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## ABSTRACT

**Background and Purpose:** Collaborative medical doctor/physical therapist primary care services are not described in the literature. The 2 purposes of this observational study were to describe a collaborative medical doctor/physical therapist primary care service, and to describe simple, one question, outcomes including patient acceptable symptom state (PASS), global rating of normal function (GRNF), and success of treatment (SOT) at intake, 1 to 7 days, and 45 to 60 days follow-up. **Methods:** Patients were seen for 1 to 2 visits and typically received exercise, hands on treatment, ie, manual therapy, and education. Medical doctor/physical therapist collaborative encounters and provider training are described. Outcome measures were recorded at the first visit, via phone once between 1 to 7 days and once between 45 to 60 days. Descriptive data was calculated at each time point. **Findings:** Examples of collaborative diagnosis and treatment opportunities are tabulated. A total of 31.9% of patients were PASS Yes at intake (n=402). At 1 to 7 days (n=157; 50.3%) and 45 to 60 days (n=93; 55.9%), the proportion of PASS Yes patients were higher. There was little difference in the GRNF scale at any follow-up. At 45 to 60 days, the SOT question indicated most patients (45.7%) reported “improved” and 29.3% of patients reported as “partly cured” or “cured.” **Clinical Relevance:** Collaborative opportunities for diagnosis and treatment in primary care are provided. A model using the PASS, GRNF, and SOT questions for judging the urgency which a service needs modification to meet patient needs is proposed. **Conclusion:** A collaborative medical doctor/physical therapist model is a viable option to improve primary care services. This descriptive data suggests some level of success, however, there is little relevant data for comparison.

**Key Words:** patient acceptable symptom state, global rating of normal function, interprofessional model

## INTRODUCTION

Models of primary care physical therapy services have tended to focus on direct access rather than collaborative models.<sup>1-3</sup> Medical providers are motivated to collaborate with the specialist because of the potential to improve care and reduce provider burden.<sup>4</sup> Low staff and other factors contribute to poor provider satisfaction and retention making health reform difficult in primary care.<sup>4</sup> By having a physical therapist take on responsibilities in primary care, the potential to implement neglected, well-supported, health initiatives may become realistic.<sup>5,6</sup> This parallels suggestions to integrate primary care and specialty care (ie, physical therapy) around a particular set of patient needs (ie, musculoskeletal problems) to increase value and lower costs.<sup>7</sup> In addition, organizing teams around patient needs fits well into existing integrative models of care delivery in primary care.<sup>8</sup> The motivations for physical therapists to collaborate in primary care include the opportunity to directly address patient needs<sup>1</sup> with immediate access to patients that would benefit from physical therapy.<sup>2</sup> The proportions of patients in primary care are typically older, female, and frequently present with multiple medical problems.<sup>9,10</sup> Addressing the needs of these patients may be better managed by a team integrating services in primary care.<sup>7</sup>

Developing an effective service for patients with musculoskeletal (MS) complaints that documents patient recovery as a routine part of primary care remains elusive.<sup>11-13</sup> Although benefits of early physical therapy show promise,<sup>14-16</sup> more data is necessary. For example, one clinical trial found little benefit of early 4 session treatment for low back pain.<sup>14</sup> However, “triage” physical therapy, described as an evaluation with minimal treatment of advice and exercise, and

follow-up of 1 to 2 visits demonstrated benefits.<sup>17-20</sup> Assessment of triage consultation demonstrated better outcomes for health state, and several outcomes on a validated Quality from the Patients Perspective Questionnaire.<sup>18-20</sup> Studies also noted decreased imaging and other medical services compared to usual care.<sup>17</sup> However, existing studies do not use a patient-reported outcome (PRO) that quantifies patient health status to define the value of therapist involvement in primary care. Currently there is no practical feedback provided to the therapist in primary care to determine the outcomes. Providing 1 to 2 treatment services in primary care will require outcome assessments to determine if the minimal services are improving patient health outcomes, experiences, and are cost effective.<sup>12</sup>

Use of disease specific outcome measures appears impractical given the multiple diagnoses of patients attending primary care. New instruments that measure generic health domains like the Patient Reported Outcome Information Management System (PROMIS) show some distinct advantages.<sup>13</sup> However, wide spread implementation of these computer adaptive measures requires strong technology support and provider adoption.<sup>21</sup> Another alternative is simple dichotomous generic measures such as patient acceptable symptom state (PASS),<sup>22,23</sup> global rating of normal function (GRNF),<sup>20</sup> and success of treatment (SOT).<sup>21</sup> These single question measures are simple and provide distinctly different views of patient outcome. The PASS is a yes or no question that asks patients if they are currently satisfied with their level of symptoms and activity.<sup>22-27</sup> This question gives a measure of whether patients are able to live with their current state of health. In contrast, the GRNF asks patients to rate whether their joint or body region is normal on a 0 to 10 scale.<sup>28</sup> The GRNF likely provides an internal reference of whether the patient senses his or her body as normal. The



SOT question focuses on the outcome of the provider experience, asking the patient simply if he or she considers the "...treatment a success?"<sup>29</sup> The response choices are "Not Helped," "Improved," "Partly Cured," and "Cured." While these 3 questions are relatively quick to administer, and the information provided is fairly general, together they suggest whether the patient's current state is "livable" (PASS Yes), consider his or her body "normal" (GRNF), and whether the treatment provided was a success (SOT). All are separate and relevant benchmarks of the effectiveness of a service.

The purpose of this case report was to describe the collaborative physical therapist/medical doctor model of care and report on simple generic PROs (PASS, GRNF, and SOT) at appropriate intervals after care. The hypothesis was that these outcome measures would provide a global evaluation regarding primary care services sufficiently useful to determine how well the collaborative medical doctor/physical therapist service was meeting patient needs as defined by the 3 PRO measures.

### Description of Collaborative Medical Doctor /Physical Therapist Primary Care Service

Patients attending primary care physical therapy services between August 2016 and June 2018 were included in this analysis. The only eligibility criteria were that each participant consented at intake to allow their data to be used for research. A review of 1,288 records showed that the average patient was 54.7 ± 19.2 years old and 63% were female. The proportion of body region/joints affected was by a large margin associated with the spine 46.3%, with the next highest regions being the knee 12.8%, shoulder 11.7%, and hip 10.7% (Figure 1).

The collaborative medical doctor/physical therapist primary care service consisted of evaluation and treatment during the primary care visit. One physical therapist was staffed to service 13 medical doctors and 6 physician assistants. The medical doctor/physician assistant identified patients as they came in with MS complaints for consultation with physical therapy, which occurred either together with the medical doctor/physician assistant or after the medical doctor/physician assistant completed the encounter. The physical therapy service included (1) consultation for diagnosis or treatment related decisions, (2) co-treatment with the provider, and (3) independent treatment unique from the medical doctor/physician assistant provider

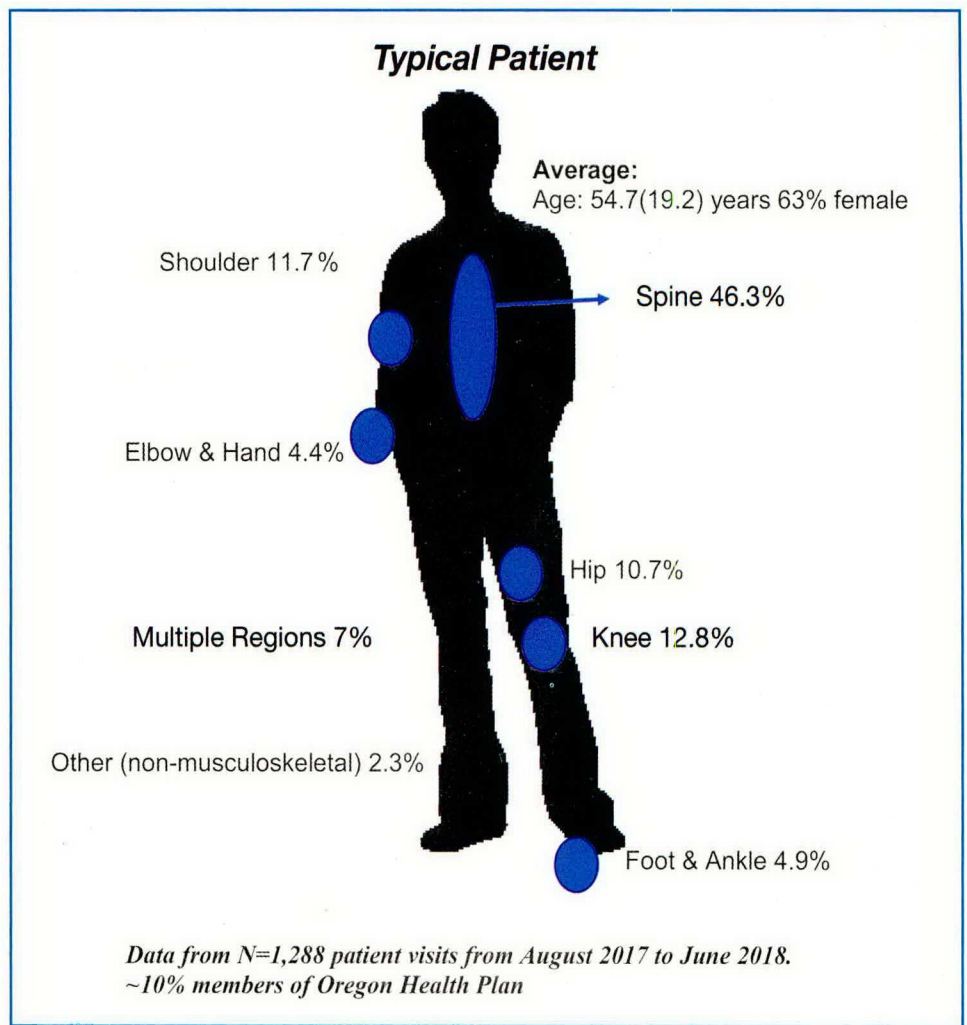


Figure 1. Typical patient by age, gender, and joint or body region of musculoskeletal problem.

(Table 1). Consultation typically involved discussion of diagnosis, need for imaging, and benefit of referral or specific treatments. Co-treatment among providers occurred often. Patients frequently mention MS complaints as a secondary rather than a primary medical problem. Note that typical patients this age attending primary care have multiple chronic illnesses they are managing.<sup>9,10</sup> These patients were best cared for using a co-treatment approach, providing both medical doctor/physician assistant medical consultation and physical therapy consultation in a single appointment. Independent diagnosis and treatment also occurred frequently. These patients would benefit in a direct access, fee for service model.

Documentation showed that a majority of patients receiving physical therapy care in this model were instructed in exercise and education. A review of therapist notes of 1,285 patient encounters showed that patients received one or more hands on treatments such as manual therapy, exercise,

education, and referral for further treatment (Figure 2). Time with patients varied from a few minutes to 45 minutes depending on the type of problem, patient needs, and patient availability.

Therapist training involved preparation and ongoing training to address provider and patient needs. Prior to implementation, imaging related clinical practice guidelines were reviewed including cervical spine,<sup>30,31</sup> low back pain,<sup>32</sup> shoulder,<sup>33</sup> and knee.<sup>34</sup> In addition, clinical practice guidelines for low back pain<sup>35</sup> and neck pain<sup>36</sup> were also reviewed. Throughout the trial period one-half day "bootcamps" were held between a team of 3 and 4 providers covering the service. To address patient needs, specific areas were identified by the medical doctor/physician assistant providers and became the focus of these training sessions. These sessions included training on a mixture of topics including cognitive behavioral approaches to pain with an emphasis on spine related problems.<sup>37,38</sup> The work of O'Sullivan and the



**Table 1. Examples of Interactions in Primary Care Collaborative Treatment Model That May Create Value and Possible Charges**

	Case Examples	Therapist Skill/Expertise Required
<b>Consultation with provider</b>		
Diagnosis-related	Imaging decisions—ankle/knee trauma	Ottawa Ankle/Knee Rules, Fracture Management
Treatment-related	Chronic pain—repeat visit or failed therapy	Biopsychosocial Model, Multi-modal Approach
<b>Co-treatment with provider</b>		
Both Treat Same Problem	Shoulder pain in patient with stage IV cancer - Scapula pain and instability	Shoulder Diagnosis
Treat Distinct Problems	Patient with renal disease and low back pain (unable to take NSAIDs)	Pharmacology Medical Diagnoses
<b>Independent diagnosis and treatment (provider not typically trained or no time)</b>		
<i>Spine related</i>		
Manual Therapy/Exercise	STarT Back Tool: acute onset, low and Mod risk, PROMIS scores, movement screen	CPG Low Back Pain
Psychologically Informed PT (Targeted Approach)	STarT Back Tool: moderate and high risk, PROMIS scores, movement screen	Cognitive Functional Therapy
<i>Geriatric care</i>		
Screening for Falls	STEADI screening for falls	Geriatric Care
Home Exercise for Falls Prevention	Otago based home exercise program	Balance Training
<i>Non-spine related</i>		
Hip/Knee OA Nonsurgical	Presurgery decision-making related for knee OA – exercise/NSAIDs/imaging	OA Management
Hip/Knee OA Postsurgical	Postoperative care – continued pain and low function – increase activity for cardiac fitness	OA Management
Shoulder problem	Rotator cuff decision making	Shoulder Diagnosis
Provider = Physician assistant, nurse practitioner, or medical doctor Orange – likely no charge, Blue – incident to charge, Green – charge fee for service  Abbreviations: NSAIDs, nonsteroidal anti-inflammatory drugs; PROMIS, Patient Reported Outcome Management Information System; CPG, clinical practice guidelines; STEADI, Stopping Elderly Accidents, Death, and Injuries; OA, osteoarthritis		

concept of guided behavioral experiments were emphasized.<sup>39,40</sup> Basic spinal manipulation techniques were also practiced and shared among practitioners with an emphasis on standard techniques.<sup>41</sup> Also, the benefits of “stay active” advice<sup>42</sup> and principals of behavior change to engage in physical activity were reviewed.<sup>43</sup>

Provider (medical doctor/physician assistant) training included quarterly in-services and challenging beliefs of targeted providers. Working with the medical director, specific targeted areas were presented for collaboration with the providers. The training sessions included (1) introduction of the collaborative medical doctor/physical therapist model, (2) two sessions on the low back pain approach, (3) non-traumatic rotator cuff tears, and (4) STopping Elderly Accidents, Deaths and Injuries (STEADI). It is worth noting that the STEADI program is a largely unimplemented CDC recommended program that is reimbursable by Medicare that remains largely unimplemented.<sup>5,6</sup> In addition

to formal training, informal collaboration was important. Interactions frequently provided opportunities to challenge non-evidence-based treatments such as overuse of injections, over reliance on imaging, and underutilization of rehabilitation services. In fact, referrals to physical therapy providers increased from 16.5% the year before to 31.0% during the implementation of the program.

### Outcome Measurements

At the initial encounter, the treating therapist obtained PASS and GRNF prior to treatment. Patients were also called once between 1 and 7 days and once between 45 and 60 days after their treatment. Selected PROMIS scales (not reported here), PASS, and GRNF were collected at 1 to 7 days posttreatment. All of these scales and SOT were collected at the 45- to 60-day call back point. All study procedures were approved by the George Fox University Human Subjects Review Board.

The PASS question was derived from previous studies that sought to define when patients reached a point of symptoms and activity that they judged satisfactory (Table 2).<sup>23</sup> A common wording to define a PASS state was used, “Taking into account all the activities you do during your daily life, your level of pain, and also your function, do you consider your current state satisfactory?”<sup>23</sup> A PASS Yes state is consistent with low levels of pain and moderate levels of function on other PRO scales that approximate normative values or slightly worse than normal in patients with MS problems.<sup>44,45</sup>

A GRNF rating asks patients to rate their joint or body region relative to normal. A global rating is used widely in psychology to capture a broad judgement from the patient regarding various attributes.<sup>28</sup> Similarly, they are used in some validated rehabilitation scales to capture normal function.<sup>46,47</sup> In this study, participants were asked to rate their joint or body region relative to normal function. The caller altered the joint or body



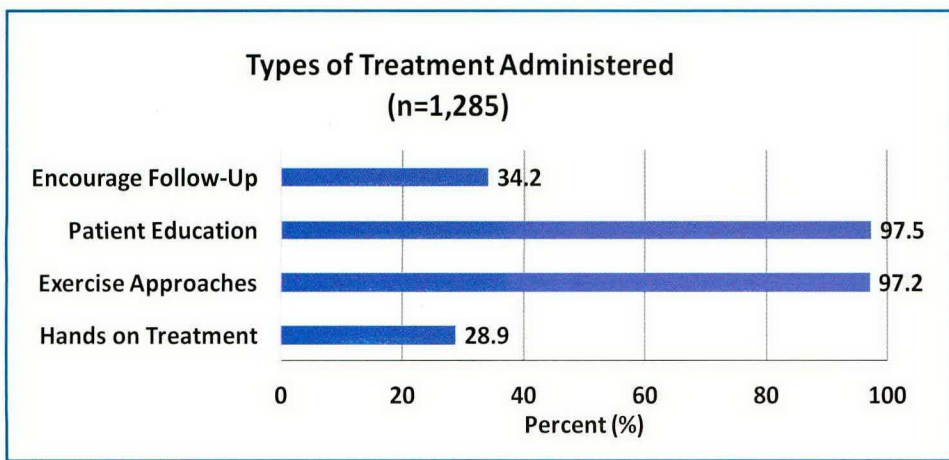


Figure 2. Typical treatments patients received from a physical therapist.

region (Table 2) for the primary or treated problem determined from the medical record. For patients with multiple problems (7%), the patient answered relative to their primary problem.

The SOT question was used to validate a new treatment satisfaction scale and is consistent with other studies of patient success.<sup>29</sup> Questions of patient's perception of treatment success were used post foot and ankle orthopedic surgery.<sup>48</sup> The specific SOT question allows for some graduation in responses including "Not Helped," "Improved," "Partly Cured," and "Cured." For the purposes of assessing primary care, these categories have good face validity. Patients "Not Helped" likely do not associate improvement with treatments received with their MS problem. In contrast, patients "Partly Cured" or "Cured" can be considered a success, where patients perceive the treatment received as contributing to "cure" or close to it. Patient's responding "Improved" likely perceive the effects of their treatment between these two extremes. Clinically, when high proportions of "Not Helped" responses occur, revision of the current protocols might be prioritized.

### Outcome Results

The PASS question was obtained at intake (prior to treatment) (n=402), 1 to 7 days after treatment (n=157), and 45 to 60 days (n=93) after treatment. At intake, patients seeking care varied on a PASS "Yes" response from 25% to 40% (Figure 3). The overall average was 31.9%, suggesting that 32% of patients were likely attending primary care for prevention or reassurance rather than rehabilitation. Tracking progress from intake 1 to 7 days follow-up showed a marked difference from intake with 50.3% of patients reporting as PASS Yes at 1 to 7 days (18.4% more than

at intake) (Figure 4). There was less difference from 1 to 7 days and 45 to 60 days (5.6%); however, a majority of patients reported as PASS Yes (55.9%) at 45 to 60 day follow-up.

The GRNF rating was also obtained at intake (prior to treatment) (n=402), 1 to 7 days after treatment (n=157), and 45 to 60 days (n=93) after treatment. The GRNF rating varied little over a 5-month period at intake, ranging from an average of  $5.3 \pm 2.1$  to  $5.6 \pm 2.1$ . The overall average was  $5.6 \pm 2.1$  suggesting patients felt their joint or body region was 5.6/10 at intake. There was little difference in the GRNF scale at 1 to 7 days ( $5.8 \pm 2.2$ ) and 45 to 60 day follow-up ( $6.2 \pm 2.4$ ).

Finally, the SOT question was obtained at 45 to 60 days (n=93) after treatment (Figure 5). The largest proportion (45.7%) reported "improved." The proportions of patients reporting as "not helped" was 25.0% compared to 29.3% of patients reporting as "partly cured" or "cured."

## DISCUSSION

This study describes a collaborative primary care physical therapist/medical doctor model and provides initial data on generic simple outcomes related to PASS, GRNF, and SOT. To our knowledge this is the first report of outcomes from primary care for MS problems to report these simple generic outcomes. These outcomes contrast with generic health domains such as PROMIS, which focus on actionable areas of need from the perspective of the patient's perceived health status, eg, fatigue or physical function. The outcomes used in this case provide global benchmarks to judge whether the overall service is meeting patient needs based on how "livable" current symptoms are (PASS), whether the patient perceives him or herself as "normal," and whether he or she perceives the treatment received a success. These outcomes present a mixed view of the collaborative service. However, because there is no previous data on the same outcomes for comparison, it is difficult to know if this is better than previous performance.

The description of the collaborative physical therapist/medical doctor service contrasts with current primary care services that focus on direct access.<sup>1</sup> A current review of direct access services notes that although direct access services are available, few patients access care through this mechanism.<sup>1</sup> Current models of emergency department services note standing orders for specific MS problems that allow therapists to engage in clinical decision-making independently.<sup>49</sup> The described collaborative service combines both direct access and collaborative care in a primary care environment (Table 1). A key advantage to this approach is achieving greater access to patients that may benefit from physical therapy services.<sup>2</sup> What is

Table 2. Simple Outcomes Used to Assess Collaborative Medical Doctor/Physical Therapist Primary Care Service

<b>Global Rating of Normal Function (GRNF)</b>	How would you rate the function of your _____ [Fill in problem] on a scale of 0 to 10 with 10 being normal, excellent function, and 0 being the inability to perform any of your usual daily activities which may include sports?
<b>Patient Acceptable Symptom State (PASS)</b>	Taking into account all the activity you have during your daily life, your level of pain, and also your functional impairment, do you consider that the current state of your foot and ankle is satisfactory?
<b>Success of Treatment (SOT)</b>	How successful was the treatment for your problem? Not Helped Improved Partly Cured Cured



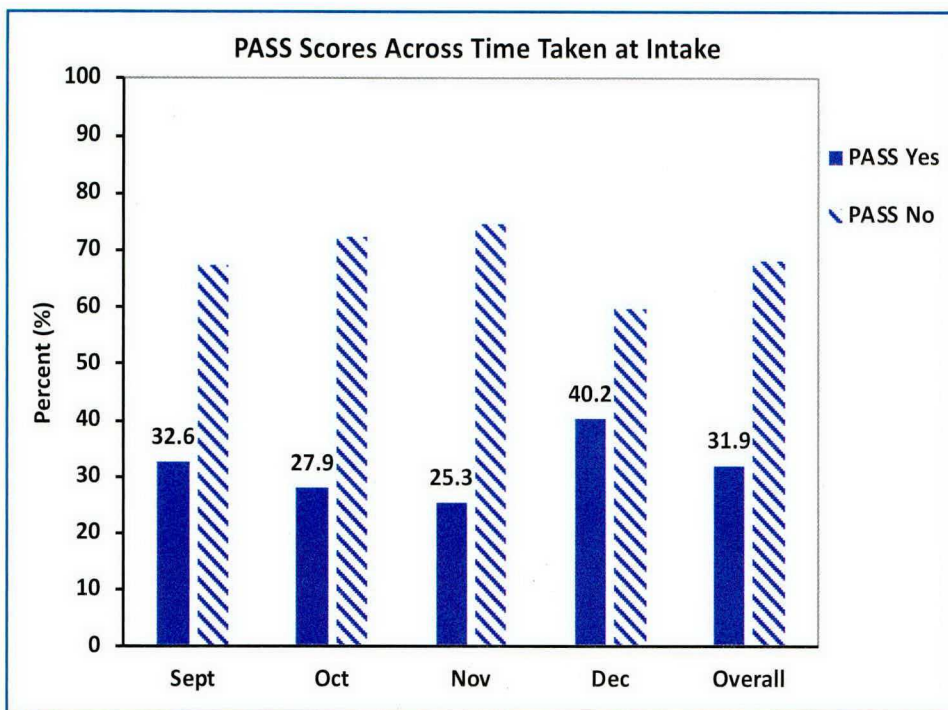


Figure 3. Patient acceptable symptoms state (PASS) question at intake (prior to treatment) (N=402) over a 4-month period.

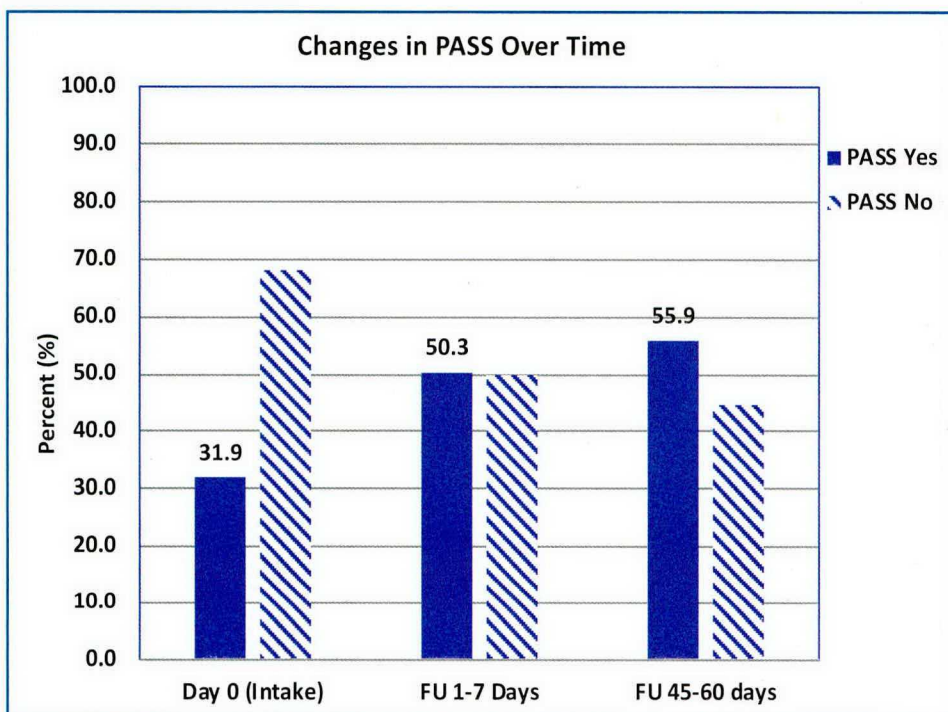


Figure 4. Patient acceptable symptoms state (PASS) question at intake (prior to treatment) (N=402), 1 to 7 days after treatment (N=157) and 45 to 60 days (N=93) after treatment.

unique in this model is that the role of the physical therapist is focused on improving primary care service either independently or by sharing management for MS problems. This will likely lead to an extension of the role of physical therapy in caring for other medical problems such as geriatric care and cardiovascular problems. However, long-

term, ongoing assessment will be a relevant part of this service.<sup>11,12</sup>

The PASS question showed a clear trend toward improvement, especially over the 1 to 7 day intake interval. Surprisingly, at intake there were a significant number of patients that were PASS "Yes" (25-40%). This suggests that these patients had either relatively

minor problems to start with or were primarily seeking reassurance. This underscores an unanticipated use of the PASS question. The PASS may serve at intake as a quick benchmark to assist the clinician in understanding the primary reason for the visit, reassurance or symptom/activity problems severe enough to interfere with normal function. The PASS question also showed differences at specific time points. The proportion of patients reporting PASS "Yes" at 1 to 7 day follow-up was ~18% higher than at intake. The difference between 1 to 7 days and 45 to 60 days was much smaller (5.6%), suggesting few patients likely experienced continued improvement or natural recovery after the 1 to 7 days. This data suggests early assessment using PASS could be effective for monitoring treatment outcomes. The overall outcome suggests the majority were satisfied with their symptoms/activity, however, a large proportion of patients remained PASS "No" (~44%) even at 45 to 60 days follow-up.

The GRNF rating underscore that patients continued to feel their joint or body region was not normal. The average GRNF score at 45 to 60 days was  $6.2 \pm 2.4$  out of 10. Outcomes from standard physical therapy services are arguably better on disease specific scales.<sup>27</sup> However, these scales do not reference normal and only sample a small and distinct group of patients that attend physical therapy. It is unclear if physical therapy applied to a much broader sample would see similar success.<sup>14</sup> The GRNF rating suggests on average patients were not feeling "normal" as a result of time or treatments received.

The SOT question showed a large majority of patients felt helped ("improved," "partly cured," or "cured") in response to their treatment (Figure 5). This question directly asks patients to assign a benefit to the treatment received. At 45 to 60 days, a majority of patients (45.7%) felt "improved," 21.7% "partly cured," and 7.6% "cured." Only a small minority (20%) felt "not helped." This data suggests that although most patients received minimal care they assigned benefit to the treatment even 45 to 60 days after their primary care encounter.

While these simple generic questions lack specificity of other generic measures such as PROMIS, they offer a quick profile of how a service is performing from a patient's perspective. At face value, services whose outcomes are associated with a majority of patients that find their condition livable (PASS Yes), see their body as "Normal," and attribute benefit to the treatment received should be seen as successful. And, services where a majority of



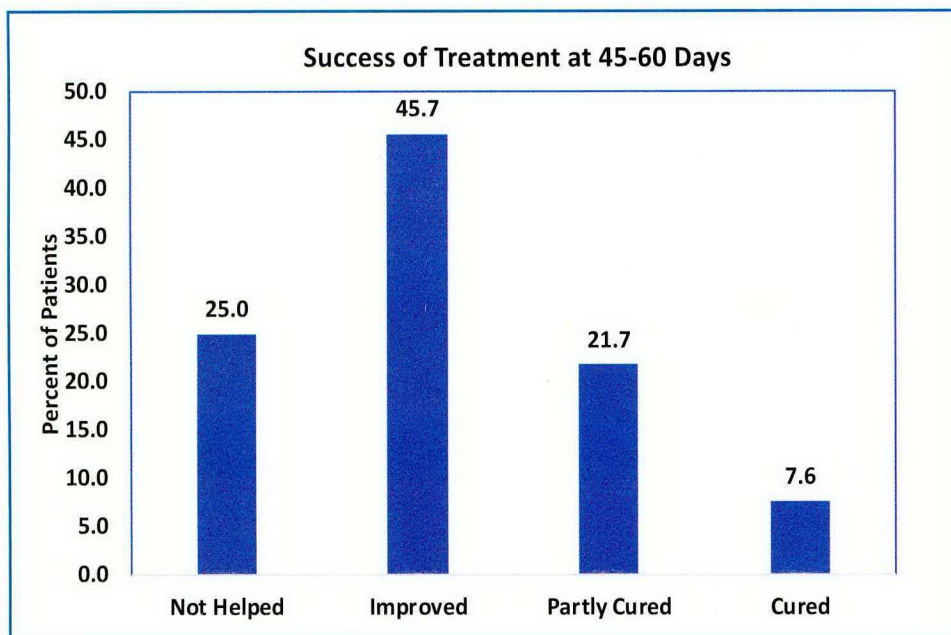


Figure 5. The success of treatment question responses at 45 to 60 days (N=93) after treatment.

people find their condition not livable (PASS No), their body as “Abnormal,” and respond that the treatment was “Not Helpful” should be revised. Although anecdotal, an example interpretation of how the 3 questions could lead to prioritization of services that are in urgent, moderate, or low priority for revision are suggested (Table 3). Applying this example to the collaborative medical doctor/physical therapist service presented here deems it in moderate need of revision.

### Limitations

There are currently many different outcome assessments evolving. This data focused on a few generic outcome questions. Also, the data represents cross sectional measures at each time point. A prospective sample followed longitudinally would be preferred.

The collaborative service was new and provided minimal services to patients. Whether this service improved on medical doctor only care has not been answered. The outcomes themselves, irrespective of how the service is delivered, show there is room for significant improvement in care management associated with MS problems presenting in primary care.

### CONCLUSIONS

This study of the collaborative medical doctor/physical therapy service suggests point of care collaborations that may benefit patients in primary care with significant opportunities in existing integrated primary care models. The simple generic assessment questions were very efficient and provide for assessment of 3 distinct patient outcomes.

Table 3. Example Interpretation of Scores on the Three Outcome Questions and How They Might Be Used to Trigger a Revision of Care

	Urgent Need for Revision—Are New Approaches Available?	Moderate Need for Revision—Weigh Value of New Approaches Available?	No Need for Revision
PASS	>50% PASS Yes	50-70% PASS Yes	PASS Yes >70%
GRNF	GRNF < 5	GRNF 5-7	GRNF >7
SOT	Not Helped >30% Partly Cured or Cured <30%	Not Helped 20% to 30% Most patients Improved but Not Cured	Not Helped <10% Partly Cured or Cured >50%

Abbreviations: PASS, patient acceptable symptom state; GRNF, global rate of normal function; SOT, success of treatment

These individual questions may serve as a basic set of patient outcomes or complement other PRO assessments to determine the success of service models.

### REFERENCES

- Boissonnault WG, Lovely K. Hospital-based outpatient direct access to physical therapist services: current status in Wisconsin. *Phys Ther*. 2016;96(11):1695-1704.
- Frogner BK, Harwood K, Pines J, Andrilla H, Schwartz M, Washington TG. Does unrestricted direct access to physical therapy reduce utilization and health spending? *Health Care Cost Institute*. Issue Brief, February 25, 2016.
- Pendergast J, Kliethermes SA, Freburger JK, Duffy PA. A comparison of health care use for physician-referred and self-referred episodes of outpatient physical therapy. *Health Serv Res*. 2012;47(2):633-654. doi: 10.1111/j.1475-6773.2011.01324.x. Epub 2011 Sep 23.
- Bodenheimer T, Sinsky C. From triple to quadruple aim: care of the patient requires care of the provider. *Ann Fam Med*. 2014;12(6):573-576. doi: 10.1370/afm.1713.
- Casey CM, Parker EM, Winkler G, Liu X, Lambert GH, Eckstrom E. Lessons learned from implementing CDC's STEADi falls prevention algorithm in primary care. *Gerontologist*. 2017;57(4):787-796.
- Eckstrom E, Parker EM, Lambert GH, Winkler G, Dowler D, Casey CM. Implementing STEADi in academic primary care to address older adult fall risk. *Innov Aging*. 2017;1(2):1-9.
- Porter ME, Pabo EA, Lee TH. Redesigning primary care: a strategic vision to improve value by organizing around patients' needs. *Health Aff (Millwood)*. 2013;32(3):516-525. doi: 10.1377/hlthaff.2012.0961.
- Jackson GL, Powers BJ, Chatterjee R, et al. Improving patient care. The patient centered medical home. a systematic review. *Ann Intern Med*. 2013;158(3):169-178.
- Salisbury C. Multimorbidity: redesigning health care for people who use it. *Lancet*. 2012;380(9836):7-9. doi: 10.1016/S0140-6736(12)60482-6. Epub 2012 May 10.



10. Violan C, Foguet-Boreu Q, Flores-Mateo G, et al. Prevalence, determinants and patterns of multimorbidity in primary care: a systematic review of observational studies. *PLoS One*. 2014;9(7):e102149. doi: 10.1371/journal.pone.0102149. eCollection 2014.
11. Porter ME. What is value in health care? *N Engl J Med*. 2010;363(26):2477-2481. doi: 10.1056/NEJMp1011024. Epub 2010 Dec 8.
12. Porter ME, Lee TH. The strategy that will fix health care. *Harv Bus Rev*. 2013;(10):50-70.
13. Baumhauer JF. Patient-reported outcomes-are they living up to their potential? *N Engl J Med*. 2017;377(1):6-9. doi: 10.1056/NEJMp1702978.
14. Fritz JM, Magel JS, Mcfadden M, et al. Early physical therapy vs usual care in patients with recent-onset low back pain a randomized clinical trial. *JAMA*. 2015;314(14):1459-1467. doi: 10.1001/jama.2015.11648.
15. Fritz JM, Childs JD, Wainner RS, Flynn TW. Primary care referral of patients with low back pain to physical therapy: impact on future health care utilization and costs. *Spine (Phila Pa 1976)*. 2012;37(25):2114-2121. doi:10.1097/BRS.0b013e31825d32f5.
16. Fritz JM, Kim M, Magel JS, Asche CV. Cost-effectiveness of primary care management with or without early physical therapy for acute low back pain: economic evaluation of a randomized clinical trial. *Spine (Phila Pa 1976)*. 2017;42(5):285-290. doi:10.1097/BRS.0000000000001729.
17. Bornhoft L, Larsson ME, Thena J. Physiotherapy in primary care triage—the effects on utilization of medical services at primary health care clinics by patients and sub-groups of patients with musculoskeletal disorders: a case-control study. *Physiother Theory Pract*. 2015;31(1):45-52. doi: 10.3109/09593985.2014.932035. Epub 2014 Jul 2.
18. Bornho L, Larsson ME, Thorn J. Physiotherapy in primary care triage—the effects on utilization of medical services at primary health care clinics by patients and sub-groups of patients with musculoskeletal disorders: a case-control study. *Physiother Theory Pract*. 2015;31(1):45-52. doi:10.3109/09593985.2014.932035.
19. Samsson KS, Larsson ME. Physiotherapy triage assessment of patients referred for orthopaedic consultation - long-term follow-up of health-related quality of life, pain-related disability and sick leave. *Man Ther*. 2015;20(1):38-45. doi:10.1016/j.math.2014.06.009.
20. Samsson KS, Bernhardsson S, Larsson ME. Perceived quality of physiotherapist-led orthopaedic triage compared with standard practice in primary care: a randomised controlled trial. *BMC Musculoskelet Disord*. 2016;17:257. doi:10.1186/s12891-016-1112-x.
21. Papuga MO, Dasilva C, McIntyre A, Mitten D, Kates S, Baumhauer JF. Large-scale clinical implementation of PROMIS computer adaptive testing with direct incorporation into the electronic medical record. *Health Systems*. 2018;7(1):1-12.
22. Emerson Kavchak AJ, Cook C, Hegedus EJ, Wright AA. Identification of cut-points in commonly used hip osteoarthritis-related outcome measures that define the patient acceptable symptom state (PASS). *Rheumatol Int*. 2013;33(11):2773-2782. doi: 10.1007/s00296-013-2813-1. Epub 2013 Jun 29.
23. Kvien TK, Heiberg T, Hagen B. Minimal clinically important improvement/difference (MCII/ MCID) and patient acceptable symptom state (PASS): what do these concepts mean? *Ann Rheum Dis*. 2007;66 (suppl 3):iii 40-41.
24. Levy DM, Kuhns BD, Chahal J, Philippon MJ, Kelly BT, Nho SJ. Hip arthroscopy outcomes with respect to patient acceptable symptomatic state and minimal clinically important difference. *Arthroscopy*. 2016;32(9):1877-1886. doi: 10.1016/j.arthro.2016.05.014. Epub 2016 Jun 18.
25. Muller B, Yabroudi Ma, Lai C-L, et al. Defining patient acceptable symptom state thresholds for the IKDC Subjective Knee Form and KOOS for patients undergoing ACL reconstruction. *Orthop J Sports Med*. 2013;1(4 suppl):9-11. doi: 10.1177/2325967113S00069.
26. Salaffi F, Carotti M, Gutierrez M, Carlo MD, Angelis RD. Patient acceptable symptom state in self-report questionnaires and composite clinical disease index for assessing rheumatoid arthritis activity: identification of cut-off points for routine care. *Biomed Res Int*. 2015;2015:930756. doi:10.1155/2015/930756 Epub 2015 Jun 18.
27. Wright AA, Hensley CP, Gilbertson J, Leland JM 3rd, Jackson S. Defining patient acceptable symptom state thresholds for commonly used patient reported outcomes measures in general orthopedic practice. *Man Ther*. 2015;20(6):814-819. doi: 10.1016/j.math.2015.03.011. Epub 2015 Mar 27.
28. Aas IH. Guidelines for rating Global Assessment of Functioning (GAF). *Ann Gen Psychiatry*. 2011;10:2. doi: 10.1186/1744-859X-10-2.
29. Hawthorne G, Sansoni J, Hayes L, Marosszeky N, Sansoni E. Measuring patient satisfaction with health care treatment using the Short Assessment of Patient Satisfaction measure delivered superior and robust satisfaction estimates. *J Clin Epidemiol*. 2014;67(5):527-537. doi: 10.1016/j.jclinepi.2013.12.010.
30. Stiell IG, Clement CM, O'Connor A, et al. Multicentre prospective validation of use of the Canadian C-Spine Rule by triage nurses in the emergency department. *CMAJ*. 2010;182(11):1173-1179. doi: 10.1503/cmaj.091430. Epub 2010 May 10.
31. Michaleff ZA, Maher CG, Verhagen AP, Rebeck T, Lin CW. Accuracy of the Canadian C-spine rule and NEXUS to screen for clinically important cervical spine injury in patients following blunt trauma: a systematic review. *CMAJ*. 2012;184(16):E867-876. doi: 10.1503/cmaj.120675 Epub 2012 Oct 9.
32. Flynn TW, Smith B, Chou R. Appropriate use of diagnostic imaging in low back pain: a reminder that unnecessary imaging may do as much harm as good. *J Orthop Sports Phys Ther*. 2011;41(11):838-846. doi: 10.2519/jospt.2011.3618. Epub 2011 Jun 3.
33. Pedowitz RA, Yamaguchi K, Ahmad CS, et al. American Academy of Orthopaedic Surgeons Clinical Practice Guideline on: optimizing the management of rotator cuff problems. *J Bone Joint Surg Am*. 2012;94(2):163-167.
34. Yao K, Haque T. The Ottawa knee rules: a useful clinical decision tool. *Aust Fam Physician*. 2012;41(4):223-224.
35. Delitto A, George SZ, Van Dillen LR, et al. Low back pain. Clinical Practice Guidelines Linked to the International



- Classification of Functioning, Disability, and Health from the Orthopaedic Section of the American Physical Therapy Association. *J Orthop Sports Phys Ther.* 2012;42(4):A1-57. doi: 10.2519/jospt.2012.0301. Epub 2012 Mar 30.
36. Blanpied PR, Gross AR, Elliott JM, et al. Neck pain: revision 2017. *J Orthop Sports Phys Ther.* 2017;47(7):A1-A83. doi: 10.2519/jospt.2017.0302.
  37. Vibe Fersum K, O'Sullivan P, Skouen JS, Smith A, Kvåle A. Efficacy of classification-based cognitive functional therapy in patients with non-specific chronic low back pain: a randomized controlled trial. *Eur J Pain.* 2013;17(6):916-928. doi: 10.1002/j.1532-2149.2012.00252.x. Epub 2012 Dec 4.
  38. O'Sullivan PB, Caneiro JP, O'Keeffe M, et al. Cognitive functional therapy: an integrated behavioral approach for the targeted management of disabling low back pain. *Phys Ther.* 2018;98(5):408-423. doi: 10.1093/ptj/pty022.
  39. Caneiro JP, Ng L, Burnett A, Campbell A, O'Sullivan P. Cognitive functional therapy for the management of low back pain in an adolescent male rower: a case report. *J Orthop Sports Phys Ther.* 2013;43(8):542-554. doi: 10.2519/jospt.2013.4699. Epub 2013 Jun 11.
  40. O'Sullivan P, Caneiro JP, O'Keeffe M, O'Sullivan K. Unraveling the complexity of low back pain. *J Orthop Sports Phys Ther.* 2016;46(11):932-937.
  41. Flynn TW, Wainner RS, Fritz JM. Spinal manipulation in physical therapist professional degree education: a model for teaching and integration into clinical practice. *J Orthop Sports Phys Ther.* 2006;36(8):577-587.
  42. Olaya-Contreras P, Styf J, Arvidsson D, Frennered K, Hansson T. The effect of the stay active advice on physical activity and on the course of acute severe low back pain. *BMC Sports Sci Med Rehabil.* 2015;7:19. doi: 10.1186/s13102-015-0013-x. eCollection 2015.
  43. Ben-Ami N, Chodick G, Mirovsky Y, Pincus T, Shapiro Y. Increasing recreational physical activity in patients with chronic low back pain: a pragmatic controlled clinical trial. *J Orthop Sports Phys Ther.* 2017;47(2):57-66.
  44. Muller B, Yabroudi Ma, Lynch A, et al. Defining thresholds for the patient acceptable symptom state for the IKDC Subjective Knee Form and KOOS for patients who underwent ACL reconstruction. *Am J Sports Med.* 2016;44(11):2820-2826.
  45. Tashjian RZ, Deloach J, Porucznik CA, Powell AP. Minimal clinically important differences (MCID) and patient acceptable symptomatic state (PASS) for visual analog scales (VAS) measuring pain in patients treated for rotator cuff disease. *J Shoulder Elbow Surg.* 2009;18(6):927-932. doi: 10.1016/j.jse.2009.03.021. Epub 2009 Jun 16.
  46. Irrgang JJ, Anderson AF, Boland AL, et al. Development and validation of the international knee documentation committee subjective knee form. *Am J Sports Med.* 2001;29(5):600-613.
  47. Martin RL, Irrgang JJ, Burdett RG, Conti SF, Van Swearingen JM. Evidence of validity for the Foot and Ankle Ability Measure (FAAM). *Foot Ankle Int.* 2005;26(11):968-983.
  48. Anderson MR, Baumhauer JF, DiGiovanni BF, et al. Determining success or failure after foot and ankle surgery using Patient Acceptable Symptom State (PASS) and Patient Reported Outcome Information System (PROMIS). *Foot Ankle Int.* 2018;39(8):894-902. doi:10.1177/1071100718769666.
  49. Lebec MT, Jogodka CE. The physical therapist as a musculoskeletal specialist in the emergency department. *J Orthop Sports Phys Ther.* 2009;39(3):221-229. doi: 10.2519/jospt.2009.2857.