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The Method of Psychological State Evaluation of Patients after Liver Transplantation based on Analytic Hierarchy Process

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Abstract: At present, the evaluation of psychological status of liver transplant inpatients has gradually developed from subjective experience to comprehensive scientific means, but there are still some problems. It is suggested that the purpose of psychological assessment should be made clear, combined with China's national conditions and the characteristics of hospitalized patients, some psychological assessment scales suitable for liver transplant patients should be developed by optimizing the assessment methods, and reasonable assessment standards should be established, so as to guide clinical psychological nursing practice and improve the scientificity and effectiveness of psychological nursing.

Keywords: Analytic hierarchy process; Liver transplantation; Physical condition assessment

1. Introduction

With the role and status of psychological nursing in modern nursing mode, the evaluation of patients' psychological state is paid more and more attention by the majority of clinical nurses [1]. Accurate evaluation of the psychological state of patients is the premise of optimizing nursing strategies, and has become a consensus of the majority of clinical nurses [2]. The evaluation method of psychological state of inpatients has also gradually changed from the subjective experience type to the comprehensive scientific type [3]. Patients should face many pressures, such as family members' interaction mode change, social life change, physical and psychological discomfort caused by lifelong immunosuppressant, inconvenience of regular review, and heavy economic pressure [4]. The quality of life and psychological state of patients after liver transplantation were investigated and the related psychosocial factors affecting their quality of life and mental state were investigated, which provided theoretical basis for further implementation of clinical psychological intervention [5].

2. Mental health and Quality of Life in Patients after Liver Transplantation

With the continuous treatment and the occurrence of complications, patients will become extremely depressed, and a series of anxiety and depression symptoms with different severity will appear [6]. The second symptoms were sleep disorder, somatization, interpersonal relationship and compulsion. Some patients in the first days after organ transplantation, although the body recovered quickly, but still difficult to adapt psychologically [7]. Traditional therapeutic indicators such as survival rate and mortality only reflect the therapeutic effect of patients from the biomedical level, while quality of life can comprehensively reflect the level of social development and people's living conditions from the subjective feeling of patients after surgery and the ability to return to family and society, which has become a recognized therapeutic evaluation index [8]. Based on the evaluation index, the design operability items are further designed as follows:

Table 1. Items in the first draft of ipeq-1

Aspect	Entry	Diagnostic criteria
Anxious	Feel that something bad will happen and panic	Panic
	Have inexplicable sense of panic	Panic
Depressed	Feel down	Depressed mood
	Feel in a bad mood	Depressed mood
Commit suicide	Have the idea of ending your life	Suicide concept

It has been pointed out by prospective study of liver transplantation patients that the quality of life after liver transplantation will be affected by insufficient psychological preparation before liver transplantation or high expectation of operation [9]. Therefore, it is necessary to carry out psychosocial assessment of patients, including quality of life, subclinical mental state, personality char-

acteristics, past response to stress, compliance, history of substance abuse, social support level, transplantation motivation, current mental state assessment and current psychiatric diagnosis [10].

3. Evaluation of Psychological Status of Patients after Liver Transplantation

3.1. Research objects

Methods from January 2015 to December 2020, 53 outpatients and inpatients underwent liver transplantation in a large tertiary hospital.

3.2. Assessment method

According to the degree of expert opinion concentration and the degree of expert opinion coordination, the indicators are selected according to the degree of expert opinion recognition and importance; the degree of expert opinion coordination indicates the degree of coordination and credibility of all experts on all indicators. According to the experts' self-evaluation, the authority of experts completed the judgment basis and familiarity table of this study.

Table 2. Judgment basis and influence degree quantification table

Judgment basis	The degree of influence on expert judgment		
	Large	Middle	Lower
Theoretical analysis	0.30	0.20	0.10
Practical experience	0.50	0.40	0.30
Intuition	0.10	0.10	0.10

The quantitative values are given in the table. Authority degree is the arithmetic mean value of the sum of judgment coefficient and familiarity coefficient.

$$C_r = \frac{C_a + C_g}{2} \quad (1)$$

There is a certain functional relationship between the authority of experts and their prediction accuracy. Generally speaking, with the increase of experts' authority, the prediction accuracy will be improved. The acceptable range of Cr should reach 0.70 and above. The recovery rate of the expert consultation table is different from the proportion table of the experts who put forward suggestions, and the coefficient indicates the degree of the experts' concern for the research. The greater the difference between the two indicators, the higher the enthusiasm of experts. It is expressed by mean (M) and full score ratio (K), and the calculation formula is as follows:

$$M_j = \frac{1}{m_j}\sum_{i=1}^{m} C_{ij} - C_r \quad (2)$$

Where Mj is the average number of J index evaluation; mj refers to the number of experts participating in J index evaluation; Cij refers to the score value of I expert on J index. The larger Mj is, the higher the importance of the corresponding J index is. Then the full score ratio is further calculated as follows:

$$K_j = \sum M_j + \frac{m_j'}{m_i} \quad (3)$$

The coefficient of variation of the evaluation results is as follows.

$$V_j = \frac{s_j}{K_j - M_j} \quad (4)$$

Furthermore, Kendall coordination coefficient is used to calculate the coordination degree of the indicators.

$$W = \frac{12\sum_{j=1}^{k} R_j^2 - 3bk(k+1)^2}{b^2 k\left(k^2 - 1\right)} \quad (5)$$

In order to ensure the scientificity and rationality of the index weight, this study adopts the comprehensive weighting method to calculate the weight. Then the combination weight product method is used to calculate the combination weight of an index in the evaluation index system, as shown in the table.

Table 3. Weight coefficient of primary index

First level indicators	Importance score	Intra layer weight	Combination weight
A structure	4.79	0.3434	0.3434
B process	4.87	0.3491	0.3491
C results	4.29	0.3075	0.3075

In the significance test of expert coordination coefficient, when pg0.05, the result of expert opinion is credible, otherwise, the expert opinion should be treated carefully.

4. Analysis of Experimental Results

By filling in the form of questionnaire, through the selected scale, the relevant data of the respondents were collected, and then the corresponding statistical processing was carried out to analyze the psychosocial factors affecting the psychological state and quality of life of the patients after transplantation.

4.1. Data statistics processing method

Microsoft Excel 2007 was used to input data, and spss20.0 statistical software was used for statistical analysis. The continuity data was expressed by X ± s, and the correlation between the two variables was analyzed by Pearson correlation.

4.2. Experimental result

According to the reference standard of item screening, the items that are prompted to be deleted by any method are deleted, and the selected items are determined by combining with professional knowledge. The sample size is estimated by simple random sampling, and the calculation formula is as follows:

$$n = \frac{u_{a/2}^2 p(1-p)}{d^2} \quad (6)$$

Using stratified random sampling method, each department according to the patient's bed number according to the random number method to extract hospitalized patients. A total of 1080 questionnaires were distributed in this study, and 1050 effective questionnaires were recovered, with an effective recovery rate of 97.22%. General information of inpatients is shown in the table below.

Table 4. General information of inpatients in pre survey, formal survey and scale evaluation

Project-	Pre investigation (n=130)	-	Formal investigation (n=419)	-	Scale evaluation (n=523)	
	Number of people	Composition ratio (%)	Number of people	Composition ratio (%)	Number of people	Composition ratio (%)
Defect	2	1.54	7	1.67	8	1.53
Married / cohabiting	109	83.85	342	81.62	449	85.85
Defect	8	6.15	9	2.15	15	2.87

There is a significant positive correlation between the personality factors of mental health people and those of professional and successful people and the overall subjective perception of their own health after operation.

Table 5. Correlation analysis between quality of life and 16-pf dimension personality in patients after liver transplantation

Project	Physiological field	Psychological field	Social field	Environmental field	G1	G4
R value	-0.445	-0.320	-0.330	-0.399	-0.362	-0.262
P value	0.002**	0.030*	0.025*	0.006**	0.013*	0.078
R value	0.003	-0.057	-0.11	0.099	0.022	0.08
P value	0.982	0.706	0.466	0.514	0.885	0.597

The standard error of the test level estimation is equal to the reciprocal of the arithmetic mean root of the test information function.

$$SE(q) = [I(q)]^{\frac{1}{2}} \quad (7)$$

The age, education level, postoperative time, economic status, postoperative complications, postoperative stress and other social and disease factors of patients were used as qualitative classification indicators. The analysis results are shown in the table. The determination coefficient r of education level in the physiological field of postoperative quality of life is 0.215, and the regression coefficient B is 1.407.

Table 6. Multiple stepwise regression analysis of influencing factors of qql physiological score in patients after liver transplantation

Variable	B value	Beta	R2	T value	P value
Education level	1.407	0.463	0.215	3.659	0.001**
Postoperative time	-	-	-	-0.633	0.530
Postoperative pressure	-	-	-	-1.019	0.313

The quality of life psychological score of patients after liver transplantation was used as the dependent variable to make multiple stepwise regression analysis. The social and disease factors such as age, education level, postoperative time, economic status, postoperative complications and postoperative pressure were classified qualitatively. The specific detection rate of adverse emotions is shown in Figure.

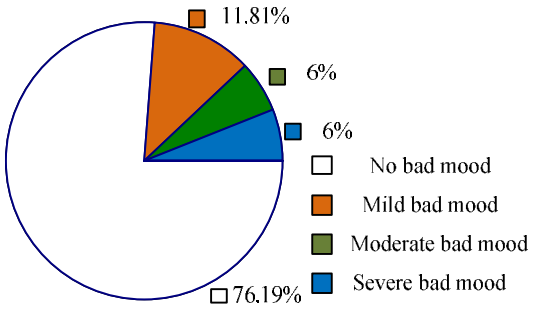

Figure 1. Detection rate of negative emotions in patients

The detection rate of the severity of adverse emotions of inpatients in different departments is shown in the figure below.

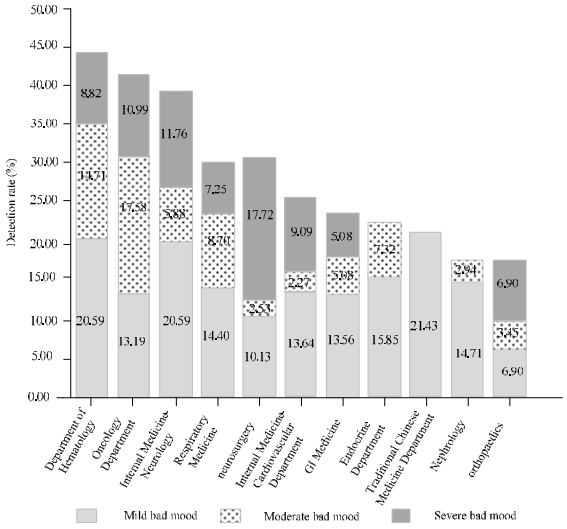

Figure 2. The detection rate of the severity of adverse emotions of inpatients in different departments

4.3. Discuss

The psychological changes of patients after liver transplantation can be divided into three stages: the first stage is the rebirth, in which the patients experience surprise, trust and cooperation; the second stage is the "physical recovery period". With the emergence of a series of problems in the process of postoperative recovery, such as various complications, the patients bear great psychological pressure, which can be manifested as anxiety, depression and other symptoms; the third stage is the "long-term adaptation period". After recovery and adaptation, patients get recognition of new organs, and their quality of life gradually recovers and improves. A series of psychological and physical symptoms, such as anxiety, depression and sleep disorders, may occur after surgery due to high preoperative expectations of surgery, lack of postoperative rehabilitation knowledge, self-care problems, adverse drug reactions and uncertainty about future life.

5. Conclusions

Liver transplantation, as the only effective method to treat end-stage liver disease caused by various reasons, has attracted more and more attention. Traditional therapeutic indicators such as survival rate and mortality rate can only reflect the therapeutic effect from the biomedical level, but cannot fully reflect the mental health and social function of patients. Through the corresponding statistical methods to find the psychosocial factors associated with the quality of life and specific psychological problems, in order to provide theoretical basis and practical guidance for clinical psychological intervention.

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