Identifying typologies of quality of life in patients with moderate to severe hand trauma based on patient-reported outcomes

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Background: This study sought to classify the level of quality of life in patients with moderate to severe hand trauma, and explore differences in their potential profile characteristics based on the Patient-Reported Outcomes Measurement Information System (PROMIS).

Methods: This was a survey research. A convenience sampling method was used to investigate 296 patients with moderate to severe hand trauma. A general information questionnaire (which was used to gather general demographic data and disease-related data) and PROMIS-57 were administered form November 2020 to May 2021. A latent profile analysis and Chi square test were conducted to analyze the data.

Results: Based on quality of life, patients with moderate to severe hand trauma were divided into the following 3 groups: (I) Group C1: the psychosocial-pain low-impact group (38.9%); (II) Group C2: the psychosocial-moderate-impact severe-pain group (43.9%); and (III) Group C3: the psychosocial-pain high-impact group (17.2%). There were significant differences in the distribution of age, educational level, marital status, occupation, monthly income, medical insurance type, family role, subsequent financial resources, cause of the injury, satisfaction with the appearance of the hand, degree of the injury, and impact of the injury on daily life among patients in the different groups (P<0.05).

Conclusions: The quality of life in patients with moderate to severe hand trauma can be identified to provide precise care.

Keywords: Hand trauma; quality of life; patient-reported outcome; latent profile analysis

Introduction

Patients with moderate to severe hand trauma suffer from the partial loss of hand function or even disability, which adversely affects their interpersonal and daily life and may even cause numerous physical and psychological problems (1). Patients with severe physical disabilities are at risk of losing job opportunities and their livelihoods, and becoming self-absorbed. Due to a range of factors, such as physical pain, functional impairment, and loss of work, patients suffer from

anxiety, depression and other psychological problems that can seriously affect their quality of life. Following the shift in the biomedical paradigm, more attention should be paid to the quality of life of patients with hand trauma to treat the disease, improve patients' symptoms, and enhance their physiological functioning (2).

Quality of life refers to the state of health and subjective experience of an individual suffering from an injury or illness, undergoing medical treatment, ageing, or

experiencing changes in their social environment (3). In recent years, latent profile analysis (LPA) has provided a new way of gaining insights into the symptom profiles of different patients (4). The LPA adopts an individual-centered perspective (4) and identifies the response characteristics of study groups and the heterogeneity of differences between cohorts. In this study, based on the concept of patient-reported outcomes, the Patient-Reported Outcomes Measurement Information System (PROMIS), which is a current international standard assessment tool, was used to assess the current quality of life of patients with moderate to severe hand trauma (5,6). Additionally, an individual-centered statistical analysis technique was used to conduct an in-depth analysis on the population heterogeneity of different patients' quality of life to gain a comprehensive understanding of the differences in the internal characteristics of the quality of life in different patients with moderate to severe hand trauma, and provide a reference basis for healthcare professionals to offer targeted and personalized interventions to patients in the future, which will ultimately help enhance patients' experiences and improve their quality of life (7). We present the following article in accordance with the SURGE reporting checklist (available at https://dx.doi.org/10.21037/apm-21-2235).

Methods

Research objects

This was a survey research. With the use of convenience sampling method, investigators and nurses at the Department of Orthopedics enrolled patients with moderate to severe hand trauma in Wuxi Ninth People's Hospital from November 2020 to May 2021. To be eligible to participate in this study, patients had to meet the following inclusion criteria: (I) met the definition of hand trauma and had moderate to severe hand trauma according to the Abbreviated Injury Scale (AIS); (II) aged 18 to 65 years, with the ability to read, understand, and complete the study questionnaire on their own or with the help of others; and (III) understood their condition and were able to participate in this study. Patients were excluded from the study if they met any of the following exclusion criteria: (I) had a mental disorder, cognitive impairment, or self-inflicted injuries; or (II) had compound injuries or other severe complications. All procedures performed in this study involving human participants were in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the ethics committee of Wuxi Ninth People's Hospital (No. KT2020021) and informed consent was taken from all the patients.

Research tools

Patients' sociodemographic information
Data about patients' gender, age, marital status, educational level, occupation, monthly income, family role, medical insurance type, and financial resources were collected.

Patient disease questionnaire
Disease-related data were gathered, including the site of the injury, the cause of the injury, the severity of the injury, the appearance of the hand, and the impact of the injury on daily life. The severity of injury was scored using the AIS (2015 version), which classifies the severity of a patient's hand injury as mild, moderate, or severe (not life-threatening) (8); only patients with moderate to severe hand trauma were included in this study.

PROMIS-57 (Chinese version)
PROMIS-57 is a standardized self-reported questionnaire of quality of life in patients with hand trauma, which comprises 56 items (8 items per dimension) covering the following 7 dimensions: physical function, anxiety, depression, fatigue, sleep disturbance, ability to participate in social roles and activities, and pain interference. Participants were asked to rate each item using a 5-point Likert scale, which included the following response options: never, rarely, sometimes, often, or always. The total score of these 56 items ranges from 56 to 280, with higher score indicating the worse quality of life. For item 57 of PROMIS-57, participants were asked to rate their pain on a numerical rating scale of 0–10 where 0 represents "no pain" and 10 represents "intolerable pain". The PROMIS Health Organization granted the investigators authorization to use the Chinese version of PROMIS-57, which have been confirmed to have good reliability and validity.

Investigation methods

The investigators used a uniform instructional language to explain the purpose of the investigation and cautions. Participants took 20–25 minutes to fill in the paper questionnaires independently at orthopedic ward or outpatient department. They volunteered to complete the questionnaires, and no incentives were provided. The

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investigators checked the questionnaires on the spot, and excluded those with incomplete response or logical error. A total of 308 questionnaires were distributed in this study, and 296 valid questionnaires were returned, with a return rate of 96.1%.

Statistical analyses

SPSS 21.0 and Mplus 7.0 were used to analyze the data. Frequency and percentage were used to describe the categorical variables, and mean ± standard deviation was used to describe the continuous variables. All valid data were collated into Excel, and Mplus 7.0 software was used to analyze the potential category models of quality of life for patients with moderate to severe hand trauma. As the scale entries were divided into continuous variables in this study, an LPA was conducted. Starting from the initial model, the number of categories in the model was gradually increased until the model fit the data optimally (9). The main model fitting indicators were the information evaluation indicators of Akaike information criteria (AIC), Bayesian information criterion (BIC), adjusted Bayesian information criterion (aBIC), Entropy index, Lo-Men-dell-Rubin (LMR), and Bootstrap likelihood ratio test (BLRT). Following the determination of the proportion of potential categories, differences in the distribution of potential categories of quality of life in patients with moderate to severe hand trauma were analyzed to examine general information using the Chi-square test based on the classification results. A P<0.05 was considered statistically significant.

Results

General data

A total of 296 patients with moderate to severe hand trauma participated in this study. Of the patients, 219 (74.0%) were male and 77 (26.0%) were female. The patients were aged from 18 to 65 years old, and had an average age of 39.29±7.53 years. In relation to educational level, most patients (43.6%) had acquired a junior high school level of education, followed by a senior high school or technical secondary school level of education (18.6%), a junior college level of education (14.9%), a primary school or below level of education (16.6%), and a bachelor's degree or above level of education (6.4%). 76.5% of patients were married, 20.6% were unmarried, and 3.0% were divorced

or widowed. The study population was dominated by workers, who accounted for 52.0% of patients. Regarding the income, 19.9%, 23.6%, 34.1%, and 22.3% of patients had a monthly income of less than 2,000 RMB, 2,001–4,000 RMB, 4,001–6,000 RMB, and 6,001 or more RMB, respectively. In terms of medical costs, 39.9% of payments were self-paying, 38.5% were for work-related injuries, and 21.6% were for other costs. 79.1% of patients were the main labor force in their families and 20.9% were non-main labor force. Additionally, 32.8% of patients lost all sources of income, 43.2% still had other sources of income and 24.0% had an irregular income.

Disease-related data

Of the 296 patients with moderate to severe hand trauma, 66.9% had injured their dominant hand, and 33.1% had injured their non-dominant hand. Work injuries accounted for 83.4% of injuries, and 98.6% of patients were affected more or less. 74.7% of patients had moderate injuries and 25.3% had severe injuries. The injuries partially affected 94.6% of patients' daily life, while 1.3% of patients were unaffected, and 4.1% of patients were completely unable to care for themselves. In terms of the percentages of patients who were bothered by the appearance of their hand, 8.4% were not bothered at all, 41.9% were somewhat bothered, 22.0% were moderately bothered, and 27.8% were extremely bothered.

Score of PROMIS-57 in patients with moderate to severe hand trauma

The mean score for each dimension of PROMIS-57 in patients with moderate to severe hand trauma ranged from 19.38 to 22.70. Patients had a mean physical function score of 19.38. In relation to psychological function, the highest mean score was 22.11 for anxiety and the lowest mean score was 19.46 for fatigue. The mean score for social communication was 22.70, the mean score for pain interference was 22.70, and the mean score for pain intensity was 4.19, which indicated that patients had moderate pain (*Table 1*).

LPA of self-reported quality of life in patients with moderate to severe hand trauma

This study analyzed the latent category models from 1 to 6 in turn. The potential category indicators are

Table 1 Mean score for the dimensions of PROMIS-57 in patients with moderate to severe hand trauma (n=296)

Dimension	Maximum score	Minimum score	Mean score	Standard deviation
Physical function	38	9	19.38	5.31
Anxiety	40	8	22.11	8.84
Depression	40	8	19.95	8.73
Fatigue	40	8	19.46	8.36
Sleep disturbance	37	8	19.46	4.15
Social communication	40	8	22.61	7.18
Pain interference	40	8	22.70	8.68
Pain intensity	10	0	4.19	2.83

Table 2 Latent indicators for the quality of life in patients with moderate to severe hand trauma

Model	LL	AIC	BIC	aBIC	LMR	BLRT	Entropy index	Category probability
C =1	−3,210.729	6,453.459	6,512.505	6,461.764	–	–	–	
C =2	−2,683.934	5,417.868	5,510.127	5,430.844	<0.001	<0.001	0.912	0.48/0.51
C =3	−2,473.547	5,015.095	5,140.567	5,032.742	<0.001	<0.001	0.952	0.39/0.44/0.17
C =4	−2,350.885	4,787.770	4,946.455	4,810.088	0.010	<0.001	0.945	0.24/0.34/0.24/0.17
C =5	−2,272.136	4,648.271	4,840.170	4,675.261	<0.001	<0.001	0.947	0.14/0.10/0.26/0.33/0.17
C =6	−2,194.380	4,510.760	4,735.872	4,542.422	0.014	<0.001	0.957	0.14/0.26/0.33/0.10/0.05/0.12

AIC, Akaike information criteria; BIC, Bayesian information criterion; aBIC, adjusted Bayesian information criterion; LMR, Lo-Men-dell-Rubin; BLRT, Bootstrap likelihood ratio test.

Table 3 Average attribution rate (n=296) and average attribution probability of 3 potential categories in patients with moderate to severe hand trauma

Model	C1	C2	C3
C1	0.988	0.012	0.000
C2	0.024	0.974	0.002
C3	0.000	0.022	0.978

summarized in *Table 2*. As the information indices all decreased monotonically, the comparison between K and K-1 categories revealed significant differences on both LMR and BLRT values, and entropy values were all above 0.9. A steep slope plot was made from the information indices, showing an inflection point at 2 rather than 3 categories. As the entropy results were higher for 3 categories than 2 categories, a final decision was made to draw 3 categories. For each category, the moderate to severe hand trauma patients were attributed a specific mean probability of 97.4%

to 98.8%, which confirmed the credibility of the 3 potential category model results (*Table 3*). The scores of patients with moderate to severe hand trauma for each dimension of the latent quality of life categories are shown in *Figure 1*. The differences in the conditional means for physical function and sleep disturbance were not significant among the 3 groups; however, the differences in the conditional means for anxiety, depression, fatigue, social communication, and pain interference were significant. The quality of life analysis of the 3 groups revealed that Group C1, which referred to the psychosocial-pain low-impact group (38.9%), scored lower than the other 2 groups, but was close to the other 2 groups in terms of physical function and sleep disturbance. Group C2, which referred to the psychosocial-moderate-impact severe-pain group (43.9%) had intermediate scores at all 7 dimensions and high pain interference and pain intensity scores. Group C3, which referred to the psychosocial-pain high-impact group (17.2%), scored significantly higher on the 7 dimensions of quality of life, especially the psychological, social communication, and pain interference
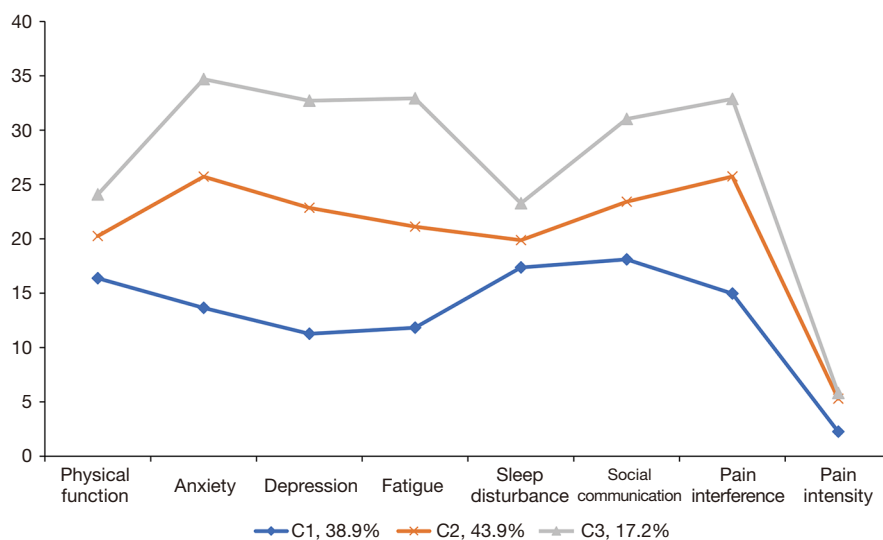
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Figure 1 Scores of the 8 dimensions for the 3 potential categories of quality of life in patients with moderate to severe hand trauma.

dimensions, than the other 2 groups.

Demographic characteristics of potential categories of patients with moderate to severe hand trauma

There were statistically significant differences in the distribution of the patients in the 3 groups in terms of age, educational level, marital status, occupation, monthly income, medical insurance type, family role, and financial resources (P<0.05) (*Table 4*). Patients in Group C1 were younger than those in Groups C2 and C3. Patients with a tertiary level of education or above, who were married or unmarried, were specialist technical staff, worked in institutions, had a monthly income of RMB 6,001 or above, had employee health insurance, represented the non-main labor force, and had subsequent financial resources after hand injury were more likely to be classified in Group C1. Patients with a high school or secondary level of education, who were workers, had a monthly income of RMB 4,001–6,000, suffered from work-related injuries, had health insurance, were self-paying, represented the main labor force, had partial subsequent financial resources, and were uncertain of follow-up work were more likely to be classified in Group C2. Patients with a lower secondary education level or below, were divorced, were farmers, had a monthly income of RMB 2,000 and below, new rural cooperative medical insurance system (NRCMIS), were completely unable to take care of themselves, and had

no subsequent financial resources were more likely to be classified in group C3.

Distribution of disease-related variables in different categories of patients with moderate to severe hand trauma

The results showed that there were no statistically significant differences in relation to whether the dominant hand was injured across the 3 groups (P>0.05); however, statistically significant differences were observed in the distributions for the cause of injury, satisfaction with the appearance of the hand, the impact of the injury on daily life, and the degree of injury (P<0.05) (*Table 5*). Patients were categorized into groups C1, C2, or C3 according to whether the injury had no impact on their daily life, had a partial impact on their daily life, or rendered them completely unable to care for themselves. In terms of the cause of injury, patients with work injuries were more likely to be classified in Group C2, and patients with life injuries, traffic injuries, or sports injuries were more likely to be classified in Group C1. Group C1 comprised patients who did not mind the appearance of the hand, Group C2 comprised patients who moderately minded the appearance of their hand, and Groups C2 and C1 comprised patients who greatly minded the appearance of their hand. Groups C1 and C2 comprised patients with moderate impairments, and Group C3 comprised patients with severe impairments.

Table 4 Distribution difference in demographic variables for 3 potential categories of quality of life in patients with moderate to severe hand trauma (n=296)

Category	Quality of life			χ^2/F	P
	C1 (n=115)	C2 (n=130)	C3 (n=51)		
Age (years), mean ± SD	39.67±10.20	40.12±10.76	34.69±11.51	8.243	0.001
Gender, n (%)				11.199	0.004
Male	30 (13.7)	107 (48.9)	82 (37.4)		
Female	21 (27.3)	23 (29.9)	33 (42.9)		
Educational level, n (%)				56.716	0.001
Primary school or below	11 (22.4)	16 (32.7)	22 (44.9)		
Junior high school	27 (20.9)	75 (58.1)	27 (20.9)		
Senior high school or technical secondary school	6 (10.9)	27 (49.1)	22 (40.0)		
Junior college	7 (15.9)	3 (6.8)	34 (77.3)		
Bachelor degree or above	0	9 (47.4)	10 (52.6)		
Marital status, n (%)				29.951	0.001
Married	44 (19.5)	105 (46.5)	77 (34.1)		
Unmarried	3 (4.9)	22 (36.1)	36 (59.0)		
Divorced	4 (66.7)	0	2 (33.3)		
Widowed	0	3 (100.0)	0		
Occupation, n (%)				71.722	0.001
Unemployed	0	9 (81.8)	2 (18.2)		
Farmer	10 (40.0)	13 (52.0)	2 (8.0)		
Worker	37 (24.0)	75 (48.7)	42 (27.3)		
Non-career professional technician	4 (11.8)	10 (29.4)	20 (58.8)		
Employee of enterprise or public institution	0	3 (14.3)	18 (85.7)		
Others	0	20 (39.2)	31 (60.8)		
Monthly income, n (%)				47.631	0.001
2,000 RMB and below	25 (42.4)	10 (16.9)	24 (40.7)		
2,001–4,000 RMB	14 (20.0)	29 (41.4)	27 (38.6)		
4,001–6,000 RMB	8 (7.9)	51 (50.5)	42 (41.6)		
More than 6,000 RMB	4 (6.1)	40 (60.6)	22 (33.3)		
Medical insurance type, n (%)				56.789	0.001
Medical insurance for employees	4 (9.1)	11 (25.0)	29 (65.9)		
Self-paying	8 (6.8)	61 (51.7)	49 (41.5)		
New rural cooperative medical system	8 (53.3)	6 (40.0)	1 (6.7)		
Work-related injury	31 (27.2)	52 (45.6)	31 (27.2)		
Others	0	0	5 (100.0)		

Table 4 (*continued*)

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Table 4 (*continued*)

Category	Quality of life			χ²/F	P
	C1 (n=115)	C2 (n=130)	C3 (n=51)		
Family role				17.880	0.001
Main labor force	47 (20.1)	110 (47.0)	77 (32.9)		
Non-main labor force	4 (6.5)	20 (32.3)	38 (61.3)		
Still have sources of income after hand trauma				65.418	0.001
Yes	4 (4.1)	24 (24.7)	69 (71.1)		
No	31 (24.2)	69 (53.9)	28 (21.9)		
Not sure	16 (22.5)	37 (52.1)	18 (25.4)		

Table 5 Distribution difference in disease-related variables for 3 potential categories for quality of life in patients with moderate to severe hand trauma (n=296)

Category	Quality of life			χ²/F	P
	C1 (n=115)	C2 (n=130)	C3 (n=51)		
Is the injured hand the dominant hand? n (%)				2.542	0.281
Yes	30 (15.2)	86 (43.4)	82 (41.4)		
No	21 (21.4)	44 (44.9)	33 (33.7)		
Is daily life affected? n (%)				66.160	0.001
Unaffected	0	0	4 (100.0)		
Partially affected	39 (13.9)	130 (46.4)	111 (39.6)		
Completely unable to take care of themselves	12 (100.0)	0	0		
Cause of injury, n (%)				39.231	0.001
Work injury	51 (20.6)	117 (47.4)	79 (32.0)		
Life injury	0	8 (26.7)	22 (73.3)		
Traffic injury	0	3 (25.0)	9 (75.0)		
Fighting injury	0	2 (100.0)	0		
Sports injury	0	0	5 (100.0)		
Attitude towards hand appearance, n (%)				107.248	0.001
Does not mind	0	0	25 (100.0)		
Minds somewhat	0	65 (52.4)	59 (47.6)		
Minds moderately	18 (27.7)	32 (49.2)	15 (23.1)		
Mind extremely	33 (40.2)	33 (40.2)	16 (19.5)		
Degree of injury, n (%)				100.079	0.001
Moderate	10 (4.5)	108 (48.9)	103 (46.6)		
Severe	41 (54.7)	22 (29.3)	12 (16.0)		

Discussion

Heterogeneity in the quality of life of patients with moderate to severe hand trauma

The fitting results of the potential category models revealed that there was heterogeneity in the quality of life of patients with moderate to severe hand trauma, who were divided into the following 3 groups: (I) the psychosocial-pain low-impact group, which comprised 115 cases (38.9%); (II) the psychosocial-moderate-impact severe-pain group, which comprised 130 cases (43.9%); and (III) the psychosocial-pain high-impact group, which comprised 51 cases (17.2%). Accurate assessment tools are crucial to help patients improve their quality of life. At present, assessments of quality of life in patients with hand trauma lack uniformity both nationally and internationally; thus, the results of different studies cannot be compared due to the use of different scales (10). Developed at considerable expense by the National Institute of Health, the PROMIS (6) is a standardized assessment system for patient self-reported health outcomes. The PROMIS uses accurate and reliable measurement tools to collect data about patients' self-reported physical, psychological, and social wellbeing (5). Yoon *et al.* (11) evaluated 168 patients who underwent the replantation of an amputated finger using PROMIS and found that the system had good validity and reliability. Reitan *et al.* (12) measured self-reported outcomes in elderly patients with hand trauma, and noted that the knowledge gained from prospective studies of the health of elderly patients following hand trauma with complex and integrated hand function could be used to assess ongoing clinical practices and identify opportunities to improve quality of care. In this study, LPA techniques were used to identify clusters of patients with similar characteristics based on the scores of different dimensions using the PROMIS-57 scale and fitting model to identify potentially unknown correlations between complex symptoms (13,14), and explain the diversity of subjective symptoms in groups. The application of this method in nursing research is still at the conceptual introduction stage. This study introduced a new concept of "latent variable modelling" and provided an empirical basis for the feasibility and clinical applicability of LPA to the study of heterogeneous characteristics.

Effects of different demographic variables and diseases on potential categories of quality of life in patients with moderate to severe hand injuries

Based on the LPA, objective statistical indicators can be applied to confirm the accuracy and validity of the classification, with the greatest possible variation between the separated categories and the least variation within them. The LPA was used to predict the quality of life categories that patients with moderate to severe hand trauma belonged based on their general profile characteristics, and to understand the effects of these categories on patients' mental health, social communication, and pain. Such information can be used to provide appropriate health care (7).

In this study, the demographic data showed that patients with a high level of education, specialist jobs, better medical insurance, and who were unmarried or married, did not mind the appearance of their hand, and were mostly moderately injured were more likely to fall into Group C1. The unmarried patients in this study group were mostly adolescents in their 20s who had recently entered society and whose physical and psychological recovery benefited from parental care, support and encouragement. The married patients in this study had the support and encouragement of their spouses, who were not the main labor force in their families. Patients in this group had a lower score than those in the other 2 groups across all quality of life dimensions, but had scores close to the other 2 groups in terms of physical function and sleep disturbance. Thus, attention should be paid to improving the physical function and sleep quality of patients in Group C1.

Workers with a junior level of secondary education, who had a monthly income of 4,001–6,000 RMB, had work-related injuries, and were covered by work injury insurance were classified in Group C2. Patients in Group C2 were mostly moderately injured, were moderately or somewhat bothered by the appearance of their hand, and their injuries partially affected their daily lives. Patients in Group C2 scored in the middle of the range in terms of physical and psychological aspects, and had high pain scores and pain impact scores that were close to those of Group C1. As the fifth vital sign, pain and emotional management can alleviate the negative emotional impact experienced by patients with hand trauma and reduce the incidence of complications (15). Thus, proper pain assessments, individualized analgesic protocols, and the flexible application of various methods can relieve pain and reduce the impact of pain experienced by patients in Group C2.

Patients in Group C3 had a low level of education, were mostly farmers, were main labor force, and had low incomes. Patients in Group C3 suffered from a severe injury, were dissatisfied with the appearance and functional aspects of the hand, and lacked the ability to take care

of themselves, which in turn caused anxiety, depression, fatigue, and other psychological problems. Such patients had high pain scores, which had a greater impact on their daily lives. Medical insurance, which is an important way to diversify medical risks and compensate for costs, greatly affects patients' physical and mental health (16). In terms of patients using NRCMIS, while some of their costs are reimbursed, patients are prone to psychological problems, such as anxiety and depression, which also affects their social communication (17). For patients with the characteristics of Group C3, nurses should seek to understand any specific causes and hindering factors, encourage patients to engage in appropriate work, and guide patients in assessments of high-quality medical resources. Individualized analgesic protocols, sleep intervention, making videos of rehabilitation nursing guidance, and targeted psychological care should be adopted for patients in Group C3. However, the rehabilitation training cannot be supported for a long time when patients are discharged from hospitals due to the lack of professional rehabilitation institutions. More medical institutions are needed to provide professional rehabilitation training for patients who need work-related injury rehabilitation, and offer work items suitable for patients in Group C3. In addition, the hospitals can cooperate with communities to conduct continuous rehabilitation training, and take rehabilitation videos to build confidence for patients in Group C3.

This study had a limitation. The single-center survey might have potential selection bias and limit the generalizability of the results.

In summary, this study undertook an LPA to classify patients with moderate to severe hand trauma into the following 3 groups: (I) the psychosocial-pain low-impact group (38.9%); (II) the psychosocial-moderate-impact severe-pain group (43.9%); and (III) the psychosocial-pain high-impact group (17.2%). Nursing staff should seek to accurately identify the quality of life category to which a patient belongs when caring for patients with moderate to severe hand trauma, and provide targeted and precise care according to the patients' characteristics of quality of life (18). In this study, we examined patients' experiences and integrated patients' views using big healthcare data to gain a comprehensive understanding and appreciation of patients' conditions and experiences, and to improve the nursing quality and patient satisfaction (19). In the process of formulating intervention measures, caregivers should consider patients' ability to regulate their emotional state, and communicate with their family members. We call on the government to improve the social medical system, expand medical insurance coverage, reduce the financial burden placed on patients, and address patients' needs in terms of life, economy, and psychology to enhance patients' quality of life. More rehabilitation medical institutions are needed to provide more social and financial supports for patients with hand trauma. We suggested the government to increase the work place and opportunity for patients with moderate to severe hand trauma to rebuild their confidence.

Footnote

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study involving human participants were in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the ethics committee of Wuxi Ninth People's Hospital (No. KT2020021) and informed consent was taken from all the patients.

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