Am J Transl Res 2026;18(1):421-431
www.ajtr.org /ISSN:1943-8141/AJTR0169781

Original Article

Psychological intervention as an adjunct to sedation and analgesia: benefits for emotional state, resilience, and postoperative recovery among emergency multiple trauma patients

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Received November 4, 2025; Accepted December 10, 2025; Epub January 15, 2026; Published January 30, 2026

Abstract: Objective: This study aimed to explore the impact of combining sedation and analgesia management with psychological intervention for the rehabilitation of emergency patients with multiple trauma. Methods: This retrospective study included 211 multiple trauma patients with traumatic fracture who were admitted to the First Affiliated Hospital of Bengbu Medical University between January 2020 and October 2024. Based on the intervention strategy, patients were assigned to either the conventional intervention group (n=102) or the conventional + psychological intervention group (n=109). The conventional intervention group received conventional sedation, analgesia and rehabilitation training. The conventional + psychological intervention group got added psychological intervention carried out by professional psychologists. The two patient groups were compared in terms of negative emotion, post-traumatic stress disorder (PTSD), psychological resilience, incidence of postoperative adverse reactions, and quality of life. Results: After the intervention, the Self-rating Anxiety Scale (SAS) score (42.80±5.60), Self-rating Depression Scale (SDS) score (40.36±6.23), and all dimension scores of the PTSD Checklist-Civilian Version (PCL-C) in the conventional + psychological intervention group were significantly lower than those of the conventional intervention group (all $P<0.05$). In contrast, the conventional + psychological intervention group showed significantly higher scores for all dimensions of the Connor-Davidson Resilience Scale (CD-RISC) and World Health Organization Quality of Life-BREF (WHOQOL-BREF), as well as a significantly lower incidence of postoperative adverse reactions, compared to the conventional group (all $P<0.05$). Conclusion: The combination of sedation and analgesia management with psychological intervention in emergency multiple trauma patients improved negative emotional states, psychological resilience, and quality of life, and reduced PTSD and postoperative complications.

Keywords: Psychological intervention, multiple trauma, rehabilitation treatment, psychological condition, application effect

Introduction

Multiple trauma usually refers to patients who have suffered severe injury including from traffic accidents or falls from heights. These events can lead to multi-organ damage and life-threatening hemorrhagic shock or multiple organ failure [1]. Although Van Breugel et al. reported a decline of approximately 1.8% per year in the mortality rate of multiple trauma patients in the intensive care unit (ICU) over the past decades, the in-hospital mortality rate remains high, at around 15% [2]. As a result, the clinical management of emergency multiple trauma patients continues to pose significant challenges.

At present, surgery is the main method for dealing with multiple trauma. However, the patient's own injury is complex, and the trauma and physiological stress caused by the surgery itself may all affect the final treatment outcome and postoperative recovery [3]. To effectively reduce the incidence of postoperative complications and ultimately improve the prognosis of patients, it is crucial to adopt and implement scientific and systematic intervention measures

https://doi.org/10.62347/DMQZ9016

in clinical care [4]. However, the strategies for current clinical practice mostly focus on the recovery of patients' physiologic function damage and the stability of vital signs. Patients with multiple traumas often suffer from severe post-traumatic stress disorder (PTSD), chronic pain, and psychological distress [5]. The mutual influence of physical and mental states will further limit outcomes. Negative emotions can interfere with pain perception and treatment compliance. In addition, they can increase the complexity of treatment and raise the risk of disability and death [6].

Traditional sedation and analgesia management focuses more on the physiological symptoms of patients. Although this can achieve relatively significant effects in pain control, some deficiencies have gradually been exposed in practical application. The improvement effect on problems such as anxiety and depression that often accompany patients is often rather limited [7]. Effective psychological intervention is centered on the establishment of a trust-based treatment alliance, thereby creating a basis for providing personalized support to enhance the patient's psychological resilience. When patients feel understood and supported, their level of cooperation with treatment is greatly improved [8]. The study of psychological intervention to reduce anxiety and depression and improve the overall quality of life of cancer patients [9, 10] confirmed this enhanced effect. Nevertheless, there is a lack of research on targeted psychological strategies for patients with multiple injuries in emergency and rehabilitation environments. Especially regarding promoting postoperative recovery and enhancing psychological resilience, this still deserves further verification.

The main purpose of our research was to determine whether combiningsedation and analgesia with psychological care was effective for patients with multiple injuries and illnesses in the emergency department. Specifically, we intended to help patients relieve bad moods, reduce post-traumatic stress disorder, make their inner selves stronger, and ultimately recover better. We hope that through this research, we can find a new way to care for patients, not only to heal their physical injuries but also to soothe their psychological wounds.

Materials and methods

General information

This retrospective study selected 211 trauma fracture patients with multiple injuries, who were treated in the First Affiliated Hospital of Bengbu Medical University between January 2020 and October 2024, as research subjects.

Inclusion criteria: (1) patients with traumatic fractures; (2) the body presented with two or more injuries; (3) age ≥18 years old; (4) no history of mental illness, physical disabilities, or terminal diseases prior to the injury; (5) complete clinical records.

Exclusion criteria: (1) patients with systemic infections, multiple organ failure, or paraplegia; (2) comorbidity with other severe underlying diseases or coagulation dysfunction; (3) patients with persistent coma resulting from severe traumatic brain injury or similar conditions; (4) individuals with cognitive, auditory, or other functional impairments; (5) patients who either failed to complete the 3-month follow-up after the intervention or were lost to follow-up due to death, changes in contact information, or other reasons.

This study was approved by the Ethics Committee of the First Affiliated Hospital of Bengbu Medical University.

Methods

Based on the intervention strategies, patients were assigned to either the conventional intervention group (n=102) or the conventional + psychological intervention group (n=109). The conventional intervention group received conventional sedation, analgesia, and rehabilitation training. The conventional + psychological intervention group received added psychological intervention carried out by professional psychologists. The following text will specifically explain the time and method of the intervention. After the patients were discharged from the hospital, we conducted a three-month follow-up with them once a month.

(1) In supportive psychological intervention, we first encourage patients to express their thoughts and emotions without any burden

through positive communication. The consultant listened patiently and paid attention to the patient's concerns about the surgery and subsequent treatment to truly understand the patient's situation. On this basis, personalized guidance was provided to help patients eliminate anxiety and build confidence, thereby gaining the strength to face difficulties. This support was provided during the daily postoperative ward rounds, each lasting approximately 10 minutes.

(2) Cognitive behavioral intervention aimed to help patients understand the characteristics and recovery patterns of traumatic fractures and multiple injuries. The doctor would, in light of the patient's specific condition, conduct one-on-one communication to analyze the interaction between pain, anxiety, and cognition and guide patients to identify their own irrational perceptions such as catastrophic thinking or excessive worry. This can promptly correct patients' misunderstandings about postoperative pain, help them interpret it as a normal part of the recovery process, and teach them simple emotional regulation techniques. Each intervention lasted approximately 20 minutes and was implemented on the first day after surgery, the day before discharge, and during monthly follow-ups respectively, to help patients establish a positive and rational view of the disease, reduce psychological burden, and enhance confidence in recovery.

(3) Relaxation training aims to relieve patients' tension and emotional stress and is implemented under the guidance of the rehabilitation team. Guide patients to apply relaxation techniques such as deep breathing and meditation. These measures are trained once on the first day after the operation and once before discharge, each time for about 20 minutes.

(4) In terms of social support, we not only explained to patients and their families the importance and methods of postoperative rehabilitation. We even encouraged patients to keep exercising and ask their family members to accompany and support them throughout the process. We showed families how to use positive words to encourage patients and help them stay optimistic. At the same time, we suggested that family members practice relaxation techniques like meditation with the patient to create a calm environment for mental recovery. In daily life, friends and family should pay attention to the patient's emotional changes, start conversations, share happy moments, and together create a warm home atmosphere. To help patients ease anxiety, they were encouraged to listen to soothing music, read their favorite books, or watch light-hearted shows, helping shift their focus away from worries about their condition.

Evaluation indicators

Primary outcome indicators: (1) Negative emotions: Pre-intervention (on postoperative day 1) and post-intervention (at the 3-month follow-up), the Self-rating Anxiety Scale (SAS) [11] and the Self-rating Depression Scale (SDS) [12] were utilized to assess the negative emotional states of the two patient groups. Both scales have a maximum score of 100, with a score threshold of 50 for both SAS and SDS. Higher scores indicate more severe negative emotional symptoms in the patients.

(2) PTSD: PTSD in both patient groups was assessed before the intervention (on postoperative day 1) and after the intervention (at the 3-month follow-up) using the Post-Traumatic Stress Disorder Checklist-Civilian Version (PCL-C) [13]. This assessment tool consists of 17 items that evaluate three key symptom clusters: re-experiencing, avoidance/numbing, and hyperarousal. A higher score on the PCL-C indicates a greater level of trauma experienced by the individual.

Secondary outcome indicators: (1) Psychological resilience: Both groups of subjects were evaluated for psychological resilience using the Chinese version of the Conner-Davidson Resilience Scale (CD-RISC) [14] before the intervention (on the first day after the operation) and after the intervention (at the 3-month follow-up). This scale consists of 25 items, each item is scored on a scale of 0 to 4 points, with a maximum total score of 100 points. The higher the score, the stronger the level of psychological resilience.

(2) Adverse reactions: During the intervention period and throughout postoperative follow-up, the occurrence of all adverse reactions in both groups of patients was regularly monitored and documented.

(3) Quality of life: In this study, the World Health Organization Quality of Life Brief Version (WHOQOL-BREF) was used to assess patients' quality of life three months post-surgery, evaluating four domains: Physical Health, Psychological Health, Social Relationships, and Environment [15]. Each domain was scored on a scale from 4 to 100, with higher scores reflecting a better perceived quality of life.

Statistical analysis

Statistical analyses in this study were conducted using SPSS version 22.0. Kolmogorov-Smirnov normality test was applied for data distribution assessment. All continuous variables were normally distributed and are expressed as mean ± standard deviation ($\bar{x} \pm s$). Differences between groups were assessed using independent samples t-tests, while comparisons of indicators at different time points within the same group were performed using paired t-tests. The categorical variables were expressed as percentage and compared by χ^2 test. Two-sided $P<0.05$ was considered significant.

Results

Comparison of basic data

There were no significant differences in gender, age, BMI, marital status, educational background, time interval between injury and hospital admission, cause of injury, location of the fracture, multiple trauma conditions, or ISS between the two groups ($P>0.05$) (**Table 1**).

Comparison of SAS scores

Before the intervention, there was no significant difference in SAS scores between the conventional and conventional + psychological intervention groups. After the intervention, SAS scores in both groups decreased significantly compared with baseline ($P<0.001$). Moreover, the conventional + psychological intervention group had significantly lower SAS scores than the conventional intervention group at the 3-month follow-up (42.80±5.60) vs. (46.26±6.09), $P<0.001$ (**Figure 1A**).

Comparison of SDS scores

There was no significant difference in SDS scores between the two groups before the intervention. Following the intervention, SDS scores in both groups decreased significantly compared with pre-intervention values ($P<0.001$). At the 3-month follow-up, the conventional + psychological intervention group showed markedly lower SDS scores than the conventional intervention group (40.36±6.23) vs. (43.48±5.92), $P<0.001$ (**Figure 1B**).

Comparison of PTSD

Before the intervention, there were no statistically significant differences in the scores for the three dimensions of the PCL-C scale - re-experiencing, avoidance/numbing, and hyperarousal - between the conventional intervention group and the conventional + psychological intervention group ($P>0.05$). After the intervention, the scores for each dimension of the PCL-C scale in both groups were significantly reduced compared to baseline ($P<0.05$). Moreover, the conventional + psychological intervention group demonstrated significantly lower scores across all dimensions of the PCL-C scale compared to the conventional intervention group ($P<0.05$) (**Figure 2**).

Comparison of psychological resilience

As shown in **Figure 3**, before the intervention, there were no significant differences between the conventional intervention group and the conventional + psychological intervention group in their scores for the optimism, self-efficacy, and resilience dimensions on the CD-RISC scale ($P>0.05$). After the intervention, scores on all dimensions of the CD-RISC scale were significantly lower in both groups compared to baseline ($P<0.05$), with the conventional + psychological intervention group showing significantly higher scores on each dimension than the conventional intervention group ($P<0.05$). These findings suggest that the conventional + psychological intervention group receiving systematic psychological support was mentally stronger in coping with postoperative difficulties and better able to adjust themselves and overcome challenges.

Comparison of adverse reactions

As shown in **Table 2**, the results of this study indicated that the incidence of adverse reactions in the conventional + psychological intervention group (9.17%) was less than half of that

Table 1. Comparison of basic data [n (%)]/($\bar{x}$ ± s)

	Conventional intervention group (n=102)	Conventional + psychological intervention group (n=109)	t/χ^2	*P*
Gender			0.808	0.369
Male	75 (73.53)	74 (67.89)		
Female	27 (26.47)	35 (32.11)		
Age	55.82±18.15	53.71±17.92	0.850	0.397
BMI (kg/m^2)	23.46±2.58	23.74±2.17	0.855	0.378
Marital status			1.584	0.208
Unmarried	10 (9.80)	17 (15.60)		
Married	92 (90.20)	92 (84.40)		
Educational background			3.943	0.139
Primary school	15 (14.71)	21 (19.27)		
Middle and high school	38 (37.25)	27 (24.77)		
College	49 (48.04)	61 (55.96)		
Time interval between injury and hospital admission (h)	3.22±1.21	3.54±1.39	1.778	0.077
Cause of injury			0.278	0.870
Traffic accident	69 (67.65)	70 (64.22)		
Fall from height	18 (17.65)	21 (19.27)		
Crush injury	15 (14.71)	18 (16.51)		
Location of the fracture			2.978	0.395
Pelvic fracture	30 (29.41)	21 (19.27)		
Limb fractures	52 (50.98)	64 (58.72)		
Spinal fracture	12 (11.76)	14 (12.84)		
Skull fracture	8 (7.84)	10 (9.17)		
Multiple trauma conditions			2.305	0.316
Organ injury	41 (40.20)	33 (30.28)		
Brain injury	9 (8.82)	12 (11.01)		
Limb injury	52 (50.98)	64 (58.72)		
ISS	24.58±4.46	24.83±4.97	0.384	0.705

Note: BMI: body mass index; ISS: injury severity score.

in the conventional intervention group (19.61%) (*P*<0.05). These data strongly support the positive role of psychological interventions in rehabilitation management.

Comparison of quality of life

As shown in **Table 3**, after the intervention, the scores of the conventional + psychological intervention group on all four dimensions of the WHOQOL-BREF scale were significantly higher than those of the conventional intervention group (*P*<0.05). Our findings in this section indicate that integrating psychological intervention into postoperative rehabilitation management can improve patients' quality of life.

Logistic regression of factors influencing improvement in SDS and SAS scores

Negative emotional status was considered a key outcome in this study. Based on established clinical cut-off values, good emotional status was defined as SAS <50 and SDS <50 at the 3-month follow-up (coded as 0), while persistent negative emotions (SAS ≥50 and/or SDS ≥50) were classified as poor emotional outcomes (coded as 1). As shown in **Table 4**, to control for the influence of confounding factors, age and gender were included as covariates in the logistic regression model. Univariate logistic regression analysis showed that the risk of persistent negative emotions in patients

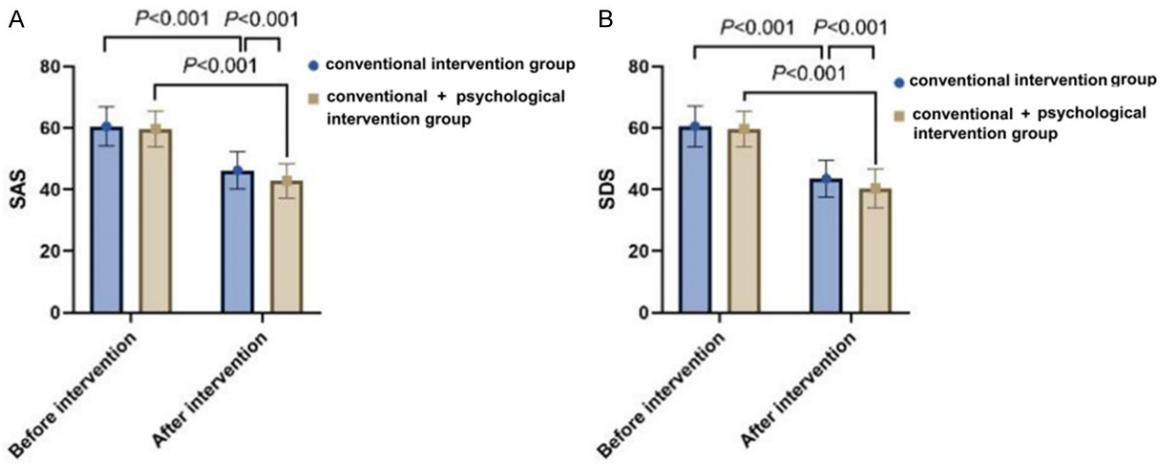

Figure 1. Comparison of SAS and SDS. A. SAS; B. SDS. SDS: Self-rating Depression Scale; SAS: Self-rating Anxiety Scale.

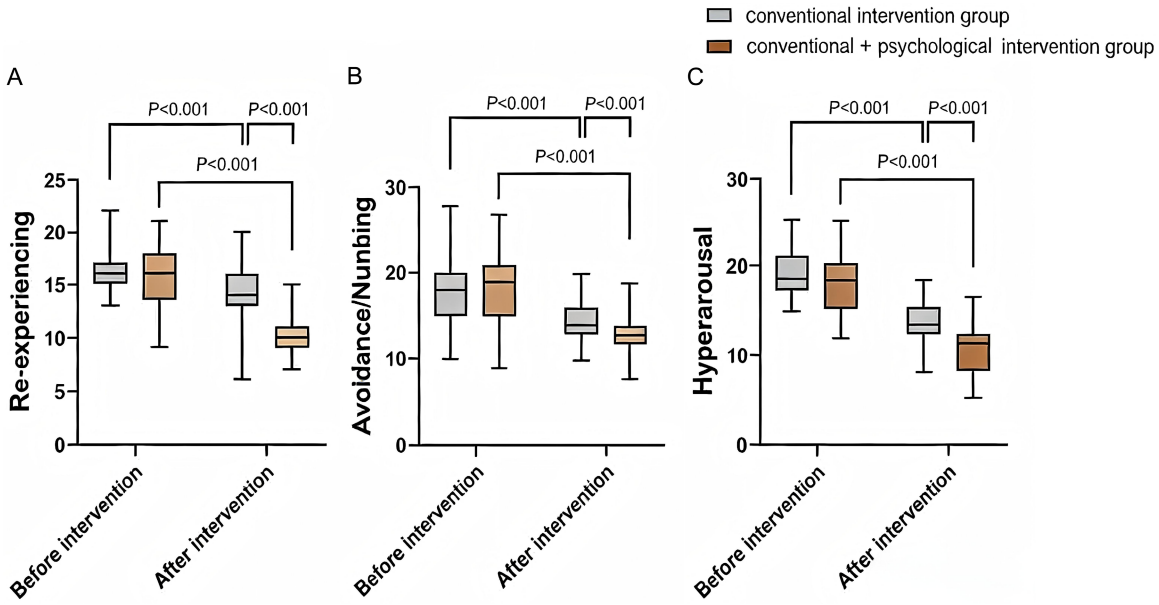

Figure 2. Comparison of PTSD. A. Re-experiencing; B. Avoidance/Numbing; C. Hyperarousal. PTSD: post-traumatic stress disorder.

who received combined intervention was significantly lower than that in those who did not (P=0.006). Then, adjusting for age and gender, the multivariate logistic regression indicated that combined intervention was an independent protective factor (P=0.006).

Discussion

Emergency multiple trauma patients often experience intense anxiety, fear, and other negative emotions due to the sudden onset and critical nature of their injuries, which can disrupt their active cooperation in treatment [16, 17]. This study compared two groups of patients to verify the effectiveness of the sedation and analgesia management program integrating psychological intervention for multiple trauma. Compared to the standard program, the program integrating psychological intervention was more effective in both psychological rehabilitation and overall rehabilitation effects.

Conventional sedation and analgesia management can effectively relieve the pain caused by trauma, but not the psychological burden of

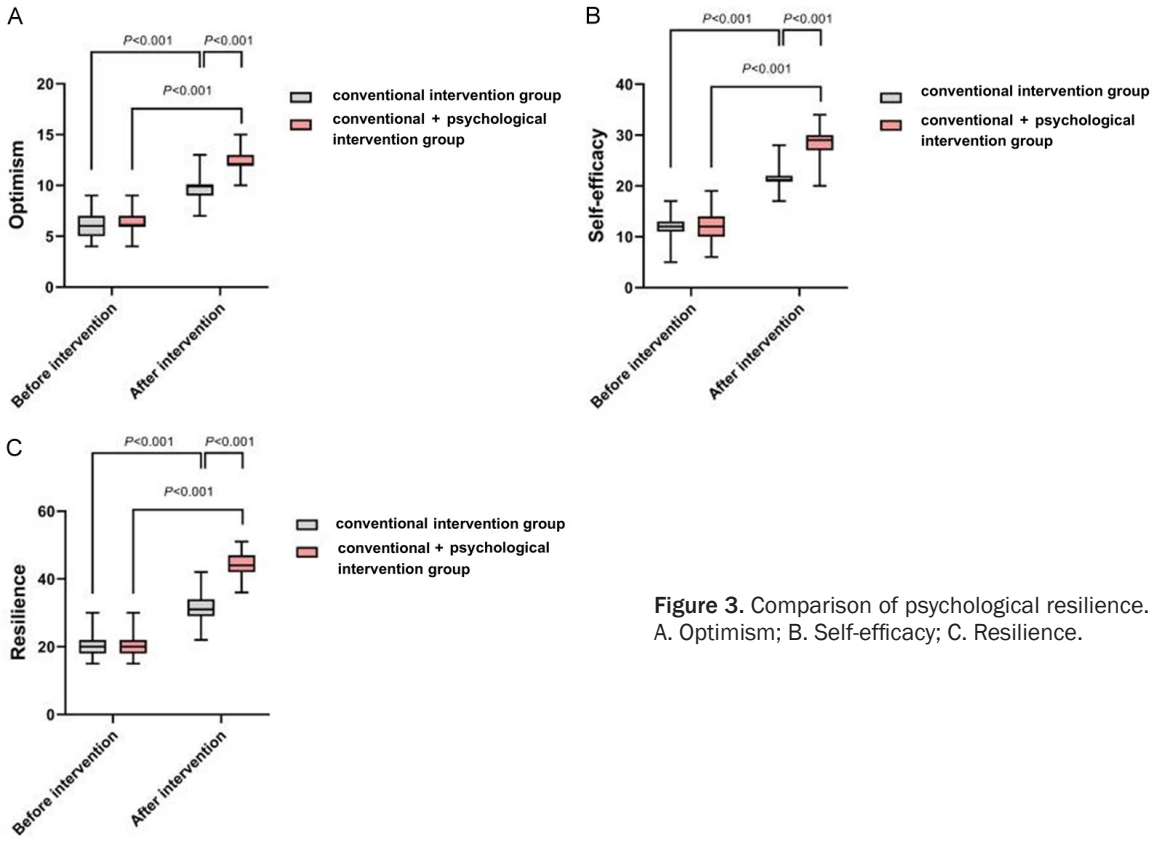

Figure 3. Comparison of psychological resilience. A. Optimism; B. Self-efficacy; C. Resilience.

Table 2. Comparison of adverse reactions

	Conventional intervention group (n=102)	Conventional + psychological intervention group (n=109)	χ^2	*P*
Overall incidence of adverse reactions	20 (19.61)	10 (9.17)	4.703	0.030
Wound infection	8 (7.84)	6 (5.50)		
DVT of the lower extremities	4 (3.92)	1 (0.92)		
Hypothermia	6 (5.88)	3 (2.75)		
Arrhythmia	2 (1.96)	0 (0.00)		

Note: DVT: deep vein thrombosis.

Table 3. Comparison of quality of life

	Conventional intervention group (n=102)	Conventional + psychological intervention group (n=109)	*t*	*P*
Physical health	69.78±8.18	79.27±10.30	7.379	<0.001
Psychological health	72.18±8.92	79.23±9.56	5.529	<0.001
Social relationships	70.43±9.04	80.23±10.28	7.333	<0.001
Environment	73.90±9.78	79.35±8.88	4.242	<0.001

patients. Literature indicates that patients with multiple traumas who have low psychological resilience may still continue to experience frequent invasive memories and insomnia and other symptoms after receiving conventional sedation and analgesia treatment. These adverse symptoms can cause serious interference to the patient's recovery process. It may also have a serious negative impact on the quality of life of patients [18, 19]. Conventional

Table 4. Logistic regression of factors influencing improvement in SDS and SAS scores

	Univariate analysis					Multivariate analysis				
	β	S.E	Z	*P*	OR (95% CI)	β	S.E	Z	*P*	OR (95% CI)
Combined intervention										
NO					1.00 (Reference)					1.00 (Reference)
Yes	-0.89	0.32	-2.75	0.006	0.41 (0.22-0.78)	-0.90	0.32	-2.77	0.006[a]	0.41 (0.22-0.77)
Age	0.00	0.01	0.45	0.651	1.00 (0.99-1.02)					
Gender										
Male					1.00 (Reference)					
Female	0.18	0.34	0.53	0.597	1.19 (0.62-2.31)					

Note: SDS: Self-rating Depression Scale; SAS: Self-rating Anxiety Scale; a: adjusted for age and gender.

drug treatment and therapy are insufficient to achieve comprehensive rehabilitation effects, especially in the field of psychological rehabilitation [20]. Additional intervention measures need to be taken to support patients in achieving full recovery.

The approach that combining sedation and analgesia management helps patients establish a positive rehabilitation mindset and supports the smooth progression of their recovery. This study implemented supportive psychological intervention. It first built trust through effective communication. This approach then encouraged patients to openly express their concerns and emotions. Additionally, the intervention provided personalized emotional support by actively listening to the patients' emotional needs. She et al. found that when healthcare providers listen respectfully, patient outcomes improve. This significantly lowers anxiety and depression and increases treatment adherence [21]. Furthermore, emergency multiple trauma patients often exhibit negative cognitive biases following traumatic events, such as excessive worry or negative anticipation regarding pain, surgery, and the rehabilitation process [22]. Wheeler's team posited that cognitive interventions are closely associated with clinical outcomes in brain injury patients, yet many patients lack adequate disease knowledge, underscoring the need for systematic education by healthcare professionals [23]. A study by Wang et al. found that progressive muscle relaxation training significantly reduced self-reported pain and alleviated anxiety levels, which helped patients maintain a positive attitude during postoperative recovery, thereby enhancing rehabilitation outcomes [24]. Social support interventions, facilitated by active family involvement, significantly increased patients' emotional support levels and improved their psychological health [25]. Bernardes et al.'s research emphasized that social support interventions tailored to the psychological needs of post-trauma patients encouraged ongoing communication with the outside world, enabling patients to receive care and support from both family and society [26]. This approach helps to relieve patients' psychological burden, enhances their proactivity and engagement in the treatment process, and effectively aids in the management and alleviation of psychological distress. Therefore, the combination of psychological intervention with sedation and analgesia management provides not only physiologic sedation and pain relief but also supports emotional and cognitive recovery, ultimately promoting a smoother rehabilitation process.

Due to the complexity of their conditions, patients with multiple trauma are at high risk of various complications. Zhu et al.'s research indicates that the infection rate of patients within 24 hours after surgery is much higher than that of general surgical patients. Especially in cases with large open wounds, infection control is particularly crucial [27]. Additionally, endothelial damage and blood stasis caused by prolonged bed rest post-surgery are major contributors to the deep vein thrombosis (DVT) of the lower extremities [28, 29]. Literature indicates that patients who are bedridden for extended periods face a significantly higher risk of DVT, which can lead to longer hospital stays and higher readmission rates [30]. Timely intervention in postoperative complications is key to improving patient prognosis and shortening hospital stays. The results of this study confirm this: the incidence of adverse reactions in the conventional + psychological

intervention group was significantly lower, while the quality of life scores were notably higher. This demonstrates that psychological intervention can not only effectively reduce postoperative adverse reactions but also comprehensively enhance the quality of patient recovery. Specifically, with the support of cognitive behavioral intervention, patients gained a clearer understanding of their treatment plans, key postoperative care instructions, and rehabilitation precautions, which improved their comprehension and compliance with the rehabilitation process, ultimately reducing the risk of complications caused by improper care or overlooked details [31]. Moreover, Madeleine et al. highlighted that combining relaxation training with biofeedback techniques allows patients to self-regulate their physiological state, restore balance to the autonomic nervous system, and activate the body's self-repair mechanisms, effectively minimizing postoperative complications arising from anxiety and muscle tension [32]. Both supportive psychological intervention and social support interventions enhanced patients' psychological resilience and emotional regulation skills, enabling them to approach the rehabilitation process with a more positive attitude, further reducing the risks of immune dysfunction and infection due to emotional instability [33, 34]. Therefore, psychological intervention, through a multi-layered intervention approach, significantly reduced the incidence of postoperative complications and substantially improved patients' overall quality of life.

Despite the positive outcomes of this study, several limitations exist. First, the study focused primarily on emergency patients, and the limited sample size may have affected the generalizability of the findings. Second, the follow-up duration was relatively short, preventing a full assessment of the long-term effects of psychological intervention. Therefore, future research should aim to broaden the sample population and extend the follow-up period to better explore the long-term effectof psychological interventions on postoperative rehabilitation.

Conclusion

This model that combining sedation and analgesia management with psychological intervention not only alleviated anxiety and depression and reduced post-traumatic stress disorder, but also heloped enhance patients' psychological resilience and promoted the recovery process.

Disclosure of conflict of interest

None.

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