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Clinical Study

# Physical function computer adaptive test outcomes in diabetic lumbar spine surgical patients

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**Abstract**

**BACKGROUND CONTEXT:** Diabetes is a highly prevalent comorbid condition among patients undergoing spine surgery. Several studies have used legacy patient-reported outcome measures to implicate diabetes as a predictor of increased disability, pain, and decreased physical function and quality of life following spine surgery. The effect of diabetes on postoperative physical function has not yet been studied using the PROMIS Physical Function Computer Adaptive Test (PF CAT).

**PURPOSE:** To understand the effect of diabetes on physical function outcomes among patients undergoing lumbar spine surgery, as reported by the PF CAT.

**STUDY DESIGN/SETTING:** A retrospective cohort study was performed at a single university-based spine clinic.

**PATIENT SAMPLE:** Patients who underwent lumbar spine surgery between October 1, 2013 and April 26, 2018 with both PF CAT and Oswestry Disability Index (ODI) scores available for review.

**OUTCOME MEASURES:** PROMIS PF CAT. Secondary measures of disability included the ODI.

**METHODS:** PF CAT and ODI questionnaires were administered to patients via electronic tablets. Data from these questionnaires were collected prospectively, and retrieved from a university database. Wilcox tests, Exact Wilcox tests, linear regression models, and descriptive analytics were applied.

**RESULTS:** Patients meeting inclusion criteria included 233 nondiabetic patients and 65 diabetic patients. Mean PF CAT scores among diabetics were lower than those of nondiabetics at all time-points from preoperative through 12 months postoperative, with significance found at both 6 months ($p=.035$) and 12 months ($p=.039$) postoperative. Mean ODI scores among diabetics were significantly higher than those of nondiabetics at 3 months ($p=.018$) and 12 months ($p=.027$) post-operative. By 12 months postoperative, a smaller proportion of diabetics reached PF CAT and ODI minimum clinically important difference thresholds when compared to nondiabetics.

**CONCLUSIONS:** Diabetes is associated with lower PF CAT scores up to one year following lumbar spine surgery. However, many of these patients achieve meaningful improvement in physical function during this time. The PF CAT is consistent with legacy outcome measures in assessing outcomes in diabetic patients undergoing lumbar spine surgery, with an added benefit of decreased patient burden. 

*Keywords:* PROMIS; PF CAT; Patient-reported outcome; Diabetes; Physical function; Minimal clinically important difference; Lumbar spine

FDA Device/Drug Note: Not applicable.

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## Introduction

Medical comorbidities have been shown to significantly influence outcomes in patients undergoing spine surgery [1,2]. Among these, diabetes mellitus is highly prevalent, affecting more than 30 million people in the United States, and up to 25% of patients undergoing spine surgery [3,4]. Diabetic patients are at increased risk for developing complications after spine surgery, including infection, poor wound healing, increased pain, longer hospital stay, and the need for early revision surgery [5−17]. Poor glucose control and hemoglobin A1c (HbA1C) levels have been directly correlated to this elevated risk [18−21]. In addition to postoperative complications, diabetes has been postulated to limit postoperative function in spine patients. This may be due to chronic pain, nerve damage, microvascular disease, and the likelihood of undergoing more invasive procedures than their nondiabetic counterparts [4,10]. Several recent studies have sought to understand how poor blood glucose control affects subjective, patient-reported outcomes after spine surgery.

Patient-reported outcome (PRO) measures are emerging as increasingly valuable in assessing medical treatment quality and patient satisfaction. They provide a subjective view of how patients perceive their health status, such as pain, disability, quality of life, and physical function. The negative effect of diabetes on PROs has been shown using legacy measures, including the EuroQol-5D (EQ-5D), Neck Disability Index (NDI), Oswestry Disability Index (ODI), 12-item Short Form Survey (SF-12), 36-Item Short Form Survey (SF-36), Numeric Rating Scale (NRS) pain scores, Pain Disability Questionnaire (PDQ), and Patient Health Questionnaire-9 (PHQ-9), to name a few [4,10,22,]. Yet, the completion of these legacy measures requires significant time, and they have often been shown to be poorly reliable [23−26].

The Patient Reported Outcome Measurement Information System (PROMIS) Physical Function Computer Adaptive Test (PF CAT), an emerging PRO, assesses the World Health Organization (WHO) physical function domain utilizing item response theory [24−26]. On an average, this allows most patients to generate a highly reliable score by answering as little as four questions. PROMIS PF CAT scores have been shown to outperform the ODI and SF-36 within the spine population, showing good psychometric qualities, item reliability, and lower floor and ceiling effects [23,24].

To our knowledge, no study to date has utilized the PF CAT to analyze physical function outcomes in diabetic lumbar spine surgery patients. The goal of this study is to understand the effect of diabetes on preoperative and postoperative physical function among patients undergoing lumbar spine surgery, as reported by the PF CAT. We also aim to discover how the minimum clinically important difference (MCID) can be used to interpret our results. The results of this study may help facilitate the treatment decision-making process for diabetic patients who elect to undergo lumbar spine surgery and establish expectations for postoperative physical function achievement over time.

## Methods

### *Participants and data collection*

A retrospective review of adult patients undergoing lumbar spine surgery was performed at a single university-based spine clinic from October 1, 2013 to April 26, 2018. PF CAT and ODI questionnaires were administered on electronic tablets in clinic to patients complaining of back pain during this period. Patients of at least 18 years of age who underwent lumbar surgery with both PF CAT and ODI available for review were included. Current Procedural Terminology codes were used to exclude patients that had undergone nonoperative lumbar procedures or encounters. PF CAT and ODI questionnaire score results at the preoperative, and 3-, 6-, and 12-month postoperative time points were used for statistical analysis. The variables of age, body mass index (BMI), race, gender, and procedure distribution were corrected during outcome score comparison analysis. To confirm that any differences in groups outcomes seen were not related purely to differences in infections rates or need for early revision surgery, both potential confounding factors in diabetic over nondiabetic patients, we analyzed each group without the infections and early revisions to see how successful patients in each group compared.

Diabetic patients were identified by way of medical chart review. These patients were categorized into the diabetic cohort if they met one or more of the following criteria: (1) an ICD9 diagnosis code in the 250 diabetes mellitus category; (2) an ICD10 diagnosis code in the E11 diabetes type II category; (3) previous or current use of insulin and/or metformin; (4) a response of "Yes" to the clinical question, "Do you have diabetes?"; (5) a written diagnosis of diabetes mellitus; (6) any blood glucose measurement greater than 200 mg/dL measured clinically at any point in their lifetime, and; (7) a clinically measured HbA1C value greater than 6.7% at any point in their lifetime [7,19,20]. Diabetic patients were included regardless of the extent of their blood glucose control at the time of surgery or office visits. Patients were designated as nondiabetic by the absence of diabetic criteria upon medical chart review.

### *Minimum clinically important difference*

We adopted the distribution-based method of determining the MCID thresholds for the PF CAT values, as thresholds for lumbar spine patients have not yet been defined in the literature [27,28]. This method defines the MCID as one-half of the standard deviation of the change in outcome score (or percentile) from baseline at each time point. Our calculated MCID threshold is 3.9 for the PF CAT. We likewise employed the same method to calculate an MCID threshold for the ODI, with 8.5 as the calculated threshold value. Literature-reported MCID thresholds for the ODI vary, with thresholds of 12.8 and 14.9 being more commonly used [29−31]. To more accurately reflect these commonly used thresholds, we also analyzed ODI outcomes with MCID threshold values of 12 and 15.

### Statistical analysis

We used descriptive statistics to summarize the distributions of patient characteristics by diabetic status. We employed the generalized linear mixed-effect regression approach to model the diabetic group specific trajectories of patient-reported outcomes from pre- to post-operation time periods [32]. The correlation among observations from same subject was accounted by using subject-level random intercept in the proposed approach. The average patient-reported outcomes at pre- and postoperation times by diabetic status were directly estimated from the models, and compared using the Wald-test. The proportion of patients reaching the MCID at any time in the first year after operation and given time points within one year after operation was reported. The fisher exact test was used to compare the proportions of patients reaching the MCID at any time point in the first year after operation by diabetic status. All these analyses were performed using statistical software R (https://cran.r-project.org). All tests were performed at the level of significance 0.05.

## Results

### Patient and operative characteristics

There were 298 patients who met inclusion criteria, with 65 found to be diabetic and 233 nondiabetic. All included patients represent a cumulative of 1,645 PF CAT scores and 1,372 ODI scores. ODI data was not found for one patient in the study population; therefore, this patient was excluded from our ODI analysis. The study population is 90% Caucasian and 44% female (Table 1). All patients were at least 18 years of age. Diabetic patients had a mean age of 65 years, whereas nondiabetic patients had a mean age of 57 years (p<.001). The mean preoperative BMI of the diabetic cohort is 30.8, and the nondiabetic BMI average is 28.8 (p=.028). A preoperative BMI of 30 or greater was present in 52.2% of diabetics and 36.6% of nondiabetics; however, this difference was not statistically significant (p=.081). 8% of diabetics and 10% of nondiabetics are smokers (p=.97). Surgical procedures include posterior lumbar fusion (64%), lumbar decompression (33%), and anterior lumbar decompression and fusion (2%). A larger proportion of diabetics underwent posterior lumbar fusion surgery (80% vs. 60%), whereas a larger proportion of nondiabetics underwent lumbar decompression surgery (37% vs. 15%). Postoperative infections were present in 4.6% of diabetics and 0.9%

Table 1
Demographic and operative characteristics (N = 298)

| | Nondiabetic (N = 233) | Diabetic (N = 65) | p Value |
|---|---|---|---|
| Age* | 59 (45, 70) | 68 (57, 73) | <0.001 |
| Mean† | 56.5 (16.1) | 65.4 (10.8) | |
| Sex‡ | | | 0.12 |
| Female | 104 (45%) | 22 (34%) | |
| Race‡ | | | 0.038 |
| Caucasian | 211 (91%) | 55 (85%) | |
| Black | 5 (2%) | 0 (0%) | |
| Asian | 3 (1%) | 0 (0%) | |
| Other | 10 (4%) | 10 (15%) | |
| Unknown | 2 (1%) | 0 (0%) | |
| Smoker‡ | | | 0.97 |
| Yes | 22 (10%) | 5 (8%) | |
| Body mass index (kg/m$^2$) | | | |
| Mean† | 28.8 (5.3) | 30.8 (5.4) | 0.028 |
| 30 or above‡ | 85 (36.6%) | 34 (52.2%) | 0.081 |
| Surgical procedure‡ | | | <0.001 |
| Posterior lumbar fusion | 140 (60%) | 52 (80%) | |
| Lumbar decompression | 87 (37%) | 10 (15%) | |
| Anterior lumbar decompression and fusion | 3 (1%) | 3 (5%) | |
| Other | 3 (1%) | 0 (0%) | |
| Postoperative Complications | | | |
| Infections | 2 (0.9%) | 3 (4.6%) | 0.071 |
| Early revision surgery | 8 (3.4%) | 3 (4.6%) | 0.71 |

N, number.
* Age was found to be non-normally distributed; therefore, median age is reported with interquartile range in parentheses.
† Values reported as mean age with standard deviation in parentheses.
‡ Values are reported as the number of patients with percentages in parentheses.Note: Preoperative demographics are reported. Characteristic differences between groups are significant at p<.05.

of nondiabetics (p=.071). Early revision surgeries were performed in 4.6% of diabetics and 3.4% of nondiabetics (p=.71). The p values for the demographic variables of race, smoking status, and surgical procedure represent the comparison of the overall distribution of the variable for diabetics versus the distribution for nondiabetics.

### *Preoperative and postoperative outcomes*

Mean PF CAT scores among diabetic patients undergoing lumbar spine surgery were found to be lower than those of nondiabetic patients at each time point (preoperative, and 3, 6, and 12 months postoperative) (Fig. 1). Preoperatively, PF CAT scores for diabetic and nondiabetic patients averaged 34.5 and 34.6, respectively (p=.987) (Table 2). Postoperatively, PF CAT scores for diabetics versus nondiabetics, respectively, averaged 36.1 and 39.8 at 3 months (p=.139), 38.8 and 42.8 at 6 months (p=.035), and 39.9 and 42.3 at 12 months (p=.039). These results represent a 12-month postoperative baseline score increase of 5.4 for diabetics compared to 7.6 for nondiabetics (p=.258) (Table 3).

Mean ODI scores (Fig. 2) in the diabetic cohort were significantly higher than the nondiabetic cohort at 3 months postoperative (39.4 vs. 28.9, p=.018), and 12 months postoperative (31.0 vs. 24.6, p=.027). Diabetics scored lower than nondiabetics preoperatively (45.9 vs. 43.5, p=.41), and 6 months postoperative (32.9 vs. 26.0, p=.057). These results represent a 12-month postoperative baseline ODI score decrease of 14.8 for diabetics, compared to a decrease of 18.9 for nondiabetics (p=.438) nondiabetics (Table 3).

The above PF CAT and ODI results were assessed to determine whether these outcomes were influenced by postoperative complications of infection or early revision surgery. Removing patients with these complications from the data and repeating our analyses revealed no change in global trajectories (p<.001). Significant differences remain

Table 2
Preoperative and postoperative outcome scores

| | Nondiabetic | Diabetic | p Value |
|---|---|---|---|
| PF CAT | | | |
| Preoperative | 34.6 (0.6) | 34.5 (1.1) | 0.987 |
| 3 months | 39.8 (0.9) | 36.1 (1.7) | 0.139 |
| 6 months | 42.8 (0.9) | 38.8 (1.7) | 0.035 |
| 12 months | 42.3 (1.0) | 39.9 (1.4) | 0.039 |
| ODI | | | |
| Preoperative | 43.5 (1.5) | 45.9 (2.6) | 0.410 |
| 3 months | 28.9 (2.4) | 39.4 (4.3) | 0.018 |
| 6 months | 26.0 (2.5) | 32.9 (4.5) | 0.057 |
| 12 months | 24.6 (2.6) | 31.0 (3.9) | 0.027 |

PF CAT, Physical Function Computer Adaptive Test; ODI, Oswestry Disability Index.

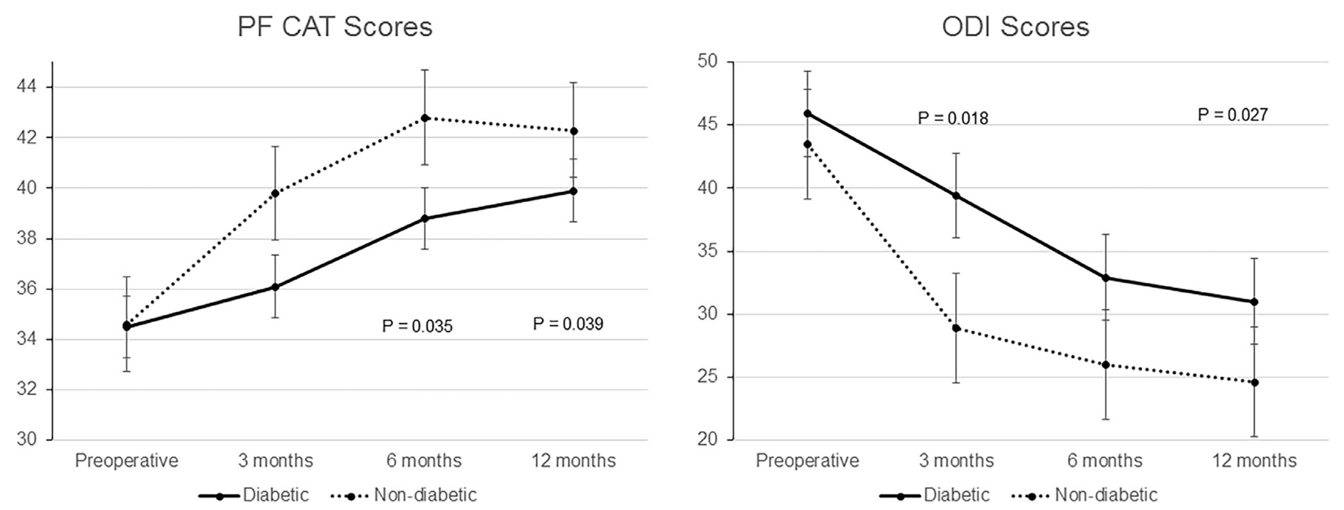
Note: Values are reported as mean outcome score +/− standard error in parentheses. Outcome scores are significantly different between groups at p<.05.

Table 3
Postoperative outcome score comparison from baseline

| | Nondiabetic | Diabetic | p Value |
|---|---|---|---|
| PF CAT | | | |
| 3 months | 5.2 (1.0) | 1.5 (1.9) | 0.097 |
| 6 months | 8.1 (1.0) | 4.3 (1.9) | 0.079 |
| 12 months | 7.6 (1.0) | 5.4 (1.7) | 0.258 |
| ODI | | | |
| 3 months | −14.6 (2.5) | −6.5 (4.9) | 0.139 |
| 6 months | −17.5 (2.8) | −13.0 (5.1) | 0.433 |
| 12 months | −18.9 (2.8) | −14.8 (4.5) | 0.438 |

PF CAT, Physical Function Computer Adaptive Test; ODI, Oswestry Disability Index.

Values represent the score increase or decrease from the preoperative baseline score +/− standard error in parentheses.




PF CAT, Physical Function Computer Adaptive Test; ODI, Oswestry Disability Index.
Standard error is represented by the error bars. Outcome scores are significantly different between groups at p < 0.05.

Fig. 1. Trends in preoperative and postoperative outcome scores, comparing lumbar spine patients with diabetes and without.

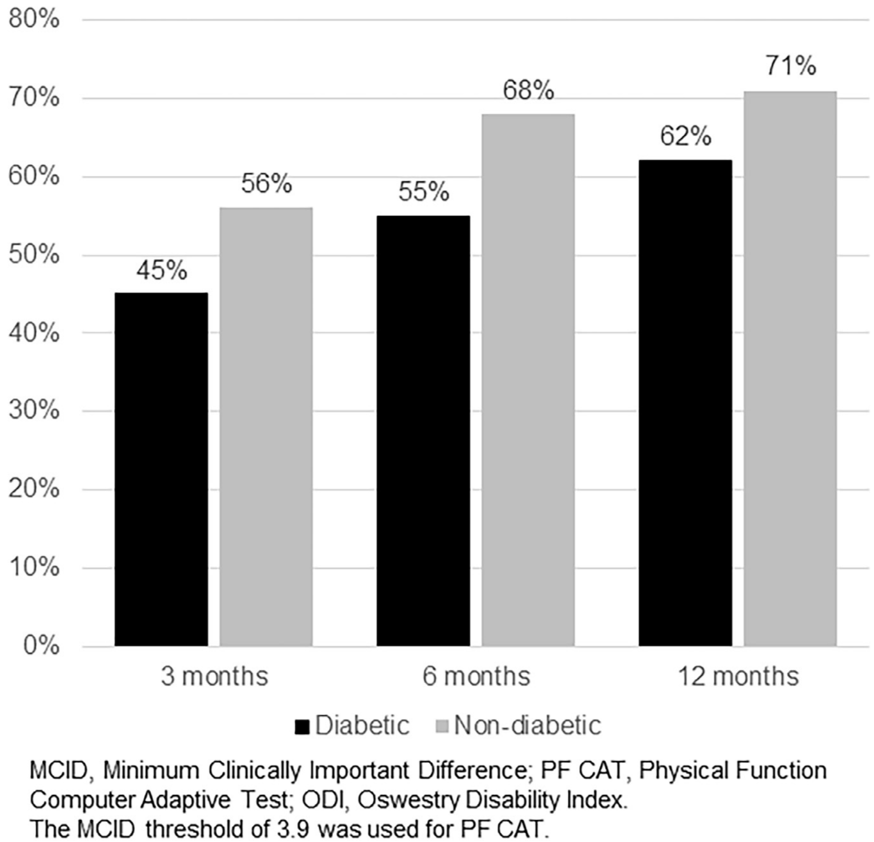



Fig. 2. Percentage of diabetic and nondiabetic patients reaching PF CAT MCID over time.

in the PRO scores between diabetics and nondiabetic patients that are not secondary to the complications of infection or early revision.

The previously mentioned MCID thresholds for the PF CAT (3.9) and ODI (8.5, 12, and 15) were exceeded by most diabetic and nondiabetic patients during the first post-operative year (Figs. 2−4). The percentage of diabetics exceeding the postoperative PF CAT MCID threshold is 45% by 3 months, 55% by 6 months, and 62% by 12 months. The percentage of nondiabetics achieving this threshold is 56% by 3 months, 68% by 6 months, and 71% by 12 months. Statistical significance was not found between patient groups (Table 4). The percentage of diabetics exceeding the postoperative ODI threshold of 8.5 was 62% by 3 months, 65% by 6 months, and 72% by 12 months. Nondiabetics exceeded this threshold at a percentage of 60% by 3 months, 68% by 6 months, and 73% by 12 months. The ODI MCID threshold of 12 was exceeded by 52% of diabetics by 3 months, 56% by 6 months, and 61% by 12 months, nondiabetics exceeded this threshold by 54% by 3 months, 62% by 6 months, and 69% by 12 months. The ODI MCID threshold of 15 was exceeded by 44% of diabetics by 3 months, 46% by 6 months, and 51% by 12 months. Nondiabetics exceeded this threshold by 51% by 3 months, 58% by 6 months, and 62% by 12 months. Statistical significance was not found between patient groups at any time point for all the ODI MCID thresholds (Table 4). Visual representation of diabetic patients exceeding ODI MCID thresholds of 8.5, 12, and 15 by each postoperative time point is illustrated in Fig. 3. Nondiabetics are similarly represented in Fig. 4.

Table 4
Cumulative MCID threshold achievement over time

| | Nondiabetic | Diabetic | p Value |
|---|---|---|---|
| PF CAT | | | |
| 3 months | 99 (56%) | 22 (45%) | 0.227 |
| 6 months | 133 (68%) | 31 (55%) | 0.116 |
| 12 months | 144 (71%) | 37 (62%) | 0.209 |
| ODI (threshold = 8.5) | | | |
| 3 months | 102 (60%) | 30 (62%) | 0.884 |
| 6 months | 126 (68%) | 35 (65%) | 0.811 |
| 12 months | 140 (73%) | 41 (72%) | 0.973 |
| ODI (threshold = 12) | | | |
| 3 months | 91 (54%) | 25 (52%) | 0.989 |
| 6 months | 116 (62%) | 30 (56%) | 0.457 |
| 12 months | 132 (69%) | 35 (61%) | 0.353 |
| ODI (threshold = 15) | | | |
| 3 months | 86 (51%) | 21 (44%) | 0.501 |
| 6 months | 108 (58%) | 25 (46%) | 0.169 |
| 12 months | 119 (62%) | 29 (51%) | 0.165 |

MCID, minimal clinically important difference; PF CAT, Physical Function Computer Adaptive Test; ODI, Oswestry Disability Index.

Note: Values are reported as the number of patients with the percentage in parentheses.

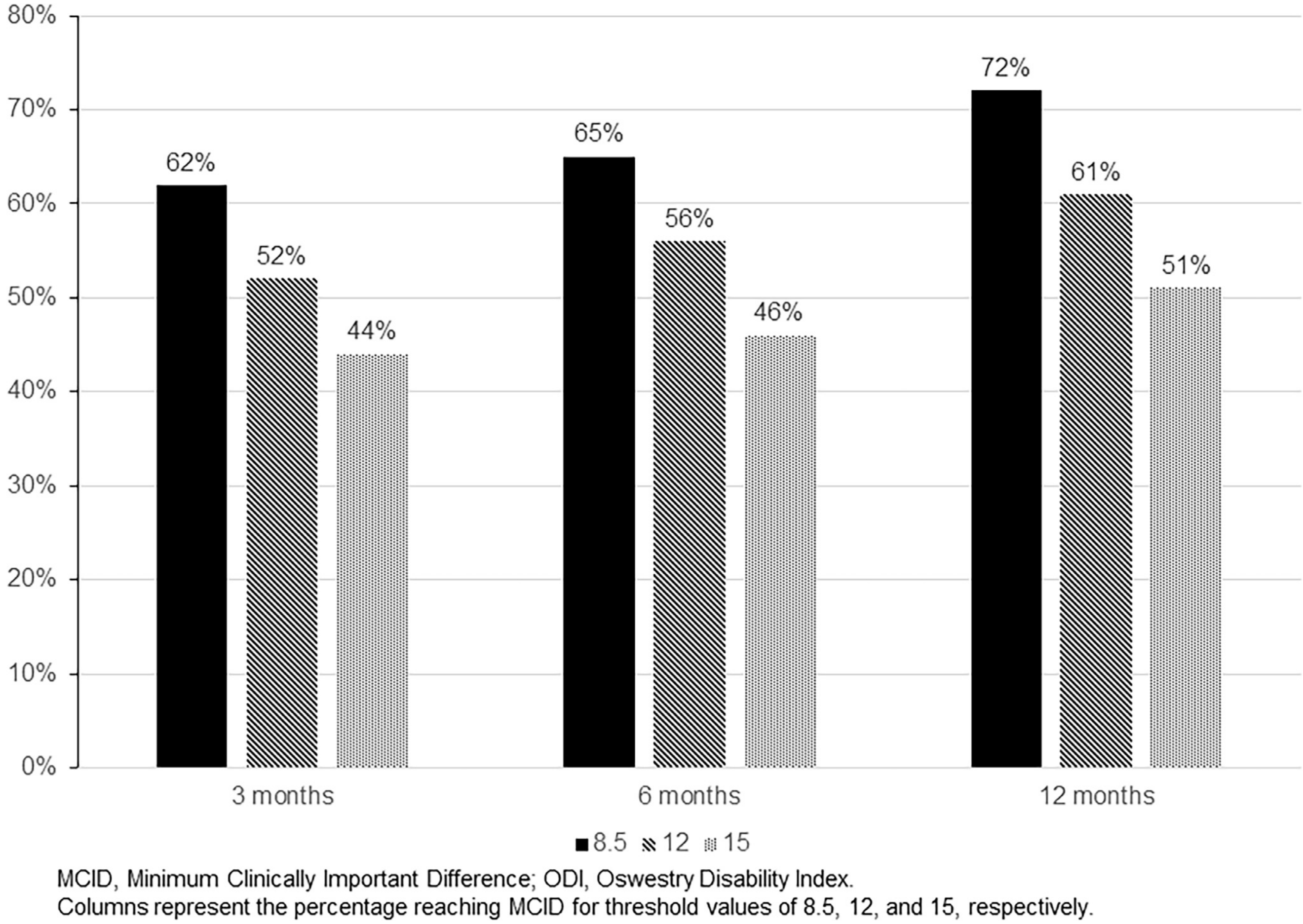



Fig. 3. Percentage of diabetic patients reaching ODI MCID per threshold value.

## Discussion

The present study is the first to date showing the response of the PROMIS PF CAT to lumbar intervention in any comorbid population. Our results demonstrate that diabetes is associated with worse PF CAT outcomes up to one year after lumbar spine surgery. This may be due to several factors postulated in the literature related to diabetes including nerve damage, microvascular disease, neuropathy, and chronic pain [4,10]. Another plausible explanation is that the diabetic cohort underwent more invasive procedures, although this was not explored in the current study. Postoperative infections and early revision surgeries, both potential confounders to outcomes in diabetic patients, did not vary significantly between groups and controlling for these in a secondary analysis did not affect global outcome trajectories ($p<.001$). This indicates that early revision and infection do not solely explain the differences seen in outcomes between diabetic and nondiabetic cohorts.

The diagnosis of diabetes represents a wide range of pathology from diet controlled to noninsulin and insulin dependent patients often with varying levels of glucose control. While blood glucose levels and hemoglobin A1C were not followed postoperatively, it is our institution's practice to limit elective surgeries to patients with A1C levels less than 8.0. It is possible that the severity of diabetes and duration of disease state may have influenced the diabetic cohort's ability to improve. Though, in one study, mean blood glucose levels were not predictive of functional outcomes one year after surgery [4].

Our study confirms that diabetes negatively influences physical function in lumbar spine surgical patients. Yet, many diabetic patients still see significant increases in physical function when compared to their preoperative status, as evidenced by the proportion of patients in our diabetic population reaching the MCID threshold for PF CAT mean scores. This is an important point to consider. Diabetics may have worse physical function outcomes when compared to nondiabetics up to one year after lumbar surgery, but may still achieve and perceive benefit from the procedure. Further research using more sophisticated determinants of MCID may be necessary to validate this claim.

Although diabetes appears to predict significantly worse physical function outcomes up to one year after lumbar spine surgery, diabetic PROMIS PF CAT scores show a trend of steady increase during this time. An increasing proportion of diabetics achieving the PF CAT MCID threshold

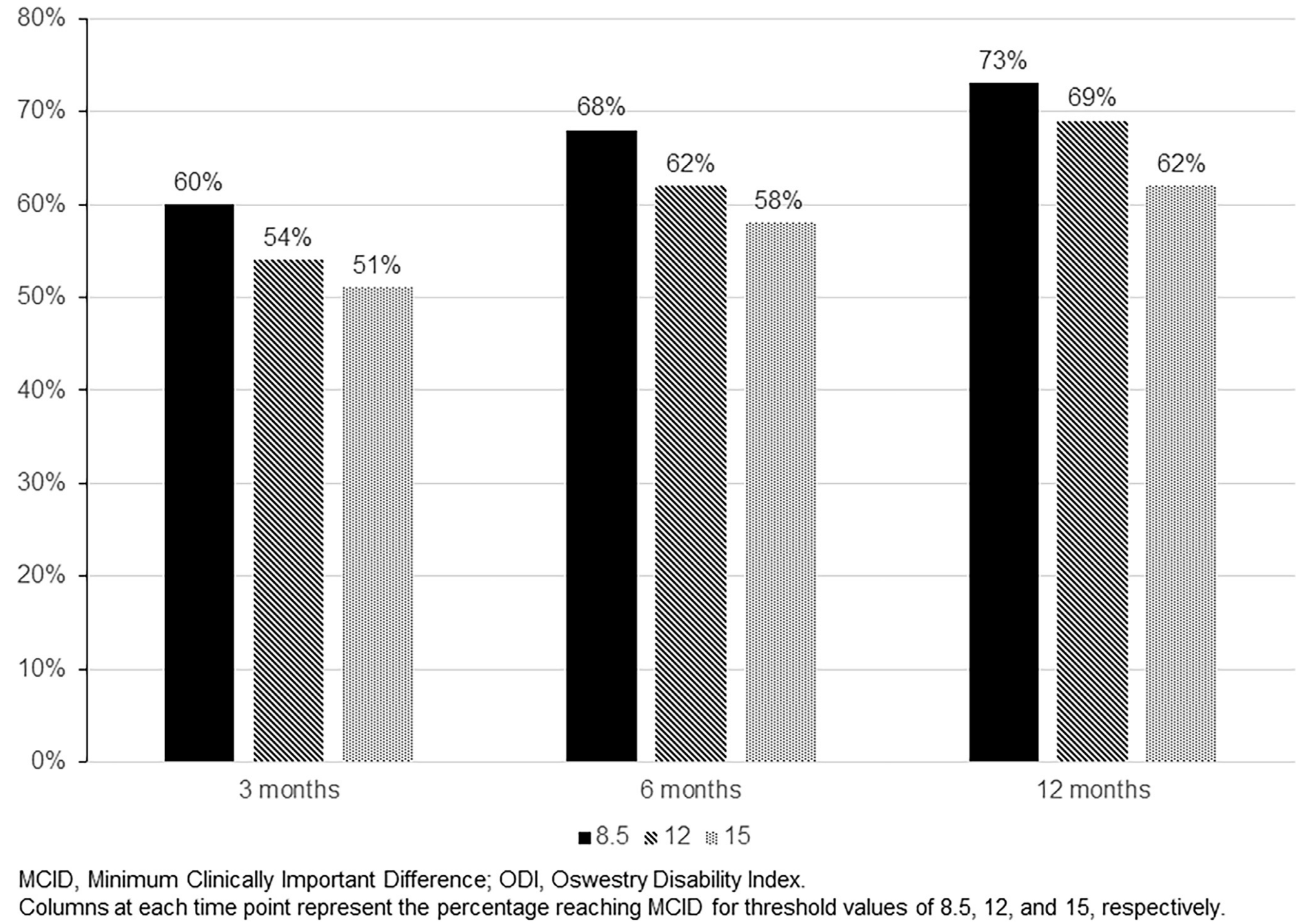



Fig. 4. Percentage of non-diabetic patients reaching OCI MCID per threshold value.

in the first postoperative year is also apparent. This positive trajectory in early physical function outcomes is a reassuring trend, as 1-year postoperative PRO's have recently been shown to potentially estimate 2-year postoperative outcomes in a population of lumbar spine surgical patients [31]. A longer study period is required to investigate whether this positive trend is consistent with time.

Previous studies using legacy outcome measures have shown similar results to our PF CAT results, which is that diabetic patients make significant improvements after surgical intervention, but to a lesser extent than nondiabetics [4,10,22]. These legacy outcome measures have included the EQ-5D, ODI, SF-12, and SF-36 to name a few. The SPORT trial by Freedman et al. shares similarities with our current study, describing diabetic outcomes before and after spinal treatments, and with a diabetic population of increased age and BMI in relation to the nondiabetic population [10]. Their results showed diabetics with certain spinal pathologies improving significantly in physical function after intervention as measured by the SF-36, albeit to a lesser extent than nondiabetics. A more recent study showed that diabetics had worse physical function 1 year after spine surgery when compared to nondiabetics as measured by the SF-12 [4].

The present study provides evidence that the PF CAT is consistent with legacy measures in determining the physical function in diabetic patients undergoing lumbar spine surgery. Uniform with previous studies, diabetics displayed significantly worse ODI outcomes in our study than did nondiabetics up to 1 year after lumbar spine surgery. PF CAT outcomes in our study predictably mirror this result. Thus, the PF CAT and legacy measures may provide similar results and information to clinicians. However, the PF CAT appears to be superior to legacy measures. In as few as four questions it generates a highly reliable outcome score, making it a more efficient clinical tool by saving time and providing the clinician useful information. Reliable results combined with improved efficiency from the PF CAT will likely give clinicians an advantage over using legacy PRO measures in the lumbar spine surgery population. This benefit is apparent in patients with comorbid diabetes. Further study of physical function outcomes measured by the PF CAT in patients with other comorbid conditions will determine if this holds true across a spectrum of comorbidities.

Understanding trends in physical function following lumbar spine interventions allows providers to better counsel patients and manage individual expectations. While diabetic patients improve less when compared to controls, this improvement may be clinically meaningful and perceived as subjectively beneficial to their lives. This highlights the fact that one value for MCID may not be appropriate across all patients undergoing lumbar spine intervention.

We utilized three different cut-offs for MCID in terms of ODI in this study. With a more stringent value, less patients achieved this threshold at any time point in follow up. If a procedure's efficacy is judged by the proportion of patients reaching a given threshold in PROs, MCID, we must decide what the appropriate value should be. As evidenced by this study, the difference in means calculation of MCID produces a very different value at a single center when compared to published MCID values. It is unclear whether this difference represents geographic differences in patient characteristics, perceived disability from lumbar disease, or institutional preferences in treatment algorithms and surgical intervention.

### *Limitations*

Several limitations exist in this study. The small sample size of our diabetic (n=65) and nondiabetic (n=233) cohorts decrease the power of the results. Demographic differences exist between our study groups, including differences in age, race distribution, average BMI, and surgical procedure distribution. However, it is worthwhile to note that these variables were corrected for in determining our results, and that there was no significant difference in BMI greater than or equal to 30 between cohorts. Further, the surgical procedure distribution would be more strongly represented if the number of levels of fusion or decompression in our study cohorts was specified, as it is possible that diabetics undergo more extensive procedures. While procedure type was controlled for in our analysis, we lacked the granularity in our data to clearly calculate a surgical invasiveness score. Additional comorbidities affecting outcomes may also be present in our diabetic population that is not investigated in this study. The length of the study poses another limitation, and a longer study period may have provided further insight into the effect of diabetes on physical function and the response of the PF CAT in measuring diabetic outcomes. Lastly, our method of calculating the MCID is one of many [27,28]. It reflects only a numerical and statistical estimation of meaningful physical function differences within our study population. As MCID calculations become more sophisticated and begin to involve more direct patient input, our MCID results may need to be re-evaluated.

## Conclusions

Diabetes is highly prevalent in the spine surgical population. It has been shown to negatively affect quality of life, disability, and physical function after spine surgery. Consistent with legacy outcomes, the PROMIS PF CAT shows that diabetics do worse 1 year after lumbar spine surgery when compared to nondiabetics. However, the positive trajectory of diabetic PF CAT outcomes in the first postoperative year is an indicator that diabetic patients' physical function steadily improves after lumbar spine surgery, albeit to a lesser extent than nondiabetics. The PROMIS PF CAT functions well in the diabetic lumbar spine population, mirroring results reported by legacy outcome measures, but are superior to these legacy measures in terms of decreased patient burden and better reliability. It is a more useful and patient-friendly clinical tool, not only saving time, but also providing a reliable way to predict postoperative physical function in patients with comorbidities such as diabetes. This may enhance the provider-patient discussion of spinal treatments and allow better patient decision-making.

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