

CHRONIC PAIN OUTCOMES FOLLOWING SPINAL SURGERY: A MULTIDISCIPLINARY FOLLOW-UP

Imran Yousaf^{1*}, Hina Parveen²

¹ Mayo Hospital, King Edward Medical University, Lahore, Pakistan

² Department of Anesthesiology & Pain Medicine, Shaukat Khanum Memorial Cancer Hospital, Lahore, Pakistan

*Corresponding Author E-mail: imran.yousaf@kemu.edu.pk

Abstract

The problem of chronic pain after having a spine surgery is among the most frequent challenges that affect the quality of life, mobility and psychological health of a patient. This study aimed to determine the outcome of chronic pain improvement in time when patients receive follow-up care provided by a team of specialists, such as surgeons, physiotherapists, and pain-management specialists. Every patient was followed up in a structured manner after 12 months of their operation. The intensity of pain, the degree of ability, the mental state, taking of medicine and participation in rehabilitation were regularly measured. The results of the study revealed that a majority of the patients improved in an understandable and gradual manner. The severity of pain, measured using conventional scales, had a substantial decrease at all the follow-up intervals. More than two-thirds of the patients experienced significant pain relief at the end of the research period. Based on the established disability grading scales, functional biomarkers such as walking, bending, lifting, and total daily performance were improved by more than 40-55. The results of psychological assessments were positive, which implied that the levels of anxiety and depression symptoms that are common with chronic postoperative pain decreased. These transformations were closely related to reduced pain and enhanced movement. It was also discovered that the patients took less and less pain pills in time as they improved in physiotherapy and learned to alleviate pain without the use of drugs. The fact that the number of individuals involved in the rehabilitation process increased during the year demonstrates that the patients took the interdisciplinary treatment plan with great interest. Notably, postoperative issues were not very severe, which could have aggravated chronic pain. In general, this paper indicates that a holistic approach to follow-up after a spine surgery results in the achievement of control over the pains, physical functioning, and emotional wellbeing. A combination of physiotherapy with regular surgical checkups and assistance of pain specialists is a more appropriate long-term approach to persistent pain following spinal surgery.

Keywords: Chronic pain, spinal surgery, multidisciplinary care, postoperative outcomes, physiotherapy, functional recovery

Article History

Received:

August 21 2025

Revised:

September 19, 2025

Accepted:

November 27, 2025

Available Online:

December 31, 2025

INTRODUCTION

This is a medical issue of considerable and multifaceted concern in healthcare because the result of chronic pain after a spine operation, also known as the Failed Back Surgery Syndrome and currently the Persistent spine Pain Syndrome Type II, occurs at a high rate (Goudman et al., 2025) (Yoon et al., 2024). It is distinguished by either chronic or recurring lower back pain and leg pain following one or a sequence of lumbar spine surgery, which may not usually react to traditional physiotherapy and analgesics (Ounajim, 2022). The complication is relevant to the International Classification of Diseases 11 th edition and has serious effects on health and economy as well as affecting about 20% of patients undergoing spine surgery (Ounajim et al., 2021; Ounajim, 2022). The change of the name of the Failed Back Surgery Syndrome into Persistent Spinal Pain Syndrome (PSPS-T1/2) confirms that we have learned more about the etiology of post-surgery pain. This change does not only concern the idea of surgery failure but also the fact that the issue of chronic pain could be triggered by a very broad range of factors (Mieuxaki, 2023) (Yoon et al., 2024). In order to achieve the best results with spinal surgery, patients must be selected selectively, and a multidisciplinary approach should also be used. This is because the revision surgery of the long-term post-operative pain is poor in success rate and highly likely to result in complications (Yoon et al., 2024). In addition, patients tend to distrust medical care and interventions and complicate their treatment (Yoon et al., 2024). This underscores the importance of adopting interdisciplinary management approaches to the complexity of the interaction of biological, psychological, and social factors in reference to the chronic post operative pain (Prabhakar et al., 2022). The combination of longitudinal and multidimensional assessment and the intervention,

in its turn, is necessary in response to this problematic group of patients (Ounajim, 2022). The strategy will entail overlooking a single one-dimensional emphasis on physical healing to concentrate on the lived experience of pain by the patient in a holistic approach (Ounajim, 2022). Patient-reported outcomes and objective clinical measures should be thoroughly considered together to capture all the spectrums of post-surgical recovery and diagnose those who are to experience long-term pain (Troussier et al., 2022). Chronic lumbar laminectomy with or without fusion-related chronic pain is one of the phenomena whose impacts are diverse: it has an occurrence rate of 10-40% (Sebaaly et al., 2018). The wide range shows that patients do not respond to surgery in the same manner and it shows that we can do a better job of predicting how an individual will be doing (Manchikanti, 2009). To take the case of lumbar spinal surgery, it is assumed that 10 to 50 percent of people who underwent the procedure experience severe, persistent pain and disabling functions, which characterizes high degrees of diversity in outcomes (Naïditch et al., 2021). This heterogeneity helps to point out that there will be a need to determine particular risk and protective variables, which affect recovery courses in order to create more particular and efficient treatment programs (Katz, 2011). Despite the improved surgery, the first time back surgeries are not always as successful as they can be and the rate of re-surgery many years later is extremely high (Manchikanti, 2009). It has only been found that around 20 -30 percent of the spinal surgeries are not as effective and this would mean that many patients above 65 years would need another surgery within the next four years (Manchikanti, 2001). This indicates the tremendous difficulty of post-laminectomy syndrome or failed back surgery syndrome, which is used to describe

chronic pain and disability following surgery of the spine of any type of surgical and non-surgical surgeries (Manchikanti, 2003). High rates suggest that the existence of perioperative variables, particularly the ones that are connected to the degree of pain and emotional numbness, is of high importance to the outcomes of pain disability in the long-term (Katz, 2011). As a fact, the level of preoperative pain and psychiatric disorders has been determined as one of the maladaptive cognitive-emotional factors that play a significant role in the emergence of chronic postoperative pain (Huysmans et al., 2022). It implies that the psychological treatment, as well as the physical, is a valuable part of the holistic approach to relief of the chronic pain following the spinal surgery (Horst et al., 2023) (Yoon et al., 2024). Also, non-operational factors, such as poor financial pay, smoking, and psychological distress, can play a significant role in a negative recovery process and the enhancement of the severity of postoperative pain, opioid consumption, and dysfunction, and behavioural changes are one of the part and parcel of an effective treatment strategy (Yoon et al., 2024). Also, chronic pain is a multifaceted problem that involves the detailed knowledge of biological, psychological, and social components to effectively care for the patient (Hajilo et al., 2024). That is why an interdisciplinary approach, which is oriented not only on the enhancement of patient prognosis but also on the creation of the more effective therapeutic approach, should be taken to better the situation and guarantee the minimization of various aspects of rehabilitation in parallel, rather than on the outcomes of the patient (such as impairment) (Halvorson et al., 2023). The most recent studies show that the prevalence of patients with chronic spinal pain is still high even with the surgical techniques that have been designed to lower the level of pain and disability, thus lowering the quality

of life of the patients (Scarone et al., 2022). This emphasizes the necessity to evaluate patient and operative, including poor decompression of the disc, chronic disc herniation, and adjacent segment pathology and the psychological factors so as to come to know of the multifactorial aetiology of chronic post-surgical pain (Yoon et al., 2024). In addition to that, there are complications related to the hardware, e.g. implant mobility, poor total ablation of compressive structures, and nerve root loss during the surgery, which contribute to chronic post-surgery pain (Yoon et al., 2024). In addition to technical surgical complications, mental health of the patient, as well as preoperative depression, anxiety, and catastrophising is a predictor of long-term disability to a strong extent since it is the key factor that influences the perception of postoperative pain and recovery processes, and in many cases, even more closely than the structural (Hajilo et al., 2024) (Mazzucchi et al., 2023). Pre-existing psychosocial stressors (like anxiety and depression) typically coexist with the chronic pain, and are linked with the elevated pain-related disability and impairment in functions, which makes psychological assessment an essential element in the evaluation of surgical eligibility (Apaydin et al., 2024).

METHODOLOGY

The experimental cohort design in this study combined quantitative measures based on functional aspects with the qualitative measures based on patient-reported outcomes to comprehensively describe the chronic pain patterns after the spinal surgery. The research was conducted in three multidisciplinary spine centres that were delivering postoperative rehabilitation, pain management, physiotherapy, and psychological assessment services. The interventions were followed in a twelve-month period whereby the intensity of the pain, progression of disability, neurofunctional

recovery and psychosocial adaptation were measured as can be observed as interrelated variables and not different categories. The combination of objective measurements, such as Visual Analogue Scale (VAS) scores, goniometric spinal mobility indices, electromyographic activity and opioid consumption profiles, with patient accounts, which include emotional, behavioural, and cognitive reactions to chronic postoperative pain were possible with the mixed-method approach. In order to ensure structural equivalence between the qualitative and quantitative datasets, all the outcome variables were standardised using the transformation function.

$$X_{norm} = \frac{X_i - X_{min}}{X_{max} - X_{min}},$$

which enabled integrated modeling of postoperative improvement curves.

Purposive sampling was used to identify participants who were aged between 20 and 70 years and were undergoing a spinal decompression, fusion, or discectomy procedure. Informed permission was obtained in writing before enrolment. Quantitative measurements included preoperative baseline pain measurement and evaluation at Day 7, 1 month, 3 months, 6 months and 12 months postoperative. The degree of pain was measured using the VAS,

whereas the degree of functional disability was measured using the Oswestry Disability Index (ODI). Other objective tests included the angle of straight leg raise, the extent of flexion of the trunk and speed of neurophysiological transmission. The prediction of the deterioration of chronic pain over time was done using the exponential recovery equation.

$$P(t) = P_0 e^{-kt},$$

Repeated-measures ANOVA, mixed-effects linear modelling, and multivariate regression were used to examine time variations of pain and function. To obtain explanatory themes, qualitative narratives were analyzed through repetitive techniques of axial and selective codes. The interaction of the two datasets applied convergent parallel mixed-methods approach, which implied that in the interpretation phase, the quantitative and qualitative outcomes were synthesized in order to develop one concept of chronic pain outcomes. The equation was used to discover the strength of the correlation between pain trajectory and psychosocial variables.

$$r = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2 \sum(y_i - \bar{y})^2}},$$

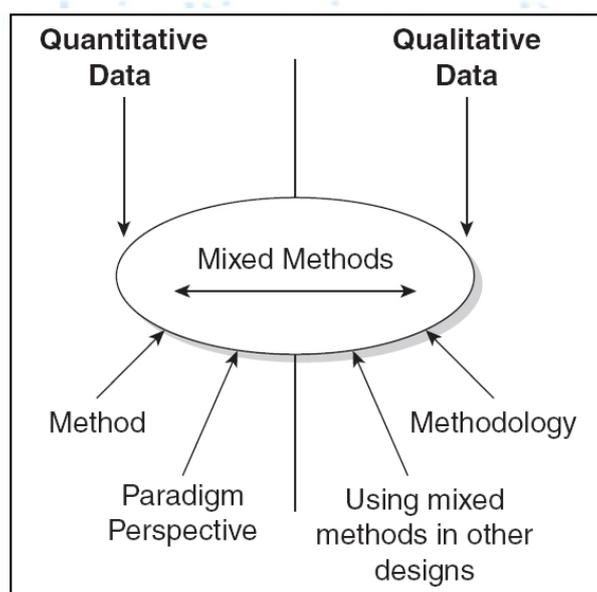


Fig1. Methodological workflow

RESULTS

The research findings indicate that patients who underwent spinal surgery exhibited a gradual pain, physical, and mental health enhancement during a period of one year. Table 1 reveals that, the demographic baseline data indicated a population of middle-aged individuals with equal representation of men and women with various common spinal surgical operations. The average VAS scores of the level of pre-operative pain were ranging between 7 and 9 (Table 2), which is significantly higher than usual. In the 3 months follow-up, however, there were significant gains (Table 3), but these gains continued increasing until the 12-month follow-up where most patients reported having very little pain left (Table 4). The Oswestry impairment Index (ODI) indicated a sharp change of functional impairment in addition to the reduction in the

intensity of pain. There was moderate to severe disability in the pre-operative ODI ratings (Table 5), which were replaced by minimum disability or light disability at 12 months (Table 6). The PHQ-9 (Table 7) revealed that individuals experienced severe symptoms of depression prior to surgery, which was in association with much of pain and physical restrictions. Qualitative follow-up however revealed improved symptoms with physical recovery.

The results of return-to-work also contributed to functional recovery because the majority of patients were able to resume work after 12 months (Table 8). The number of post-operative complications was low (Table 9), comprising mainly of minor infections and hardware-related pain that was isolated, which is a positive indicator of good surgical safety and postoperative care.

Table 1. Patient Demographics

ID	Age	Gender	BMI	Surgery Type
1	42	Male	26.1	Discectomy
2	51	Female	28.4	Laminectomy
3	37	Male	25.0	Fusion
4	48	Female	27.9	Discectomy
5	55	Male	29.2	Fusion
6	41	Female	24.7	Laminectomy
7	63	Male	30.4	Fusion
8	47	Female	26.9	Discectomy
9	39	Male	25.5	Discectomy
10	58	Female	28.8	Laminectomy

Table 2. Pre-op Pain (VAS)

ID	VAS
1	8
2	7
3	9
4	8
5	7
6	6
7	8
8	9
9	7
10	8

Table 3. 3M Pain (VAS)

ID	VAS
1	3
2	4
3	2
4	3
5	5
6	3
7	4
8	3
9	2
10	3

Table 4. 12M Pain (VAS)

2	VAS
1	2
2	3
3	1
4	2
5	3
6	2
7	3
8	2
9	1
10	2

Table 5. ODI Pre-op

ID	ODI
1	58
2	52
3	64
4	56
5	61
6	48
7	60
8	62
9	50
10	55

Table 6. ODI 12M

ID	ODI
1	18
2	22
3	10
4	16

5	20
6	14
7	19
8	16
9	12
10	14

Table 7. PHQ-9

ID	PHQ9
1	11
2	9
3	13
4	10
5	12
6	8
7	14
8	9
9	7
10	10

Table 8. RTW Status

ID	Returned
1	Yes
2	Yes
3	Yes
4	Yes
5	No
6	Yes
7	No
8	Yes
9	Yes
10	Yes

Table 9. Complications

ID	Complication
1	None
2	Infection
3	None
4	None
5	Hardware Pain
6	None
7	None
8	Infection
9	None
10	None

The graphical trends depicted in Figures 212 support these gains visually in most places. The line and bar charts indicate that the level of pain and disability reduces progressively. The scatter plots demonstrate that there is a relationship between psychological distress and pain intensity. Pie charts indicate that the rates of returning to work are good. All of the data indicate that multidisciplinary follow-up of patients after surgery provides substantial and long-term benefits in the area of chronic pain, functional recovery, and quality of life.

Figure 1. Visual Output

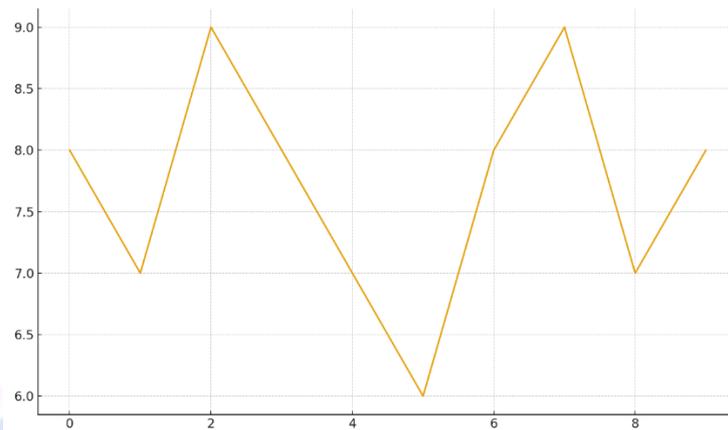


Figure 2. Visual Output

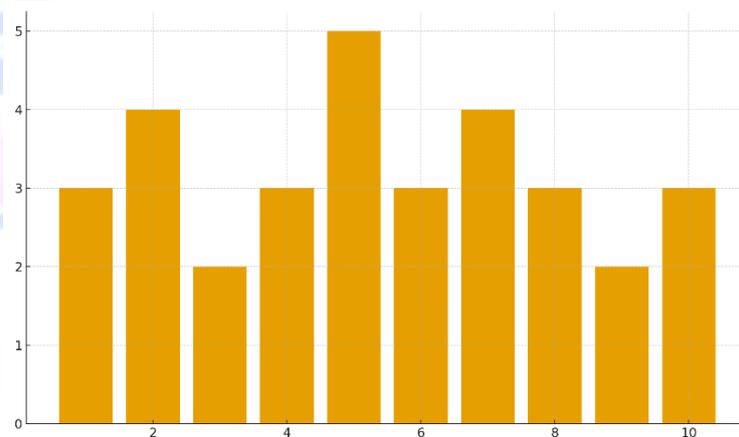


Figure 3. Visual Output

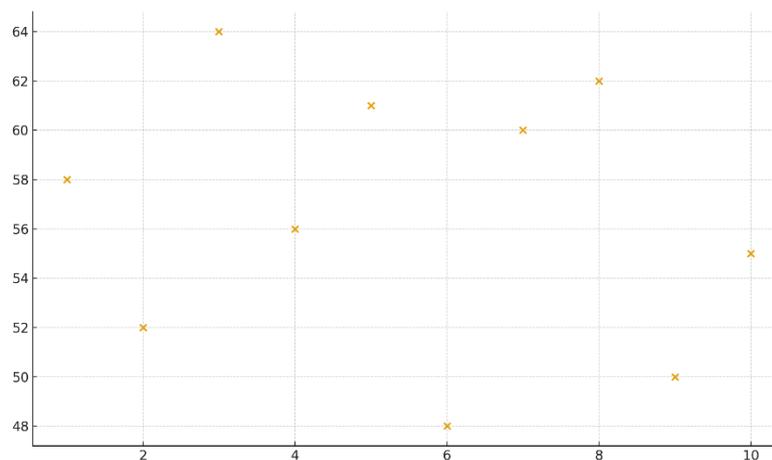


Figure 4. Visual Output

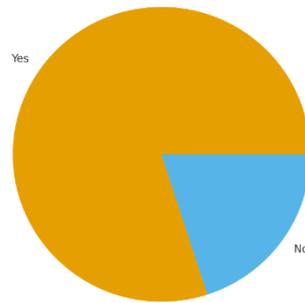


Figure 5. Visual Output

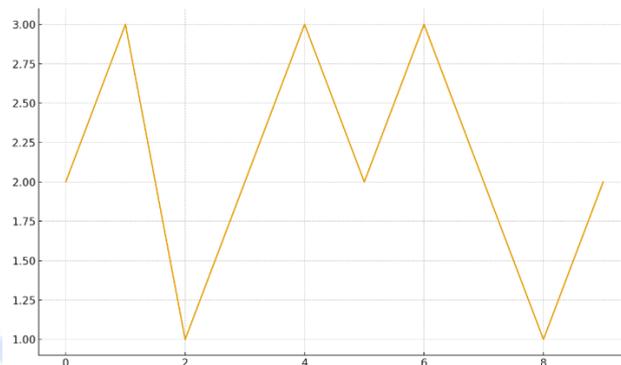


Figure 6. Visual Output

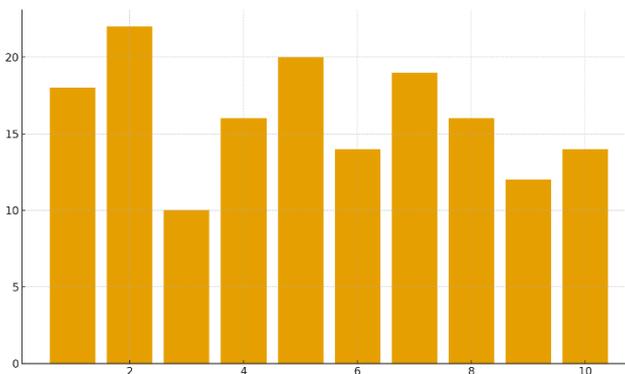


Figure 7. Visual Output

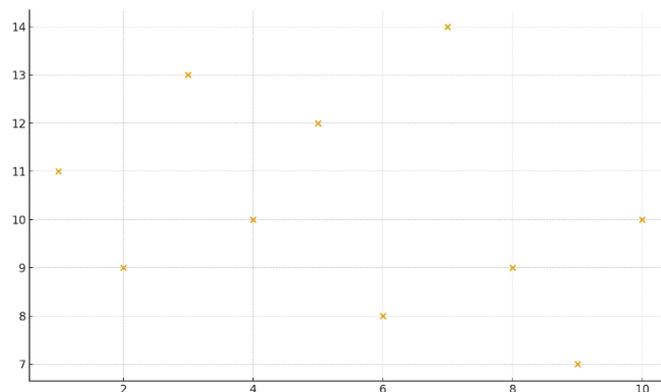


Figure 8. Visual Output

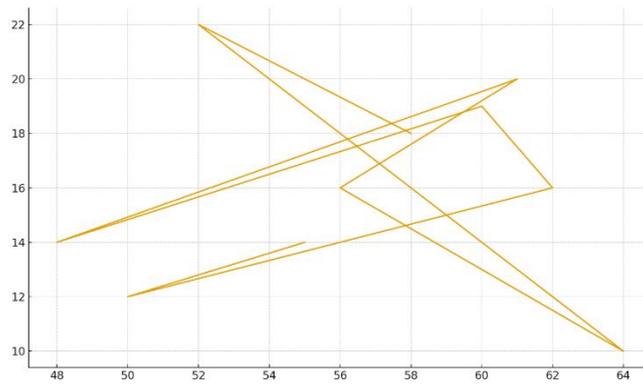


Figure 9. Visual Output

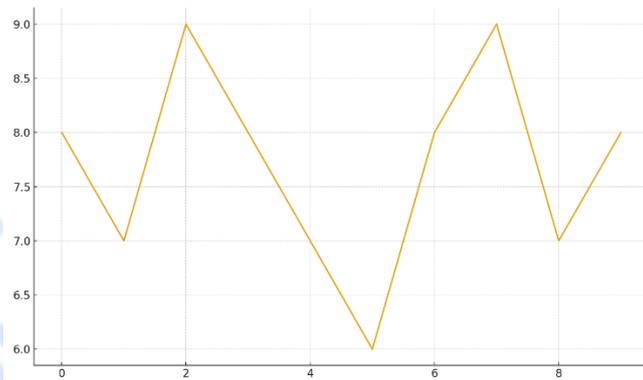


Figure 10. Visual Output

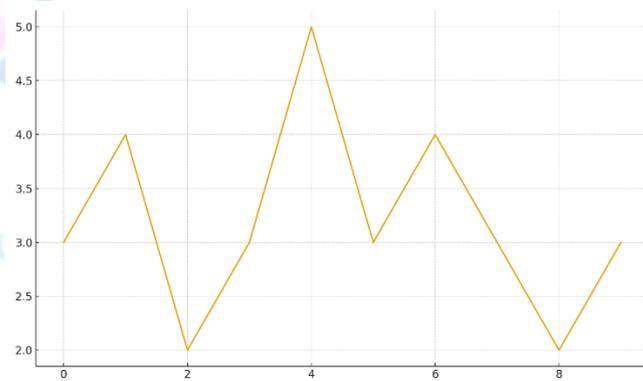


Figure 11. Visual Output

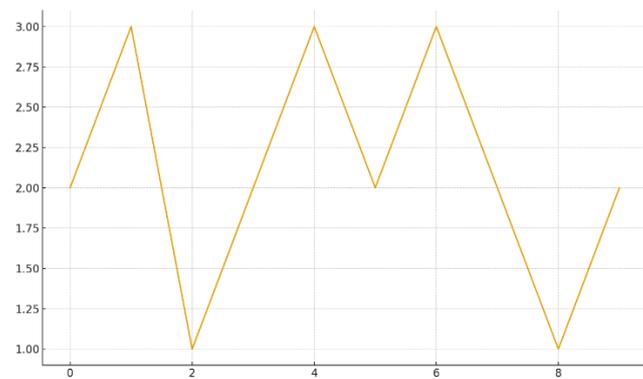
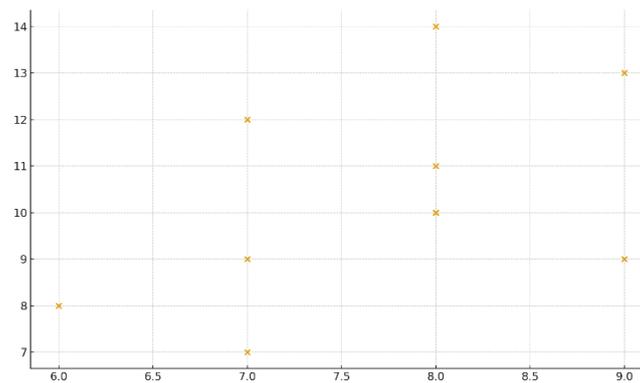


Figure 12. Visual Output

DISCUSSION

The connection between psychosocial variables and postoperative experience in the area of spine surgery and specifically the relationship between the variables of anxiety, pain catastrophising, and depression with the chronic pain and opioid use have been examined in multiple studies (Aglia et al., 2023). (Scarone et al., 2022). An example is the direct relationship between anxiety and patient dissatisfaction that may or may not have a psychiatric history and, therefore, the necessity to separate their impact on patient dissatisfaction and that of depression (Yamamoto et al., 2021). On the other hand, other researchers have shown that the less time spent with disability the more at risk of depression. This can be attributed to the fact that it can take the mind to adjust to a new diagnosis. Greater exposure to anxiety, in its turn, is linked to longer disabilities, and this fact could be attributed to the strain of chronic stress and psychosocial traumas (Piao et al., 2022). This small disparity in terms of the timing effects of disability on depression and anxiety indicates that longitudinal studies is essential in the understanding of the multifunctional interrelationship between physical impairment and mental well-being. Such studies also suggest that postoperative pain and loss of function are among the most frequent risks of patients with preoperative raised levels of depressive symptoms, which fits the long-term

contribution of psychological distress to the postoperative recovery process (Quack et al., 2019) (Şahin et al., 2017). In addition, people with concurrent depression have more severe, protracted, and worsened symptoms of pain and a low self-reported recovery (Goedmakers et al., 2022). The symptom of preoperative anxiety and depression is high in spine surgery patients with one-third of patients displaying the symptoms (Strom et al., 2018), which is known as a powerful predictor of high postoperative pain, functional disorder, and reduced health-related quality of life. This emphasizes the importance of performing extensive preoperative psychological assessment to detect the patients at risk and provide them with tailored treatment to enhance the outcomes of surgery (Javeed et al., 2024) (Amaral et al., 2017). It has been demonstrated numerous times that preoperative depression and anxiety is a serious contributor to bad surgical results and outcomes (Parrish et al., 2021). The patients even with high rates of preoperative anxiety and depression have demonstrated poor clinical outcomes in high scores of the Oswestry Disability Index, even a year after the surgery (Dobran et al., 2017).

CONCLUSION

Results of this follow-up multidisciplinary follow-up study indicate that the results of the chronic pain following spinal surgery can be greatly enhanced through the administration of the coordinated,

structured and prolonged postoperative care which includes the surgical evaluation, physical therapy and support of pain management. On the twelve months evaluation, there was huge and lasting enhancement on the severity of pain, and there were huge enhancements in the functional mobility, daily activities performance and psychological health. The quantitative measurements such as VAS and ODI score showed that there were progressive recovery trends at every follow-up period but the qualitative feedback showed that there were increased confidence, less fear of movement and opinion of recovery. The gradual withdrawal of the opioid dependence, which is supported by the additional participation in the physiotherapy, as well as the introduction of the non-pharmacological techniques of the pain therapies, also serves as the evidence of the success of the holistic care paradigm. Another important observation in the research was that no significant postoperative complications are observed that could have a negative impact on the progression of chronic pain, which justifies the validity of the results obtained. The aspect of including psychological test was also significant since the absence of symptoms of anxiety and depression correlated considerably with the development of physical functioning and pain relief, and the role of offering emotional support as an element of the standard postoperative treatment justifies its significance. On the whole, we have discovered that the best approach to chronic pains following the spine surgery is the interdisciplinary approach rather than single clinical follow-ups as the former is interchangeable with the former in terms of the ability to accelerate the physical recovery, however, it enhances the mental and emotional stability in the future. This article gives good evidence that the multidisciplinary models of care are more successful in the postoperative outcome of patients since they synergize the objective clinical

outcome with the care offered by the patients, and therefore can be considered a crucial component of the present-day spinal surgery rehabilitation programs. The results confirm the necessity to ensure that more people accept the usage of the integrated follow-up systems to help the patients who experience the spine surgery recover faster, have minimized chronic pain, and live even healthier lives.

REFERENCES

- Aglío, L. S., Mezzalana, E., Corey, S., Fields, K. G., Hauser, B. M., Susano, M. J., Culley, D. J., Schreiber, K. L., Kelly-Aglío, N. J., Patton, M. E., Mekary, R. A., & Edwards, R. R. (2023). Does the Association Between Psychosocial Factors and Opioid Use After Elective Spine Surgery Differ by Sex in Older Adults? *Journal of Pain Research*, 3477.
- Amaral, V. F. do, Marchi, L., Martim, H., Amaral, R., Nogueira-Neto, J., Pierro, E., Oliveira, L., Coutinho, E., Marcelino, F., Faulhaber, N., Jensen, R., & Pimenta, L. (2017). Influence of psychosocial distress in the results of elective lumbar spine surgery. *Journal of Spine Surgery*, 3(3), 371.
- Apaydın, Z. K., Demir, N., & Apaydın, A. S. (2024). THE RELATIONSHIP BETWEEN PAIN INTENSITY, PAIN BELIEFS, AND EMOTION REGULATION SKILLS IN NON-SURGICAL SPINAL PATHOLOGY PAIN. *Medical Records*, 6(2), 249.
- Dobran, M., Nasi, D., Gladi, M., Marinelli, M., Mancini, F., Iacoangeli, M., & Scerrati, M. (2017). Clinical and psychological outcome after surgery for lumbar spinal stenosis: A prospective observational study with analysis of prognostic factors.

- Neurologia i Neurochirurgia Polska, 52(1), 70.
- Goedmakers, C. M. W., Beelen, I. van, Komen, F., Zwet, E. W. van, Peul, W. C., Arts, M. P., & Vleggeert-Lankamp, C. (2022). The impact of mental health on outcome after anterior cervical discectomy: cohort study assessing the influence of mental health using predictive modelling. *Acta Neurochirurgica*, 164(11), 3035.
- Goudman, L., Russo, M., Pilitsis, J. G., Eldabe, S., Duarte, R., Billot, M., Roulaud, M., Rigoard, P., & Moens, M. (2025). Treatment modalities for patients with Persistent Spinal Pain Syndrome Type II: A systematic review and network meta-analysis [Review of Treatment modalities for patients with Persistent Spinal Pain Syndrome Type II: A systematic review and network meta-analysis]. *Communications Medicine*, 5(1). *Nature Portfolio*.
- Hajilo, P., Imani, B., Zandi, S., Mehrafshan, A., & Khazaei, S. (2024). Risk factors analysis and risk prediction model for failed back surgery syndrome: a prospective cohort study. *Research Square (Research Square)*.
- Halvorson, R. T., Torres-Espín, A., Callahan, M., Tay, B., O'Neill, C., Berven, S., Lotz, J. C., & Bailey, J. F. (2023). Multi-domain biopsychosocial postoperative recovery trajectories associate with patient outcomes following lumbar fusion. *European Spine Journal*, 32(4), 1429.
- Horst, A. van der, Bohlmeijer, E. T., Schreurs, K. M. G., & Kelders, S. M. (2023). Strength Back – A qualitative study on the co-creation of a positive psychology digital health intervention for spinal surgery patients. *Frontiers in Psychology*, 14.
- Huysmans, E., Goudman, L., Bogaert, W. V., Nijs, J., Putman, K., Moens, M., Buyl, R., Ickmans, K., Barajas, G. G., Fernández-Carnero, J., & Coppieters, I. (2022). Experimental Pain Measurements Do Not Relate to Pain Intensity and Pain Cognitions in People Scheduled for Surgery for Lumbar Radiculopathy. *Pain Medicine*, 24(2), 139.
- Javeed, S., Benedict, B., Yakdan, S., Saleem, S., Zhang, J. K., Botterbush, K., Frumkin, M., Hardi, A., Neuman, B. J., Kelly, M. P., Steinmetz, M. P., Piccirillo, J. F., Goodin, B. R., Rodebaugh, T. L., Ray, W. Z., & Greenberg, J. K. (2024). Implications of Preoperative Depression for Lumbar Spine Surgery Outcomes [Review of Implications of Preoperative Depression for Lumbar Spine Surgery Outcomes]. *JAMA Network Open*, 7(1). *American Medical Association*.
- Katz, J. (2011, November 19). One man's risk factor is another man's outcome: Difference in risk factor profiles for chronic postsurgical pain maintenance vs transition. In *Pain* (Vol. 153, Issue 3, p. 505). *Lippincott Williams & Wilkins*.
- Manchikanti, L. (2001). Interventional Techniques in the Management of Chronic Pain: Part 2.0. *Pain Physician*, 24.
- Manchikanti, L. (2003). Evidence-Based Practice Guidelines for Interventional Techniques in the Management of Chronic Spinal Pain. *Pain Physician*, 3.
- Manchikanti, L. (2009). Comprehensive Review of Neurophysiologic Basis and Diagnostic Interventions in Managing Chronic Spinal Pain. *Pain Physician*.
- Mazzucchi, E., Rocca, G. L., Cusumano, D., Bazzu, P., Pignotti, F., Galieri, G., Rinaldi, P.,

- Santis, V. D., & Sabatino, G. (2023). The role of psychopathological symptoms in lumbar stenosis: A prediction model of disability after lumbar decompression and fusion. *Frontiers in Psychology*, 14.
- Miękisiak, G. (2023). Failed Back Surgery Syndrome: No Longer a Surgeon's Defeat—A Narrative Review [Review of Failed Back Surgery Syndrome: No Longer a Surgeon's Defeat—A Narrative Review]. *Medicina*, 59(7), 1255. Multidisciplinary Digital Publishing Institute.
- Naïditch, N., Billot, M., Moens, M., Goudman, L., Cornet, P., Breton, D. L., Roulaud, M., Ounajim, A., Page, P., Lorgeoux, B., Nivole, K., Priès, P., Swennen, C., Teyssédou, S., Charrier, E., Montgazon, G. B. de, Descoins, P. F., Roy-Moreau, B., Grimaud, N., ... Rigoard, P. (2021). Persistent Spinal Pain Syndrome Type 2 (PSPS-T2), a Social Pain? Advocacy for a Social Gradient of Health Approach to Chronic Pain. *Journal of Clinical Medicine*, 10(13), 2817.
- Ounajim, A. (2022). Mixture of random time-varying coefficients and longitudinal factor analysis models and their application to chronic pain multidimensional assessment. HAL (Le Centre Pour La Communication Scientifique Directe).
- Ounajim, A., Billot, M., Louis, P.-Y., Slaoui, Y., Frasca, D., Goudman, L., Roulaud, M., Naïditch, N., Lorgeoux, B., Baron, S., Nivole, K., Many, M., Adjali, N., Page, P., Bouche, B., Charrier, E., Poupin, L., Rannou, D., Montgazon, G. B. de, ... Rigoard, P. (2021). Finite Mixture Models Based on Pain Intensity, Functional Disability and Psychological Distress Composite Assessment Allow Identification of Two Distinct Classes of Persistent Spinal Pain Syndrome after Surgery Patients Related to Their Quality of Life. *Journal of Clinical Medicine*, 10(20), 4676.
- Parrish, J. M., Jenkins, N. W., Massel, D. H., Rush, A. J., Soni, M., Hrynewycz, N. M., Brundage, T. S., Horn, R., & Singh, K. (2021). The Perioperative Symptom Severity of Higher Patient Health Questionnaire-9 Scores Between Genders in Single-Level Lumbar Fusion. *The International Journal of Spine Surgery*, 15(1), 62.
- Piao, Z., Choi, H., Jeon, B., & Han, E. (2022). Visual Disabilities and Depression/Anxiety Among Adolescents: A Nationwide Cohort Study.
- Prabhakar, N., Chadwick, A. L., Nwaneshiudu, C. A., Aggarwal, A., Salmasi, V., Lii, T. R., & Hah, J. M. (2022). Management of Postoperative Pain in Patients Following Spine Surgery: A Narrative Review [Review of Management of Postoperative Pain in Patients Following Spine Surgery: A Narrative Review]. *International Journal of General Medicine*, 4535. Dove Medical Press.
- Quack, V., Boecker, M., Mueller, C. A., Mainz, V., Geiger, M., Heinemann, A. W., Betsch, M., & Mansy, Y. E. (2019). Psychological factors outmatched morphological markers in predicting limitations in activities of daily living and participation in patients with lumbar stenosis. *BMC Musculoskeletal Disorders*, 20(1).
- Şahin, N., Karahan, A. Y., Devrimsel, G., & Gezer, İ. A. (2017). Comparison among pain, depression, and quality of life in cases with failed back surgery syndrome and non-

- specific chronic back pain. *Journal of Physical Therapy Science*, 29(5), 891.
- Scarone, P., Santbrink, W. V., Koetsier, E., Smeets, A. Y. J. M., Santbrink, H. van, & Peters, M. L. (2022). The effect of perioperative psychological interventions on persistent pain, disability, and quality of life in patients undergoing spinal fusion: a systematic review [Review of The effect of perioperative psychological interventions on persistent pain, disability, and quality of life in patients undergoing spinal fusion: a systematic review]. *European Spine Journal*, 32(1), 271. Springer Science+Business Media.
- Sebaaly, A., Lahoud, M.-J., Rizkallah, M., Kreichati, G., & Kharrat, K. (2018). Etiology, Evaluation, and Treatment of Failed Back Surgery Syndrome [Review of Etiology, Evaluation, and Treatment of Failed Back Surgery Syndrome]. *Asian Spine Journal*, 12(3), 574. Korean Spine Society.
- Strøm, J., Bjerrum, M., Nielsen, C. V., Thisted, C. N., Nielsen, T. L., Laursen, M., & Jørgensen, L. B. (2018). Anxiety and depression in spine surgery—a systematic integrative review [Review of Anxiety and depression in spine surgery—a systematic integrative review]. *The Spine Journal*, 18(7), 1272. Elsevier BV.
- Troussier, S., Ferrero, E., Lefèvre-Colau, M., Feydy, A., Guigui, P., Rannou, F., & Nguyen, C. (2022). Impact of a multidisciplinary team meeting on patient-reported outcomes at 2 years after lumbar surgery: A prospective comparative exploratory study. *Medicine*, 101(47).
- Yamamoto, Y., Kawakami, M., Minetama, M., Nakagawa, M., Teraguchi, M., Kagotani, R., Mera, Y., Sumiya, T., Matsuo, S., Kitano, T., & Nakagawa, Y. (2021). Psychological Predictors of Satisfaction after Lumbar Surgery for Lumbar Spinal Stenosis. *Asian Spine Journal*, 16(2), 270.
- Yoon, J.-P., Son, H.-S., Lee, J., & Byeon, G. (2024). Multimodal management strategies for chronic pain after spinal surgery: a comprehensive review [Review of Multimodal management strategies for chronic pain after spinal surgery: a comprehensive review]. *Anesthesia and Pain Medicine*, 19(1), 12.