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Analysis of the characteristics and influencing factors of early comprehensive symptoms in elderly patients after ICU

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Abstract: *Research methods: In order to solve the early syndrome of elderly patients after ICU and provide reference for the treatment of elderly patients with post ICU syndrome, this paper studied the characteristics of early symptoms of elderly patients and analyzed the influencing factors. This article describes the frequency of newly acquired cognitive impairment, activities of daily living (ADL) and depression among the elderly survivors of critical illness. Finally, the predictive factors of asymptomatic elderly patients with post intensive care syndrome (PICS) (i.e., no PICS problems) were evaluated and analyzed. Subjects: This article selects many elderly ICU patients from the internal medicine and surgery departments of ICU in major hospitals in a city. They all have respiratory failure, shock and other characteristics, ignoring patients with cognitive impairment or ADL disability. To study the characteristics of the above elderly patients at 3 and 12 months after discharge. The research samples were divided into eight groups, and the mental health problems, cognitive problems and physical disability problems of these eight groups of elderly patients were studied in combination. By using the control variable method and multivariable logistic regression analysis, the relationship between age, education level, weakness report entering ICU, time of mechanical ventilation, delirium and severe sepsis and the probability of no PICS was obtained. Study data: The sample is 406 patients, of whom the average age is 61 years old. The study found that 64% of the elderly patients had one or more PICS problems at 3 months, and the total number of patients with more than 2 PICS accounted for 25% of the total proportion, while only 6% of patients with more than 3 PICS; When the time was 12 months, the proportion of patients with one or more PICS problems decreased to 56%, and the total number of patients with more than 2 PICS accounted for 21% of the total proportion, while only 4% of patients with more than 3 PICS. This means that when the recovery time of patients after ICU is longer and longer, the proportion of patients will gradually decline. In addition, the longer the elderly patients were educated, the greater the possibility of no PICS. The data showed that at 3 and 12 months, P<0.001. The low probability of no PICS was associated with more severe frailty. The data showed that P=0.005 at 3 months and P=0.048 at 12 months. Conclusion: In this multicenter cohort study, most survivors have one or more PICS problems, but only 1/4 of the patients have merger problems. Future studies need to better understand the heterogeneous subtypes of PICS and identify modifiable risk factors. In the elderly patient group, the incidence rate of PICS has nothing to do with whether they have received education, but it is related to the doctor's weak diagnosis report of elderly patients when they enter the ICU. The lower the score of the report, the higher the incidence rate of PICS.*

Keywords: *Cognitive dysfunction; Depression survivors; ICU; PICS*

1. Research Background

Elderly patients refer to people aged 65 years and above, and the number of such people is increasing rapidly around the world. In China, there are 20 million people who retire every year [1]. As the age increases, the functions of their organs gradually decline, which is also a challenge for the medical system. With the aging of the global population, there are usually more elderly patients in intensive care units (ICUs), accounting for a large proportion of patients. Factor [2-3].

According to the data, nearly 1.4 million elderly patient-s with critical illness in the United States survive in ICU every year, and the new or deteriorated cognitive impairment, activity of daily living (ADL) and mental health disorder that appears after critical illness and continues to exceed the duration of acute care hospitalization are called post intensive care syndrome (PICS) [4], as shown in Figure 1.

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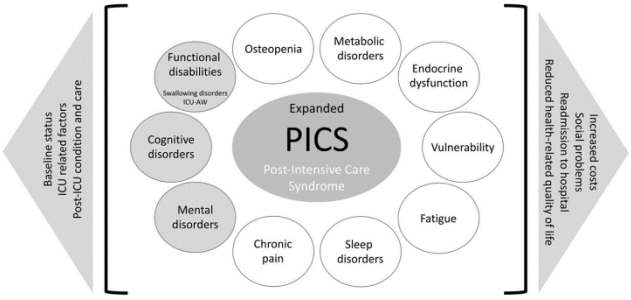

Figure 1: Extended definition of PICS

According to research, the most typical symptoms of patients with PICS are anxiety disorder, depression and stress disorder, which are basically psychological diseases. After the elderly patients survive in the ICU, their probability of suffering from depression is 19-37%, anxiety is 32-40%, and stress disorder is 19-22% [5-7]. Through research, it is found that the clinical manifestations of elderly patients are more complex, and there are two aspects that will make the condition more complex [8]. On the one hand, the elderly patients have not experienced the treatment in ICU for half their life, and they are afraid of the treatment in ICU, which makes their mental illness 4-6 times more than that of people of other ages; On the other hand, research shows that these elderly people often have some mental diseases before they are treated from ICU. Compared with the general population, more serious mental diseases often occur, which also makes treatment in ICU difficult.

There are many clinical studies on acute respiratory distress syndrome (ARDS) and sepsis in ICU. These studies have analyzed and reported the cognitive, disability and mental health problems of elderly patients [9]. However, at present, these studies cannot completely solve the clinical manifestations of elderly patients, and there is a great probability that these three types of diseases do not exist alone, and they may exist in parallel and endanger the body of elderly patients. In addition, the prediction research of PICS is not mature. Some studies have analyzed "how these three kinds of diseases come into being", "what kind of impact they will have on elderly patients", and "how elderly patients will suffer if they survive"[10].

Based on the current situation, this paper analyzes the data of cognitive disorders, disabilities and depression among elderly patients, and finds that these patients usually have no cognitive disorders or ADL disabilities before suffering from these diseases.

2. Setting and Study Participants

In this paper, the elderly aged 65 or above in 5 ICU centers in a city were taken as the research objects. They were all systematically treated in the internal medicine and surgery of ICU due to respiratory failure or shock. The purpose of such research is to predict in advance the impact on cognitive function, physical health and mental health of elderly patients after they enter the ICU ward. This prediction is effective and reliable, and can guide the actual patients to a certain extent.Some elderly patients suffered from cognitive disorders before they entered the ICU, such as congenital disorders [11]. We excluded these spontaneous high-risk groups.

3. Problems of post intensive care syndrome

In this paper, hidden predictors of no PICS during follow-up were selected. Including age, education time, delirium [12], mechanical ventilation,clinical analysis and evaluation form of healthy aginghat whelationship forms social capital.

For the comprehensive symptom problems after ICU, this paper selects 3 months and 12 months after discharge as the time benchmark, and chooses depression as the measurement standard of mental health[13]. Research shows that among ICU survivors, depression is far more harmful than ordinary trauma, about five times more. Because after the elderly have experienced ICU, anxiety, PTSD and other mental conditions often occur at the same stage as depression, leading to the aggravation of the patient's condition[14].

In order to understand the cognitive, disability and psychological depression diseases of patients after ICU, this paper defines whether patients have these diseases through the universally recognized RBANS, KatzADL and BDI-II numerical scores. When the RBANS score is below 78, the cognitive disorder is determined; When KatzADL score is greater than or equal to 1, it is recognized as disabled; When BDI-II

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score is greater than 13, it is determined as a depressive patient. The study found that these values can match the patient's performance.

4. Analytical Method

The factors studied in this paper are divided into eight groups, covering three PICS problems from no problem to all: (1) no symptom problem, (2) cognitive disorder, (3) ADL disability, (4) depression (5) cognitive disorder and disability of ADL at the same time, (6) cognitive disorder and depression at the same time, (7) disability and depression of ADL and depression at the same time. Data are reported in median and quartile intervals (IQRs) [15].

In this paper, multivariable regression method "logistic regression" was used to study the correlation and incidence of PICS free in 3 and 12 months, and the covariates were adjusted. This article excludes patients with depression before entering the ICU, and studies the economic status of elderly patients as the years of education of elderly patients through the Health Care Research Quality Institute (AHRQ) [16].

5. Results— Characteristics of the patients

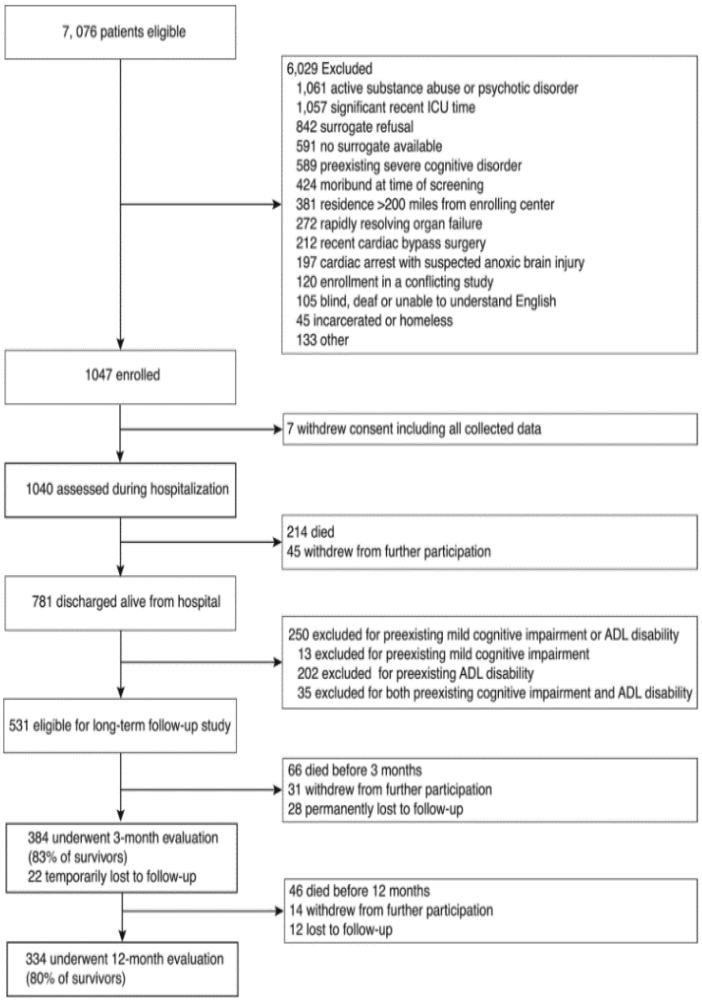

Figure 2: Enrollment and Follow-up

In the four-year survey, this paper has counted 1047 inpatients in the ICU database, as shown in Figure 2. Among these people, 214 died in the ICU, and 45 left halfway in the ICU. Among the remaining people, we found that 250 elderly people had cognitive impairment and ADL disability. Finally, only 531 patients were eligible for long-term follow-up. Finally, this paper analyzed that there were 384 survivors among 465 people in three months, accounting for 83%, and 334 survivors among 419 people in 12 months, accounting for 80%.

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Table 1: Demographic and Clinical Characteristics of Patients

Characteristic	N = 406
Age (years)	61 (51–70)
Male Sex, n (%)	256 (63%)
Education (years)	12 (12–14)
Katz ADL score[a]	0 (0-0)
IQCODE score[b]	3 (3-3)
Clinical Frailty Scale Score, n (%)	
1 (Very Fit)	21 (5%)
2 (Well)	87 (21%)
3 (Well, with Treated Comorbidities)	164 (40%)
4 (Apparently Vulnerable)	86 (21%)
5 (Mildly Frail)	28 (7%)
6 (Moderately Frail)	17 (4%)
7 (Severely Frail)	3 (1%)
Charlson Comorbidity Index Score[c]	2 (1–3)
APACHE II Score at admission[d]	23 (16–29)
Mean Daily SOFA Score[e]	7 (5–8)
Diagnoses at Admission, n (%)	
Sepsis, ARDS due to infection or septic shock	118 (29%)
Acute Respiratory Failure[f]	42 (10%)
Cardiogenic shock, CHF, myocardial infarction, or arrhythmia	79 (19%)
Upper airway obstruction[g]	40 (10%)
Gastric or colonic surgery	26 (6%)
Neurologic disease or seizure	5 (1%)
Other surgical procedure[h]	58 (14%)
Other diagnoses[i]	38 (9%)
Mechanical ventilation	
Patients, n (%)	360 (89%)
Duration of mechanical ventilation among those who were ever mechanically ventilated, days	3 (1–7)
Severe Sepsis	
Patients, n (%)	259 (64%)
Duration of severe sepsis among those who were ever septic, days	4 (2–8)
Delirium	
Patients, n (%)	289 (71%)
Duration of delirium among those who were ever delirious, days	3 (2–7)
Coma	
Patients, n (%)	221 (54%)
Duration of coma among those who were ever comatose, days	2 (1–5)

Through data analysis, the median age of 406 patients was 61 years old, and the disease degree of this stage was the highest (median APACHE II score of 23 [IQR: 16–29]), and the majority of whom were not frail (median Clinical Frailty Scale score of 3 [IQR: 2–4]) contributed data to these analyses (Table 1).

In the follow-up of ICU patients, we found that the proportion of disabled and mentally ill patients after ICU gradually decreased over time. During the 3-month follow-up, we investigated 337 patients with cognitive impairment, accounting for 88% of the total sample; There were 383 disabled patients, accounting for 99% of the total sample, and 363 patients with depression, accounting for 95% of the total sample. Among the patients with cognitive impairment, 128 have cognitive impairment, accounting for 38%; among the disabled diseases, 100 have disabilities, accounting for 26%; in terms of mental problems, 121 have depression, accounting for 33%. After 12 months, we again evaluated 292 patients with cognitive impairment (87%), 332 patients with disabilities (99%) and 313 patients with depression (94%). Among them, 97 patients with cognitive impairment had cognitive impairment, accounting for 33%; 69 patients with disabilities, accounting for 21%; 97 patients with mental problems had depression, accounting for 31%.

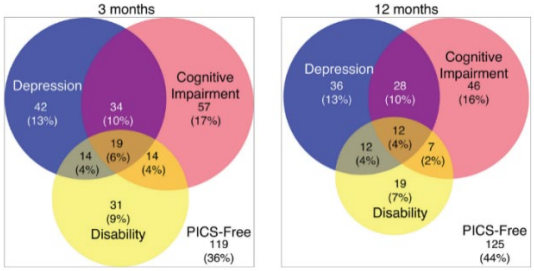

Figure 3: Syndrome problems after follow-up in ICU: 3 months and 12 months

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As shown in Figure 3, 62 elderly patients (18%) suffered from two diseases at the three-month visit, while 47 elderly patients (16%) suffered from two diseases at the 12-month visit. For the elderly who suffer from disability, cognitive disease and mental disease at the same time, 34 (10%) at 3 months and 12 (4%) at 12 months.

In the three-month visit, 62% of elderly patients suffered from only one disease, 29% from two diseases and 9% from three diseases; In the interview study in December, the proportion was 63%, 29% and 9%. Approximately 4 out of every 10 patients were PICS-free (119/330 [36%] at 3 months and 125/285 [44%] at 12 months) (Figure 3). Data shows that during the transition from 3 months to 12 months, the number of elderly patients without any problems is not much different, as shown in Figure 3. In this paper, time is used as an independent variable to analyze the changes of patients from 3 months to 12 months.

Sensitivity analysis was conducted on the analysis results to exclude patients with depression. The study found that the proportion of patients with one or more PICS problems decreased by 5% in the results of 3 and 12 months. This means that when the number of patients with depression decreases, the number of patients with a single PICS problem or multiple PICS problems will also decrease.

There are some differences between PICS patients and patients without PICS in terms of education level, physical weakness and complications. The study found that patients without PICS have higher education level, lower physical weakness and fewer complications. At the time of admission to the ICU, the proportion of patients with mechanical ventilation, infection, unconsciousness or coma was lower among patients without PICS.

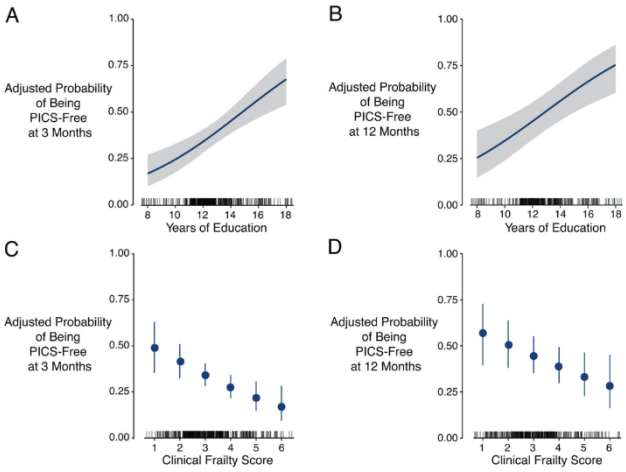

Figure 4: The relationship between no PICS in elderly patients and their education level and clinical frailty score

After adjusting the covariates, discuss the two factors of education level and admission clinical vulnerability score on the probability of elderly patients suffering from PICS. The analysis results are shown in Figure 4. According to the data in Figure 4, P=0.005 at 3 months and P=0.048 at 12 months.

According to the data, the absence of PICS in Table 2 has nothing to do with sepsis, mental illness, age and duration of mechanical ventilation of elderly patients in Table 2.

Table 2: Correlation between Baseline or Clinical factors and Being PICS-Free

Baseline or Clinical Factor	Comparison (75th vs 25th percentile)	Odds Ratio (95% CI) at 3 months	P	Odds Ratio (95% CI) at 12 months	P
Years of education	14 vs 12 years	1.6 (1.3–2.0)	<0.001	1.6 (1.3–2.0)	<0.001
Clinical Frailty Scale score	4 vs 2	0.5 (0.3–0.8)	0.005	0.6 (0.3–1.0)	0.048
Duration of Severe Sepsis	6 vs 0 days	0.7 (0.4–1.1)	0.09	0.6 (0.3–1.3)	0.42
Age	70 vs 51 years	1.2 (0.9–1.7)	0.30	1.1 (0.7–1.5)	0.09
Duration of Delirium	5 vs 0 days	0.8 (0.5–1.2)	0.35	0.5 (0.2–1.1)	0.20
Duration of Mechanical Ventilation	5 vs 1 day	1.0 (0.8–1.3)	0.97	1.2 (0.6–2.5)	0.80

6. Conclusions and Continuing Confidence Building Strategies

The conclusion of this study found that the rich educational experience of elderly patients was not related to whether they had PICS. The lower the frailty report score on admission, the higher the probability of

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patients having PICS.

For the elderly living in cities and towns, their social resources are better than those in rural areas, and these educated elderly are less likely to suffer from Alzheimer's disease, which greatly reduces mental illness. And they can get better rehabilitation in the superior social resources. However, in the sensitivity analysis of this paper, there is no correlation between socio-economic status, education level and PICS. In the future research, it is more necessary to take how to resist the diseases of the elderly after IUC as the key. This study can be used as a reference for improving the symptoms of the elderly after ICU.

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