooper, 2001), and on the efficiency of the health care system in terms of human resources (Ganapathy & Zwemer, Jr., 2003; Timpka et al., 1996). Collaborative care can also have a positive effect on patient satisfaction with care (Derengowski et al., 2000; van Soeren & Micevski, 2001), and on physician productivity and satisfaction with the work environment (Carr et al., 2002; MacDonald & Katz, 2002; Rodysill, 2003).

In the publicly funded system the most obvious choice for collaborative care in the management of musculoskeletal impairments is the physiotherapist. The model of care in which a physiotherapist assesses, triages and manages orthopedic patients in the out-patient surgical clinics has been implemented in some countries (Benson et al., 1995; Daker-White et al., 1999; Durrell, 1996; Gardiner & Wagstaff, 2001; Hattam & Smeatham, 1999; Hockin & Bannister, 1994; Hourigan & Weatherley, 1994; Jibuike et al., 2003). One study has reported on the diagnostic accuracy of physiotherapists and orthopedic surgeons compared to definitive diagnostic methods, however this was done on separate cohorts of patients (Gardiner & Turner, 2002). So, what has not been determined within these models of care is if the same cohort of patients would receive similar diagnoses from a physiotherapist and an orthopedic surgeon, and if these patients would receive appropriate treatment options from both professionals.

The purpose of this study was to determine diagnostic concordance and accuracy between a physiotherapist and two orthopedic surgeons on the same cohort of patients, and to determine if these patients would be offered similar treatment advice.

Methods

The study was undertaken in an out-patient orthopedic clinic to determine:

- (1) Concordance of the diagnosis of musculoskeletal impairments made by a physiotherapist and an orthopedic surgeon on the same cohort of patients.
- (2) Accuracy of the diagnoses made by these two professionals.
- (3) Concordance of the recommendations for treatment between an orthopedic surgeon and a physiotherapist.

It was decided that patients with a limited number of joint-related conditions should be assessed in order to ensure accuracy of the study. The patients chosen were those who had knee problems, since physiotherapy accuracy in diagnosis of this joint has been reported in the literature (Gardiner & Turner, 2002), and those who had shoulder problems, since this is the second most common peripheral joint complaint for patients with musculoskeletal impairments (Katz et al., 2000).

Inclusion criteria

The criteria for inclusion into the study were: (i) referral to the orthopedic clinics for shoulder or knee musculoskeletal impairments, and (ii) between the ages of 16 and 75 years.

Exclusion criteria

Potential subjects were excluded from study if they: (i) had a diagnosis in their referral of masses or lumps such as ganglia, (ii) had a complex diagnostic problem or a complex medical history that was evident from radiographs or blood work or had been cited by the referring family physician, and (iii) were assessed by a resident or a surgeon before being assessed by the physiotherapist.

Potential subjects were identified upon their arrival to the clinic. A sample of convenience was used and 25 subjects were recruited into the study.

Diagnostic concordance

Diagnostic concordance was defined as the degree to which the physiotherapist and the orthopedic surgeon agreed on diagnoses for the subjects. In order to obtain information about diagnoses, subjects were assessed by the physiotherapist prior to being assessed by the surgeon. Both the physiotherapist and the surgeon determined their diagnoses based on clinical assessment techniques, and any X-ray or blood work that was available on the subjects' charts. They then each completed a form listing the primary and any secondary diagnoses. Once the physiotherapist had completed her assessment, she sealed the assessment form in an envelope. Then the surgeon did his assessment and sealed the form in a different envelope. They did not discuss the patient until this had been completed. Diagnoses from both the surgeon and the physiotherapist were evaluated for concordance.

Diagnostic accuracy

Diagnostic accuracy refers to the agreement between the physiotherapist's or the orthopedic surgeons' diagnosis and any definitive diagnostic methods (surgery or advanced diagnostic imaging). In order to compare both the physiotherapist's and the orthopedic surgeons' diagnoses to definitive diagnoses, at the completion of the study, the subjects' charts were reviewed looking for evidence of a definitive diagnosis in the form of an imaging study or a surgical finding, only those subjects who had undergone one of these procedures were included in this part of the analysis. Therefore there was a selection bias for these subjects because they would have undergone surgery or advanced diagnostic testing whether or not they were in the study. The review of advanced diagnostic tests and surgery allowed for a comparison between the clinical diagnoses and a definitive diagnosis to determine accuracy of clinical diagnosis by the health care professionals.

Treatment concordance

Treatment concordance is defined as agreement between the physiotherapist and the orthopedic surgeon as to the management strategy for the patient. On the same forms on which the physiotherapist and the orthopedic surgeon recorded their diagnoses, they also checked off their recommendations from a list which included; education, exercise prescription, further diagnostic testing, surgery, or medications. Once again, both professionals made their recommendations and sealed them in envelopes before discussing the subject.

Results

Diagnostic concordance

In order to compare the concordance of the diagnoses the primary diagnosis and any secondary diagnoses from the surgeons' and the physiotherapist's diagnostic forms were coded using the ICD 9. These were compared and a percentage of concordance was determined. Raw concordance was found to be 90% for all knee and shoulder diagnoses. To augment these findings and to eliminate the possibility of these results occurring by chance, the Kappa statistic was calculated.

Although the physiotherapist and the surgeon were free to make any diagnosis possible, the knee diagnoses appeared to fall into three general categories, based on the ICD diagnostic codes: (i) ligament or meniscus trauma; (ii) chronic / overuse problems such as osteoarthritis or patellofemoral syndrome; (iii) not-yet-diagnosed or atypical soft-tissue injuries.

The kappa statistic was calculated in a 3 × 3 matrix. This is summarized in Figure 1.

Kappa = 80% agreement between knee diagnoses for the surgeons and the physiotherapist. From Figure 1 it can be seen that the surgeon and the physiotherapist agreed on their diagnoses 21 out of 24 times, and they only disagreed in 3 cases. Since there were only six

MD Diagnosis → PT Diagnosis ↓	Ligament or meniscus trauma	Overuse / chronic problems	Not-yet diagnosed / Atypical soft – tissue injuries	Totals
Ligament or meniscus trauma	9	1		10
Overuse / chronic problems	1	9	1	11
Not-yet diagnosed / Atypical soft – tissue injuries			3	3
Totals	10	10	4	Grand total: 24

MD results totaled horizontally
PT results totaled vertically

Figure 1. Matrix of knee diagnosis correlation between physiotherapist and surgeon.

data points for the shoulder patients, and there was perfect concordance in diagnosis (100%), the Kappa statistic is irrelevant.

There were seven cases where a secondary diagnosis was made by one health professional and not the other. In five of these instances, the secondary diagnosis augmented the primary diagnosis, but did not change the recommendations for either a medical or a conservative course of management that should have been followed with the subject.

Diagnostic accuracy

In order to determine accuracy of diagnoses by the two health professionals, in cases where diagnostic testing or surgery was done on the subject, this diagnosis was also coded using the ICD 9, and a comparison was made to both the physiotherapist’s and the surgeons’ diagnosis to determine accuracy. Because the majority of the subjects seen in this study required conservative management, there were only eight cases where definitive diagnoses from surgery or diagnostic testing were able to be obtained. The results of these are summarized in Figure 2.

In five of the cases, the surgeon and the physiotherapist agreed on the diagnosis, and the surgery or MRI confirmed their diagnosis. In one instance, the surgeon and the physiotherapist agreed on the diagnosis of osteoarthritis, but the surgery showed that the subject had a torn lateral meniscus. In two instances, the surgeon and the physiotherapist disagreed on the diagnosis. In one of these cases the surgeon was proven correct in his diagnosis of lipoma, when the physiotherapist had indicated a lump, not-yet-diagnosed. In the other case, the physiotherapist was proven correct in her diagnosis of an ACL tear by MRI, when the surgeon had diagnosed a medial meniscus tear. For the diagnoses that could be confirmed by a definitive diagnostic method, both the surgeon and the physiotherapist had 75% overall accuracy in making the correct diagnosis clinically.

Treatment concordance

Following the diagnostic concordance, the recommendations made by the surgeon and the physiotherapist were noted and a 5 × 5 matrix was generated for the kappa statistic to determine the amount of concordance in the recommendations. In some instances, one of the health care professionals made more recommendations than the other one. These results are shown in shaded boxes in Figure 3. Kappa = 87% agreement between the recommendations made by the surgeon and the physiotherapist (not including the shaded areas in Figure 3), with a 90% raw concordance.

However, the physiotherapist made more recommendations (77) than the surgeons (50). When these are added into the calculation, Kappa = 52% for all recommendations. The extra recommendations were all from the physiotherapist and can be summarized as: 11

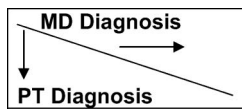
	Correct Diagnoses	Incorrect Diagnoses
Correct Diagnoses	5 (3 surgical, 2 MRI)	1 (MRI)
Incorrect Diagnoses	1 (diagnostic ultrasound)	1 (surgery)

Figure 2. Summary of diagnosis confirmed by definitive methods.

	Education	Exercise Prescription	Diagnostic Testing	Surgery	Medications	Sub Total	No Recommendation	Totals
Education	13					13	11	24
Exercise Prescription	1	9	1	1		12	11	23
Diagnostic Testing			7	2		9	3	12
Surgery				7		7	1	8
Medications					9	9	1	10
No Recommendation								0
Totals:	14	9	8	10	9	Total = 50	27	Grand Total = 77

Figure 3. Matrix of recommendation concordance between surgeon and physiotherapist.

recommendations for education; 11 recommendations for exercise prescription; 3 recommendations for further diagnostic testing; one recommendation for surgery; and one recommendation for medications. Because the recommendations were all from the physiotherapist, a category of “no recommendations” was added as the 6th cell of the matrix, and these are captured in the shaded areas of Figure 3. This is meant to reflect that there was no matching recommendation because more were made by the physiotherapist. The surgeons made an average of two recommendations for each subject, while the physiotherapist made an average of three.

Discussion

Although this is a pilot study, and the results should be viewed with that in mind, the results of this study showed that a physiotherapist and an orthopedic surgeon make similar diagnoses and have similar levels of accuracy in making a clinical diagnosis for non-complex musculoskeletal impairments of the knee and shoulder. Similar findings have previously been reported for diagnoses of the knee (Moore et al., 2005), however this comparison was not done on the same cohort of subjects. The diagnostic concordance between the physiotherapist and the surgeon is an extremely important finding. One of the reasons patients and surgeons are not comfortable with models of collaborative care is that they have the perception that patients may receive inferior or inaccurate treatment from another health care professional (Carr et al., 2002; Hooker et al., 2005). In five instances, one health professional made more diagnoses than the other, but this did not affect the resulting treatment outcome. For example, diagnosing the subject with osteoarthritis and a secondary diagnosis of patellofemoral syndrome would not alter the need for a course of conservative management, or diagnosing an anterior cruciate ligament tear with a medial meniscus tear

would not change the need for the subject to have surgery. Therefore both professionals correctly identified if the subject required medical or conservative management.

Of concern to patients is that a diagnosis might be missed if they are seen by another practitioner besides a physician. The results of this study suggest that this is not the case for musculoskeletal triage involving a physiotherapist, however in a more pathological patient population, this might be an area for concern. In addition, the physiotherapist was able to predict all cases that were appropriate for medical intervention, therefore subjects would have received the appropriate diagnosis and care had they been triaged by the physiotherapist, because they would have seen the surgeon anyways if they needed medical attention.

The results of this study also demonstrated that the treatment recommendations made by the surgeon and the physiotherapist were highly similar for primary recommendations, however the physiotherapist tended to make recommendations in almost every case for education and exercise, which are the hallmarks of conservative management of musculoskeletal impairments. The physiotherapist recommended education and exercise for 96% and 92% of the subjects respectively, even for those who required surgical intervention; the surgeon recommended education for 56% of the subjects, and exercise for only 36% of the subjects. Since the majority of the subjects seen in this study (64%) did not require surgical management, then offering them conservative management options such as education and exercise can only improve the efficacy of the treatment they receive. This indicates that the management offered by a physiotherapist is different to that offered by an orthopedic surgeon. However, access to physiotherapy services are limited, which often leaves the orthopedic surgeons to assess and treat musculoskeletal impairments with a medical scope of services and a different expertise from the conservative one that may be required.

The results of this study should be interpreted in the context of the study's limitations. In this particular case there was only one physiotherapist and two orthopedic surgeons involved in the study. The physiotherapist was very experienced, having over five years of orthopedic practice and a research Master's degree. In addition she worked with the surgeons for a period of four months before the data collection started. This enabled the surgeons to become familiar with her capabilities, and it allowed her to become familiar with additional diagnostic criteria that the surgeons may use. This may have affected the diagnostic results. In addition, because this was a pilot study, the sample size is low and generalizations are difficult.

Conclusion

Readers should draw their own conclusions from this study in light of the limitations imposed by this being a pilot study. However, the findings of this study suggest that a physiotherapist and an orthopedic surgeon will make similar diagnoses for patients in outpatient orthopedic clinics who suffer from non-complex injuries of the knee and shoulder. In addition, these professionals demonstrate a similar level of diagnostic accuracy when compared to definitive diagnostic methods. Finally, a physiotherapist will offer more conservative treatment options to patients in orthopedic clinics, which suggests that the physiotherapist is an integral part of the orthopedic team. The results of this study have been used to implement a collaborative model of care in which a physiotherapist with extra training in the ordering of diagnostic tests, assesses and triages all patients referred to orthopedics for hip or knee arthroplasty surgery. While this study was limited to the use of one health professional in a non-traditional role, the contribution of this idea to other models of collaborative care should be considered.

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