

Evaluation of an Advanced-Practice Physical Therapist in a Specialty Shoulder Clinic: Diagnostic Agreement and Effect on Wait Times

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ABSTRACT

Purpose: To examine the role of an advanced-practice physiotherapist (APP) with respect to (1) agreement with an orthopaedic surgeon on diagnosis and management of patients with shoulder problems; (2) wait times; and (3) satisfaction with care. **Methods:** This prospective study involved patients with shoulder complaints who were referred to a shoulder specialist in a tertiary care centre. Agreement was examined on seven major diagnostic categories, need for further examination and surgery, and type of surgical procedure. Wait times were compared between the APP- and surgeon-led clinics from referral date to date of initial consultation, date of final diagnostic test, and date of confirmed diagnosis and planned treatment. A modified and validated version of the Visit-Specific Satisfaction Instrument assessed satisfaction in seven domains. Kappa (κ) coefficients and bias- and prevalence-adjusted kappa (PABAK) values were calculated, and strength of agreement was categorized. Wait time and satisfaction data were examined using non-parametric statistics. **Results:** Agreement on major diagnostic categories varied from 0.68 (good) to 0.96 (excellent). Agreement with respect to indication for surgery was $\kappa = 0.75$, $p < 0.001$; 95% CI, 0.62–0.88 (good). Wait time for APP assessment was significantly shorter than wait time for surgeon consultation at all time points ($p < 0.001$); the surgeon's wait time was significantly reduced over 3 years. High satisfaction was reported in all components of care received from both health care providers. **Conclusions:** Using experienced physiotherapists in an extended role reduces wait times without compromising patient clinical management and overall satisfaction.

Key Words: advanced practice; diagnosis; physiotherapist; shoulder.

RÉSUMÉ

Objectif : Examiner le rôle du physiothérapeute en pratique avancée en ce qui a trait (1) aux accords avec un chirurgien orthopédique sur le diagnostic et la gestion de patients aux prises avec des problèmes à l'épaule; (2) au temps d'attente; (3) à la satisfaction par rapport aux soins. **Méthode :** Cette étude prospective a fait appel à des patients avec des douleurs à l'épaule qui ont été dirigés vers des spécialistes de l'épaule dans un centre de soins tertiaires. Les accords ont été examinés pour sept catégories de diagnostics, en fonction de la nécessité d'examen plus poussés ou de chirurgie et du type d'intervention chirurgicale projeté. On a comparé les temps d'attente pour le physiothérapeute en pratique avancée et les cliniques dirigées par un chirurgien à partir de la date où le patient a été redirigé à la consultation initiale, jusqu'à la date de diagnostic définitif, jusqu'à la date de diagnostic confirmé et jusqu'au traitement planifié. Une version modifiée et validée de l'instrument d'évaluation de la satisfaction à la suite d'une consultation (*Visit-Specific Satisfaction Instrument*) a permis de mesurer la satisfaction dans sept domaines. Les coefficients kappa (κ) et les valeurs kappa ajustées pour la prévalence et le biais (PABAK) ont été calculés et les accords ont été catégorisés selon leur force. Les données sur les temps d'attente et la satisfaction ont été examinées à l'aide de statistiques non paramétriques. **Résultats :** Le degré d'accord sur les diagnostics importants variait de 0,68 (bon) à 0,96 (excellent). Les accords en ce qui concerne le recours à la chirurgie étaient de $\kappa = 0,75$, $p < 0,001$, I.C. 95%, 0,62–0,88 (bon). Les temps d'attente pour une évaluation par un physiothérapeute en pratique avancée étaient considérablement plus courts que ceux pour une consultation auprès d'un chirurgien à toutes les étapes ($p < 0,001$); les temps d'attente pour un chirurgien étaient considérablement réduits sur 3 ans. Un degré élevé de satisfaction a été observé dans toutes les composantes des soins prodigués par des fournisseurs de soins. **Conclusions :** Le recours à un physiothérapeute expérimenté dont la pratique s'étend hors des rôles traditionnels réduit les temps d'attente sans nuire à la gestion clinique du patient ni influencer sur sa satisfaction globale.

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Musculoskeletal (MSK) problems are a common reason for seeking medical treatment.^{1,2} Neck and shoulder disorders are the second most prevalent MSK condition^{3,4} and are reported to affect people's perception of health-related quality of life (QOL).⁵⁻⁷ Of all specialists, orthopaedic surgeons are the most commonly consulted for MSK problems,¹ and approximately 37% of ambulatory encounters with orthopaedic surgeons in Canada and the United States are reported to be for arthritis and related conditions.^{8,9} In Ontario, the Ministry of Health and Long-Term Care has proposed 189 days as the wait-time target for shoulder surgery, but wait times remained as high as 543 days for some hospitals in 2011 and 436 days in 2012.¹⁰ Demand is outstripping supply in this area, for a variety of reasons including surgeon shortages, geographic variation in the supply of surgeons,¹¹ unnecessary referrals resulting from deficiencies in primary care management and lack of guidelines for surgical consultation,¹²⁻¹⁴ and an ageing population. Productivity losses and paid sick leave for people waiting for surgical consultation and elective orthopaedic surgery cost society millions of dollars each year.¹⁵

Alternative methods of service provision, such as using advanced-practice physiotherapists (APPs), can reduce wait times. Studies of outpatient orthopaedic caseloads published in the 1980s and 1990s¹⁶⁻²⁴ suggested that a proportion of orthopaedic outpatient referrals could be managed efficiently and effectively with specialist support but without direct surgical intervention. More recent studies²⁵⁻³² have supported the notion of using physiotherapists with an extended scope of practice to reduce wait times and improve system efficiencies while maintaining high patient satisfaction.

Physiotherapists have extensive education and training in the MSK field and provide safe, effective, and evidence-based care.²⁵⁻³² It has been reported that experienced physiotherapists have higher levels of expertise in managing MSK conditions than medical students, physician interns, residents, and specialist physicians.^{33,34} A validity study using magnetic resonance imaging (MRI) as the gold standard found that clinical diagnostic accuracy of MSK conditions was significantly higher among physiotherapists than among non-orthopaedic physicians, nurse practitioners, and physician assistants and noted no difference between physiotherapists and orthopaedic surgeons.³⁵ The sample in that study included five specific shoulder pathologies in addition to other spine and extremity problems,³⁵ but no known study has examined diagnostic concordance between physiotherapists and surgeons for shoulder problems alone.

The emerging literature on MSK care has demonstrated the efficacy of alternative care providers in managing lower-extremity and lumbar spine conditions, but we are not aware of formal research related to this new model of care in the management of shoulder conditions. Examining the impact of this new role on wait

times for orthopaedic surgeons and on patient satisfaction will help us to better understand this role and the model's potential contribution to transforming health care systems. Our objective in the present study was to examine the role of an extended-scope physiotherapist with respect to (1) agreement on diagnosis and management between the APP and an orthopaedic surgeon; (2) wait times to care; and (3) patient satisfaction with care.

METHODS

Background of the APP role

In 2006, system-wide changes were implemented at the Holland Orthopaedic and Arthritic Centre alongside the development of an APP role to streamline access to care for patients with hip and knee arthritis. The APP role was added to maximize health human resources by redistributing the clinical workload of surgeons to health care professionals with a complementary skill set. APPs at the Holland Centre are physiotherapists with graduate degrees and extensive orthopaedic clinical experience who, through additional training, have acquired further skills and competencies that enable them to perform additional controlled acts under medical directives approved by the Sunnybrook Health Sciences Centre's Medical Advisory Committee. Specifically, the APPs are authorized, by delegation from the orthopaedic surgeons, to order diagnostic tests such as X-rays, laboratory tests, and imaging investigations under specific conditions. The APPs function across the continuum of care, managing referrals, triaging for surgical consultation, prescribing conservative management, and monitoring non-surgical and post-surgical patients.

An APP was introduced into the Shoulder Clinic in late 2009. The physiotherapist selected and trained for this role holds advanced degrees and was trained through a 3-month on-site residency program (additional details about the residency program and role have been published elsewhere²⁹). As is standard practice at the Holland Centre, patients and their referral sources were informed that the initial assessment would be conducted by the APP; in addition, upon arrival patients received a brief letter detailing the nature of the clinic visit and of our study.

Study design

This prospective study of patients with shoulder complaints who were referred to a shoulder specialist in a tertiary care centre had three separate components: agreement, wait time, and satisfaction. Participants were excluded from the agreement if they were unable to speak or read English; if there was evidence of infection or underlying metabolic or inflammatory disease; or if they had a history of previous surgery, motor vehicle accident, shoulder injuries with an active compensation claim related to the shoulder, or psychiatric illness that precluded informed consent. The wait time and satisfac-

tion samples did not require specific exclusion criteria. Approval for use of human subjects was obtained from the Research Ethics Board of the Sunnybrook Health Sciences Centre.

Agreement component

Agreement on clinical diagnosis and management (ordering investigation(s), indication for surgery) was examined in 100 consecutive patients who were seen by the APP and the orthopaedic surgeon on the same day in 2010.

Since reliability and validity are affected by patient demographics (i.e., severity and level of pathology), we descriptively documented level of disability for patients who participated in the agreement component of the study by using two self-report disability measures: a joint-specific outcome measure, the American Shoulder and Elbow Surgeons (ASES) assessment form,³⁶ and an upper-extremity outcome measure, the Quick Disabilities of the Arm, Shoulder, and Hand (QuickDASH).³⁷ ASES scores range from 0 (most symptomatic) to 100 (representing the highest functional status). QuickDASH scores also range from 0 to 100, with higher scores indicating higher disability. Both measures are reported to be valid and reliable in patients with shoulder complaints.^{36–40}

To avoid asking patients for the same information twice, the APP took the history using a standardized questionnaire that was then shared with the surgeon. The investigations on file were reviewed by both examiners independently, to mimic a real clinical situation; each clinician's diagnosis was based on individual clinical examination and available diagnostic reports. The data collection forms were completed independently and put in a sealed envelope by a research assistant. Based on aetiology and location of structure involved, seven major diagnostic categories were recorded: rotator cuff (RC) pathology, biceps pathology, osteoarthritis (OA) in the glenohumeral and acromioclavicular joints, instability-related pathologies, inflammatory conditions, superior labral anterior and posterior (SLAP) pathologies, and "other." Some of these major categories had subcategories to further examine agreement: RC pathology was broken down into subacromial pathology, partial-thickness tear, full-thickness tear, and cuff tear arthropathy; inflammatory conditions into rheumatoid arthritis and Milwaukee shoulder; and the "other" category into cervical spine pathology and adhesive capsulitis. Other potential diagnoses were also documented under this category (see Appendix 1).

Management plans included ordering further investigations (X-rays, ultrasound [US], computed tomography [CT] scan, MRI, MR arthrogram, laboratory tests) and treatment. Agreement with respect to treatment was simplified into two categories: *yes* and *no* for candidacy for surgery.

Wait-time component

The second sample was a separate sample consisting of 100 consecutive patients initially seen by the APP in 2010. In this sample, we examined type of pathology and the proportion of patients who did not require a consultation with the surgeon. We then compared the wait time for this sample with information extracted from the charts of 100 randomly selected patients seen by the orthopaedic surgeon in 2008 with respect to wait times from (1) date of referral to date of consultation (T1); (2) date of referral to date of final diagnostic test (T2); and (3) date of referral to date of confirmed diagnosis and planned treatment (T3; see Appendix 2). The surgeon's overall wait time in 2008 was also compared with his own wait time in 2011, using hospital administrative data.

Patient satisfaction component

To examine satisfaction with care, we compared two independent samples of patients seen by the APP and the surgeon in 2011, using the modified version of the 9-item Visit-Specific Satisfaction Instrument (VSQ-9), originally designed to assess satisfaction with physical therapy practitioners in pediatric rheumatology.^{41,42} The details on validation of the modified tool are provided by Kennedy and colleagues,⁴³ who replaced two items of the original VSQ-9⁴⁴ (length of time waiting for an appointment; convenience of office location) with two new items (responding to patient queries; advice and information about exercise and returning to activities) and validated the modified version using exploratory principal-components analysis, Cronbach's alpha, and correlation with patient outcomes after surgery.⁴⁴ Two items not directly related to the APP clinic ("getting through to the Outpatient Clinic by phone" and "length of time waiting once you arrived") were not included in analysis. The remaining seven items were relevant to our study: (1) Time spent with the health care providers, (2) Answers to questions, (3) Explanation of the results of the assessment, (4) Advice and information about exercise and returning to activities, (5) The technical skills (thoroughness, carefulness, competence) of the health care providers, (6) The personal manner (courtesy, respect, sensitivity, friendliness) of the health care providers, and (7) The overall visit. Two questions related to process were not included.

Responses then underwent a linear transformation to score from 0 (poor) to 100 (excellent), as recommended by the original developers.⁴⁵

Statistical analysis

The kappa coefficient (κ),⁴⁵ their associated *p*-values, and percent agreement (number of cases agreed on divided by total number of cases) were used to determine agreement between clinicians. When $\kappa = 0$, agreement is by chance; greater than chance agreement leads

to positive values of κ , and less than chance agreement leads to negative values. In certain situations, such as low prevalence of a finding or discordance between examiners in reporting a finding, the kappa values may be misleading, and additional values should be provided. Therefore, we also calculated (1) presence of bias between observers (when frequency of occurrence of a condition is different between observers), (2) impact of prevalence of positive findings (when the overall proportion of positive results is substantially different from 50%), and (3) bias-adjusted and prevalence-adjusted kappa (PABAK) values, using the formula suggested by Byrt and colleagues.⁴⁶ In this formula, a , b , c , and d are cells of the 2×2 kappa table; observed agreement is ($p_o = (a + d)/n$), the bias index is ($BI = |b - c|/n$), and the prevalence index is ($PI = |a - d|/n$). For any 2×2 table, PABAK is calculated as ($2 p_o - 1$).

Strength of agreement was interpreted as suggested by Spratt⁴⁷: < -0.20 = strong systematic disagreement; -0.20 to -0.01 = potential systematic disagreement; 0.00 – 0.20 = weak agreement; 0.21 – 0.40 = slight agreement; 0.41 – 0.60 = moderate agreement; 0.61 – 0.80 = good agreement; 0.81 – 0.90 = very good agreement; and 0.91 – 1.00 = excellent agreement. We examined the wait-time comparison and satisfaction data for normality distribution, using parametric and non-parametric tests (Wilcoxon z -tests).

RESULTS

Agreement component

A total of 100 patients (37 women; mean age 57 [SD 14], range 19–92; see Table 1) participated in the agreement component. The average disability level was moderate; scores ranged from 2 to 100 (mean 51 [SD 25]) on the ASES and 0 to 85 (mean 36 [SD 19]) on the Quick-DASH. X-rays were on file for 9 patients, US reports for 23, MRI for 56, and MR arthrogram reports for 5.

The kappa values for investigations varied from 0.27 to 0.91. The low kappa values for MRI and MR arthrogram are related to the low prevalence of these investigations; PABAK values indicated higher agreement (see Table 2).

The kappa values related to diagnostic categories are shown in Table 3. Agreement on major diagnostic categories varied from 0.63 (good) to 0.86 (very good), improving to 0.68 (good) to 0.94 (excellent) after adjustment for bias and prevalence. The kappa value was highest for full-thickness tear ($\kappa = 0.84$, $p < 0.0001$, 95% CI, 0.73–0.95, PA = 92%, BI = 0.03, PI = 0.12, PABAK = 0.84, good agreement) and lowest for impingement syndrome ($\kappa = 0.43$, $p < 0.0001$, 95% CI, 0.24–0.61, PA = 75%, BI = 0.07, PI = 0.35, PABAK = 0.50, moderate agreement). With respect to treatment, the APP tended to recommend surgery more often than the surgeon did (65% vs. 55%; $\kappa = 0.75$, $p < 0.0001$, PA = 88%, 95% CI, 0.62–0.88, BI = 0.10, PI = 0.20, PABAK = 0.76, good agreement).

Table 1 Demographics of Three Samples

Samples (No.)	Mean age (SD) y	Sex, F/M
Agreement (100)	57 (14)	37/63
Wait time		
Physiotherapist (100)	56 (15)	45/55
Surgeon (100)	54 (16)	42/58
Satisfaction		
Physiotherapist (105)	57 (14)	39/66
Surgeon (89)	57 (15)	37/52

F/M = Female/Male

Wait-time component

Data extracted from 100 charts of patients (42 women; mean age 54 [SD 16] y) seen by the surgeon in 2008 were compared with data for the first 100 patients seen in the APP clinic in 2010 (45 women; mean age 56 [SD 15] y). There were no statistically significant between-group differences in sex distribution ($\chi^2 = 0.18$, $p = 0.67$) or age ($t = 1.18$, $p = 0.23$).

For the surgeon in 2008, mean and median were 198 (SD 185) and 79 days for T1; 208 (SD 194) and 84 days for T2; and 227 (SD 218) and 88 days for T1. For the APP in 2010, mean and median were 147 (SD 140) and 65 days for T1; 155 (SD 147) and 78 days for T2; and 156 (SD 144) and 83 days for T3. The T1 varied from 0 to 611 days for the surgeon and from 12 to 475 days for the APP. Because the data were not normally distributed (Kolmogorov–Smirnov = 0.25, $p < 0.01$), we used non-parametric statistics to examine the difference between surgeon and APP. There was a statistically significant difference at all three time points (Wilcoxon z -values of 6.20, 5.92, and 5.41 for T1, T2, and T3 respectively, $p < 0.001$). The surgeon's average wait time in 2008 was 198 days, with some patients waiting up to 611 days (1.7 years). The average wait time in September 2011 was 75 days, according to the administrative data.

In the wait-time sample seen by the APP, the prevalence of partial-thickness tear was 35%; impingement syndrome was the second most common category, at 25%, and osteoarthritis of the glenohumeral joint in third place at 20%. Of patients in this sample, 2 had normal findings at the time of assessment; 53 did not have any indications to see the surgeon. The APP considered 35 patients likely to benefit from a corticosteroid injection; of these, 13 patients with advanced osteoarthritis and 4 with a diagnosis of adhesive capsulitis received an intra-articular injection under sonogram by a radiologist. Of 47 patients seen by the surgeon, 18 were referred for a subacromial injection (2 pre-surgical, 16 non-surgical management); 20 patients booked surgery (7 decompression, 4 RC repair [1 patient had both], 5 arthroplasty, 3 SLAP repair, and 1 stabilization). Eleven patients saw the surgeon for other reasons (anxiety issues, exaggerated pain behaviours, work-related or motor-vehicle accidents

Table 2 Results of Inter-examiner Agreement on Investigation Categories*

X-rays		Surgeon	
		Yes	No
Physiotherapist	Yes	77 (a)	4 (b)
	No	2 (c)	20 (d)
$\kappa = 0.91$ ($p < 0.001$; 95% CI, 0.81–1.00), PA = 97%, BI = 0.02, PI = 0.57, PABAK = 0.94			
MRI		Surgeon	
		Yes	No
Physiotherapist	Yes	2 (a)	1 (b)
	No	8 (c)	89 (d)
$\kappa = 0.27$ ($p < 0.001$; 95% CI, -0.05 to 0.59), PA = 93%, BI = 0.01, PI = 0.70, PABAK = 0.86			
MR Arthrogram		Surgeon	
		Yes	No
Physiotherapist	Yes	1 (a)	1 (b)
	No	2 (c)	96 (d)
$\kappa = 0.38$ ($p < 0.001$; 95% CI, -0.16 to 0.93), PA = 0.01%, BI = 0.01, PI = 0.95, PABAK = 0.94			

* No ultrasound investigation was ordered.

MRI = magnetic resonance imaging; MR arthrogram = magnetic resonance arthrogram; BI = bias index = $(b - c/n)$; PI = Prevalence index $(a - d/n)$; PABAK = $(2 p_o - 1)$; p_o = observed agreement = $(a + d)/n$.

requiring the written opinion of a surgeon, or a need to discuss potential future surgery).

Satisfaction component

A sample of 247 patients not involved in the other components of the study completed the VSQ-9.⁴³ Of these, 21 did not provide information on their age or sex, and 15 felt that information on exercise was not relevant to their visit; thus, we had complete data on all questions for 194 patients (105 in the APP-led clinic, 89 in the surgeon-led clinic; see Table 1). Satisfaction data were not normally distributed (Kolmogorov–Smirnov = 0.24, $p < 0.01$) and were therefore analyzed using the Wilcoxon two-sample test. The mean of the total score for the APP was 649 (SD 71), median 675, inter-quartile range (IQR) = 100. The scores were slightly lower for the surgeon, at 606 (103), median 625, IQR = 150 (Wilcoxon z -value = -2.91, $p = 0.004$). To examine patients' responses more specifically, we compared the scores for each question; all questions showed statistically significant differences in favour of the APP-led clinic (see Table 4).

DISCUSSION

Advanced-practice physiotherapists (APPs) have established efficiency in assessing and triaging patients referred for hip and knee arthritis and in performing long-term surgical follow-up with patients after total hip and knee replacement.^{29,30,43} Our findings demonstrate

that the same results can be obtained for patients referred to a specialist with a variety of shoulder conditions.

Agreement on diagnosis was good to excellent, and the number of cases not agreed on was small for all categories. The inconsistency in some categories (e.g., impingement; OA of the acromioclavicular joint) was related to the definition of diagnosis: the APP's diagnosis incorporated all aspects of radiological and clinical information, whereas the surgeon's diagnosis was based on findings the surgeon considered relevant to the present symptoms (e.g., the radiological degenerative changes of the AC joint confirmed by the radiologist were not reported by the surgeon in some cases). Both approaches are correct, and more comprehensive documentation of pathology by the APP should be encouraged to meet professional obligations and facilitate inter-professional communication. Furthermore, given the overall poor reliability and validity of the impingement tests,⁴⁸ one should not rely heavily on clinical signs of impingement.

Findings related to wait time demonstrate improved efficiency achieved by the APP in managing referrals for patients with shoulder conditions. In our centre, 53% of patients did not require a surgical consultation. This finding is consistent with those of Byles and Ling,⁴⁹ who suggested that between 40% and 60% of all orthopaedic outpatient referrals could be safely treated by a physiotherapist practising independently. Some studies have reported more extreme ranges. Pearse and colleagues,⁵⁰ who examined a large range of pathologies, noted that

Table 3 Results of Inter-examiner Agreement on Diagnostic Categories

Rotator cuff pathology		Surgeon	
		Yes	No
Physiotherapist	Yes	80 (a)	4 (b)
	No	2 (c)	14 (d)
$\kappa = 0.79$ ($p < 0.001$, 95% CI, 0.62–0.95), PA = 94%, BI = 0.02, PI = 0.66, PABAK = 0.88			
Biceps pathology		Surgeon	
		Yes	No
Physiotherapist	Yes	7 (a)	4 (b)
	No	3 (c)	86 (d)
$\kappa = 0.63$ ($p < 0.001$, 95% CI, 0.37–0.88), PA = 93%, BI = 0.01, PI = 0.70, PABAK = 0.86			
Osteoarthritis GH		Surgeon	
		Yes	No
Physiotherapist	Yes	15 (a)	10 (b)
	No	3 (c)	72 (d)
$\kappa = 0.62$ ($p < 0.001$, 95% CI, 0.43–0.80), PA = 0.87%, BI = 0.07, PI = 0.57, PABAK = 0.74			
Osteoarthritis AC		Surgeon	
		Yes	No
Physiotherapist	Yes	44 (a)	13 (b)
	No	3 (c)	40 (d)
$\kappa = 0.68$ ($p < 0.0001$, 95% CI, 0.54–0.82), PA = 84%, BI = 0.1, PI = 0.04, PABAK = 0.68			
Instability		Surgeon	
		Yes	No
Physiotherapist	Yes	11 (a)	0 (b)
	No	3 (c)	86 (d)
$\kappa = 0.86$ ($p < 0.001$, 95% CI, 0.71–1.00), PA = 97%, BI = 0.03, PI = 0.75, PABAK = 0.94			
Inflammatory conditions		Surgeon	
		Yes	No
Physiotherapist	Yes	2 (a)	0 (b)
	No	2 (c)	96 (d)
$\kappa = 0.67$ ($p < 0.001$, 95% CI, 0.22–1.00), PA = 98%, BI = 0.02, PI = 0.94, PABAK = 0.96			
Superior labral pathologies		Surgeon	
		Yes	No
Physiotherapist	Yes	4 (a)	3 (b)
	No	1 (c)	92 (d)
$\kappa = 0.65$ ($p < 0.001$, 95% CI, 0.32–0.97), PA = 96%, BI = 0.02, PI = 0.88, PABAK = 0.92			

BI = Bias index = $(b - c)/n$; PI = Prevalence index $(a - d)/n$; PABAK = $(2 p_o - 1)$, p_o = observed agreement = $(a + d)/n$.

Table 4 Scores of the Satisfaction Questionnaire for Surgeon and Physiotherapist-led Clinics

VSQ-9 item	Clinician	Mean	Median	Q1/Q3	z-value	p-value
Time spent with the health care provider	PT	91	100	75/100	-3.03	0.003
	S	84	100	75/100		
Answers to questions	PT	93	100	88/100	-2.74	0.001
	S	86	100	75/100		
Explanation of the results of the assessment	PT	93	100	100/100	-2.47	0.014
	S	88	100	75/100		
Advice and information about exercise and returning to activities	PT	88	100	75/100	-2.29	0.022
	S	83	75	75/100		
Technical skills (thoroughness, carefulness, competence) of the health care provider	PT	95	100	100/100	-2.75	0.006
	S	83	100	75/100		
Personal manner (courtesy, respect, sensitivity, friendliness) of the health care provider	PT	96	100	100/100	-2.88	0.004
	S	91	100	75/100		
Overall visit	PT	94	100	100/100	-4.80	0.001
	S	82	75	75/100		
Total score	PT	649	675	600/700	-2.91	0.004
	S	605	625	550/700		

VSQ-9 = modified 9-item Visit-Specific Satisfaction Instrument; Q1 = first quartile; Q3 = third quartile; PT = physiotherapist; S = surgeon.

consultant review was required for 81% of shoulder cases; on the other hand, Hockin and Bannister⁵¹ reported that a physiotherapist in an outpatient orthopaedic clinic treated 85% of patients independently. Identifying non-surgical candidates who require appropriate conservative treatment and providing timely guidance is an important strategy to reduce disability, lost productivity, and costs to the health system. In addition, the orthopaedic surgeon's clinical time can be redirected to those patients with conditions amenable to surgical intervention.

During the study period we did not encounter any problems with respect to care provided by the APP, which is consistent with our findings in the hip and knee program over the past 6 years. An inter-professional model of care has been shown to increase patient safety, and fear of liability should not be a barrier to implementing similar roles.⁵² It has also been shown that physiotherapists can independently distinguish medical conditions from problems of musculoskeletal origin and can manage the medical-related pain problems by referring the patient to an appropriate professional.⁵³ Concerns that patients will be at greater risk of adverse events if they are not first screened by a physician is unjustified;³² Moore and colleagues⁵⁴ reported no such risk in a pool of 50,799 patients in terms of injury, adverse events, disciplinary action, revocation of the professional's licensure, or litigation.

Patients reported high satisfaction with all components of care received from both examiners, but satisfaction scores were significantly higher in the APP-led clinic. The difference may be related to having more time with the APPs than with the surgeon, the added role of physiotherapists (e.g., patient education and rehabilitation), and/or overall patient reassurance. Our findings further validate this role and model of care, which, over time,

may have positive financial implications for hospitals and the health system.

Future research should involve health human resource planning and cost assessment to build a sustainable and economically feasible strategy. It is possible that such team-based models of care will decrease visits to primary-care physicians and hospital emergency departments and reduce unnecessary and inappropriate imaging.²⁶⁻²⁸ The potential exists to spread the model of care to remote or underserved areas by providing guidelines on triaging, ordering investigations, and management options to physiotherapists in rural and remote areas. This may be facilitated by validated risk-factor assessment tools and management algorithms. In addition, further research examining client outcomes with new care pathways would help to reinforce the utility of APP roles.

LIMITATIONS

This study has a few limitations. First, we did not collect comprehensive socio-demographic information or data on disability level for patients included in the wait-time or satisfaction components of the study. Second, the study was conducted at a single location with one physiotherapist with advanced training, which may affect the external validity of our findings. Third, history was documented on a standardized form, which may have limited the examiners with respect to the specific information they might have found useful in their decision making. Finally, our findings on agreement do not apply to individuals not included in this study, such as patients with evidence of infection, underlying metabolic or inflammatory disease, previous surgery, or a positive history of work-related or motor vehicle accident.

Reliability of results depends on several variables,

such as population demographics, disease prevalence, the bias index, and the threshold of how much reliability is “good enough.”^{55–57} The kappa statistic alone is appropriate if the marginal totals for the 2×2 table are relatively balanced, but if the prevalence of a given response is very high or very low, which often happens in real clinical situations, the value of kappa may be misleading. In addition, there is no consensus on strength of agreement, and all cut-off points suggested are somewhat arbitrary. In this study, details on prevalence of pathology and demographics of the sample used for agreement between clinicians are provided, and kappa values were adjusted for potential examiner bias and prevalence. It is left to the reader to decide which of these measures are more appropriate and how they should be interpreted.

CONCLUSIONS

The results of our study indicate good agreement on major diagnostic categories and management of patients with shoulder problems between an orthopaedic shoulder specialist and an experienced and trained physiotherapist. Advanced-practice roles in the clinical area of orthopaedics can improve the efficiency of the present health care system by improving access, reducing wait times to see an orthopaedic surgeon, and facilitating the management of non-surgical patients without compromising care or patient satisfaction.

KEY MESSAGES

What is already known on this topic

There is a large body of literature on extended-scope and advanced-practice roles in the management of patients with musculoskeletal disorders, and particularly lower-extremity problems. Experienced physiotherapists have shown superior clinical skills relative to non-orthopaedic specialists, family physicians, and other health care providers.

What this study adds

This study supports the advanced-practice role in the management of shoulder pathology by documenting agreement in diagnosis, efficiency in overall management, and high satisfaction with important aspects of patient care.

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APPENDIX 1**Inter-examiner agreement component**

Study ID#: _____

Date: ____/____/____ Day / Month / Year

Sex: Male Female Age _____ Surgeon APP**Primary diagnostic categories (with multiple pathologies, mark all that apply)** **Rotator cuff pathology** Subacromial pathology / Impingement syndrome Partial thickness tear Full thickness tear Cuff tear arthropathy **Biceps pathology** **Osteoarthritis glenohumeral joint** Primary Secondary Osteonecrosis Instability-related Fracture Other _____ **Osteoarthritis acromioclavicular joint** **Instability related pathologies** **Inflammatory conditions** Rheumatoid arthritis Milwaukee shoulder Other _____ **Superior labral pathologies** **Other** Cervical spine pathology Adhesive capsulitis Neurological disorders Other _____**Management plan****Investigation** Further investigation is required to clarify diagnosis No Yes X-rays US CT Scan MRI MR-Arthrogram Laboratory Tests Other _____**Treatment**

Pathology will be resolved/clarified by surgery

 No Yes**APPENDIX 2****Wait-time component**

Study ID#: _____

Sex: Male Female Age _____ Surgeon (chart review) APP

Date of Referral: ____/____/____

Day / Month / Year

Date of First Consultation: ____/____/____ **T1**

Day / Month / Year

Is there any previous Investigation?

 No Yes X-Rays US MRI/ MR ARTHROGRAM/CT Laboratory Tests Other _____

Is there an order for more investigations?

 No Yes X-rays US MRI/ MR ARTHROGRAM/CT Laboratory Tests Other _____Date of Final Diagnostic Test: ____/____/____ **T2**

Day / Month / Year

Date of Confirmed Diagnosis ____/____/____ **T3**

Day / Month / Year