THE INFLUENCE OF IMAGING ON CASH BASED PHYSICAL THERAPY UTILIZATION: A RETROSPECTIVE ANALYSIS

Edwin Espinosa, Melinda Geisel

UCF Faculty Mentor: William Hanney PT, DPT, ATC, PhD

Doctor of Physical Therapy Program, School of Kinesiology & Physical Therapy, University of Central Florida, Orlando, Florida, USA

Correspondence:

William Hanney PT, DPT, ATC, PhD
Division of Physical Therapy
School of Kinesiology & Physical Therapy
College of Health Professions & Sciences
Academic Health Sciences Center
University of Central Florida
12805 Pegasus Drive, HPA 1, Room 262
Orlando, FL 32816-2205
Phone: (407) 823-0217
Fax: (407) 823-2596
E-mail: William.j.hanney@ucf.edu

ABSTRACT

Cash Based Physical Therapy (CBPT) is a burgeoning healthcare model that requires upfront out of pocket payment to clinicians in exchange for enhanced access and services, sometimes termed "concierge healthcare." Concierge healthcare studies have reported increased patient satisfaction and decreased healthcare utilization, i.e. money spent, as driving factors of adoption. In contrast, it is long purported that patients who receive imaging, such as MRI, X-Ray, or CT, prior to physical therapy (PT) incur increased PT healthcare utilization compared to patients who did not receive imaging. **PURPOSE:** Therefore, the purpose of this study was to investigate the effects of prior imaging on healthcare utilization in a CBPT setting. **METHODS:** This study utilized retrospective data collected from 254 charts of patients who completed their course of care at a CBPT clinic between 2015 and 2019. Means and standard deviations were calculated for all ratio data, while frequency counts were calculated for all nominal data. Differences in means were evaluated via independent t-tests and analysis of variance (ANOVA). **RESULTS:** Those individuals that received advanced imaging spent more money on CBPT services than those who did not ($623.12, p=0.000). Furthermore, patients that received x-rays spent more than those who did not ($503.21, p=0.000). There was no significant difference in money spent based on age or gender, p= 0.429 and p=0.903 respectively. **CONCLUSION:** Our findings support that receiving prior imaging, whether advanced imaging or x-ray, results in increased healthcare utilization, albeit suggests less than insurance clinic averages, despite using CBPT services.

Keywords: cash based physical therapy, utilization, imaging, x-ray, advanced imaging

Abbreviations: cash based physical therapy, CBPT; physical therapy, PT; analysis of variance, ANOVA; magnetic resonance imaging, MRI; computerized tomography, CT; musculoskeletal, MSK

INTRODUCTION

Concierge healthcare is a relatively new healthcare business model when compared to the traditional health insurance model, thus concierge healthcare has yet to mature enough to establish stringent definitions as to what constitutes a concierge healthcare provider. While there are a wide range of criteria that could define what constitutes a concierge healthcare service, most concierge healthcare services can be defined as accepting out of pocket payment from patients for greater access, commonly in the domains of time or accessibility of the healthcare provider. This burgeoning healthcare business model is experiencing adoption from clinicians, seeing numbers in the US grow from 2,400-5,000 to 12,000 practices from 2010-2014.[1]

One benefit of switching to concierge healthcare, expressed by both clinicians and patients alike, is greater patient service and satisfaction. Clinicians have commonly reported benefits such as smaller patient caseloads, an average of 500 for concierge clinics compared to 2,500 for traditional clinics, and more time spent with patients, an average of 30 minutes more per patient, as key factors in deciding to open a concierge clinic.[1] Patients who participate in concierge healthcare benefit from more direct access to their clinician than traditional healthcare. The level of clinician access is a spectrum that varies from clinician cell phone numbers to same day appointments.[1] Insufficient communication between patient and clinician is often cited by patients as an area that adulterates patient satisfaction in traditional healthcare models.[2] In contrast, patient satisfaction with Cash Based Physical Therapy (CBPT), a colloquial term for concierge physical therapy (PT), was reported as “very good” in a patient satisfaction survey of 24 CBPT clinics.[3]

Another reported benefit of concierge healthcare is up to 50% reductions of downstream care, which is defined as service(s) occurring after initial evaluation, for concierge medicine patients when compared to national averages.[4] Similarly, CBPT, a form of direct access where a patient may be evaluated and treated by a physical therapist without a physician referral, has been shown to decrease healthcare utilization. CBPT has been reported to decrease patient costs, $0.64 for every $1.00, and total number of visits per episode, 86.2% fewer, when compared to PT as per a physician referral.[5,6]

In contrast, patients receiving imaging, either x-rays or advanced imaging such as MRIs and CTs, has led to an increase in healthcare utilization.[7] There is evidence to suggest that imaging as the first management strategy for musculoskeletal (MSK) injuries following the initial visit to a new primary care consultation equates to a significantly higher annual total health care utilization, by an average of $4,793, when compared to patients who received PT as their first management strategy.[7] While there has been increased efforts to decrease the use of imaging as the initial management strategy for patients with a new MSK condition, a major limitation is failing to satisfy the patient's expectations. Generally, patients perceive advanced imaging as a benefit, reporting a belief that imaging will identify the cause of their condition.[7] However, receiving advanced imaging early during a new MSK condition can reduce a patient's well-being and result in the patient perseverating on the findings despite a lack of correlation to symptoms.[8] PT is an alternative approach to advanced imaging which benefits a patient by improving self-management skills, providing education, and increasing MSK function in an effort to improve the patient's overall functional mobility and quality of life.

Evidence suggests that concierge healthcare has high levels of patient satisfaction when compared to national averages, stating increased clinician access as a driving factor.[1,3] Concierge healthcare and CBPT, a colloquial term for concierge PT, have also shown a decrease in healthcare utilization.[4-6] Inversely, there is a large body of evidence to suggest patients who received imaging as the first management strategy for MSK conditions correlated with increased healthcare utilization.[7] Currently to our knowledge, there are no studies that investigate the effects of imaging on healthcare utilization in a CBPT setting. Therefore, the purpose of this study was to evaluate the influence of imaging on utilization of CBPT services and investigate if the increased clinician access and decrease in healthcare utilization of concierge healthcare could mitigate the deleterious effects of imaging on healthcare utilization. It was hypothesized that patients who received advanced imaging or x-rays would have greater utilization of CBPT services, represented by the total amount of money spent.

METHODS

Study Design

This study utilized retrospective data from a private CBPT. This CBPT clinic is an orthopedic outpatient practice which focuses on treating patients with musculoskeletal conditions. All previous patients who completed a plan of care under direct supervision of a licensed Doctor of Physical Therapy (DPT) at the private CBPT practice were eligible for inclusion in this study. This study was approved by the institutional review board at the University of Central Florida.

Participants

Data was collected from 254 patient charts who completed their plan of care between April 2015 and December 2019. To ensure the Health Insurance Portability and Accountability Act (HIPAA) compliance, all data was de-identified prior to the researchers receiving access. The de-identification of the data deemed informed consent unnecessary. All charts included in the study were reviewed by 4 investigators.

Data Collection

Characteristics extracted from the patient charts included: age, gender, diagnosis, prior x-ray, prior advanced imaging, number of treatment visits, and the total amount of money spent on CBPT services. Inclusion criteria for imaging was any form of imaging, whether x-ray, MRI, CT, or ultrasound, the patient had received pertaining to their CBPT episode diagnosis. Diagnosis was categorized by body part and included elbow/wrist/hand, shoulder, cervical/thoracic, lumbo/pelvic, hip/knee, and ankle/foot.

Statistical Analysis

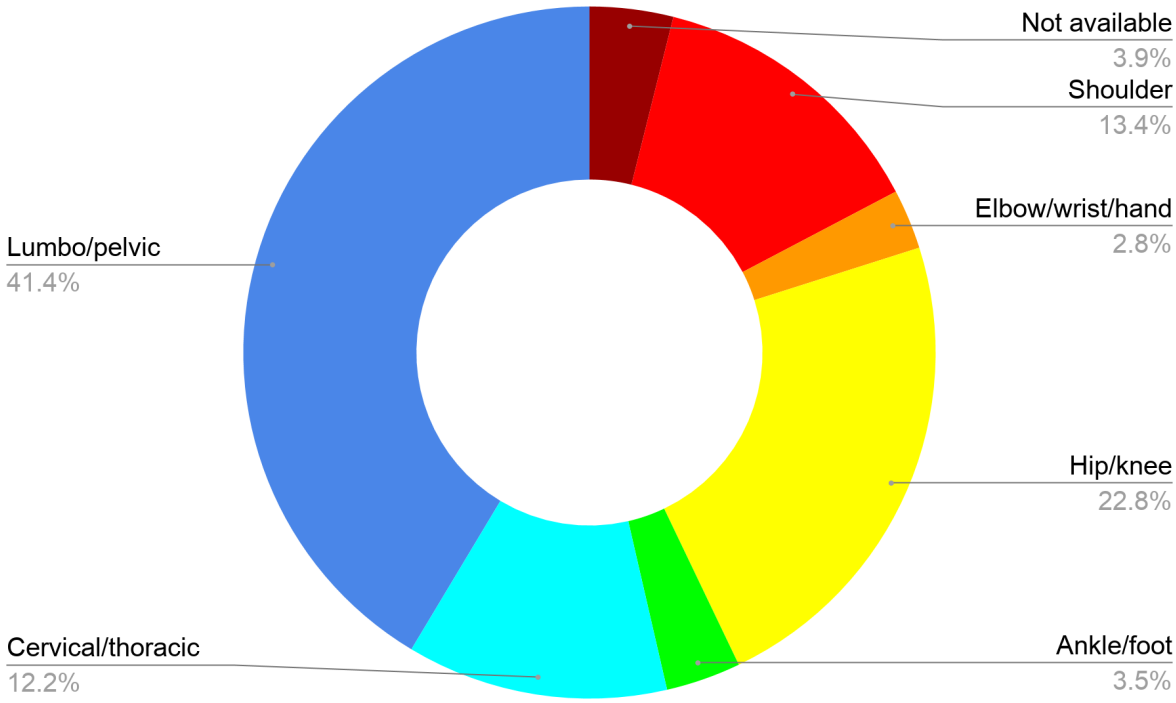
IBM SPSS Statistics Version 27 was used to perform the data analysis. Means and standard deviations were calculated for all ratio data which included age, number of treatment visits, and amount

of money spent on CBPT services. Frequency counts were calculated for all nominal data which included gender, diagnosis, prior x-ray, and prior advanced imaging. The difference in means were evaluated via independent t-tests, as well as analysis of variance (ANOVA).

RESULTS

Of our sample (n=254), there were more females (55.5%, n=141) than males (44.5%, n=113). The mean age of participants was 43.0 ± 15.77 years. As pertaining to diagnosis by body part, the lumbo/pelvic complex was by far the most common region of diagnosis among our participants. There were other regions reported which included cervical/thoracic (12.2%), ankle/foot (3.5%), shoulder (13.4%), and elbow/wrist/hand (2.8%). However, the vast majority of patients exhibited diagnosis of lumbo/pelvic (41.4%) and hip/knee (22.8%). The frequencies for each diagnosis can be seen in Figure 1.

Figure 1. Frequency of diagnosis based on body part.



On average, a patient's episode of care encompassed 9.67 ± 8.69 treatment visits. Additionally, total utilization of CBPT services, represented by the mean amount of money spent, was $1,390.66 ± $997.34 per episode. Patient demographics, including age, gender, mean treatment visits, and total amount of money spent on CBPT can be seen in Table 1.

Table 1. Patient Demographics and Variables.

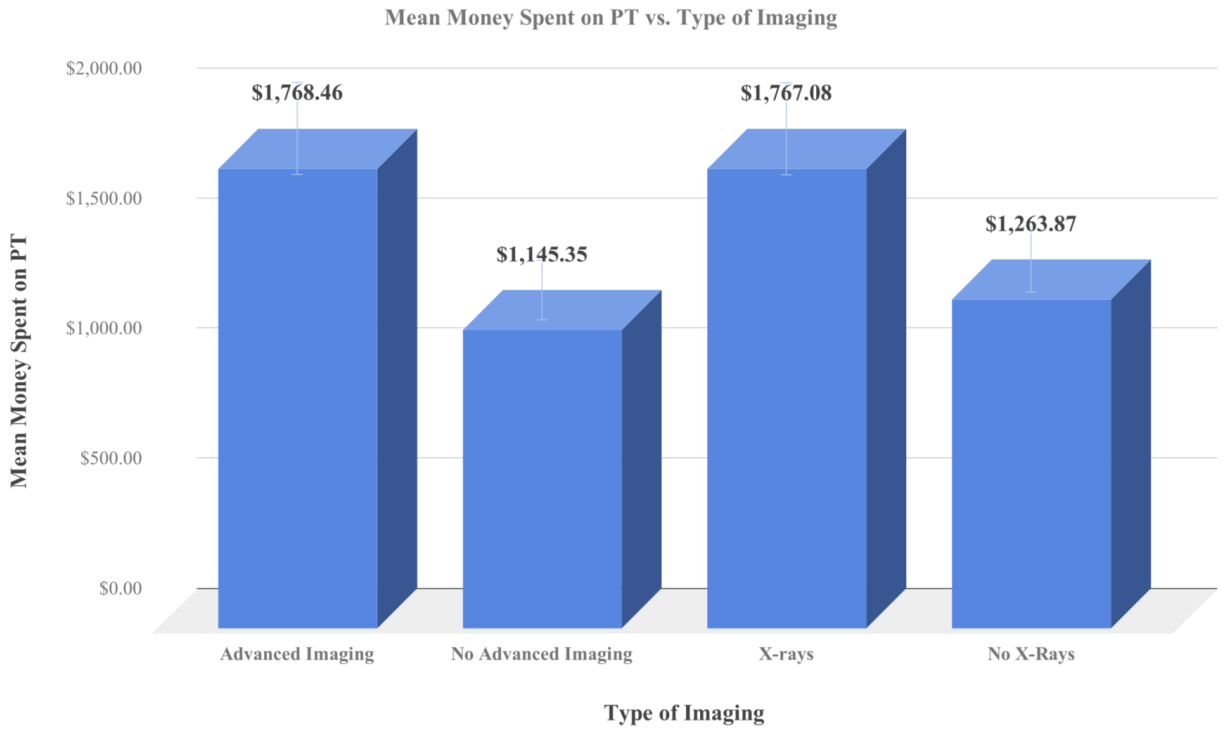
	Mean or Percent
Age (n=254)	43.0 ± 15.77 years
Gender: male (n=113)	44.5%
Gender: female (n=141)	55.5%
Patients with prior x-ray (n=64)	25.2%
Patients with prior advanced imaging (n=100)	39.4%
Treatment visits	9.67 ± 8.69
Total amount of money spent on CBPT	$1,390.66 ± $997.34

Among the participants, 25.2% (n=64) of patients received x-rays pertaining to their CBPT diagnosis, while 74.8% (n=190) did not; 39.4% (n=100) of patients received advanced imaging pertaining to their CBPT diagnosis, while 60.6% (n=164) did not. Frequency of patients who received imaging can be seen in Table 1. Those individuals that received advanced imaging spent more money on CBPT services than those who did not ($623.12, p=0.000). Furthermore, patients that received x-rays spent more money than those who did not ($503.21, p=0.000). There was no significant difference in money spent based on age or gender, p= 0.429 and p=0.903 respectively. The mean amount of money spent on CBPT services based on imaging received is shown in Table 2 and Figure 2.

Table 2. Mean money spent on CBPT services based on type of imaging received.

Type of Imaging	**Yes**	**No**	**Significance**
Advanced Imaging	$1,768.46	$1,145.35	p=0.000
X-ray	$1,767.08	$1,263.87	p=0.000

Figure 2. Mean money spent on CBPT based on type of imaging.



DISCUSSION

If CBPT continues to gain traction, as the general trend of concierge healthcare has over the last decade, then it behooves the PT industry to understand the advantages and disadvantages of this concierge healthcare model. Evidence suggests patient satisfaction, measured by greater clinician access,[1,3] and decreased healthcare utilization[4-6] as advantages of the concierge healthcare model. In stark contrast, patients that received imaging prior to PT have shown increased healthcare utilization.[7] Currently, there is a dearth of knowledge investigating the effects of the CBPT model on healthcare utilization. Our study set out to investigate if CBPT could reduce the deleterious effects that receiving imaging prior to PT has on healthcare utilization by comparing total money spent on CBPT services from patients that had prior imaging versus no prior imaging.

The results of the present study indicate that patients who received imaging prior to their CBPT episode had significantly increased PT utilization when compared to patients who did not have imaging.

Patients who received prior x-ray imaging spent an average of 39.81% more on their CBPT episode of care than patients without. Similarly, patients who received advanced imaging spent an average of 54.04% more than patients without imaging. These findings support the growing body of literature pertaining to the negative effects of imaging on PT outcomes.[7-9]

The use of imaging has increased dramatically within the past decade, despite literature supporting a reduction in a patient's well-being, due to perseverating of symptoms, and lack of correlation to symptoms.[8-10] While using imaging as the first management strategy may be advantageous for many pathologies, literature and healthcare guidelines are dubious to initially opt for imaging to manage MSK conditions. According to the American College of Radiology guidelines, imaging is not recommended during the first 6 weeks of uncomplicated low back pain with or without radiculopathy.[10] The use of imaging as the first management strategy for MSK conditions has also been correlated with significant increases in healthcare utilization for the patient.[7] Patients that receive imaging as their first management strategy for low back pain spent an average of $4,887 on PT services.[7] When juxtaposed to low back pain patients that received PT as their first management strategy and spent an average of $1,467 on PT services, the deleterious effects of imaging on healthcare utilization when imaging is the first management strategy for MSK conditions is extremely evident.

Despite research indicating decreased healthcare utilization as an advantage of the concierge healthcare model, our research shows that the CBPT could not abolish the deleterious effects on healthcare utilization from prior imaging before starting a PT episode of care. Upon further investigation however, our study did find interesting data to support that CBPT could mitigate the effects of prior imaging on healthcare utilization in low back pain patients. Our data showed that patients diagnosed with low back pain, who had prior MRI imaging, spent an average of $1,894 on their CBPT episode, which was 60.65% more than patients diagnosed with low back pain who had no prior imaging; these patients spent an average of $1,179. The aforementioned study, by Fritz and colleagues, also investigated a similar set of patients with low back pain who had MRI imaging done prior to PT. However, this data was collected from traditional insurance based clinics. Fritz and colleagues found patients diagnosed with low

back pain who had prior MRI imaging spent an average of $4,887 on their insurance based PT episode, which was 233.13% more than patients diagnosed with low back pain who had no prior MRI imaging; these patients spent an average of $1,467.[7]

Since CBPT is a relatively new concept and is still rapidly growing, there is minimal literature to support or refute its effectiveness. In fact, the only published study on CBPT is by Pulford et al., which investigated service utilization and costs associated with CBPT. Pulford and his colleagues found that of their participants (n=48), the majority of patients were male (n=27, 56.3%).[11] Our study contradicts these findings and coincides with current literature associated with MSK conditions, with the majority of our participants (n=254) being female (n=141, 55.5%). The higher prevalence of females can be attributed to predisposing factors, such as gender, that have been associated with higher risk of injury or disease. Females have been shown to have a higher incidence of non-contact ACL tears, as well as higher prevalence of low back pain, when compared to males.[12,13] With females comprising the majority of our participants, it is not surprising that lumbo/pelvic (41.4%) and hip/knee (22.8%) diagnoses were the most common diagnosis seen among participants of our study.

Additionally, the percentage of patients in our study seeking care for spine, hip or knee pain are similar to the aforementioned study of Pulford and colleagues. Along with lumbo/pelvic and hip/knee, shoulder (13.4%) and cervical/thoracic (12.2%) were also common diagnoses among our participants. These findings concur with Pulford et al. which reported the majority of participants' (n=48) diagnoses as lumbo/pelvic (39.6%), hip/knee (29.1%), and cervical/thoracic (14.6%), with shoulder (4.2%) making up a much smaller portion.[11] Furthermore, while mean visits encompassed within an episode of care (9.67 $\pm$ 8.69) and mean total amount of money spent on PT ($1,390.66 $\pm$ $997.34) were greater in our study compared to Pulford et al. (mean visits= 8.0 $\pm$ 8.1, mean money spent $780.19 $\pm$ $530.30), the mean cost of a CBPT episode of care in both studies was less than the mean cost of an insurance based PT episode of care ($ 1,709), as reported by Chevan et al. However, it is important to note that the CBPT studies (n=254; n=48) had fewer participants than the insurance based PT study (n=2,189).[11,14]

Upon further analysis of our data we also discovered findings relating to age and total money spent on CBPT that supports national data published by the American Physical Therapy Association (APTA). The APTA found patients within the ages of 18-64 (n=165) spent, on average, the most money on PT per episode ($1,839). In contrast the APTA reports patients within the ages of 0-17 (n=165) spent the least on PT ($1,458), while patients older than 65 (n=574) spent the median amount ($1,463).[14] While it is uncertain how many CBPT participants were included in the APTA survey, it is reasonable to assume the majority of clinics that participated were traditional insurance based PT practices. Despite contrasting business models, CBPT had similar stratification of data compared to insurance based clinics. Our study found CBPT patients within the ages of 18-64 (n=218) spent, on average, the most money on PT per episode ($1,416.80). In contrast CBPT patients within the ages of 0-17 (n=9) spent the least on PT ($926.67), while patients older than 65 (n=27) spent the median amount ($1,334.31). While we acknowledge our study had a limited data set (n=254), it is interesting to note that while the stratification of age groups to money spent was the same for both traditional insurance based PT and CBPT, total healthcare utilization per episode was reduced in all CBPT age groups.

Similarly, our study also concurred with the APTA's study when comparing gender to the amount of money spent on PT. The APTA found female patients (n=1,373) spent, on average, more money on PT per episode ($1,732) than their male (n=813) counterparts, who spent less ($1,672) on insurance based PT services.[14] Likewise, our study found female patients (n=140) spent, on average, more money on PT per episode ($1,407.67) than males (n=114), who spent ($1,369.44) on CBPT services.

One major limitation of our study is that the findings are based on patients from one CBPT clinic, making it difficult to generalize these findings to CBPT practices across the country. The CBPT clinic used for data collection was an orthopedic outpatient PT setting, which primarily focuses on treating individuals with MSK conditions. Our study has low external validity due to the fact that CBPT utilization may drastically differ depending on the specialty of the clinic (e.g. orthopedic, sports, geriatric, pediatric, neurologic, pelvic health), the general population, and the clinic's geographic location.

Additionally, the main purpose of this study was to determine if prior imaging influences CBPT utilization. Due to the nature of CBPT and its up and coming popularity, a large number of patients only utilize the service once traditional insurance based PT has failed. While these patients more than likely received imaging prior to starting their PT episode of care, whether that be traditional insurance based PT or CBPT, it is nearly impossible to pinpoint exactly when the imaging took place.

Concierge medicine, the model of which CBPT is founded on, has been shown to reduce downstream care when compared to national averages.[4] Additionally, direct access, a common entry method into CBPT care, has proven to have decreased health care utilization when compared to physician referral.[5,6] Our study is the first of its kind to show a link between prior imaging and increased utilization of CBPT services. It also suggests that CBPT is more cost effective than traditional insurance based PT when treating MSK conditions, independent of a patient's prior imaging services.[7] While both of these findings are supportive of the idea that CBPT decreases total health care utilization, these ideas necessitate additional research in order to be affirmed.

In summary, this is the first study of its kind to explore the effects of imaging on utilization of CBPT services. Our data supports the idea that receiving imaging, whether advanced imaging or x-ray, results in increased utilization of CBPT services, represented by a greater total amount of money spent on PT when compared to patients who did not receive imaging. However, due to our study's limitations and the current lack of literature, further research is warranted in order to investigate the link between imaging, CBPT utilization, and total health care utilization.

REFERENCES

1. Dalen JE, Alpert JS. Concierge Medicine Is Here and Growing!! *Am J Med.* 2017;130(8):880-881.
2. Braeuninger-Weimer K, Anjarwalla N, Pincus T. Discharged and dismissed: A qualitative study with back pain patients discharged without treatment from orthopaedic consultations. *Eur J Pain.* 2019;23(8):1464-1474.
3. Hush JM, Cameron K, Mackey M. Patient satisfaction with musculoskeletal physical therapy care: a systematic review. *Phys Ther.* 2011;91(1):25-36.
4. Page L. The rise and further rise of concierge medicine. *BMJ.* 2013;347:f6465.
5. Ojha HA, Snyder RS, Davenport TE. Direct access compared with referred physical therapy episodes of care: a systematic review. *Phys Ther.* 2014;94(1):14-30.
6. Pendergast J, Kliethermes SA, Freburger JK, Duffy PA. A comparison of health care use for physician-referred and self-referred episodes of outpatient physical therapy. *Health Serv Res.* 2012;47(2):633-654.
7. Fritz JM, Brennan GP, Hunter SJ. Physical Therapy or Advanced Imaging as First Management Strategy Following a New Consultation for Low Back Pain in Primary Care: Associations with Future Health Care Utilization and Charges. *Health Serv Res.* 2015;50(6):1927-1940.
8. de Schepper EI, Damen J, van Meurs JB, et al. The association between lumbar disc degeneration and low back pain: the influence of age, gender, and individual radiographic features. *Spine (Phila Pa 1976).* 2010;35(5):531-536.
9. Brinjikji W, Luetmer PH, Comstock B, et al. Systematic literature review of imaging features of spinal degeneration in asymptomatic populations. *AJNR Am J Neuroradiol.* 2015;36(4):811-816.
10. Davis PC, Wippold FJ, 2nd, Brunberg JA, et al. ACR Appropriateness Criteria on low back pain. *J Am Coll Radiol.* 2009;6(6):401-407.

11. Pulford K, Kilduff B, Hanney WJ, Kolber M, Liu X, Miller R. Service Utilization and Costs of Patients at a Cash-Based Physical Therapy Clinic. *Health Care Manag (Frederick)*. 2019;38(1):37-43.

12. Prodromos CC, Han Y, Rogowski J, Joyce B, Shi K. A meta-analysis of the incidence of anterior cruciate ligament tears as a function of gender, sport, and a knee injury-reduction regimen. *Arthroscopy.* 2007;23(12):1320-1325 e1326.

13. Wang YX, Wang JQ, Kaplar Z. Increased low back pain prevalence in females than in males after menopause age: evidences based on synthetic literature review. *Quant Imaging Med Surg.* 2016;6(2):199-206.

14. Chevan J, Riddle DL, Reed SD. Out-of-Pocket Spending for Ambulatory Physical Therapy Services From 2008 to 2012: National Panel Survey. *Phys Ther.* 2015;95(12):1681