Original Article

Clinical Outcomes and Treatment Costs of Low Back Pain using ICHOM Patient-reported Measures: A Real-world Study

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Abstract

Background: One of the main causes of disability and financial burden is low back pain (LBP). Despite being essential to value-based care, patient-reported outcome measure (PROM) is still not widely used in Saudi Arabia. **Objectives:** This study assessed the feasibility, clinical utility, and economic implications of implementing the ICHOM LBP Standard Set in routine insured care. **Materials and Methods:** For adults with LBP treated between August 2023 and March 2025, a retrospective study of anonymized PROM and insurance claims data was carried out. Disability, pain, quality of life, employment status, and expenses were among the outcomes that were measured at baseline, one, three, and 6 months. Data completeness and adherence to ICHOM follow-up schedules were used to assess feasibility. **Results:** There were 97 patients total (mean age 50 years; 88.7% male). PROM completion rates were high and on schedule. All outcomes showed significant improvements: Oswestry Disability Index scores improved, three-level EuroQol Five-Dimension questionnaire domains demonstrated recovery, and mean back pain dropped from 8.5 to 1.7. 58.8% of patients who were employed went back to work within a month, and 100% did so within 6 months. Clinical heterogeneity was reflected in the diversity of the median episode-level treatment costs, which were SAR 53,170. **Conclusions:** It is possible to enhance pain, function, quality of life, and return-to-work outcomes in Saudi Arabia by using the ICHOM LBP Standard Set. Value-based treatment is supported by PROM integration, and future research should standardize occupational and comorbidity data and evaluate multicenter implementation to maximize patient-centered, economical LBP management.

Keywords: ICHOM, low back pain, patient-reported outcome measures, treatment costs, value-based healthcare

Introduction

Globally, healthcare systems continue to struggle to provide high-quality care while remaining financially viable. Measurable advances in patient-centered outcomes have frequently been limited despite significant healthcare spending, underscoring a continuing gap between investment and value delivered.[1,2] Value-based care (VBC) models, which aim to optimize health outcomes in relation to the costs of care delivery rather than concentrating just on service volume, have become more popular as a result of this gap.[3] The systematic application of outcomes assessment to enhance quality improvement, direct clinical decision-making, and match incentives with patient benefit is fundamental to VBC.[4]

Patient-reported outcome measures (PROM) are a keystone of VBC as they straight capture patients' perspectives on their symptoms, functional status, and quality of life.[5,6] PROM can improve patient-provider communication, facilitate shared decision-making, and allow for long-term treatment efficacy monitoring by reflecting outcomes that are most important to patients.[7] Nevertheless, despite its conceptual appeal, PROM is still not consistently implemented in clinical settings and healthcare systems.[5,8]

Comprehensive outcome measurement is especially crucial for conditions like low back pain (LBP). One of the main causes of disability worldwide, LBP has a significant impact

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on healthcare use, lost productivity, and absenteeism from work.[9] Evaluation frameworks that take into account functional capacity, quality of life, and work involvement in addition to pain intensity are necessary for the effective management of LBP. Multidimensional PROM that accurately evaluate these domains in LBP patients are crucial, according to systematic studies of outcome measuring tools.[10] Among the most popular and psychometrically sound instruments for assessing results in LBP care are the Oswestry Disability Index (ODI), Numeric Pain Rating Scale (NPRS), and general health-related quality-of-life measures like the EQ-5D.[10,11]

The International Consortium for Health Outcomes Measurement (ICHOM) has created condition-specific standard sets that specify which outcomes should be measured and how they should be evaluated to advance standardized, patient-centered outcome assessment globally.[12] The ICHOM LBP Standard Set provides a thorough framework for assessing LBP care across settings by combining clinical outcomes like complications and recurrence with important PROM like the ODI, NPRS, and EQ-5D.[13] Although these standard sets are being promoted increasingly as value-based healthcare (VBHC) facilitators, there is still disagreement over their viability, scalability, and incorporation into conventional clinical procedures.[14]

Research from primarily Western healthcare systems indicates that incorporating PROM into clinical practice might enhance communication, facilitate treatment monitoring, and guide efforts to improve quality.[4,15] However, there are significant differences in PROM uptake, data quality, and connection to cost and use data.[5,8] Furthermore, there is still a lack of data from Middle Eastern healthcare systems, especially when it comes to the viability of PROM implementation and their contribution to VBC evaluation.[8,16]

According to research already conducted in Saudi Arabia, multidimensional PROM that evaluate function and quality of life are less frequently utilized by medical professionals when managing LBP than simple pain intensity measures.[17] In addition to a lack of standardized longitudinal data to allow value-based evaluation of LBP care, this pattern highlights a disconnect between suggested outcome-measuring frameworks and actual practice.[8,14]

Evaluating standardized, practical outcome measurement frameworks like the ICHOM LBP Standard Set is vital given the continuous shift in healthcare systems toward value-based models and the crucial role that patient-centered outcomes play in determining the quality of care.[3,14] This study assessed the feasibility, clinical utility, and economic implications of implementing the ICHOM LBP Standard Set in routine insured care.

Materials and Methods

Ethical considerations

This study did not involve direct patient contact; instead, it involved secondary analysis of fully anonymized data; therefore, written informed consent was not obtained. The Institutional Review Board (IRB) approval number is (IRB-2025-03-0928) dated November 29, 2025. The procedures of this research adhered to the ethical principles of the Declaration of Helsinki. The secondary data analysis complied with the relevant ethical guidelines. Confidentiality agreements prevent the specific insurance provider from being revealed. Written informed consent was not obtained due to the retrospective nature of the study and the use of fully anonymized secondary data. STROBE Reporting Guidelines were followed for this study.

Study design and setting

Anonymized administrative and patient-reported outcome data from a significant Saudi Arabian private health insurance provider were used in this study's retrospective secondary data analysis design. The purpose of the analysis was to determine whether the ICHOM LBP Standard Set could be implemented in standard clinical practice. This was a retrospective observational study; therefore, no causal inferences were planned to be made.

Study population

Adult patients with LBP who received insured medical care between August 2023 and March 2025 represented the study population.

Patients who completed PROM that matched the ICHOM LBP Standard Set, had connected insurance claims data accessible for the same episode of care, and had a verified diagnosis of LBP were eligible for inclusion. These standards made it possible to evaluate clinical results as well as related healthcare expenses and use them consistently.

Patients received heterogeneous treatments, including conservative management (physiotherapy, medications) and surgical interventions, as reflected in insurance claims data. However, detailed clinical pathways were not standardized across patients.

Incomplete or missing identifiers that made it impossible to reliably link PROM data to insurance claim information led to the exclusion of patients. Longitudinal assessment of changes in patient-reported outcomes during the course of care was made possible by the availability of follow-up PROM data at several predetermined time points.

Data sources

In this study, two main sources of data were used. The ICHOM LBP Standard Set, a standardized framework created to identify and quantify outcomes that are most important to patients with LBP throughout the entire cycle of care, was first used to collect patient-reported outcome data.[18] Consistent longitudinal evaluation of symptoms, functional status, and health-related quality of life is made feasible by the ICHOM LBP Standard Set, which outlines essential PROMs and suggested follow-up intervals.

Second, information on insurance claims was taken out of the administrative database of the insurer. Care pathways, clinical

interventions, episode-level healthcare consumption, overall treatment expenditures, and follow-up status were all included in this data. Prior to analysis, all datasets were completely anonymized to guarantee patient privacy and adherence to relevant regulations pertaining to data protection.

Outcome measures

Functional disability

The ODI, a popular and established tool for assessing impairment associated with LBP, was used to measure functional disability. Pain severity, personal care, lifting, walking, sitting, standing, sleeping, sexual activities (if applicable), social life, and travel are all covered in eleven areas of the ODI. A total score between 0 and 50 is obtained by scoring each item on a 5-point ordinal scale. This score is then transformed into a percentage score. The ODI's application in clinical and research contexts is supported by evidence of its strong internal consistency and structural validity in LBP groups.[19,20] Scores above 80% indicated higher levels of disability. Disability severity was classified as minimum (0%–20%), moderate (21%–40%), severe (41%–60%), and crippled (61%–80%).[19]

Pain intensity

The NPRS, an 11-point scale from 0 (no pain) to 10 (worst imagined pain), was used to measure patient-reported pain severity. The NPRS is frequently used in clinical practice and research to track the intensity of pain and how it changes over time in musculoskeletal diseases, and there is evidence to support its validity and reliability in this setting.[21]

Health-related quality of life

The three-level EuroQol Five-Dimension questionnaire (EQ-5D-3 L), which evaluates five domains of health status – mobility, self-care, usual activities, pain/discomfort, and anxiety/depression – as well as the EQ visual analogue scale (EQ-VAS) for general health, was used to assess health-related quality of life. A popular tool with proven validity and responsiveness in clinical populations is the EQ-5D-3L.[22]

In addition, the EQ-VAS, which measures self-rated general health on a vertical scale from 0 (worst imaginable health state) to 100 (best imaginable health state), was also completed by the patients. A consistent evaluation of overall health and quality of life throughout time was made possible by the combination of the EQ-VAS and the EQ-5D-3 L descriptive system.

Work status and economic outcomes

When available, work status was documented, including employment status at baseline and follow-up, as well as the timeframes for returning to work for patients who reported missing work due to LBP. Throughout the course of care, these data were used to investigate functional recovery and work participation. The LBP literature frequently reports return-to-work rates as a crucial functional and socioeconomic result. Systematic reviews indicate that 68% of patients return to work after 1 month, and greater percentages at longer follow-ups in working populations with back pain.[23]

The entire treatment expenses per episode of care, which were obtained from insurance claims data, were used to evaluate economic outcomes. Costs included bundled payments covering surgical procedures, follow-up care, and rehabilitation. The total claims for services linked to managing LBP during the study period were represented in the costs. Episode-level cost data were utilized to investigate correlations between patient-reported outcomes and healthcare expenditures as well as variability in resource utilization.

Analytical approach

Data were analyzed using SPSS version 23 (IBM Corp., Armonk, NY, USA). Clinical data, PROMs, treatment costs, and demographic features were all summarized using descriptive statistics. Means with standard deviations were used to report continuous variables, whereas frequencies and percentages were used to summarize categorical variables. To investigate relationships between sick leave status and return to work status over 6 months, bivariate analyses were carried out.

Repeated measures ANOVA were used to assess changes over time. The analyses were checked for the confounding effect of demographics and clinical factors. However, none of them showed significant confounding effects on the outcomes. Missing data were handled using complete case analysis. $P < 0.05$ was considered significant.

Data availability

Due to contractual and confidentiality restrictions with the data source, the datasets examined for this study are not publicly available; however, upon reasonable request and subject to institutional and data-sharing approvals, the corresponding author may make them available.

Results

Characteristics of the study population

This preliminary investigation comprised 97 patients in all. Table 1 provides a summary of the study population's demographic features. Of the patients, 88.7% were men and 11.3% were women. 38% of participants were non-Arab expats, whereas 62% of participants were of Arab ethnicity, mostly Saudi nationals.

Only one per cent of patients stated they had never attended education. Primary education accounted for 38.1% of patients, followed by secondary education (27.8%) and tertiary education (33.0%). The patients ranged in age from 26 to 79, with a median of 48 and a mean of 50.

As seen in Figure 1, the cohort's age distribution showed a bimodal pattern, with a peak among patients aged 35–44, representing the working-age population, and a second peak among patients aged 60–69, representing older adults.

A total of 97 patients were included at baseline, with follow-up available for 71 at 1 month, 54 at 3 months, and 42 at 6 months. This follow-up decreased from 97 at baseline to 42 at 6 months, indicating attrition that may introduce bias.

Table 1: Demographic characteristics of the study population (*n*=97)

Characteristic	Category	Mean (range)
Sex	Male	86 (88.7)
	Female	11 (11.3)
Ethnicity	Arab	60 (62.0)
	Non-Arab	37 (38.0)
Education level	No formal education	1 (1.0)
	Primary education	37 (38.1)
	Secondary education	27 (27.8)
	Tertiary education	32 (33.0)
Age (years)	Mean	50
	Median	48
	Range	26–79

Values are presented as *n* (%) unless otherwise indicated

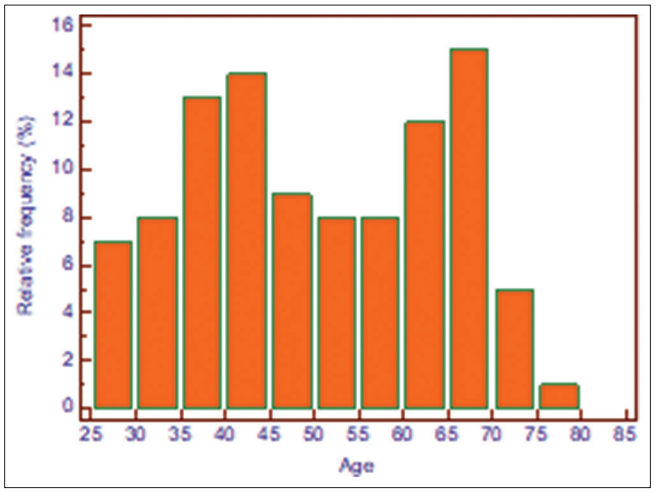

Figure 1: Age distribution of patients with low back pain included in the Saudi Arabian study population

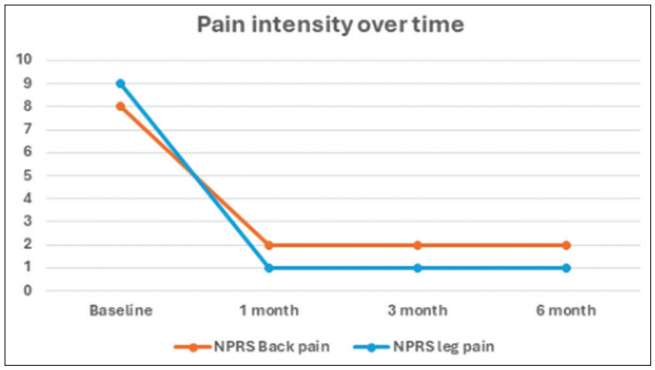

Figure 3: Mean back and leg pain intensity scores over time measured using the Numeric Pain Rating Scale

Functional status of low back pain patients over time

Functional disability

Figure 2 shows how functional disability levels have changed over time. At baseline, the majority of patients were categorized as either moderately disabled (25%) or severely disabled (44%), with 26% being crippled and 3% being bed-bound.

The percentage of patients with severe disabilities significantly decreased after the 1-month follow-up, and no patients were categorized as bed-bound or crippled. As recovery advanced, the percentage of patients with moderate disability increased with time, indicating a move toward lower disability severity categories.

Pain intensity

Figure 3 displays the average patient-reported pain intensity scores for leg and back pain as determined by the Numeric Pain Rating Scale (NPRS). With a mean back pain score of 8.0 (standard deviation [SD] =2.0) and a mean leg pain score of 9.0 (SD = 2.0), patients reported high levels of discomfort at baseline.

By the 1-month follow-up, significant decreases in pain intensity were noted, with mean scores for both back and leg pain significantly falling. These gains persisted during the three and 6-month check-ups, suggesting long-term pain alleviation.

Health-related quality of life

Figure 4 shows changes in health-related quality of life for each of the five EQ-5D-3 L domains. Patients reported the most impairment

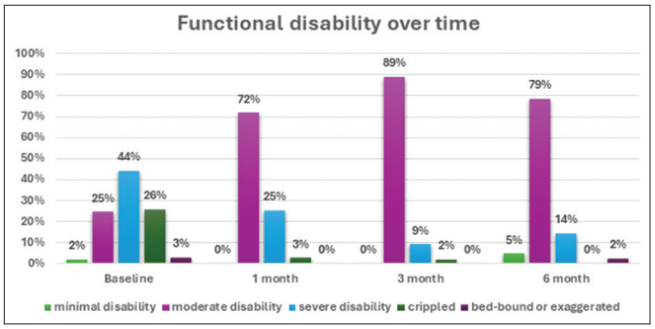

Figure 2: Distribution of functional disability categories over time based on Oswestry Disability Index classifications

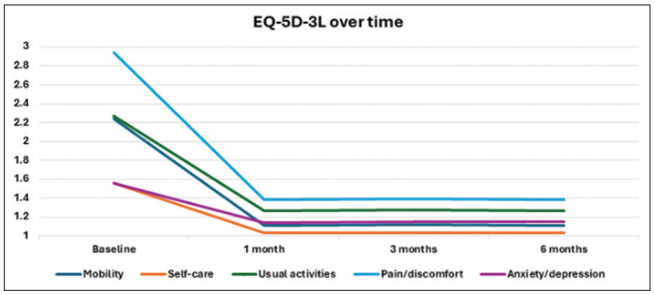

Figure 4: Mean three-level EuroQol Five-Dimension questionnaire domain scores over time

in the pain/discomfort domain at baseline (mean = 2.94, SD = 0.24), followed by mobility (mean = 2.24, SD = 0.67) and normal activities (mean = 2.27, SD = 0.55). The lowest impairment levels were found in self-care and anxiety/depression (mean = 1.56 for both).

All EQ-5D-3 L domains showed significant mean score reductions by the 1-month follow-up, indicating better health. At the 3-and 6-month follow-ups, these gains persisted, demonstrating a steady recovery across several aspects of quality of life.

Detailed functional outcomes over follow-up

Detailed longitudinal changes in functional status, pain severity, and health-related quality of life over all observation points are shown in Table 2. From 22.7% at baseline to 79.6% at 1 month, 86.6% at 3 months, and 88.3% at 6 months, subjective health scores (EQ-VAS) significantly showed improvement.

From baseline to the 6-month follow-up, consistent gains were seen across ODI items, NPRS measures, and EQ-5D-3 L domains. For instance, mean back pain dropped from 8.5 to 1.7, mean leg pain from 8.8 to 1.0, and mean pain intensity from 5.2 at baseline to 1.8 at 6 months. Over time, all quality-of-life domains showed a similar progressive improvement.

Work status and return-to-work outcomes

At baseline, 71 participants (73.2%) in the study population had full-time jobs. Thirty-two (45.1%) of them stated they had taken sick leave because of LBP. Nine patients took up to 1 week of sick leave, fourteen took 1–4 weeks, and ten took 1–3 months.

Table 3 provides a summary of return-to-work patterns. Of those who took sick leave, 18.2% went back to work in less than a week, 45.5% in 1–4 weeks, and the rest of the patients in 1–3 months.

Table 4 shows the return-to-work status across the follow-up period. Follow-up time and return-to-work status showed a significant linear relationship (contingency coefficient = 0.453, $P < 0.001$). After 1 month, 58.8% of patients were back at work; by 3 months, that number rose to 97.3%, and by 6 months, it reached 100%.

Treatment costs and insurance claims

Figure 5 shows treatment cost information obtained from insurance claims. For episodes of LBP, the median cost of treatment was almost SAR 53,170. Variability in resource consumption was indicated by the distribution of expenditures, which exhibited lower outliers at SAR 33,500 and larger outliers reaching roughly SAR 112,542.

Over the course of a 6-month episode of care, surgical procedures, follow-up services, complication management, and post-operative rehabilitation were all covered by the insurance payment model for the treatment of LBP. Surgical complexity and the number of spinal levels involved were used to determine bundle variations, and high-cost cases were subject to outlier protection (personal conversation with the insurance provider, May 2025).

Table 2: Functional status of the study population at baseline and follow-up time points (mean±standard deviation)

Instrument	Domain/item	Baseline, mean±SD	Month 1, mean±SD	Month 3, mean±SD	Month 6, mean±SD	*P*
ODI						
ODI_Q01	Pain intensity	5.2±0.6	2.1±0.8	2.1±0.8	1.8±0.8	<0.001
ODI_Q02	Personal hygiene	2.7±0.9	1.2±0.5	1.1±0.6	1.3±0.8	<0.001
ODI_Q03	Lifting	5.0±1.4	5.6±0.9	5.2±0.8	4.5±1.0	<0.001
ODI_Q04	Walking	3.4±1.1	1.5±0.9	1.2±0.7	1.3±0.7	<0.001
ODI_Q05	Sitting	3.7±1.4	1.7±1.1	1.4±0.9	1.6±1.0	<0.001
ODI_Q06	Standing	4.7±1.0	2.1±1.3	1.6±1.2	1.8±1.3	<0.001
ODI_Q07	Sleeping	2.5±1.4	1.2±0.6	1.0±0.2	1.2±0.6	0.126
ODI_Q08	Sexual life	-	-	-	-	
ODI_Q09	Social life	3.6±1.6	1.4±0.9	1.1±0.6	1.1±0.6	<0.001
ODI_Q10	Traveling	3.3±1.5	1.5±1.0	1.4±0.7	1.3±0.6	<0.001
NPRS						
NPRS_Q01	Back pain (last week)	8.5±2.3	2.2±1.8	1.8±1.6	1.7±1.9	<0.001
NPRS_Q02	Leg pain (last week)	8.8±2.1	1.4±1.9	0.9±1.4	1.0±2.0	<0.001
EQ-5D-3L						
EQ5D_Q01	Mobility	2.2±0.7	1.1±0.3	1.1±0.3	1.1±0.3	<0.001
EQ5D_Q02	Self-care	1.6±0.5	1.0±0.2	1.0±0.1	1.0±0.2	-
EQ5D_Q03	Usual activities	2.3±0.5	1.3±0.4	1.3±0.4	1.3±0.5	<0.001
EQ5D_Q04	Pain/discomfort	2.9±0.2	1.4±0.5	1.3±0.5	1.4±0.5	<0.001
EQ5D_Q05	Anxiety/depression	1.6±0.7	1.1±0.3	1.1±0.3	1.2±0.5	<0.001
EQ5D_Q06	Subjective health (VAS)	22.7±7.9	79.6±14.1	86.6±11.8	88.3±13.8	<0.001

Sexual life (ODI_Q08) data were not available. ODI: Oswestry Disability Index, NPRS: Numeric Pain Rating Scale, EQ-5D-3L: EuroQol five dimension three-level questionnaire, SD: Standard deviation, VAS: Visual Analogue Scale

Table 3: Sick leave duration and time to return to work among working participants with low back pain

Sick leave status	<1 week, *n* (%)	1–4 weeks, *n* (%)	1–3 months, *n* (%)	*P*	Contingency coefficient
No	4 (40.0)	4 (40.0)	2 (20.0)	0.378	0.239
Yes	4 (18.2)	10 (45.5)	8 (36.4)		

P-value derived from Chi-square test, percentages are calculated within each sick leave category

Table 4: Return-to-work status across follow-up time points

Follow-up time	Returned to work, *n* (%)	Not returned, *n* (%)	*P*	Contingency coefficient
1 month	30 (58.8)	21 (41.2)	<0.001	0.453
3 months	36 (97.3)	1 (2.7)		
6 months	32 (100)	0		

P-value obtained from Chi-square test for trend, percentages are calculated within each follow-up time point

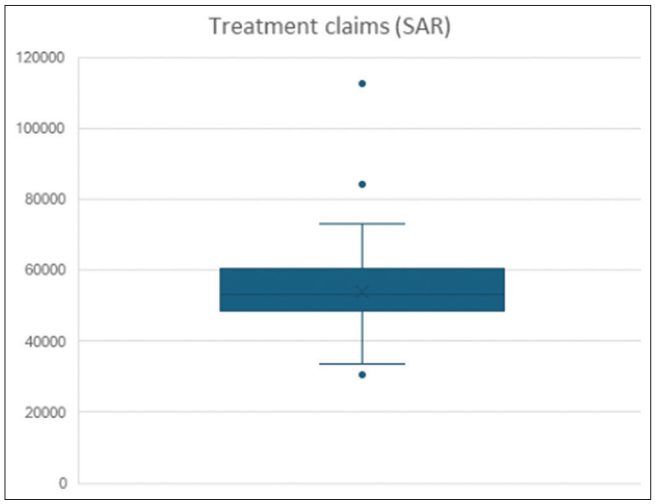

Figure 5: Boxplot of treatment claims for low back pain (Saudi Riyals)

Discussion

The feasibility and benefits of incorporating the ICHOM LBP Standard Set into regular care pathways within the Saudi healthcare system are demonstrated by this preliminary study. Significant improvements were seen over a 6-month follow-up period in a number of patient-reported outcome areas, such as subjective health status, functional impairment, pain severity, and health-related quality of life. These results are consistent with the key principles of VBHC, which emphasize patient-relevant outcomes in relation to the expenses associated with achieving them.[1,2]

Over time, validated tools including the NPRS, ODI, and EQ-5D-3 L showed consistent and clinically significant decreases in pain and impairment. The amount and direction of improvement are consistent with global data demonstrating these measures' responsiveness and dependability in LBP populations.[10,13,19] Interestingly, the most significant improvements were noted during the 1st month of follow-up and persisted at subsequent intervals, which is consistent with trends frequently noted in interventional LBP groups.[10,19,22]

Generic health-related quality-of-life measures are useful for capturing broader functional recovery in LBP therapy, as seen by the observed improvements across all EQ-5D domains, especially in pain/discomfort and regular activities.[6,22] These findings support the suitability of the ICHOM Standard Set, which strikes a balance between condition-specific and generic PROM to allow for cross-condition comparison and therapeutic relevance.[12,18]

The study's return-to-work results demonstrate the functional significance of PROM-based evaluation. Within the 1st month, a significant percentage of working patients resumed their jobs, and by 3 months, their return was almost complete. This progression is in line with earlier meta-analytic data showing that, depending on clinical severity and occupational demands, the majority of working-age people with LBP return to work within weeks to months.[23]

From the standpoint of VBHC, employment is a crucial result that has social and financial benefits in addition to therapeutic rehabilitation.[1-3,5] Early return to work and improvements in functional status point to possible decreases in productivity loss and disability-related expenses. This is especially important for health systems that want to maximize both economic and health results.[9] These results add credibility to recommendations that work-related outcomes be more methodically incorporated into LBP evaluation frameworks, particularly for working and insured populations.[1,2,4,5]

The insurer's reimbursement structure and actual care patterns are in line, as evidenced by the examination of episode-level treatment costs, which showed a median expense in line with bundled payment expectations.[1-3] However, the existence of expensive outliers emphasizes the significance of strong risk-adjustment techniques and outlier protection measures, especially in LBP populations with clinical variability.[3,9]

An important basis for assessing value, rather than the amount of care – a primary goal of VBHC programs – is provided by connecting PROM outcomes with cost data.[3,4] The observed convergence of better patient outcomes and stable episode-level costs highlights the potential of PROM-informed bundled payment models to improve accountability and transparency, even though this study was not intended to formally evaluate cost-effectiveness.[1-3,5]

Despite positive results, a number of implementation issues were noted. Despite the high PROM completion rates, there were few options for thorough risk adjustment and subgroup analysis due to the lack of extensive comorbidity data. The necessity for integrated clinical, administrative, and patient-reported data infrastructures is highlighted by this

difficulty, which has been extensively documented in actual PROM implementation initiatives.[8,14]

The interpretation of employment outcomes was further complicated by differences in the definition and verification of work status.[5] Future analyses' interpretability and policy relevance would be significantly improved by standardizing job-related variables, such as employment type, work demands, and partial return-to-work status.[4] Such uniformity is crucial for converting PROM data into useful insights at the system and payer levels, according to earlier research.[5,7]

This study illustrates the usefulness of standardized outcome assessment in routine insured treatment in the Saudi environment, where PROM use has traditionally been restricted to certain specialties and individual clinician initiatives.[16,17] Value-based contracting, provider benchmarking, and better patient-centered decision-making could be supported by integrating the ICHOM LBP Standard Set into clinical and insurance workflows.[14]

The study encompasses a few limitations, caveating generalization. The high proportion of male participants likely reflects the insured workforce population in Saudi Arabia, particularly in sectors with predominantly male employment. This limits generalizability to the broader population. As the study included only privately insured patients, findings may not be generalizable to uninsured or public-sector populations. Loss to follow-up may bias results toward patients with better outcomes. A formal cost-effectiveness or cost-utility analysis was not conducted due to the nature of available data. Future research should emphasize larger, multicenter cohorts with extended follow-up to create standardized PROM paths and cost benchmarks for LBP care in Saudi Arabia. Further improving risk adjustment and facilitating more accurate value judgments would include the incorporation of comorbidity indices, psychosocial aspects, and occupational characteristics.[5,8,10] Furthermore, prospective research investigating the impact of real-time PROM input on therapeutic choices and results would offer crucial insights into the ways in which PROM provides preliminary cost insights relevant to VBC.[15]

Conclusions

The use of the ICHOM LBP Standard Set in an insured healthcare setting in Saudi Arabia appears feasible and was associated with improvements in pain, functional status, quality of life, and return-to-work outcomes over time. These findings provide preliminary support for integrating PROMs into routine care. However, given the observational design, absence of a comparator group, and potential selection bias, the results should be interpreted with caution. Further multicenter, prospective studies with standardized data collection and robust economic evaluation are needed to better assess the value of PROM-based care in this context.

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Conflicts of interest

There are no conflicts of interest.

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