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Original Research

The Influence of Active, Passive, and Manual Therapy Interventions for Low Back Pain on Opioid Prescription and Health Care Utilization

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Abstract

Objective. The aim of this study was to explore associations between the utilization of active, passive, and manual therapy interventions for low back pain (LBP) with 1-year escalation-of-care events, including opioid prescriptions, spinal injections, specialty care visits, and hospitalizations.

Methods. This was a retrospective cohort study of 4827 patients identified via the Military Health System Data Repository who received physical therapist care for LBP in 4 outpatient clinics between January 1, 2015 and January 1, 2018. One-year escalation-of-care events were evaluated based on type of physical therapist interventions (ie, active, passive, or manual therapy) received using adjusted odds ratios.

Results. Most patients (89.9%) received active interventions. Patients with 10% higher proportion of visits that included at least 1 passive intervention had a 3% to 6% higher likelihood of 1-year escalation-of-care events. Similarly, with 10% higher proportion of passive to active interventions used during the course of care, there was a 5% to 11% higher likelihood of 1-year escalation-of-care events. When compared to patients who received active interventions only, the likelihood of incurring 1-year escalation-of-care events was 50% to 220% higher for those who received mechanical traction and 2 or more different passive interventions, but lower by 50% for patients who received manual therapy.

Conclusion. Greater use of passive interventions for LBP was associated with elevated odds of 1-year escalation-of-care events. In addition, the use of specific passive interventions such as mechanical traction in conjunction with active interventions resulted in suboptimal escalation-of-care events, while the use of manual therapy was associated with more favorable downstream health care outcomes.

Impact. Physical therapists should be judicious in the use of passive interventions for the management of LBP as they are associated with greater likelihood of receiving opioid prescriptions, spinal injections, and specialty care visits.

Keywords: Electric Stimulation Therapy, Exercise, Hot/Cold Pack, Low Back Pain, Manual Therapy, Needle Therapy, Traction

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Introduction

Low back pain (LBP) is one of the leading causes of disability in the USA. [1,2] The prevalence of LBP has continued to increase each year, as has the costs associated with its management and related disability.[3] Clinical Practice Guidelines (CPGs) commonly recommend physical therapist interventions as the first line of treatment for patients with LBP.[4–8] However, the standardization of LBP rehabilitation programs is complicated by the numerous combinations of available physical therapist interventions. As such, it is plausible that some patients with LBP receive interventions that provide little to no health benefits, which in turn can lead to suboptimal outcomes and inefficient use of valuable health care resources.[9] Therefore, there is a need for identification of evidence-informed best practices to improve physical therapist care for LBP,[9–11] which can in turn help reduce the burden of this disease on the global health system.[12]

To support evidence-based practice, recommendations from CPGs help inform best practices and, as a result, optimize patient care with appropriate weighting of the benefits and harms of alternative care options.[13,14] Numerous CPGs have been developed for the management of patients with LBP,[4,6,7,15,16] including 1 specifically for physical therapists published in 2012 by the Academy of Orthopaedic Physical Therapy of the American Physical Therapy Association,[5] and updated in 2021.[17] Across the board, the use of active interventions, such as physical activity and exercise therapy, is consistently recommended as core interventions for management of both acute and chronic LBP.[5–7,15–17] Conversely, previous studies and CPGs caution against using a treatment approach focused primarily on the use of passive interventions, as well as poorly or aggressively dosed active interventions, as they may lead to worse clinical outcomes and greater downstream health care utilization and costs.[18,19] Passive interventions in this context refer to those that require minimal engagement by the patient, where they are a passive recipient (eg, hot or cold packs, electrical stimulation, or mechanical traction).

While passive interventions are not recommended as primary management strategies for musculoskeletal conditions,[20] manual therapy (to include spinal mobilization and manipulation), which could be considered a passive intervention, is frequently recommended by most CPGs for the management of both acute and chronic LBP.[5,7,15–17] To this end, Rhon and Deyle[21] have argued that manual therapy is a management model that consists of many integrated elements, both passive and active, and its use is guided by sound clinical reasoning. Furthermore, it is often suggested that effective manual therapy interventions must include active participation of the patient to reinforce and perpetuate any improvements in symptoms or movements derived from the hands-on intervention.[21] As such, manual therapy, and more specifically "orthopaedic manual physical therapy," which is the preferred terminology for the approach by accredited fellowship training programs within the USA, is rarely utilized by physical therapists without also providing patients specific tailored active movements and reinforcing exercises. Thus, inclusion of manual therapy as a part of a comprehensive physical therapist program for management of LBP is recommended by the Academy of Orthopaedic Physical Therapy of the American Physical Therapy Association CPG,[5,17] and its use is firmly supported in results from systematic reviews of clinical trials.[22–24]

Although the use of passive interventions such as superficial heat and needle therapies (ie, acupuncture and dry needling) has been recommended by some CPGs for the management of LBP, the use of other passive interventions, such as mechanical traction, is generally not supported due to a lack of benefit.[5,15,17] Some suggest that passive interventions could be used judicially to facilitate patient participation in an active intervention program.[20,25,26] However, an indiscriminate use of passive interventions, especially in place of active interventions, can lead to escalation-of-care events such as spinal injections and surgeries, or specialty pain care management.[18,19,27] To date, empirical evidence regarding the supporting role of passive interventions used in conjunction with an active program for management of LBP remains scant.

The overall objective of the current retrospective analysis was to explore the associations between the use of active, passive, and manual therapy interventions for the management of LBP and the following 1-year escalation-of-care events: (1) opioid prescriptions, (2) spinal injections, (3) specialty care visits, and (4) hospitalizations. The specific aims of this project included exploring the following: (1) the frequency of active and passive physical therapist intervention utilization for management of LBP; (2) the association between the proportion of physical therapist visits that included at least 1 active intervention, the proportion of physical therapist visits that include at least 1 passive intervention, and the percentage of passive interventions relative to all interventions received during the course of care and the 1-year escalation-of-care events; and (3) the additional benefits of combining passive or manual therapy interventions with active interventions, as compared to active interventions alone, on the likelihood of reducing the 1-year escalation-of-care events. We hypothesized that patients with a larger proportion of physical therapist visits with at least 1 passive intervention and those with care that included a larger proportion of passive interventions would have greater likelihood of having 1-year escalation-of-care events. We also hypothesized that the use of CPG-recommended interventions, such as manual therapy in addition to active interventions, will reduce odds of 1-year escalation-of-care events as compared to the use of active interventions alone.

Methods

Study Design

The current analysis was a retrospective observational cohort study of patients who received physical therapist care for LBP within the Military Health System between January 1, 2015 and January 1, 2018. The Institutional Review Board at the Naval Medical Center San Diego approved the study protocol for this project (NMCSD.2018.0034). In addition, the Defense Health Agency approved a data sharing agreement for data access (18-2024). Reporting of these findings was guided by the REporting of studies Conducted using Observational Routinely-collected health Data (RECORD) checklist.[28]

Description of the Data Source

Using the Military Health System Data Repository (MDR), we identified the LBP-related physical therapist encounters and procedures, as well as opioid prescription and medical

Table 1. List of Common Procedural Terminology (CPT) Codes for Physical Therapist Interventions Used for Management of Low Back Pain

Physical Therapist Intervention	CPT Code(s)
Active (eg, exercise and therapeutic activity)	90901, 97110, 97112, 97113, 97116, 97150, 97530, 97537, S9451
Hot or cold packs	97010
Manual therapy	97140, 98925, 98926, 98940, 98941
Electrical stimulation	97014, 97032
Needle therapy	97810, 97813, 97814, S8990
Mechanical traction	97012
Massage	97124
Ultrasound	97035

resource utilization. The MDR is a centralized data repository that captures, validates, integrates, distributes, and archives corporate health care data fed from a worldwide network of more than 260 Military Health System health care facilities, within a single-payer health system. The MDR captures both inpatient and outpatient data from claims data and electronic medical records, in both military and civilian clinics around the world. As such, the MDR is one of the most comprehensive health care databases within the Department of Defense that provides the opportunity to study the impact of universal access to care and has the potential to influence US health care. The research team received all MDR data at the person-level.

Identification of Study Sample

The analysis included patients with an evaluation for LBP at 4 Military Health System physical therapist clinics (Naval Medical Center San Diego, Marine Corps Air Station Miramar, Naval Base San Diego, and Walter Reed National Military Medical Center) that are part of an ongoing pragmatic clinical trial for LBP.[29] We used the date of the new physical therapist evaluation as the index date. Inclusion in the cohort required a new physical therapist evaluation along with at least 1 standard International Classification of Disease, 10th Revision, Clinical Modification diagnosis codes for LBP without any physical therapist–related care for LBP in the prior 12 months. We used the first eligible index date for this study to ensure each patient only counted once in the sample. The time period queried included 1-year look-back and 1-year follow-up periods for all patients, each relative to the index physical therapist visit.

Physical Therapist Care Visits, Duration, and Content

We identified physical therapist care encounters and procedures related to LBP using the Physical Therapy Medical Expense and Performance Reporting Systems and Current Procedural Technology (CPT) codes. Medical Expense and Performance Reporting Systems codes provide information about the specific location of care (eg, primary care, orthopedics, physical therapy). The course of care was considered complete once no additional physical therapist visit had occurred within 45 consecutive days of the last visit. The duration of the course of care included the number of days between the index and final physical therapist visit. Patients were not included in the analysis if they only received a single physical therapist visit due to inadequate number of visits with which to judge the content of the course of care. The content of care was then categorized based on CPT Codes (Tab. 1) entered in the electronic health records for each visit and only interventions that were used in at least 10% of the cohort were considered for analysis.

The procedures used during each visit were classified as active, passive, or manual therapy. Active codes included procedures that required active patient participation (eg, therapeutic exercise, neuromuscular reeducation), while passive codes included procedures during which the patient had a passive role, solely receiving the intervention (eg, ultrasound, mechanical traction, electrical stimulation). Of note, manual therapy was considered a distinct category because: (1) its position on the active/passive continuum has been debated, and (2) there is an abundance of recommendations for its use for LBP within CPGs and clinical trial results, which is not the case for any other passive physical therapist intervention.[5,17–19,21] The primary variables of interest for the study included: (1) percentage of visits that included at least 1 active CPT code, (2) percentage of visits that included at least 1 passive CPT code, and (3) the percentage of passive CPT codes relative to the total number of CPT codes that were active or passive (ie, [total number of passive CPT codes/sum of all passive and active CPT codes received during the course of care] × 100).

To assess the possible additional benefits of combining passive and active interventions, the cohort was subdivided into the following 8 mutually exclusive categories based on the procedure codes used during the entire course of physical therapist care for each patient: (1) active codes only, (2) active codes plus hot or cold packs, (3) active codes plus manual therapy, (4) active codes plus electrical stimulation, (5) active codes plus needle therapies, (6) active codes plus mechanical traction, (7) active codes plus more than 1 passive intervention, and (8) passive codes only. To be placed in a category, the patient needed to have received the intervention at least once (ie, 1 CPT code) during the entire course of care. Therefore, patients in the "active codes only" and "passive codes only" categories solely received those interventions, while patients in the combined categories received a passive modality or manual therapy in addition to active interventions. If the patient received more than 1 passive modality during their course of care, they were placed in the "active codes plus more than one passive intervention" category.

One-Year Escalation-of-Care Events

We queried the Pharmacy Data Transaction Service to identify opioid prescriptions. The Pharmacy Data Transaction Service is part of the MDR and provides records of outpatient pharmacy prescriptions (by product name, therapeutic and generic classes) dispensed at all military and civilian network pharmacies. We used the American Hospital Formulary System therapeutic class codes 280,808 and 280,812 to identify opioid medication prescription. Additionally, we identified and categorized epidural steroid injections, referrals to specialists (eg, orthopedists, spine surgeons, physiatrists, pain management), and LBP-related hospitalizations as 1-year escalation-of-care events. The medical resource utilization data were identified and categorized using Medical Expense and Performance Reporting Systems, CPT codes, Healthcare Common Procedure Coding System, along with LBP diagnostic codes (ICD-10).

Data Analysis

Descriptive statistics, including means, standard deviations (SDs), and frequencies were calculated for patient demographics, physical therapist interventions, and escalation-of-care events. Logistic regression models were used to identify the association between the content of physical therapist care and the following 1-year escalation-of-care events: (1) at least 1 opioid prescription, (2) at least 1 spinal injection, (3) at least 1 specialty care visit, and (4) at least 1 LBP-related hospitalization. The independent variables for the logistic regression analyses included: (1) the percentage of physical therapist visits during the course of care with at least 1 active CPT code, (2) the percentage of physical therapist visits during the course of care with at least 1 passive CPT code, and (3) the percentage of passive to active CPT codes during the entire course of care. Logistic regression models were also used to evaluate the influence of various active and passive intervention combinations on 1-year escalation-of-care events, using the patients who only received active interventions as the comparator. All tests were 2-sided with the type I error rate set at 0.05 and were adjusted for age and sex. All analyses were performed using the SAS software package (version 9.4, SAS Institute, Inc, Cary, NC).

Role of the Funding Source

The funders played no role in the design, conduct, or reporting of this study.

Results

We identified a total of 5909 patients with an initial physical therapist evaluation for LBP during the observational period. Of these, 919 patients did not have any additional follow-up and 163 had prior physical therapist care and therefore were removed from the cohort, leaving 4827 total patients with 32,799 cumulative physical therapist visits for LBP during the observational period (Tab. 2). On average, patients with LBP attended 6.8 (SD = 8.9) physical therapist visits, and the total length of their physical therapist care lasted 63.6 (SD = 64.7) days. The 6 most commonly used physical therapist interventions (received at least once) included: active interventions (89.9%), hot/cold packs (42.5%), manual therapy (35.4%), electrical stimulation (17.9%), needle therapies (10.6%), and mechanical traction (9.5%). In addition, massage therapy and ultrasound were used in less than 1% of the total sample and were not included in any follow-up analyses (Tab. 2).

On average, 73.6% of visits included at least 1 active procedure code, 27.7% included at least 1 passive procedure code, while the average percentage of passive procedure codes relative to the sum of all passive and active procedure codes during the course of care was 20.1% (Tab. 2). The results from the regression analysis suggest patients with a 10% higher proportion of visits that included at least 1 active procedure code, had an associated 7% higher likelihood of LBP hospitalization, but we did not observe any associations with receiving an opioid prescription, a spinal injection, or a specialty care visit (Tab. 3). Conversely, with a 10% higher proportion of visits that included at least 1 passive procedure code, there was an associated 3%, 6%, and 5% higher likelihood of receiving an opioid prescription, a spinal injection, and a specialty care visit, respectively, but we did not observe any associations with LBP hospitalizations (Tab. 3). Similarly, with a 10% higher percentage of passive procedure codes relative to the sum of all passive and active procedure codes used during the course of care, there was an associated 5%, 11%, and 10% higher likelihood of receiving an opioid prescription, a spinal injection, and a specialty care visit, respectively, but we did not observe any associations with LBP hospitalizations.

The mean number of physical therapist visits during the episode of care was higher ($P < .01$) for patients who received active plus multiple passive interventions (10.8 [SD = 12.3]), active interventions plus electrical stimulation (6.6 [SD = 5.4]), active interventions plus manual therapy (6.5 [SD = 7.2]), active interventions plus hot and cold packs (6.4 [SD = 5.3]), and active interventions plus mechanical traction (6.2 [SD = 4.0]), but lower for patients who only received passive interventions (2.5 [SD = 2.5]), as compared to those who only received active interventions (4.1 [SD = 4.2]; Tab. 4). Additionally, the duration of physical therapist care in days was longer ($P < .01$) for patients who received active plus multiple passive interventions (83.6 [SD = 72.8]), and active interventions plus manual therapy (65.3 [SD = 61.7]), as compared to patients who only received active interventions (50.0 [SD = 54.0]; Tab. 4).

Among the patients who received only active interventions ($n = 1483$), 36.8% received an opioid prescription, 8.2% had a spinal injection, 23.1% had a specialty care visit, and 4.5% had an LBP-related hospitalization within the 1-year follow-up period (Tab. 4). In contrast, the likelihood of receiving an opioid prescription was 50% higher for those who received 2 or more different passive interventions in addition to active interventions, as well as for those who only received passive interventions (Tab. 4). Similarly, compared to patients who received only active interventions, the likelihood of receiving a spinal injection was 80% higher for patients who received 2 or more different passive interventions in addition to active treatments (Tab. 4). Conversely, patients who received manual therapy in addition to active interventions had a 50% lower probability of receiving a spinal injection, as compared to patients who received only active interventions. Finally, when compared to the patients who received only active interventions, there was a 220% higher likelihood of receiving care from a specialist for patients who received mechanical traction, and 70% higher likelihood in those who received 2 or more different passive interventions. In contrast, we observed a 30% reduction in need for specialty care for patients who received manual therapy along with active interventions. The odds of hospitalization for LBP within 1-year of receiving physical therapist care was low among all groups and we did not observe any differences between the comparison groups.

Discussion

The current study focused on exploring the associations between a variety of combinations of active and passive

Table 2. Descriptive Statistics for the Cohort

Variable	$N = 4827$
Age, y, mean (SD)	34.7 (9.1)
Sex (% male)	77.2%
Height, m, mean (SD)	1.74 (0.1)
Weight, kg, mean (SD)	84.9 (15.8)
Body mass index, mean (SD)	27.9 (8.2)
Opioid prescription during 1-year follow-up (% sample)	41.0%
Spinal injection during 1-year follow-up (% sample)	9.7%
Specialty care visit during 1-year follow-up (% sample)	26.4%
Hospitalization during 1-year follow-up (% sample)	4.1%
Received active interventions (% sample)	89.9%
Received hot/cold pack (% sample)	42.5%
Received manual therapy (% sample)	35.4%
Received electrical stimulation (% sample)	17.9%
Received needle therapies (% sample)	10.6%
Received mechanical traction (% sample)	9.5%
Received massage therapy (% sample)	0.9%
Received ultrasound (% sample)	0.5%
Received passive interventions only (% sample)	3.7%
Percentage of visits with at least 1 active procedure code, mean (SD)	73.6% (30.8)
Percentage of visits with at least 1 passive procedure code, mean (SD)	27.7% (32.87)
Percentage of passive procedure codes divided by the sum of all passive and active procedure codes, mean (SD)	20.1% (23.1)

Table 3. Association Between the Content of Physical Therapy During the Course of Care and 1-Year Escalation-of-Care Processes[a]

Content of Physical Therapy	Opioid Prescription	Spinal Injections	Specialty Care Visit	Hospitalization
Percentage of visits with at least 1 active procedure code	0.99 (0.97–1.01)	1.03 (1.00–1.07)	1.02 (0.99–1.04)	1.07[b] (1.01–1.13)
Percentage of visits with at least 1 passive procedure code	1.03[b] (1.01–1.05)	1.06[b] (1.03–1.10)	1.05[b] (1.03–1.08)	0.99 (0.94–1.04)
Percentage of passive procedure codes divided by the sum of all passive and active procedure codes	1.05[b] (1.02–1.08)	1.11[b] (1.06–1.16)	1.10[b] (1.07–1.13)	1.00 (0.93–1.07)

[a]Values represent odds ratios with (95% CI). All analyses were adjusted for age and sex. [b]Statistically significant findings at $P < .05$.

interventions for LBP and the likelihood of 1-year escalation-of-care events. The main findings of the study confirmed the hypothesis that greater utilization of passive interventions, either alone or in conjunction with active interventions, resulted in greater 1-year odds of receiving opioid prescriptions, spinal injections, and specialty care visits. Using an example scenario, if a patient received at least 1 passive intervention during 50% of their visits, the 1-year likelihood of receiving an opioid prescription (15%), spinal injection (32%), or specialty care (27%) would significantly increase compared to a patient who received only active interventions. Similarly, the results of our study suggest that if a patient received an equal number of passive and active interventions (ie, 50%–50%) during the entire course of their LBP care, the likelihood of receiving an opioid prescription (25%), a spinal injection (53%), and seeking specialty care (50%) would significantly increase as compared to a patient who received only active interventions. Although less than one-third of the overall physical therapist visits for LBP included passive interventions in the current study, it stands to reason that additional reductions in use of passive interventions could perhaps lead to more favorable outcomes.

In general, active interventions were the cornerstone of physical therapist care received by patients with LBP in our study, with 89.9% of the patients receiving active interventions and 73.6% of all visits including at least 1 active intervention. Surprisingly, the greater utilization of active interventions was not necessarily associated with lower likelihood of 1-year escalation-of-care events. In fact, our findings suggest that with higher proportion of visits that included at least 1 active procedure, there was a 7.0% increase in likelihood of LBP-related hospitalizations. Given the low rate of LBP-related hospitalizations in our cohort (4.1%), however, interpretation of this finding requires caution. It is plausible that an indiscriminate use of active interventions, ie, overly aggressive or poorly dosed and tailored exercise programs, may result in undesirable outcomes. Nevertheless, the lack of an association between greater utilization of active interventions with 1-year escalation-of-care events was surprising and inconsistent with the findings of previous studies.[18, 19] One potential explanation for this discrepancy could be the already high rate of active intervention use in our cohort, which has the potential to create a ceiling effect, reflecting an already high threshold of value in care. These rates (~90%) are much higher than those reported in previous studies.[18, 19]

The findings of our study also suggest that the effect of active and passive interventions on 1-year escalation-of-care events may be modality specific. For example, although addition of manual therapy to an active intervention program was associated with lower likelihood of receiving spinal injections and specialty care visits, the use of mechanical traction in

Table 4. Association Between Combinations of Active and Passive Interventions and 1-Year Escalation-of-Care Processes[a]

Intervention	Number of Visits Mean (SD) Duration of Care (Days) Mean (SD)	Opioid Prescription Odds Ratio 95% CI % of Patients	Spinal Injections Odds Ratio 95% CI % of Patients	Specialty Care Odds Ratio 95% CI % of Patients	Low Back Pain Hospitalization Odds Ratio 95% CI % of Patients
Active + hot/cold pack codes ($n = 575$)	6.4 (5.3)[b] 55.7 (56)	1.2 (0.99–1.5) 39.5%	1.1 (0.8–1.6) 8.5%	1.1 (0.91–1.4) 24.4%	1.0 (0.6–1.6) 4.2%
Active + manual therapy codes ($n = 373$)	6.5 (7.2)[b] 65.3 (61.7)[b]	1.02 (0.8–1.3) 37.0%	0.5[b] (0.3–0.9) 4.3%	0.7[b] (0.5–0.9) 17.4%	0.8 (0.4–1.4) 3.5%
Active + electrical stimulation codes ($n = 32$)	6.6 (5.4)[b] 70.1 (79.4)	0.8 (0.4–1.7) 31.3%	0.7 (0.2–3.2) 6.3%	0.6 (0.2–1.5) 15.6%	0.7 (0.09–5.1) 3.1%
Active + needle therapy codes ($n = 33$)	5.2 (3.9) 57.5 (52)	0.7 (0.3–1.5) 30.3%	1.1 (0.3–3.7) 9.1%	0.7 (0.3–1.7) 18.2%	0.6 (0.09–4.8) 3.0%
Active + mechanical traction codes ($n = 107$)	6.2 (4.0)[b] 55.0 (54.5)	1.1 (0.7–1.6) 40.2%	1.8 (1.0–3.2) 14.0%	2.2[b] (1.4–3.2) 40.2%	0.6 (0.2–1.9) 2.8%
Active + 2 or more different passive codes ($n = 1736$)	10.8 (12.3)[b] 83.6 (72.8)[b]	1.5[b] (1.3–1.8) 46.4%	1.8[b] (1.4–2.3) 13.7%	1.7[b] (1.5–2) 33.6%	1 (0.71–1.4) 4.4%
Passive codes only ($n = 180$)	2.5 (2.5)[b] 52.0 (62.8)	1.5[b] (1.1–2.1) 47.8%	0.6 (0.3–1.2) 5.0%	1.0 (0.7–1.4) 23.3%	0.5 (0.2–1.3) 2.2%
Active codes only ($n = 1483$)	4.1 (4.2) 50.0 (54.0)	1.0 (–, –) 36.8%	1.0 (–, –) 8.2%	1.0 (–, –) 23.1%	1.0 (–, –) 4.5%

[a]Values represent mean (SD), odds ratios with (95% CI), and group percentages of active versus passive interventions. The group receiving active intervention only was used as the comparator, and all analyses were adjusted for age and sex. [b]Statistically significant findings at $P < .05$.

combination with active interventions was associated with higher likelihood of specialty care visits. Benefits of manual therapy were observed even though patients included in this group may have had a more severe disease presentation based on attending 2.4 more physical therapist visits and having a duration of physical therapist care that was on average 15.3 days longer as compared to the group that only received active interventions. Although considered a partially passive intervention, the addition of manual therapy to an active exercise program in our study appears to support the orthopaedic manual physical therapy model that an effective use of manual therapy should consist of both active and passive elements.[21] The benefits of manual therapy use in the current study, although underutilized with only 35.4% of patients receiving it, appear to align with the recent Academy of Orthopaedic Physical Therapy of the American Physical Therapy Association CPG update recommendations for reducing pain and disability in patients with acute, subacute, and chronic LBP.[17]

A greater 1-year escalation-of-care events in patients who received mechanical traction also appears to support the recent CPG recommending against the use of traction for reducing symptoms in patients with acute, subacute, or chronic LBP.[17] It is important to consider, however, that mechanical traction is often used for the management of nerve root compression and in presence of radicular neurologic symptoms. Therefore, it is plausible that patients in our study who received mechanical traction may have received spinal injections and specialty care regardless of the content of their physical therapist care due to having, or at least the perception of, more severe neurologic symptoms.

Another noteworthy finding of the current study was the observation that a combination of 2 or more different passive interventions along with active interventions during the course of care was associated with a 50% to 80% greater likelihood of escalation-of-care events, as compared to patients who received only active interventions. Additionally, this group attended 6.7 more physical therapist visits and had a duration of physical therapist care that was on average 33.6 days longer, as compared to the group who only received active interventions. It is possible that the greater number of visits and duration of care could reflect a more severe case, leading to a greater perceived need for passive interventions to manage symptoms. The greater duration of care for those patients receiving multiple passive interventions could also reflect the clinical reality of more complex and/or indirect approaches. However, the evidence that passive interventions are more effective in cases with greater severity is still lacking. Another possible explanation may be that passive management approaches often foster a sense of dependency and perceived need for additional care (eg, opioids, injections), whereas active interventions are more likely to provide patients with a sense of self-efficacy and control.[30] In addition, there is emerging evidence that passive physical agents can harm patients by communicating to them that passive, instead of active, management strategies are advisable, thus exacerbating fear and anxiety that many patient have about being physically active when in pain. This can prolong recovery, increase costs, and increase the risk of exposure to invasive and costly interventions such as spinal injections or surgery.[20] Considering that the group that received 2 or more different passive interventions along with active interventions represented more than 35% of our entire cohort, this common physical therapist practice approach requires further investigation to fully understand its potential consequences. Without supporting evidence for improved outcomes, the use of multiple passive interventions combined with active interventions suggests inefficiencies in current physical therapist practice.

Despite the lack of compelling evidence and guidelines not fully supporting the use of opioids for the management of LBP,[4, 6, 7,31–33] more than 41% of patients in the current study received an opioid prescription during the 1-year follow-up. This finding is concerning because in addition to increasing medical costs, there are numerous side-effects and complications associated with the use of opioids, including sedation, dizziness, nausea, vomiting, constipation, physical dependence, tolerance, and respiratory depression.[34–36] The role of opioids is questionable as they may even be less effective than nonsteroidal anti-inflammatory drugs for managing LBP.[37] Although we did not identify specific physical therapist interventions associated with lower downstream opioid use, we did find that patients who receive only passive interventions or multiple passive interventions along with active treatments had a 50% higher likelihood of receiving an opioid prescription. To this end, future research identifying effective physical therapist management strategies that can reduce the use of opioids is of paramount importance as these treatments have great potential to make long-term and meaningful improvements in pain, function, and quality of life, while reducing medical resource utilization and thus improving the value of care.

Limitations

The high percentage of men in our sample (77.2%), while consistent with military demographics, limits the ability to fully understand the potential influence of sex on our findings. Additionally, we evaluated the content of physical therapist care based on CPT codes included in the patients' electronic health records. These codes are in general very broad and at times do not completely reflect the full extent of the procedures performed. Additionally, physical therapist intervention decisions are often made based on the judgment of the therapist and numerous therapist- and patient-related factors. The retrospective nature of this study limited deeper assessment of the relationships between physical therapist care elements and outcomes; notably, severity of disease, dosing of interventions, and psychosocial variables known to have prognostic importance. It is also important to note that we were not able to consider whether the acuity, severity, or complexity of the presentation of the patient with LBP had any influence on the escalation-of-care events, regardless of the content of physical therapist care (which is a strong possibility). Similarly, whether the acuity, severity, or complexity of the condition of the patient with LBP influenced the utilization of passive treatments to foster engagement in active treatments also remains unknown. Finally, although our results suggest that physical therapist programs with greater utilization of passive interventions may be more resource intensive, we cannot evaluate the effectiveness of care without patient-reported outcomes (ie, pain, function, disability, satisfaction).

Conclusion

The findings from the current study suggest that greater utilization of passive interventions for management of LBP may result in greater likelihood of receiving opioid prescriptions, spinal injections, and specialty care visits. In addition, passive interventions used in conjunction with active interventions were no better than active interventions alone. Manual therapy use along with other active interventions appeared particularly helpful in reducing spinal injections and specialty care. A more granular assessment of the content, including timing and dosing of physical therapist interventions for the management of LBP, can likely improve our understanding of factors that drive quality of care and better patient outcomes. Additionally, given the enormous manpower and cost burdens of excessive and unnecessary care for patients with LBP, eliminating interventions with minimal or no perceived beneficial effects can have important implications for designing optimal physical therapist care delivery models.

Author Contributions

Shawn Farrokhi (Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing—original draft, Writing—review & editing), Laura Bechard (Conceptualization, Methodology, Project administration, Writing—original draft, Writing—review & editing), Sara Gorczynski (Conceptualization, Methodology, Project administration, Writing—original draft, Writing—review & editing), Charity Patterson (Data curation, Formal analysis, Methodology, Writing—original draft, Writing—review & editing), Joseph Kakyomya (Data curation, Formal analysis, Methodology, Writing—original draft, Writing—review & editing), Brad D. Hendershot (Conceptualization, Funding acquisition, Methodology, Writing—original draft, Writing—review & editing), Rachel Condon (Conceptualization, Methodology, Resources, Supervision, Writing—review & editing), Matthew Perkins (Conceptualization, Methodology, Resources, Supervision, Writing—review & editing), Daniel I. Rhon (Conceptualization, Formal analysis, Methodology, Writing—review & editing), Anthony Delitto (Conceptualization, Formal analysis, Methodology, Writing—review & editing), Michael Schneider (Conceptualization, Formal analysis, Methodology, Writing—review & editing), and Christopher L. Dearth (Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing—original draft, Writing—review & editing).

Ethics Approval

This study was approved by the Naval Medical Center San Diego Institutional Review Board (NMCSD.2018.0034).

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