Taylor & Francis
Taylor & Francis Group

Check for updates

ORIGINAL RESEARCH PAPER

Physical therapy clinical specialization and management of red and yellow flags in patients with low back pain in the United States

Carlos E. Ladeira

Department of Physical Therapy, Nova Southeastern University, Fort Lauderdale, FL, USA

ABSTRACT

Objectives: Physical therapists (PTs) may practice in direct access or act as primary care practitioners, which necessitate patients' screening and management for red, orange and yellow flags. The objective of the project was to assess the American PT's ability to manage red, orange and yellow flags in patients with low back pain (LBP), and to compare this ability among PTs with different qualifications.

Methods: The project was an electronic cross-sectional survey. The investigators contacted 2,861 PTs. Participants made clinical decisions for three vignettes: LBP with red flag for ectopic pregnancy, with orange flag for depression and with yellow flag for fear avoidance behaviour (FAB). The investigators used logistic regression to compare management of warning flags among PTs with distinct qualifications: orthopaedic clinical specialists (PTOs), fellows of the AAOMPT (PTFs), PTOs and PTFs (PTFOs), and PTs without clinical specialization (PTMSs).

Results: A total of 410 PTs completed all sections of the survey (142 PTOs, 110 PTFOs, 74 PTFs and 84 PTMSs). Two hundred and seventeen PTs (53%) managed the patient with LBP and symptoms of ectopic pregnancy correctly, 115 PTs (28.5%) of them managed the patient with LBP and symptoms of depression correctly, and 177 (43.2%) managed the patient with LBP and FAB correctly.

Discussion: In general, PTs with specialization performed significantly better than PTMSs in all three clinical vignettes. PTs ability to manage patients with warning flags was relatively low. Based on our results, further education on patients with LBP and warning flags is needed. The survey had the potential for non-response and self-selection bias.

Level of Evidence: 3b.

Introduction

Physical therapy practice has long involved the recognition of red flags associated with medical disease and the referral of patients with these red flags to physicians [1–4]. In the last 10 years, the recognition of orange flags associated with psychiatric disorders (e.g. depression, anxiety, somatoform disorders) and yellow flags related to maladaptive pain coping strategies (e.g. fear avoidance behaviour [FAB], kinesiophobia, catastrophic thoughts) have also received attention in physical therapy practice [5–8]. The prevalence of psychiatric disorders is high in patients with movement disorders [9–11]. Psychiatric disorders such as depression may require referral for pharmacological and/or behavioural therapy and may hinder the rehabilitation process in any rehabilitation setting when not managed appropriately [9–11]. Orange flag recognition and referral is essential to improve patient outcome in rehabilitation [5,12]. Maladaptive pain coping strategies are predictors of long-term disability in musculoskeletal rehabilitation [8,13,14]. Management of patients with yellow flags using behavioural therapy approaches is fundamental to prevent chronic pain and long-term disability [5,15,16]. The first objective of this study was to investigate whether physical therapists (PTs) could distinguish patients with the following clinical presentations: (a) low back pain (LBP) and red flags who require referral without intervention, (b) LBP and orange flags who require referral and physical therapy intervention, and (c) LBP and yellow flags who do not require a referral but should be managed with behavioural therapy management strategies.

We chose to study clinical decision-making in patients with LBP because LBP is the most common musculoskeletal disorder seen by physical therapists in the United States [17]. LBP accounts for approximately 3.5% of all emergency department visits in the United States [18]. A recent study showed that as many as 41,200 acute LBP emergency visits may occur yearly in the United States [18]. LBP is rarely caused by non-mechanical disease;[19] however, because of such high incidence, PTs may need

---

to identify and refer patients with LBP caused by non-mechanical diseases.

LBP may be triggered by serious spine diseases (e.g. bone cancer, osteomyelitis) or grave illnesses unrelated to the spine (e.g. colon cancer, ectopic pregnancy) [19–21]. Consequently, in an era of direct access,[22] PTs need to recognize signs and symptoms of diseases requiring physician referral. The most common cause of non-mechanical LBP is pelvic disease [19]. The incidence of LBP triggered by pelvic disease (2%) is higher than the combined incidence of LBP originating from neoplasm (0.7%), infection (0.01%) and inflammatory arthritis (0.3%) [19]. For this reason, to investigate whether PTs could distinguish patients LBP and red flags who require referral without intervention, we used a clinical vignette of a patient with LBP triggered by a pelvic disorder.

PTs may manage patients with pelvic disorders mimicking musculoskeletal LBP. PTs often treat women with LBP who may or may not be pregnant [23,24]. LBP and pelvic pain are the most common health disorders affecting pregnant women before childbirth, 24–90% of all pregnant women reporting LBP [23,25]. Twenty per cent of all pregnant women may seek medical attention for LBP and pelvic pain [23]. Two per cent of all pregnant women may have an ectopic pregnancy in their first trimester and 6% of all pregnant women presenting in emergency departments may have an ectopic pregnancy [26–28]. Subsequently, it is important that PTs are able to recognize red flags of ectopic pregnancy in women presenting with LBP. Hence, for the patient vignette with red flags that require referral without intervention, the authors chose ectopic pregnancy for the pelvic disorder mimicking mechanical LBP.

LBP is one of the most expensive musculoskeletal disorders in the United States [29]. Patients who develop chronic LBP are responsible for the majority of these health care costs [30–32]. Psychiatric disorders, for example depression, are major predictors of increased health care costs associated with chronic LBP [31,33,34]. FAB and catastrophic thoughts are also predictors of poor outcome in patients with LBP [13,14,35]. Early recognition and appropriate management of patients with psychiatric disorders and maladaptive pain coping strategies may improve patient outcome and reduce health care costs [5,16,30].

The Physical Therapy Guide to Practice indicates that specialization is crucial to help clinicians advance their clinical skills and optimize patient outcomes [36]. Specialization in orthopaedic physical therapy (OPT) requires that PTs recognize patients with red flags that require medical referral [37]. PTs specialized in OPT need to be able to recognize patients with symptoms of ectopic pregnancy (abnormal menstrual cycle, vaginal discharge, abnormal vital signs) [37]. PTs specialized in OPT also need to recognize patients with symptoms of depression and maladaptive pain behaviour [8]. In its 2020 vision, the APTA anticipates PT specialists to lead

the profession in the management of movement disorders [38,39]. The American Board of Physical Therapy Residency and Fellowship Education (ABPTRFE) credentials two specialists expected to lead the profession in LBP management: orthopaedic clinical specialists (PTOs) and fellows of orthopaedic manual therapy (PTFs) [40]. The second objective of this investigation was to determine whether PT specialists (PTOs, PTFs, PTFs and PTOs [PTFOs]) were indeed better able to recognize and manage warning flags (red, orange and yellow) than members of the Orthopaedic Section of the APTA with a musculoskeletal interest (PTMSs) without an ABPTRFE recognized clinical credential.

In summary, the purpose of the current investigation was twofold. The first objective was to determine the ability of PTs to recognize and manage patients with LBP and red flag for ectopic pregnancy, LBP and orange flag for depression, and LBP and yellow flag for FAB. The second objective was to compare the ability of PTs with different clinical qualifications (PTFOs, PTFs, PTOs and PTMSs) to recognize and manage patients with LBP and warning flags for ectopic pregnancy, depression and FAB.

Methods

Subjects

The authors recruited participants from the Orthopaedic Section of the APTA and the American Academy of Orthopaedic Manual Physical Therapy (AAOMPT). At the time of the data collection (December 2014 to February 2015), the Orthopaedic Section of the APTA had approximately 11,789 PTMSs and 5,349 PTOs; and the AAOMPT had 1000 PTFs [41,42]. Note that 810 PTFs were members of both the AAOMPT and the Orthopaedic Section of the APTA (Melanie Taylor, AAOMPT Association Coordinator, personal communication, Nov 2015). Therefore, the target population included a total of 17,328 PTs.

The investigators wanted the sample to represent the targeted population of 17,328 with a margin of error of ±5 percentage points (confidence interval 95%) for a dichotomous outcome variable; hence the investigators needed a sample of approximately 376 individuals (PTFs, PTOs and PTMSs) to represent the combined population above [43]. Based on recent electronic survey response rates for health care professionals (ranging from 10 to 17%),[44–46] the plan was to email 3000 potential participants to obtain an estimated sample between 300 and 510 participants. The authors attempted to contact all PTFs (approximately 1000 individuals) from the AAOMPT and a random sample of 2000 Orthopaedic Section of the APTA members (stratified into 1000 PTOs and 1000 PTMSs). The authors were able to obtain a random sample of 1,000 PTOs and 1,000 PTMSs. However, only 861 of the 1,000 PTOs had email addresses. Thus, the authors sent the recruitment email to the final target of 2,861 subjects: 1,000 PTFs, 861 PTOs and 1,000 PTMSs, Figure 1.
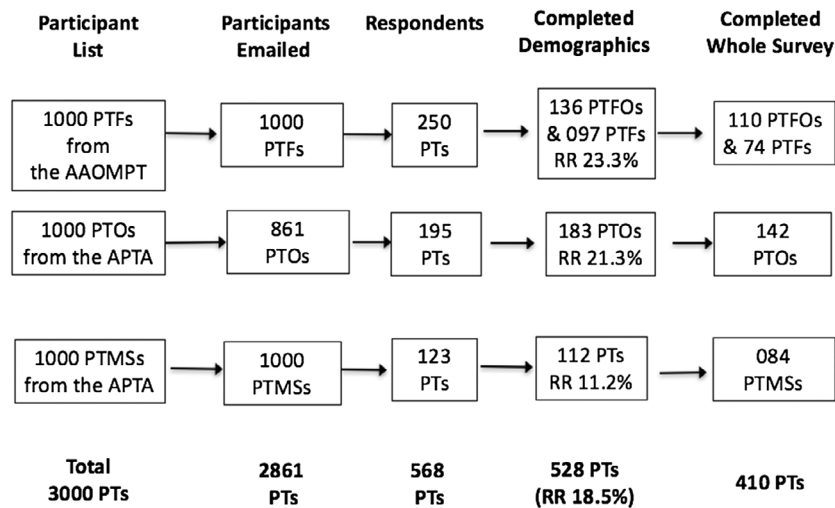
Figure 1. Subject selection process, potential participants to final sample.
Notes: PTs= Physical Therapists, PTFs = PT Fellows, PTOs= PTs with orthopaedic clinical specialization, PTFOs= PTs with a fellowship and orthopaedic specialization (PTFOs). PTMSs= PTs without a clinical specialization recognized by APTA, but with a musculoskeletal interest. APTA= American Physical Therapy Association, AAOMPT= American Academy of Orthopaedic Manual Physical Therapy, RR= response rate.

Research design

The data were collected with an electronic cross-sectional survey (Appendices 1 and 2). The study was approved by the local Institutional Review Board. Subjects consented electronically prior to participating in the study. Participants were asked to make their clinical decision based on hypothetical patient vignettes as has been done in prior studies [4,44,47]. Study participants were presented with three vignettes (Appendix 2): (a) acute LBP with red flag signs and symptoms of ectopic pregnancy (late menstrual period, pink vaginal discharge, low blood pressure with elevated heart rate),[37,48] (b) subacute LBP with orange flag signs and symptoms of depression (weight loss, difficulty to sleep, recent loss of a close relative, crying),[5,8] (c) subacute LBP with signs and symptoms of FAB (fear that work, golf or lifting may worsen LBP; lack of confidence to deal with pain) [5,8].

For the purpose of determining appropriate clinical decisions for the clinical scenarios, the PTs were instructed to select a minimum of one and a maximum of five preferred management procedures (Appendix 2) that they would use to manage the patient in each of the three clinical scenarios, during the first week of treatment. Appropriate clinical decisions were based on EBP guidelines for LBP, Table 1 [17,29].

Three PT experts validated the specific treatment approaches selected for the survey. All three experts were PTFOs and had a post-professional terminal academic doctorate and multiple peer-reviewed publications in musculoskeletal medicine. All three experts were professors in American PT programmes. Each patient vignette was independently reviewed from the same treatment list offered to study participants. Agreement among experts for each vignette was high (κ .80–.94, Table 1).

Table 1. Outcome variables & agreement among experts.

Vignette	Variables required for guide-line adherence	IA (%)[a]	K[b]
Red Flag: Ectopic Pregnancy	Refer to physician without intervention	100	1.0
Orange Flag: Depression	Refer to psychologist and PT intervention	100	0.90
	Strategies/education to address negative affective tendencies	000	
Yellow Flag: FAB[c]	No medical or psychological referral	100	0.85
	Strategies/education to address negative affective tendencies	100	

[a]Individual agreement between outcome variables.
[b]Fleiss kappa (k) and agreement for all 27 possible interventional variables.
[c]FAB = fear avoidance behaviour.

Survey

The author surveyed potential participants from December 2014 to February 2015. The self-report survey was adapted from Li and Bombardier [49] Jette et al.,[4] and Ladeira et al's [44] surveys (Appendices 1 and 2). The electronic survey was created with the Opinio Software (version 7.1.1, Oslo, Norway) [50]. Inter-item reliability was not assessed statistically because it did not include multiple items addressing the same content areas. The scenarios in the survey scored 100% in the Flesh-Reading Easy test and the Flesh-Kincaid Grade Level test;[51] these readability scores indicated that the English used in the survey was extremely easy to comprehend [52,53].

The survey was tested prior to data collection with 10 PTs in a pilot study and took between 15 and 25 min to be completed. The email had a web link directing the PTs to the website where the survey was located. To improve survey response rate, each subject was emailed three times with an interval of two weeks between emailing. The subjects had four weeks to answer the survey after the last email was sent.

Data analysis

The first objective of the study was addressed descriptively, management of LBP for patients with warning flags was analyzed for each clinical vignette (LBP with red flag, orange flag or yellow flag). In addition, descriptive statistics were also used in the study to describe the demographic characteristics of the sample (age, gender, clinical experience, clinical specialization, professional education, post-professional education, work setting, weekly patient caseload and LBP caseload), Appendix 1. The PTs were given 27 management options to choose from to manage LBP, Appendix 2.

For the second objective of the investigation, the authors used multiple binary logistic regression to adjust for demographic covariates that could confound the influence of clinical specialization on LBP management. The authors adjusted the analyses for clinical experience, outpatient practice setting, high LBP caseload (≥50%), gender and post-professional education because these covariates were predictors of correct clinical management of LBP in previous studies [44,46,47]. The authors tested the null hypothesis that specialization (PTFO, PTO, PTF and PTMS) does not predict appropriate management of warning flags. We performed an analysis ($α = 0.05$), for each patient vignettes: red, orange or yellow flag.

Results

Five hundred and sixty-eight PTs replied to the survey; however, 40 did not complete the demographics and vignette sections of the survey and were excluded from the analysis. From the remaining 528 participants, 410 completed all sections of the survey and 118 completed the demographic section but they did not complete the clinical vignette section of the survey, Figure 1. We calculated our response rate based on the recommendations of the American Association of Public Opinion Research (528 complete and incomplete surveys out of 2,861 potential respondents): 18.5%, AAPOR RR-6 [54,55]. The sample represented the members of the Orthopaedic Section of the APTA with ±4.11 percentage points (confidence interval 95%). Response rate varied among different clinical specialties: PTMSs 11.2%, PTOs 21.3%, combined PTFOs and PTFs 23.3% (Figure 1).

PTMSs had a significantly lower response rate than PTOs ($χ^2 = 24.72$, $p = .001$) and PTFs/PTFOs ($χ^2 = 35.59$, $p = .001$). There was not any difference in incomplete survey response rate between PTOs and combined PTFs/PTFOs. To test our hypothesis that PT specialization is not a predictor for appropriate management of warning flags in physical therapy practice, we only utilized the 410 respondents who completed the demographics and the vignette sections of the survey, Figure 1.

The demographics of the participants were displayed in Table 2. For the first objective of the study, the description of how PTs managed LBP with the warning flags was described on Table 3. For first vignette (LBP with signs and symptoms of ectopic pregnancy), appropriate management of red flags ranged from 45.2 to 62.2%. For the second vignette (LBP with associated signs and symptoms of depression), proper management of orange flags ranged from 19.2 to 36.4%. For the third vignette (LBP with associated signs and symptoms of FAB), proper management of yellow flag ranged from 22.6 to 60.0%).

For the second objective of the study, the regression analyses were displayed in Table 4. For the first vignette of LBP and a red flag, the PTFs performed significantly better than PTMSs (OR = 2.09 [1.08, 4.06], $p = .029$). For the second vignette of orange flag, the PTFOs performed significantly better than PTMSs (OR = 2.55 [1.28, 5.11], $p = .008$). For the third vignette of yellow flag, both PTFOs (OR = 5.28 [2.71, 10.31], $p = .001$) and PTOs (OR = 3.10 [1.64, 5.86], $p = .001$) performed significantly better than PTMSs.

Discussion

The first objective of this study was to determine the ability of PTs to recognize and manage patients with LBP and red, orange, or yellow flags. For warning red flags, the descriptive results showed that only 52.7% (from 45.2% for PTMSs to 62.2% for PTFs) of the PTs in the current study made the correct decision for the patient with LBP and red flag, Table 3. This finding was similar to the findings reported by Jette et al. [4] for PT management of patients with critical medical conditions. Jette et al. [4] reported that 62.2% of PTOs and PTs certified in manual therapy made the correct decision 100% of the time for critical medical conditions (spine cancer, knee septic arthritis and abdominal aortic aneurism), while only 46.5% of PTs without clinical specializations made the correct decision 100% of the time for critical medical conditions.

The findings here could not be compared to results of other studies addressing appropriate referral of patients with symptoms of ectopic pregnancy. However, it is interesting to note that misdiagnosed ectopic pregnancy is a concern in medicine. The Eighth Report of the Confidential Enquiries into Maternal Deaths in the United Kingdom mentioned that 6 out of 11 (54%) women died in early pregnancy because of substandard diagnosis of ectopic pregnancy [56].

It should be noted that 93.4% of the PTs in the present study would refer the patient with red flag to a physician; however, 43.9% of these PTs would provide intervention to the patient in addition to the medical referral. This is of great concern because the patient with LBP and red flag in the clinical vignette had abnormal vital signs indicating hypovolemia. Hypovolemia may be a sign of emergency in occult (ruptured ectopic pregnancy, ruptured spleen, severe dehydration) as well as previously

Table 2. Demographics for each PT specialty group.

	PTMS	PTF	PTO	PTFO	Total
	n= 84	*n*=74	*n*= 142	*n*=110	*N*=410
Therapist	(20.5%)	(18.1%)	(34.6%)	(26.8%)	(100%)
Age[a]	46.5 (12.4)	41.0 (08.6)	42.5 (9.4)	42.3 (9.3)	42.9 (10.1)
Gender[b]					
Female	41 (47.6%)	27 (36.5%)	56 (39.4%)	28 (25.5%)	154 (37.6%)
Male	43 (52.4%)	47 (63.5%)	86 (60.6%)	82 (74.5%)	256 (62.4%)
Experience[a]	17.8 (12.3)	14.9 (9.1)	16.8 (9.6)	16.7 (9.9)	17.2 (10.5)
Prof. Degree					
Bachelor	38 (45.2%)	17 (23.0%)	49 (34.5%)	37 (33.6%)	34.4% (141)
Master	26 (31.0%)	39 (52.7%)	59 (41.5%)	39 (35.5%)	39.8% (163)
Doctor	14 (16.7%)	17 (23.0%)	32 (22.5%)	32 (29.1%)	23.2% (095)
Other	06 (07.1%)	01 (01.4%)	02 (01.4%)	02 (01.8%)	02.7% (011)
PP Degree[bc]					
None	39 (46.4%)	34 (45.9%)	70 (49.3%)	49 (44.5%)	192 (46.8%)
MS	13 (15.5%)	06 (08.1%)	14 (09.9%)	09 (06.7%)	042 (10.2%)
TDPT	14 (28.6%)	21 (28.4%)	39 (34.5%)	42 (35.9%)	136 (33.2%)
PhD	02 (02.4%)	12 (16.2%)	12 (08.5%)	13 (07.8%)	039 (09.5%)
Practice[b]					
Out Ortho	063 (75.0%)	066 (89.2%)	125 (88.0%)	089 (80.9%)	343 (83.7%)
Weekly Caseload[bd]					
>20 patients	58 (69.0%)	63 (85.1%)	128 (85.2%)	79 (71.8%)	321 (78.3%)
>40 patients	36 (42.9%)	44 (59.5%)	86 (60.6%)	62 (56.4%)	228 (55.6%)
>60 patients	09 (10.7%)	13 (17.6%)	13 (09.2%)	15 (13.6%)	050 (12.2%)
LBP load[bd]					
>20%	53 (63.1%)	68 (91.9%)	99 (69.7%)	90 (81.8%)	310 (75.6%)
>50%	16 (19.0%)	10 (13.5%)	08 (05.6%)	09 (08.2%)	043 (10.5%)

Notes: PT = physical therapy. PTF = fellow of orthopaedic manual therapy, PTO = orthopaedic clinical specialist, PTMS = physical therapist with musculo-skeletal interest, PTFO = PT with both fellowship and orthopaedic clinical specialization, and LBP = low back pain. Out Ortho = Outpatient Orthopaedics, PP = post-professional, MS = master of science, health science, or arts; TPDT = transitional doctorate in physical therapy, PhD = philosophy doctor, science doctor, doctor of science, educational doctor and doctor of health science.
[a]Mean (standard deviation).
[b]Number of participants (percentage).
[c]Participants could have several post-professional degrees.
[d]Results reflect cumulative participants (percentage).

Table 3. Management of warning flags in physical therapy practice.

	PTMS	PTF	PTO	PTFO	Total
	n = 84	*n* = 74	*n* = 142	*n* = 110	*N* = 410
Physical therapists	(20.5%)	(18.1%)	(34.6%)	(26.8%)	(100%)
Red Flag Management					
Refer to physician without physical therapy intervention[a]	38 (45.2%)	46 (62.2%)	76 (53.5%)	56 (50.9%)	216 (52.7%)
Refer to physician with physical therapy intervention	45 (53.6%)	24 (32.4%)	64 (45.1%)	47 (42.7%)	180 (43.9%)
Refer to MD with or without PT Intervention	79 (94.0%)	67 (90.5%)	136 (95.8%)	101 (91.8%)	383 (93.4%)
Orange Flag Management					
Refer to Psychologist & address negative affective tendencies[a]	16 (19.0%)	20 (27.0%)	41 (28.9%)	40 (36.4%)	117 (28.5%)
Refer to Psychologist	61 (72.6%)	60 (81.1%)	110 (77.5%)	90 (81.8%)	321 (78.3%)
Education to address negative affective tendencies	24 (28.6%)	23 (31.1%)	49 (34.5%)	51 (46.4%)	147 (35.9%)
Yellow Flag Management					
No referral & education to address negative affective tendencies[a]	19 (22.6%)	32 (33.8%)	67 (47.2%)	66 (60.0%)	177 (43.2%)
Education to address negative affective tendencies	27 (32.1%)	32 (43.2%)	84 (59.2%)	76 (69.1%)	219 (53.4%)
Referral to physician	29 (34.5%)	20 (27.0%)	28 (19.7%)	18 (16.4%)	95 (23.2%)
Referral to psychologist	00 (0.0%)	04 (5.4%)	05 (3.5%)	03 (2.7%)	12 (2.9%)

Notes: PTF = fellow of orthopaedic manual therapy, PTO = orthopaedic clinical specialist, PTMS = physical therapist with musculoskeletal interest, PTFO = PT with both fellowship and orthopaedic clinical specialization, and LBP = low back pain.
[a]Appropriate decision for patient vignette. Note that the numbers in the columns for each flag management option (red, orange or yellow) do not add up to 100% the clinical decisions are not mutually exclusive.

known illnesses (colon cancer, sepsis, cirrhosis) [57–59]. PTs regularly perform vital sign assessment in clinical practice; however, most PTs do not know vital sign findings that indicate hypovolemia. The shock index (pulse rate divided by systolic blood pressure) is an accurate indicator for hypovolemia [57–59]. Unfortunately, even classic physical therapy books that address screening for medical disease do not address the shock index [48]. In the current scenario, the shock index (102 heart rate divided by 90 mm Hg systolic pressure) was above .85, this was a predictor of blood loss in ruptured ectopic pregnancy, hence the patient in the clinical vignette should not receive physical therapy intervention [60].

For orange warning flag, the descriptive results showed that 78.3% (from 72.6% for PTMSs to 81.8% for PTFOs) of the PTs recognized that the patient with LBP and depression needed a referral to see a psychologist, Table 3. This patient was having difficulty to deal with

Table 4. Results of binary logistic regression analyses[b].

Multivariate analysis adjusted for demographic covariates[c]					
	Vignette 1		Vignette 2		Vignette 3	
	Red flag		Orange flag		Yellow flag	
Predictor variables	OR (CI)	P value	OR (CI)	P value	OR (CI)	P value
PTFO	1.294 (0.71, 2.36)	0.399	2.55 (1.28, 5.11)	0.008[a]	5.11 (2.62, 9.95)	0.001[a]
PTO	1.590 (0.90, 2.81)	0.110	1.82 (0.93, 3.59)	0.082	3.11(1.65, 5.88)	0.001[a]
PTF	2.094 (1.08, 4.06)	0.029[a]	1.53 (0.71, 3.28)	0.280	1.57 (0.76, 3.24)	0.220

Notes: PTF = fellow of orthopaedic manual therapy, PTO = orthopaedic clinical specialist, PTFO = physical therapist with both fellowship and orthopaedic clinical specialization, Dir. = directional, FAB = fear avoidance behaviour. OR = Odds Ratio. CI = confidence interval.
[a]Statistically significant at alpha < .05 (CI = 95%).
[b]The indicator variable utilized in the regression analyses was physical therapists with a musculoskeletal interest (PTMS).
[c]Adjusted for gender, post-professional degree, high low back pain caseload (≥50%), clinical experience and outpatient orthopaedic practice setting.

the recent death of his son, was not sleeping well, and even teared during the PT interview. This is slightly better than what Haggman et al. [7] reported for the ability of PTs in private practice to recognize patients with depression (67–69%). Primary care physicians also had more difficulty than the PTs in the current study to recognize patients with depression, Pignone et al. [61] reported that primary care physicians failed to recognize 35–50% of patients with depression.

The PTs in the current study did not manage the patient with orange flag for depression appropriately. Even though 78.3% of PTs recognized that the patient with depression needed a referral and could benefit from additional physical therapy intervention, they would not manage this patient to address negative affective tendencies as recommended in the guide to practice of the Orthopaedic Section of the APTA [17]. Only 28.5% of the PTs (ranging from 19.0% for PTMSs to 36.4% for PTFOs) would refer the patient to a psychologist and address the negative affective tendencies of depression. These findings are similar to the results reported by Cohen et al.,[62] the latter authors reported that even when medical practitioners identify depression, the majority do not provide any particular intervention or help for depression. The inappropriate handling of depression is a concern because depression is a major contributing factor for delayed rehabilitation and development of persistent LBP [31,33,34].

For yellow warning flag, the descriptive results showed that 23.2% of PTs (from 16.4% for PTFOs to 34.5% for PTMSs) in the present study would unnecessarily refer the patient with FAB to a physician, Table 3. Note that patients with LBP and FAB do not require referral to physicians or to behavioural therapists, only patients with signs and symptoms of non-mechanical and visceral disease or psychiatric disorders require referral [5,17]. Primary and specialist medical care for patients with non-specific LBP (without red flag for serious medical conditions and non-surgical candidates) often involve needless requests for diagnostic imaging and avoidable prescriptions for opioid medications, both of which may increase health care cost as well as contribute to persistent LBP [63, 64].

Only 43.2% of PTs (ranging from 22.2% for PTMSs to 60.0% for PTFOs) would appropriately manage the patient in Vignette 3 with LBP and yellow flag for FAB: educate the patient for negative affective tendencies without referral to a physician or a behavioural therapist. Only 53.4% of PTs (ranging from 32.1% for PTMSs to 69.1% for PTFOs) would educate the patient with FAB to address negative affective tendencies as recommended in the EBP guideline of Orthopaedic Section of the APTA. These findings indicate that the management of patients with LBP and FAB may need a reappraisal in physical therapy practice. If PTs are to become the practitioners of choice for non-surgical patients with LBP and to be recognized as the preferred providers for non-surgical LBP as envisioned by the APTA, a greater percentage of PTs should start using EBP to guide their management of patients with LBP and FAB [39].

The second objective of the study was to compare the ability of PTs with different clinical qualifications to recognize and manage patients with LBP and warning flags. The inferential statistics showed that PTs with clinical specialization performed better than PTMSs, Table 4. For the first patient with LBP and red flag associated with ectopic pregnancy, the odds for PTFs to appropriately refer patients to a physician were 2.09 times better than those for PTMSs, these results were consistent with the findings of Jette et al. [4] who reported that PTs with clinical specialization (PTOs and PTs with manual therapy certification) performed significantly better than PTs without clinical specialization for patients with red flags. For the second patient with LBP and orange flag for depression, the odds for PTFOs to appropriately manage the patient were 2.55 times better than those for PTMSs. For the third patient with LBP and yellow flag for FAB, the odds for PTFOs to properly manage the patient were 5.28 times and for PTOs were 3.10 times better than those for PTMSs. The authors could not compare the results of the current investigation on management of orange and yellow flags with other studies because, to date, no study has investigated how clinical specialization in physical therapy affects management of patients with depression or FAB.

Future studies should investigate cognitive reasons for inappropriate clinical decision-making in physical therapy practice [65]. The reason clinical specialization improves clinical decision-making in physical therapy requires further investigation. The most common reason physicians make cognitive errors in clinical management is processing bias [66]. It is possible that fellowship and residency training provided the PTs with specialization in the current study with metacognitive strategies to reduce processing bias to manage patients with warning flags [67]. It is also possible that clinical specialization filled knowledge gaps required for appropriate clinical decision-making

Limitations of the study

The participants in the current study were members of the Orthopaedic Section of the APTA or the AAOMPT and, therefore, the results cannot be generalized to PTs who are not members of these associations in the USA. The results of the study were delimited to the validity and reliability of the survey including clinical vignettes. The participants' clinical decisions in the vignettes may not directly transfer to their actual practice in the clinic. The authors did not perform a test–retest reliability of the survey.

The electronic response rate in the present survey (18.5%) was low when compared to postal surveys [45]. However, there is currently no consensus about the correlation between response rates and survey quality. Recent studies have shown that multivariate inferences similar to ours are relatively immune to non-response bias [68,69].

We looked at our possible response bias comparing participants who filled the survey completely vs. incompletely. We analyzed the five variables previously shown to predict correct management of LBP, Appendix 3. PTMSs who filled up the survey incompletely had a lower LBP caseload than PTMSs who filled up the survey completely. In addition, these PTMSs with incomplete surveys were less likely to work in outpatient orthopaedic settings than PTs with specializations. These latter two findings may indicate that PTMSs with incomplete surveys were less motivated and probably less knowledgeable about LBP management than our participants with complete surveys.

Our survey had more specialists than any recent electronic [44,46] or postal [47, 70] surveys that investigated management of LBP. Because of the high percentage of specialists, our participants were more motivated and probably more up-to-date in treatment of LBP than the non-respondents. If there was any self-selection bias, it was probably worst among PTMSs because PTMSs had a lower response rate (11.2%) than PTFs/PTFOs (23.3%) and PTOs (21.3%). Hence, the results of the current study might have underestimated the better clinical management of warning flags among PTs with clinical specialization when compared to PTMSs; this was a limitation of the study (Appendix 3).

Conclusion

Educational programmes may want to emphasize how to recognize and manage warning flags in physical therapy practice. Ninety-three per cent of PTs recognized that the patient with red flag needed a medical referral, but only 52.7% of them correctly made a referral without intervention. Seventy-eight per cent of PTs recognized that the patient with orange flag needed a referral, but only 28.5% of them made the correct decision to refer and educate the patient to address negative affective tendencies. Twenty-three per cent of PTs inappropriately referred the patient with LBP and yellow flag and only 43.2% of them correctly educated the patient to address negative affective tendencies without a referral. Future studies should investigate cognitive reasons for inappropriate clinical decision-making in physical therapy practice.

The authors rejected the null hypothesis that clinical specialization is not a predictor of appropriate management of warning flags in patients with LBP. PTs with clinical specialization managed warning flags better than their peers without specialization.

References

[1] Ferguson F, Holdsworth L, Rafferty D. Low back pain and physiotherapy use of red flags: the evidence from Scotland. Physiotherapy. 2010;96:282–288.

[2] Boissonnault WG, Ross MD. Physical therapists referring patients to physicians: a review of case reports and series. J Orthop Sports Phys Ther. 2012;42:446–454.

[3] Leerar PJ, Boissonnault W, Domholdt E, et al. Documentation of red flags by physical therapists for patients with low back pain. J Man Manip Ther. 2007;15:42–49.

[4] Jette DU, Ardleigh K, Chandler K, et al. Decision-making ability of physical therapists: physical therapy intervention or medical referral. Phys Ther. 2006;86:1619–1629.

[5] Nicholas MK, Linton SJ, Watson PJ, et al. Early identification and management of psychological risk factors ("yellow flags") in patients with low back pain: a reappraisal. Phys Ther. 2011;91:737–753.

[6] Singla M, Jones M, Edwards I, et al. Physiotherapists' assessment of patients' psychosocial status: are we standing on thin ice? A qualitative descriptive study. Man Ther. 2015;20:328–334.

[7] Haggman S, Maher CG, Refshauge KM. Screening for symptoms of depression by physical therapists managing low back pain. Phys Ther. 2004;84:1157–1166.

[8] Lentz TA, Beneciuk JM, Bialosky JE, et al. Development of a yellow flag assessment tool for orthopaedic physical Therapists: results from the optimal screening for prediction of referral and outcome (OSPRO) cohort. J Orthop Sports Phys Ther. 2016:1–45.

[9] Rickards H. Depression in neurological disorders: Parkinson's disease, multiple sclerosis, and stroke. J Neurol Neurosurg Psychiatry. 2005;76(Suppl 1):i48–i52.

[10] Huffman JC. Review: depression after myocardial infarction is associated with increased risk of all-cause mortality and cardiovascular events. Evid Based Ment Health. 2013;16:110.

[11] Reme SE, Tangen T, Moe T, et al. Prevalence of psychiatric disorders in sick listed chronic low back pain patients. Eur J Pain. 2011;15:1075–1080.

[12] Main CJ, George SZ. Psychologically informed practice for management of low back pain: future directions in practice and research. Phys Ther. 2011;91:820–824.

[13] Wertli MM, Eugster R, Held U, et al. Catastrophizing-a prognostic factor for outcome in patients with low back pain: a systematic review. Spine J. 2014;14:2639–2657.

[14] Wertli MM, Rasmussen-Barr E, Held U, et al. Fear-avoidance beliefs-a moderator of treatment efficacy in patients with low back pain: a systematic review. Spine J. 2014;14:2658–2678.

[15] O'Sullivan K, Dankaerts W, O'Sullivan L, et al. Cognitive functional therapy for disabling nonspecific chronic low back pain: multiple case-cohort study. Phys Ther. 2015;95:1478–1488.

[16] Vibe Fersum K, O'Sullivan P, Skouen JS, et al. Efficacy of classification-based cognitive functional therapy in patients with non-specific chronic low back pain: a randomized controlled trial. Eur J Pain. 2013;17:916–928.

[17] Delitto A, George SZ, Van Dillen LR, et al. Orthopaedic section of the american physical therapy a. Low back pain. J Orthop Sports Phys Ther. 2012;42:A1–A57.

[18] Waterman BR, Belmont PJ Jr, Schoenfeld AJ. Low back pain in the United States: incidence and risk factors for presentation in the emergency setting. Spine J. 2012;12:63–70.

[19] Jarvik JG, Deyo RA. Diagnostic evaluation of low back pain with emphasis on imaging. Ann Intern Med. 2002;137:586–597. Epub 2002/10/02.

[20] Klineberg E, Mazanec D, Orr D, et al. Masquerade: medical causes of back pain. Clevel Clin J Med. 2007;74:905–913.

[21] Amirdelfan K, McRoberts P, Deer TR. The differential diagnosis of low back pain: a primer on the evolving paradigm. Neuromodulation. 2014;17(Suppl 2):11–17.

[22] American Physical Therapy Association. Direct access to physical therapy services: overview 2015 [cited 2015 Nov 24]. Available from: http://www.apta.org/StateIssues/DirectAccess/Overview/

[23] van Benten E, Pool J, Mens J, et al. Recommendations for physical therapists on the treatment of lumbopelvic pain during pregnancy: a systematic review. J Orthop Sports Phys Ther. 2014;44:464–473, A1–15.

[24] Liddle SD, Pennick V. Interventions for preventing and treating low-back and pelvic pain during pregnancy. Cochrane Database Syst Rev. 2015;9:CD001139.

[25] Casagrande D, Gugala Z, Clark SM, et al. Low back pain and pelvic girdle pain in pregnancy. J Am Acad Orthop Surg. 2015;23:539–549.

[26] Sivalingam VN, Duncan WC, Kirk E, et al. Diagnosis and management of ectopic pregnancy. J Fam Plann Reprod Health Care. 2011;37:231–240.

[27] Jurkovic D, Wilkinson H. Diagnosis and management of ectopic pregnancy. BMJ. 2011;342:d3397.

[28] Huancahuari N. Emergencies in early pregnancy. Emerg Med Clin North Am. 2012;30:837–847.

[29] Chou R, Qaseem A, Snow V, et al. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the american college of physicians and the american pain society. Ann Intern Med. 2007;147:478–491. Epub 2007/10/03.

[30] Mathew J, Singh SB, Garis S, et al. Backing up the stories: the psychological and social costs of chronic low-back pain. Int J Spine Surg. 2013;7:e29–e38.

[31] Fritz JM, Brennan GP, Hunter SJ, et al. Initial management decisions after a new consultation for low back pain: implications of the usage of physical therapy for subsequent health care costs and utilization. Arch Phys Med Rehabil. 2013;94:808–816.

[32] Gore M, Sadosky A, Stacey BR, et al. The burden of chronic low back pain: clinical comorbidities, treatment patterns, and health care costs in usual care settings. Spine (Phila Pa 1976). 2012;37:E668–E677.

[33] Shaw WS, Means-Christensen AJ, Slater MA, et al. Psychiatric disorders and risk of transition to chronicity in men with first onset low back pain. Pain Med. 2010;11:1391–1400.

[34] Pinheiro MB, Ferreira ML, Refshauge K, et al. Symptoms of depression as a prognostic factor for low back pain: a systematic review. Spine J. 2016;16:105–116.

[35] Nicholas MK, George SZ. Psychologically informed interventions for low back pain: an update for physical therapists. Phys Ther. 2011;91:765–776.

[36] American Physical Therapy Association. Chapter1: introduction to the guide to physical therapist practice. Guide to physical therapy practice 3.0. 2014 [cited Oct 15, 2015]. Alexandria, VA, [cited Oct 15, 2015]. Available from: http://guidetoptpractice.apta.org/content/1/SEC1.body.

[37] George SZ, Beneciuk JM, Bialosky JE, et al. Development of a review-of-systems screening tool for orthopaedic physical therapists: results from the optimal screening for prediction of referral and outcome (OSPRO) cohort. J Orthop Sports Phys Ther. 2015;45:512–526.

[38] American Physical Therapy Association. Clinical specialization in physical therapy 2012 [updated 2012; cited 2015 Oct 24]. Available from: http://www.apta.org/uploadedFiles/APTAorg/About_Us/Policies/Specialization/ClinicalSpecialization.pdf-search=%22Clinical%20Specialization%20in%20Physical%20Therapy%22.

[39] American Physical Therapy Association. APTA vision sentence and vision statement for physical therapy 2020 [updated 2013; cited 2015 Oct 24]. Available from: http://www.apta.org/Vision2020/.

[40] American Board of Physical Therapy Residency and Fellowship Education. Specializations and fellowships:

American physical therapy association; [cited 2015 OCt 25]. Available from: http://www.abptrfe.org/home.aspx.

[41] Orthopaedics Section Profile American Physical Therapy Association; 2015 [cited 2015 Oct 29]. Available from: http://www.apta.org/apta/components/public/componentprofile.aspx?navID=10737421970&compcode=J.

[42] Find a Fellow: American Academy of Orthopaedic Manual Physical Therapy [cited 2015 Jan 30]. Available from: http://www.aaompt.org/directory/fellowSearch.cfm.

[43] Sample Size Calculator: Calculator.net; [cited 2015 Oct 25, 2015]. Available from: http://www.calculator.net/sample-size-calculator.html?type=1&cl=95&ci=5&ps=1000&x=57&y=14.

[44] Ladeira CE, Cheng MS, Hill CJ. Physical therapists' treatment choices for non-specific low back pain in Florida: an electronic survey. J Manual Manipul Ther. 2015;23:109–118.

[45] Hardigan PC, Succar CT, Fleisher JM. An analysis of response rate and economic costs between mail and web-based surveys among practicing dentists: a randomized trial. J Commun Health. 2012;37:383–394.

[46] Hendrick P, Mani R, Bishop A, et al. Therapist knowledge, adherence and use of low back pain guidelines to inform clinical decisions – a national survey of manipulative and sports physiotherapists in New Zealand. Man Ther. 2013;18:136–142.

[47] Learman KE, Ellis AR, Goode AP, et al. Physical therapists' clinical knowledge of multidisciplinary low back pain treatment guidelines. Phys Ther. 2014;94:934–946.

[48] Goodman CC, Snyder TEK. Differential diagnosis for physical therapists: screening for referral. St. Louis: Missouri Elsevier, Saunders; 2013.

[49] Li LC, Bombardier C. Physical therapy management of low back pain: an exploratory survey of therapist approaches. Phys Ther. 2001;81:1018–1028.

[50] Software Opinio 7.1.1. Øvre Slottsgate 5, 0157 Oslo, Norway; 2015.

[51] Flesch R. A new readability yardstick. J Appl Psychol. 1948;32:221–233.

[52] Hall JC. The readability of original articles in surgical journals. ANZ J Surg. 2006;76:68–70.

[53] Williamson JM, Martin AG. Assessing the readability statistics of national consent forms in the UK. Int J Clin Pract. 2010;64:322–329.

[54] Phillips AW, Reddy S, Durning SJ. Improving response rates and evaluating nonresponse bias in surveys: AMEE Guide No. 102. Med Teach. 2016;38:217–228.

[55] Johnson TP, Wislar JS. Response rates and nonresponse errors in surveys. JAMA. 2012;307:1805–1806.

[56] Lewis G. (ed) Saving mothers' lives: reviewing maternal deaths tomake motherhood safer—2006–2008. The Eighth Report of the Confidential Enquiries into Maternal Deaths in the United Kingdom. BJOG. 2011;118:1–205.

[57] Rappaport LD, Deakyne S, Carcillo JA, et al. Age- and sex-specific normal values for shock index in National Health and Nutrition Examination Survey 1999–2008 for ages 8 years and older. Am J Emerg Med. 2013;31:838–842. Epub 2013/03/13.

[58] Olaussen A, Blackburn T, Mitra B, et al. Review article: shock index for prediction of critical bleeding post-trauma: a systematic review. Emerg Med Aus. 2014;26:223–228. Epub 2014/04/10.

[59] Acker SN, Bredbeck B, Partrick DA, et al. Shock index, pediatric age-adjusted (SIPA) is more accurate than age-adjusted hypotension for trauma team activation. Surgery. 2017;161:803–807. Epub 2016/11/07.

[60] Polena V, Huchon C, Varas Ramos C, et al. Non-invasive tools for the diagnosis of potentially life-threatening gynaecological emergencies: a systematic review. PLoS One. 2015;10:e0114189.

[61] Pignone MP, Gaynes BN, Rushton JL, et al. Screening for depression in adults: a summary of the evidence for the u.s. preventive services task force. Ann Intern Med. 2002;136:765–776.

[62] Cohen M, Nicholas M, Blanch A. Medical assessment and management of work-related low back or neck-arm pain: more questions than answers. J Occup Health Safety Aust NZ. 2000;16:307–317.

[63] Werber A, Schiltenwolf M. Treatment of Lower Back Pain-The Gap between Guideline-Based Treatment and Medical Care Reality. Healthcare (Basel). 2016;4:1–9.

[64] Salt E, Gokun Y, Rankin Kerr A, et al. A description and comparison of treatments for low back pain in the United States. Orthop Nurs. 2016;35:214–221.

[65] Croskerry P, Tait G. Clinical decision making: the need for meaningful research. Acad Med. 2013;88:149–150.

[66] Graber ML, Franklin N, Gordon R. Diagnostic error in internal medicine. Arch Intern Med. 2005;165:1493–1499.

[67] Croskerry P. The importance of cognitive errors in diagnosis and strategies to minimize them. Acad Med. 2003;78:775–780.

[68] Abraham KG, Helms S, Presser S. How social processes distort measurement: the impact of survey nonresponse on estimates of volunteer work in the United States. Am J Soc. 2009;114:1129–1165.

[69] Amaya A, Presser S. Nonresponse bias for univariate and multivariate estimates of social activities and roles. Public Opin Quart. 2016. Epub October 11, 2016.

[70] Madson TJ, Hollman JH. Lumbar traction for managing low back pain: a survey of physical therapists in the United States. J Orthop Sports Phys Ther. 2015;45:586–595.

Appendix 1. Survey participant demographics

This section of the survey contains 10 demographic questions about you. It should not take longer than 3 or 5 min to complete. If, after clicking the START button at the end of this section, you return here; please review your answers below and correct all replies highlighted in red.

1. How old are you?

☐

2. What is your gender?
☐ Male
☐ Female

3. Which year did you graduate from entry-level PT school?

☐

4. What is your entry-level PT degree?
☐ Diploma
☐ Bachelor
☐ Master
☐ Doctorate
☐ other

5. Do you have any Post-Professional academic degree (additional to your Entry-Level PT degree)? Check all that apply.
☐ None
☐ Master of Arts
☐ Master in Health Sciences
☐ Post-Professional Master's in PT
☐ Transitional DPT
☐ Doctor of Health Sciences
☐ PhD
☐ ScD or DSc
☐ EdD
☐ Other, specify in the box below

☐

6. Do you have any of the following clinical certifications or specializations? Check all that apply.
☐ None
☐ COMT
☐ FAAOMPT
☐ MDT
☐ MTC
☐ OCS
☐ OMT
☐ Other, specify in the box below

☐

7. In the last 12 months, what was your employment setting?
☐ Outpatient orthopaedics
☐ Inpatient orthopaedics
☐ Inpatient & outpatient orthopaedics
☐ Academia
☐ Other, specify in the box below

☐

8. How many years of clinical experience do you have?
Years that you worked only in academia or only in administration do not count

☐

9. In the past year, in average, how many patient visits have you had per week?
☐ None
☐ Between 11 and 20
☐ Between 21 and 30
☐ Between 31 and 40
☐ Betweeen 41 and 50
☐ Between 51 and 60
☐ Above 60

10. What percentage of your case load consists of patients with low back pain?

☐ 0%
☐ 10% or less
☐ Between 11% and 20%
☐ Between 21% and 30%
☐ Between 41% and 50%
☐ Above 60%

Appendix 2. Survey patient vignettes and interventional options

This section of the survey contains four clinical scenarios of patients with low back pain. This section should not take longer than 20 min. If, after clicking the FINISH button at the end of the survey, you return here; please, review your answers below and correct all replies highlighted in red.

Vignette 1 Low back pain with red flag for ectopic pregnancy
History. A 28-year-old woman has suffered from low back pain on and off for 45 days. Low back pain started insidiously and does not appear to change with physical activity or posture. She works as a school teacher. She sits all day. Her back pain is worse in the end of the day and at night. The pain does not radiate to the legs; it is located on the low back and left buttock area. She has been married for five years; she has no children and is trying to become pregnant. Her medical history is unremarkable, except that her period is 6 weeks late and she reports a pinkish vaginal discharge. She is taking 200 mg ibuprofen 4 times a day for the back pain. Physical exam. Vitals signs: blood pressure 90/60 mm Hg and pulse rate 102. Back range of motion is full with pain at end range of flexion. Straight leg raise stretch the hamstrings bilaterally at 80° of hip flexion. The neurological exam is within normal limits. Palpation and accessory motion testing did not reproduce low back pain symptoms; however, tenderness was noted from the L3 to the L5 lumbar vertebrae with PA pressure.

Please choose the preferred procedures you would use to manage the patient in the FIRST WEEK OF THE PLAN OF CARE. **Choose a MINIMUM of 1 and a MAXIMUM of 5 options to manage the patient on the clinical scenario.**

Acupuncture or dry needling	Exercises: centralization & directional preference	Lumbar brace or corset	Refer to a psychologist without intervention
Back school	Exercises: coordination, endurance, & strengthening	Mechanical Traction	Spinal non-thrust manipulation
Bed rest	Exercises: endurance & fitness	Neurodynamic mobilization	Spinal thrust manipulation
Education to pursue or maintain an active lifestyle	Exercises: lumbar flexion	Radiographs or magnetic resonance imaging	Work conditioning or hardening
Education: home exercise programme	Interferential current or TENS	Refer to a physician	Work modification
Education in symptom alleviating posture and movements	Ice or heat	Refer to a physician without intervention	Other, specify in the box below.
Education to address negative affective tendencies	Laser or Ultrasound	Refer to a psychologist	

Vignette 2 Low back pain with orange flag for depression
History. A 42-year-old man has been suffering from lower back pain for the past 8 weeks. He comes to see you in direct access. His symptoms started insidiously after renovating his kitchen. He is a handyman and works for Home Depot. The pain has not improved over the past 8 weeks despite the fact that he lies down regularly. Currently, his back feels stiff and he avoids bending due to pain. His medical history is unremarkable. Social history reveals that his 5-year-old son drowned in a pool 6 weeks ago. He says that he is not sleeping well. He has missed at least 15 days of work because of the pain. He is a bit teary when he talks about his son and how his family is coping with his son death. He says that he lost a few pounds after his son passed away. He denies taking any medication at the moment.

Physical Exam. Vital signs: blood pressure 130/ 85 mm Hg and pulse rate 78. During range of motion testing, the patient experiences some pain during extension and lateral flexion, particularly to the right. These movements are not noticeably limited. While standing, active flexion of the lower back is nearly impossible. The SLR on the left provokes only lower back pain at around 80°. Palpation and accessory motion testing did not reproduce low back pain symptoms; however, tenderness was noted diffusely and bilaterally on the lumbar paravertebral muscles.

Please choose the preferred procedures you would use to manage the patient in the FIRST WEEK OF THE PLAN OF CARE. **Choose a MINIMUM of 1 and a MAXIMUM of 5 options to manage the patient on the clinical scenario.**

Acupuncture or dry needling	Exercises: centralization & directional preference	Lumbar brace or corset	Refer to a psychologist without intervention
Back school	Exercises: coordination, endurance, & strengthening	Mechanical Traction	Spinal non-thrust manipulation
Bed rest	Exercises: endurance & fitness	Neurodynamic mobilization	Spinal thrust manipulation
Education to pursue or maintain an active lifestyle	Exercises: lumbar flexion	Radiographs or magnetic resonance imaging	Work conditioning or hardening
Education: home exercise programme	Interferential current or TENS	Refer to a physician	Work modification
Education in symptom alleviating posture and movements	Ice or heat	Refer to a physician without intervention	Other, specify in the box below.
Education to address negative affective tendencies	Laser or Ultrasound	Refer to a psychologist	

Vignette 3 *Low back pain with Fear Avoidance Behaviour*

History. A 50-year-old man has been suffering from lower back pain for the past 6 weeks. He comes to see you in direct access. The pain started after he helped his 25-year-old son renovate a house. He did not lift any heavy objects. The pain is continuous and radiates to the left buttock. He called in sick due to the back pain and has still not gone back to work. He is an electrician in a hardware store. The pain has not reduced over the past 6 weeks despite the fact that he lies down regularly. He loves to play golf, but he has not tried to play golf since he developed back pain, he believes that playing golf will exacerbate the problem. He takes Tylenol for the pain as necessary, varying from 0 to 5 tablets per day.

Physical Exam. Vitals signs: blood pressure 110/70 mm Hg and pulse rate 60. During range of motion testing, he experiences some pain during back extension and lateral flexion, particularly to the right (these are not noticeably limited), but flexion is nearly impossible. The straight-leg-raising test on the left provokes back pain at 80°. He is not willing to lift a 20-lb weight from the floor, because he expects it will further damage his back. He assesses his own control over the pain as low, and lacks confidence that he could control the pain. Palpation and accessory motion testing did not reproduce low back pain symptoms; however, tenderness was noted diffusely and bilaterally from L1 to L5.

Please choose the preferred procedures you would use to manage the patient in the FIRST WEEK OF THE PLAN OF CARE. **Choose a MINIMUM of 1 and a MAXIMUM of 5 options to manage the patient on the clinical scenario.**

Acupuncture or dry needling	Exercises: centralization & directional preference	Lumbar brace or corset	Refer to a psychologist without intervention
Back school	Exercises: coordination, endurance, & strengthening	Mechanical Traction	Spinal non-thrust manipulation
Bed rest	Exercises: endurance & fitness	Neurodynamic mobilization	Spinal thrust manipulation
Education to pursue or maintain an active lifestyle	Exercises: lumbar flexion	Radiographs or magnetic resonance imaging	Work conditioning or hardening
Education: home exercise programme	Interferential current or TENS	Refer to a physician	Work modification
Education in symptom alleviating posture and movements	Ice or heat	Refer to a physician without intervention	Other, specify in the box below.
Education to address negative affective tendencies	Laser or Ultrasound	Refer to a psychologist	
Education to address negative affective tendencies	Laser or Ultrasound	Refer to a psychologist	

Appendix 3. Comparison between participants with complete vs. incomplete surveys

	I PTMS	C PTMS	I Special	C Special	Total
Therapist	$n = 28$ (05.3%)	$n = 84$ (15.9%)	$n = 90$ (17.1%)	$n = 326$ (61.7%)	$N = 528$(100%)
*Gender**					
Female	18 (64.3%)‡	41(47.6%)§	30(33.3%)§	111(34.0%)‡	202 (38.0%)
Male	10 (35.7%)	43 (52.4%)	60 (66.7%)	215 (66.0%)	326 (62.0%)
Clinical†					
Experience	19.4 (13.7)	20.4 (12.9)	17.8 (10.1)	16.4 (09.6)	17.4 (10.6)
*PP Degree**					
No	18 (64.3%)	39 (46.4%)	41 (45.6%)	153 (53.1%)	277 (52.5%)
Yes	10 (35.7%)	45 (53.6%)	49 (54.4%)	173 (46.9%)	251 (47.5%)
*Out Ortho**					
No	11 (39.3%)‖	21 (25%)†	19 (21.1%)	046(14.1%)‖	097 (18.4%)
Yes	17 (60.7%)	63 (75%)	71 (78.9%)	280 (85.9%)	431 (81.6%)
*Caseload**					
LBp > 50%					
No	28 (100%)#	68 (81%)#	77 (85.5%)	299 (91.7%)	472 (89.4%)
Yes	00 (000%)**	16 (19%)	13 (14.5%)**	027 (08.3%)	056 (10.6%)

Notes: I = Incomplete, C = Complete, PTMS = physical therapist with musculoskeletal interest, Special = physical therapists with clinical specialization. Out Ortho = Outpatient Orthopaedics Practice, PP = post-professional. LBP = low back pain.
*Mean (Standard Deviation), †Number of Physical Therapists (percentage). Significant difference comparisons between complete and incomplete survey groups at α < .05: ‡($X^2 = 10.178$, $p = .001$) §($X^2 = 5.689$, $p = .017$), ‖($X^2 = 12.098$, $p = .001$), #($X^2 = 6.222$, $p = .013$), **($X^2 = 4.545$, $p = .033$).