

Patient-reported outcomes and their associated factors at 1- and 2-year follow-up after lumbar spine surgery

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BACKGROUND

- Degenerative lumbar conditions are a leading cause of disability worldwide, often requiring surgery when conservative treatments fail.
- Data on surgical outcomes from patients' perspectives and influencing factors remain limited.

AIMS

- To assess 1-year and 2-year Patient-Reported Outcomes (PROs) following lumbar spine surgery.
- To identify factors associated with these outcomes.

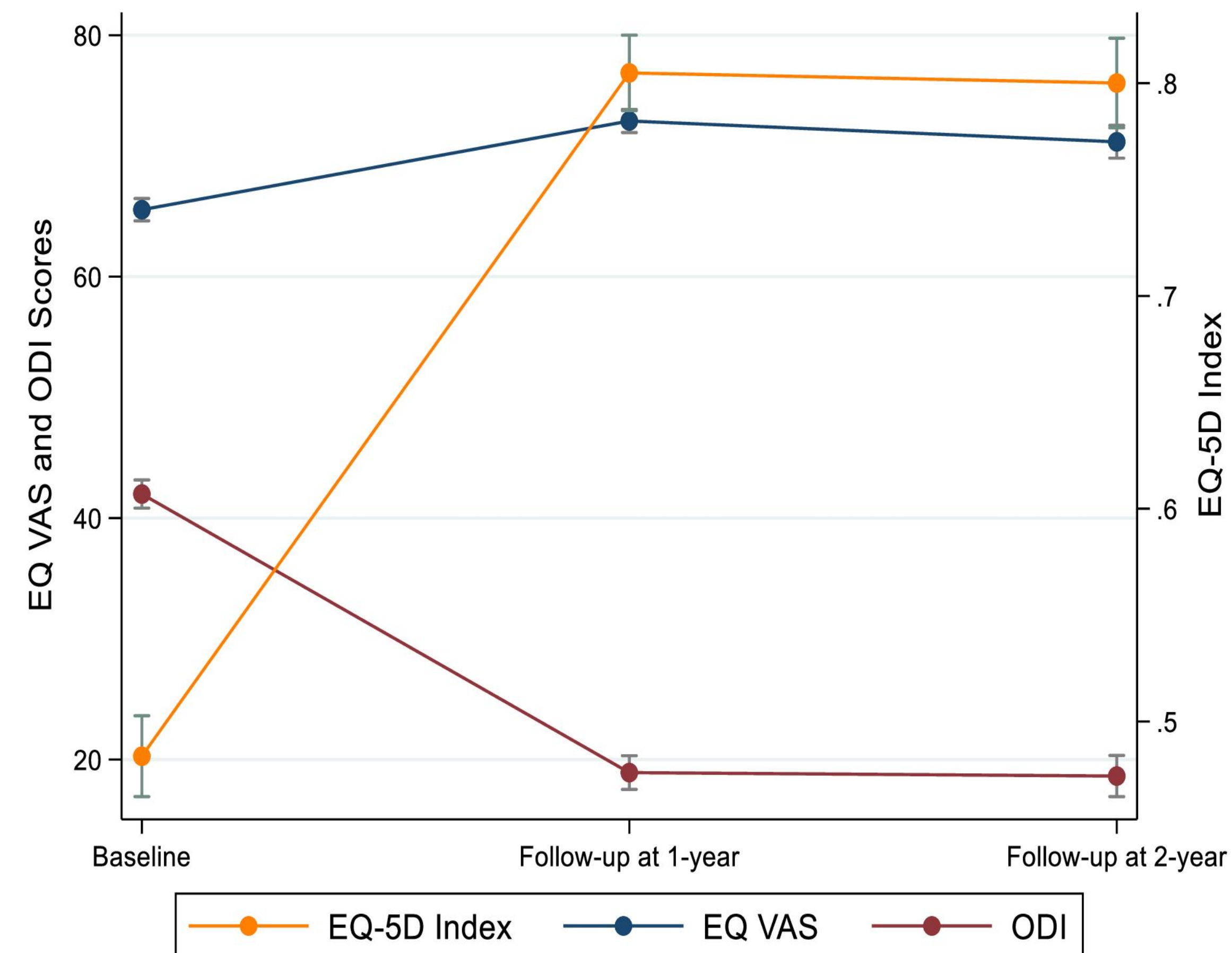
METHODS

- We analysed data from 1,195 patients enrolled in the Spine Surgery Registry at a tertiary hospital in Singapore (2017–2022).
- All patients underwent elective lumbar surgery for stenosis, prolapsed disc, spondylolisthesis, or degenerative disc disease.
- PROs were collected pre-operatively and at one- (n=741) and two-year follow-ups (n=440) using the EQ-5D-3L and Oswestry Disability Index.
- Fifteen individual PRO items were grouped into domains: activities of daily living, functional tasks, pain/discomfort, mental health, and social functioning.
- Each item was coded as improved (yes/no) at follow-up.
- Multivariable logistic regression analyses were conducted to assess associations between nine pre-specified patient factors and PRO improvements

- The mean age was 58.1 years (standard deviation [SD] = 16.1). Most patients were male (51.5%), of Chinese ethnicity (70.3%).
- From baseline to 1-year, patients experienced the largest improvements in pain/discomfort ($\delta = 0.55$ – 0.56) and social functioning ($\delta = 0.48$ – 0.53), while improvements in ADLs and functional tasks were smaller, with negligible change in lifting ($\delta = 0.04$); these effects largely persisted at 2 years.
- Patients with poorer baseline PROs consistently improved across all PROs at 1 year.
- Higher education and conditions affecting only the L4/5 spinal level were associated to better outcomes in activities of daily living, pain/discomfort, and social functioning.
- Higher education and prolapsed disc diagnosis were associated with functional task improvements.
- At 2 years, poorer baseline PROs remained influential, while the absence of comorbidities emerged as a significant factor.

Table 1 Odds ratios of improvement for each factor across different PROs and follow-up periods →

Figure 1 1- and 2-Year PROs for lumbar spine surgery in patients with degenerative lumbar conditions.



RESULTS

Odds of improvement in each PROs	ADLs				Functional tasks				Mental AD	Pain/discomfort		Social functioning				
	MO	Walking	SC	Personal care	Lifting	Sleeping	Sitting	Standing		PD	Pain	UA	Social life	Travelling	Sex life	
Follow-up at 1st Year																
Baseline PROs (Ref: Level 2)																
Severe (Level 3)	9.30	1.80			4.84	2.12	3.56	3.22			21.5	4.82	19.1	6.18	3.00	2.45
Gender (Ref: Female)																
Male																
Age (Ref: Older adults)																
Younger adults	1.87	3.15			1.52		0.50								1.58	
Ethnicity (Ref: Non-Chinese)																
Chinese	2.13	1.73													1.59	
BMI (Ref: Overweight/Obese)																
Normal/Underweight											1.91					
Level of education (Ref: Primary & Secondary)																
Tertiary	2.63	3.67	2.52	2.35	1.68		2.34	2.53	1.94	2.59	2.23	2.57	2.61	3.52		
Comorbidities (Ref: Presence)																
Absence															1.66	
Diagnosis (Ref: Stenosis)																
Prolapsed Disc	1.79					2.14	2.86	3.12	2.01				1.04	1.77		
Spondylolisthesis	1.12					1.07	1.09	0.95	1.24				0.60	0.95		
Degenerative Disc Disease	1.02					1.38	2.38	1.84	0.80				1.23	0.93		
Level of spine (Ref: Lumbar - L4/5)																
Lumbar - L4/S1	0.86		2.22	6.13					0.89			2.04	0.50	1.06	1.35	
Lumbar - L5/S1	0.93		0.71	0.62					1.11			0.87	0.54	0.58	0.90	
Lumbar - Others	0.76		0.50	0.57					0.59			1.94	0.40	0.63	0.54	
Mixed level	0.32		0.28	0.65					0.45			0.72	0.30	0.37	0.34	
Follow-up at 2nd Year																
Baseline PROs (Ref: Level 2)																
Severe (Level 3)	18.1				5.54	4.08	2.01	2.05			23.7	3.08	7.20	6.59	3.01	2.84
Gender (Ref: Female)																
Male								2.06								
Age (Ref: Older adults)																
Younger adults	2.59	2.21			2.10								1.99			
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Tertiary															1.84	
Comorbidities (Ref: Presence)																
Absence	2.62		3.21								2.20		1.96	3.01	3.96	
Diagnosis (Ref: Stenosis)																
Prolapsed Disc	1.88					3.41		3.31		1.60						
Spondylolisthesis	2.46					1.14		1.01		3.09						
Degenerative Disc Disease	1.07					1.34		1.82		1.49						
Level of spine (Ref: Lumbar - L4/5)																
Lumbar - L4/S1									1.72			0.98				
Lumbar - L5/S1									1.51			0.68				
Lumbar - Others									0.55			0.51				
Mixed level									0.91			0.79				

Tertiary: College, Diploma & University; ADLs: Activities of daily living; MO: Mobility; SC: Self-care; UA: Usual activities; PD: Pain/discomfort; AD: Anxiety/depression; Pain: Pain intensity; Mental: Mental Health; Ref: Reference group; Numbers: Odds Ratio (E.g., Those with severe problem is 1.85 times more likely to improve in walking than those with some problem at baseline); Light grey coloured cell: Non-significant; Dark grey coloured cell: Statistically significant.

CONCLUSIONS

- Significant improvements in PROs were observed at one-year post-surgery, with effects plateauing by year two.
- Substantial improvements in pain and social domains occurred within the first year and persisted to year two, while physically demanding tasks such as lifting remained difficult to restore.
- Patients with poorer baseline PROs and higher education derived the greatest benefit, emphasising tailored pre-operative interventions to optimise outcomes.