Article

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Abstract: *Objectives:* This study aimed to evaluate patients' experiences in the intensive care unit (ICU) setting and to investigate whether there was a correlation between these experiences and their nutritional status. *Methods:* The study included patients admitted to the pulmonary medicine ICU between January 1, 2022, and December 31, 2022. Only patients aged 18 years or older were eligible for inclusion. Written and verbal consent was obtained from all participants, while those unable to provide nonverbal communication were excluded from the study. The Intensive Care Experience Questionnaire (ICEQ), developed by Rattray et al. in 2004, was utilized to assess the overall experiences of ICU patients. *Results:* The ICEQ results were analyzed across four categories: awareness of surroundings, recall of experiences, frightening experiences, and satisfaction with care. A total score was generated by summing the scores of these four categories. While the initial parameters were analyzed as ordinal data, the results for the four subcategories and the total score followed a parametric distribution and were thus analyzed accordingly. *Conclusion:* The findings reinforce the hypothesis that nutritional support requirements play a critical role in shaping patients' experiences in the ICU, regardless of their pre-admission status. Adequate nutritional support was shown to have a positive impact on ICU experiences.

Keywords: Intensive care unit; Nutritional support; Patient experience; ICU outcomes

Introduction

Intensive care units (ICUs) are specialized hospital wards dedicated to providing vital functional support for patients in critical condition. These units rely on highly skilled, multidisciplinary medical teams that employ a wide range of medical interventions and advanced devices. The primary goal of ICU admission is not only to sustain life but also to provide physiological and psychological support, ensuring that patients can recover and leave the ICU with positive experiences [1]. However, several

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factors may contribute to negative experiences in the ICU, including the unfamiliar environment, disrupted sleep patterns, immobilization, restrictions on visits from relatives, insufficient information about treatment plans, and frequent invasive procedures [2,3].

Critically ill patients often require additional life support interventions, such as respiratory, cardiovascular, or renal support. Despite the critical nature of their condition, ICU patients remain susceptible to emotional and psychological challenges. Many report experiencing vivid dreams, hallucinations, and significant emotional fluctuations during their stay [4].

The role of nutritional status in shaping ICU experiences—both positive and negative—is an area of ongoing research. This study aimed to assess the overall experiences of patients in an ICU setting and to explore whether a correlation exists between patients' nutritional status and their ICU experiences.

Materials and Methods

The study included patients admitted to the pulmonary medicine ICU between January 1, 2022, and December 31, 2022. The ICU served as a facility for managing patients transferred from other intensive care units, emergency departments, and pulmonary medicine wards. Patients were eligible for inclusion if their ICU stay exceeded 24 hours and they were aged 18 years or older. Both written and verbal consent were obtained from all participants, while those unable to provide nonverbal communication were excluded from the study. All questionnaires were administered in person following patient approval.

The data collection process involved a patient information and follow-up form comprising two components. The first component recorded demographic and clinical data, including the protocol number for admission, sex, date of birth, marital status, primary diagnosis, comorbidities, admission and discharge dates, total hospitalization duration, source of admission, noninvasive mechanical ventilation (NIV) requirements, body mass index (BMI), and educational status. The second component included laboratory parameters collected at admission and prior to discharge. These parameters comprised routine blood values such as hemoglobin, hematocrit, creatinine, urea, total protein, albumin, potassium, sodium, calcium, and magnesium. Nutritional evaluations were also performed, covering nutritional support requirements, the type of nutritional support (parenteral or enteral), and nutritional scoring systems.

To assess patients' experiences in the ICU, the Intensive Care Experience Questionnaire (ICEQ), originally developed by Rattray et al. in 2004, was employed. The ICEQ was translated into Turkish by Demir et al., with a reported Cronbach's alpha reliability score of 0.79. The questionnaire consists of 19 Likert-type items, with nine focusing on patients' adaptation to the ICU environment and the remaining ten assessing emotional states. The adaptation items were rated on a scale from 1 ("Strongly Disagree") to 5 ("Strongly Agree"), while the emotional state items were rated from 1 ("Never") to 5 ("Always"). Reverse scoring was applied to items 7, 8, 9, 10, 15, and 17. The total ICEQ score ranges from 19 to 95, with lower scores indicating poorer awareness and clarity of mind in the ICU and reflecting an overall unfavorable experience [6]. Additionally, the ICEQ includes four subcategories: "Awareness of Surroundings" (6–30 points), "Recall of Experiences" (4–20 points), "Frightening Experiences" (5–25 points), and "Satisfaction with Care" (4–20 points).

Statistical Analyses

Data analysis was performed after the collection and finalization of patient information using Microsoft Excel. Descriptive statistics are presented as counts (n), percentages (%), standard deviations (SDs), and means or medians, as appropriate. The normality of parametric distributions was assessed using Q–Q plots. A paired sample t-test was applied to compare admission and discharge parameters. Pearson correlation was used to analyze relationships between two continuous variables with parametric distributions, while Spearman correlation was used for nonparametric data.

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Linear regression analysis was conducted to identify independent factors among parameters with statistically significant p-values. Model validity was confirmed using the Hosmer–Lemeshow test. Statistical significance was defined as a p-value of less than 0.05. All statistical analyses were performed using IBM SPSS Statistics, version 23.

Results

A total of 171 patients were included in the study. The majority of the patients were male (n = 113, 66.1%), with an average age of 68.25 years (± 11.28) and an average body mass index (BMI) of 24.28 (± 3.78). The dominant educational level among the patients was primary school (n = 125, 73.1%). Hypertension was the most common comorbidity (n = 75, 43.9%), followed by diabetes mellitus (n = 43, 25.1%) and congestive heart failure (n = 30, 17.5%).

The average duration of hospitalization was 10.3 days (± 6.2), with noninvasive mechanical ventilation (NIV) support required for a significant proportion of the patients (n = 108, 63.2%). Nutritional support, either enteral or parenteral, was necessary for approximately 15% of the patients.

Most ICU admissions were from either emergency services (n = 77, 45%) or other intensive care units (n = 77, 45%). A detailed breakdown of patient characteristics and clinical parameters is provided in Table 1.

Table 1. Demographic information and hospitalization parameters.

Demographic Data, Hospitalization Status, Nutritional Evaluation and Comorbidities		No. of Patients (n=171) (%)
Gender	*Male*	113 (66.1)
	Female	58 (33.9)
Age	*(mean, SD)*	68.25 (±11.28)
Education	*No Formal Education*	32 (18.7)
	Primary – Middle School	125 (73.1)
	High School	12 (7.0)
	College – University	2 (1.2)
Comorbidities	*Hypertension*	75 (43.9)
	Diabetes Mellitus	43 (25.1)
	Congestive Heart Failure	30 (17.5)
	Coronary Arterial Disease	15 (8.8)
	Kyphosis	3 (1.8)
	Idiopathic Pulmonary Fibrosis	1 (0.6)
Hospitalization and Nutritional Parameters	*Hospitalization Duration (Days) (mean, SD)*	10.3 (±6.2)
	NIMV Requirement	108 (63.2)
	BMI upon ICU Admission (mean, SD)	24.28 (±3.78)
	Enteral Support	26 (15.2)
	Parenteral Support	24 (14)
ICU Admission Origin	*Ward*	17 (9.9)
	Emergency Service	77 (45)
	Other ICU	77 (45)

SD: Standard Deviation, **BMI:** Body Mass Index, **NIMV:** Noninvasive mechanical ventilation **ICU:** Intensive Care Unit.

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Other ICU definition includes patient admission from other ICU units within the same hospital.

Hemoglobin levels showed a slight reduction between admission and discharge. Creatinine levels remained approximately 1 mg/dL, with corresponding blood urea nitrogen (BUN) levels ranging from 50.08 mg/dL to 48.12 mg/dL. Electrolyte levels, including sodium, chloride, and potassium, were within normal ranges, while magnesium levels were stable at approximately 2 mEq/L.

Albumin and total protein levels were also slightly reduced. However, no statistically significant differences were observed in any laboratory parameter between admission and discharge. A detailed summary of the laboratory evaluations is provided in Table 2.

Table 2. Comparison of laboratory parameters between intensive care unit admission and discharge.

Parameters	Testing Time	Mean	Standard Deviation	Paired Samples T Test		
				t	dF	p
Hemoglobin (g/dL)	*Pre*	11.9673	2.56991	2.362	170	0.019
	Post	11.6205	2.12611			
Creatinine (mg/dL)	*Pre*	1.0025	0.55667	2.256	170	0.025
	Post	0.9244	0.36253			
BUN (mg/dL)	*Pre*	50.0819	28.91192	1.069	170	0.287
	Post	48.1228	27.08510			
Sodium (mEq/L)	*Pre*	138.9471	4.66798	1.581	169	0.116
	Post	138.3824	3.49484			
Chloride (mEq/L)	*Pre*	97.0000	5.43843	1.052	170	0.294
	Post	96.3333	8.25405			
Potassium (mEq/L)	*Pre*	4.1718	0.58828	-0.587	170	0.558
	Post	4.2021	0.51713			
Magnesium (mEq/L)	*Pre*	2.0023	0.56287	1.422	170	0.157
	Post	1.9415	0.25153			
Albumin (g/L)	*Pre*	30.9789	6.24284	0.568	170	0.571
	Post	30.6936	7.40593			
Total Protein (g/L)	*Pre*	55.7567	11.02030	0.038	170	0.970
	Post	55.7320	8.64708			

Testing time refers to the time of blood sampling, for which the initial result is taken at the time of admission, and the second result is the last blood sampling performed before intensive care unit discharge.

The results of the ICEQ were analyzed across four categories, with each question categorized under its respective domain. The four categories were: Awareness of Surroundings, Recall of Experiences, Frightening Experiences, and Satisfaction with Care, which consisted of five, four, six, and four criteria, respectively.

The scores from these categories were summed to calculate a total ICEQ score. While the initial parameters were evaluated as ordinal, the results of the four subcategories and the total score demonstrated a parametric distribution and were analyzed accordingly. A detailed breakdown of the results is provided in Table 3.

Table 3. Intensive Care Experience Questionnaire parameters and subgroup results.

Questionnaire Components	Mean (SD)	Median	Mode

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Awareness of Surroundings			
I felt safe.	4.13 (±0.82)	4	4
I knew what was happening to me.	3.53 (±1.28)	4	5
I was aware of someone near to me.	4.43 (±0.66)	5	5
I was able to let people know what I wanted.	3.98 (±1.15)	4	5
I felt the absence of my relatives.	3.67 (±1.18)	4	4
Recall of Experiences			
I never knew whether it was day or night.	3.50 (±1.44)	4	5
I seemed to sleep too much.	3.13 (±1.31)	3	2
Most of my memories are blurred.	3.80 (±1.02)	4	4
I felt safer in the morning.	3.29 (±1.31)	4	4
Frightening Experiences			
I saw strange things.	3.12 (±1.09)	3	4
I felt helpless.	2.92 (±1.26)	3	4
I seemed to be in pain.	2.75 (±1.03)	3	3
I felt scared.	2.66 (±1.24)	3	4
I seemed to have bad dreams.	2.55 (±1.20)	3	2
I thought I would die.	3.25 (±1.24)	4	4
Satisfaction with Care			
It was always too noisy.	3.23 (±1.21)	3	2
My care was as good as it could have been.	4.41 (±0.75)	5	5
I was constantly disturbed.	3.82 (±1.06)	4	4
I felt uncomfortable being dependent on meeting my needs.	2.44 (±1.29)	2	2
Subgroup Scores	**Mean (SD)**	**Median**	**Min–max**
Awareness of Surroundings	19.73 (±2.96)	20	12-25
Recall of Experiences	13.73 (±2.52)	14	6-19
Frightening Experiences	17.62 (±5.43)	18	6-26
Satisfaction with Care	13.90 (±2.68)	14	7-20
Total Score	64.61 (±4.44)	64	53-78
SD: Standard Deviation, **Min–Max:** Minimum and maximum reported values,			

Pearson correlation analysis was conducted to evaluate relationships between parameters across the four subgroups and the total score of the questionnaire. While no parameter was significantly correlated with the total score, several parameters demonstrated correlations with the four subgroups.

Age showed a negative correlation with Awareness of Surroundings, Satisfaction with Care, and Recall of Experiences, but a positive correlation with Frightening Experiences. Nutritional support exhibited a similar correlation pattern as age, with negative correlations in the first three subgroups and a positive correlation in the last.

In contrast, albumin levels displayed a reverse correlation pattern compared with nutritional support, while total protein levels showed no significant correlation with any of the four subgroups. A detailed summary of the correlations is presented in Table 4.

Table 4. Correlations between intensive care unit evaluation subgroups, total score and other parameters.

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	Pearson Correlation and P value	Awareness of Surroundings	Recall of Experiences	Frightening Experiences	Satisfaction with Care	Total Score
Gender	*Correlation*	0.136	0.019	0.034	-0.093	0.087
	p value	0.076	0.801	0.656	0.225	0.256
Age	*Correlation*	**-0.294**	**-0.228**	**0.308**	**-0.193**	-0.067
	p value	**0.001**	**0.003**	**0.001**	**0.012**	0.384
Hospitalization Days	*Correlation*	**-0.153**	0.024	**0.220**	**-0.225**	0.044
	p value	**0.046**	0.760	**0.004**	**0.003**	0.567
NIMV History	*Correlation*	-0.065	**-0.166**	0.041	-0.010	-0.094
	p value	0.396	**0.030**	0.597	0.894	0.222
Admission BMI	*Correlation*	0.085	0.094	-0.112	0.060	0.009
	p value	0.267	0.222	0.144	0.436	0.904
Hypertension	*Correlation*	-0.111	-0.011	0.128	-0.099	0.016
	p value	0.149	0.885	0.096	0.197	0.837
Diabetes Mellitus	*Correlation*	-0.038	0.074	0.107	**-0.165**	0.047
	p value	0.618	0.335	0.165	**0.031**	0.538
Congestive Heart Failure	*Correlation*	-0.124	-0.078	**0.185**	**-0.161**	0.002
	p value	0.105	0.310	**0.015**	**0.036**	0.979
Coronary Heart Disease	*Correlation*	0.091	0.001	-0.053	0.058	0.032
	p value	0.236	0.990	0.492	0.453	0.681
Hemoglobin	*Correlation*	0.070	-0.053	**-0.159**	0.135	-0.096

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	p value	0.362	0.488	**0.038**	0.077	0.210
Creatinine	*Correlation*	-0.122	**-0.211**	0.122	-0.053	-0.084
	p value	0.111	**0.006**	0.112	0.490	0.274
BUN	*Correlation*	**-0.183**	**-0.213**	**0.187**	-0.074	-0.059
	p value	**0.016**	**0.005**	**0.014**	0.335	0.441
Sodium	*Correlation*	0.033	-0.001	0.003	0.000	0.025
	p value	0.666	0.992	0.966	0.996	0.742
Chloride	*Correlation*	-0.098	-0.007	**0.208**	**-0.151**	0.093
	p value	0.200	0.929	**0.006**	**0.049**	0.224
Potassium	*Correlation*	-0.014	0.037	-0.090	0.044	-0.072
	p value	0.858	0.627	0.239	0.565	0.351
Magnesium	*Correlation*	**-0.163**	-0.058	0.088	-0.066	-0.074
	p value	**0.033**	0.451	0.251	0.389	0.337
Albumin	*Correlation*	**0.182**	0.130	**-0.251**	**0.197**	0.008
	p value	**0.017**	0.089	**0.001**	**0.010**	0.922
Total Protein	*Correlation*	-0.013	-0.025	-0.041	-0.045	-0.099
	p value	0.871	0.749	0.597	0.561	0.197
Nutritional Support	*Correlation*	**-0.440**	**-0.301**	**0.467**	**-0.265**	-0.053
	p value	**0.001**	**0.001**	**0.001**	**0.001**	0.492

NIMV: Noninvasive mechanical ventilation, **BMI:** Body mass index, **BUN:** Blood urea nitrogen. Diabetes mellitus (DM) diagnosis includes formerly diagnosed type 1 and type 2 DM.

As the number of hospitalization days increased, a negative correlation was observed with Awareness of Surroundings and Satisfaction with Care, while a positive correlation became evident

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with Frightening Experiences. A history of noninvasive mechanical ventilation (NIMV) showed a single negative correlation, specifically with Recall of Experiences.

The presence of diabetes mellitus and congestive heart failure (CHF) was negatively correlated with Satisfaction with Care, with CHF also showing a positive correlation with Frightening Experiences. Among the laboratory parameters, BUN (blood urea nitrogen) demonstrated the strongest correlations, while other electrolytes exhibited only isolated positive or negative correlations (Table 4).

Linear Regression Analysis

Linear regression analyses were performed to evaluate each subgroup of the questionnaire independently. All models had statistically significant results and demonstrated acceptable Durbin–Watson values (between 1.7 and 2.0). The regression and residual degrees of freedom, F-statistics, and p-values for each subgroup were as follows:

- *Awareness of Surroundings*: $F(19,149) = 3.639$, $p = 0.001$
- *Recall of Experiences*: $F(19,149) = 2.389$, $p = 0.001$
- *Frightening Experiences*: $F(19,149) = 4.117$, $p = 0.001$
- *Satisfaction with Care*: $F(19,149) = 1.837$, $p = 0.023$

The models had R values of 0.563, 0.483, 0.587, and 0.436 and adjusted R^2 values of 0.230, 0.136, 0.261, and 0.086 for Awareness of Surroundings, Recall of Experiences, Frightening Experiences, and Satisfaction with Care, respectively. The regression analysis revealed that the least robust model was for Satisfaction with Care, as indicated by its lower R and adjusted R^2 values.

Across all models, nutritional support was identified as an independent factor affecting subgroup outcomes. Nutritional support was positively associated with Frightening Experiences ($p = 0.001$) but negatively associated with Awareness of Surroundings ($p = 0.001$), Recall of Experiences ($p = 0.000$), and Satisfaction with Care ($p = 0.042$).

Additional Observations

- *Gender*: Female patients reported greater awareness of their surroundings compared to males ($p = 0.038$).
- *Age:* Older individuals were more likely to report frightening experiences ($p = 0.047$).
- *Magnesium*: Among laboratory parameters, magnesium was the only independent factor. Lower magnesium levels were significantly correlated with reduced Awareness of Surroundings ($p = 0.002$).

Detailed results of the regression analysis and correlation evaluations are presented in Tables 5–6.

Table 5. Regression Analysis between Awareness of Surroundings, Recall of Experiences and Other Parameters.

Awareness of Surroundings as the Dependent Variable	***B***	***Standard Error***	***t***	***p value***
Constant	14.306	7.682	1.862	0.065
Gender	**0.991**	**0.474**	**2.092**	**0.038**
Age	-0.041	0.021	-1.928	0.056
Hospitalization Days	-0.020	0.035	-0.560	0.576
NIMV History	-0.082	0.448	-0.183	0.855
Admission BMI	0.033	0.056	0.590	0.556
Hypertension	-0.396	0.450	-0.880	0.380

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Diabetes Mellitus	0.672	0.509	1.321	0.189
Congestive Heart Failure	-0.455	0.597	-0.763	0.447
Coronary Heart Disease	0.406	0.756	0.538	0.591
Hemoglobin	0.062	0.092	0.679	0.498
Creatinine	0.223	0.440	0.506	0.613
BUN	-0.001	0.009	-0.093	0.926
Sodium	0.075	0.052	1.443	0.151
Chloride	-0.006	0.043	-0.147	0.884
Potassium	0.133	0.424	0.314	0.754
Magnesium	**-1.231**	**0.382**	**-3.221**	**0.002**
Albumin	0.045	0.039	1.156	0.250
Total Protein	-0.012	0.022	-0.561	0.576
Nutritional Support	**-2.629**	**0.559**	**-4.706**	**0.001**
Recall of Experiences as the Dependent Variable				
Constant	5.415	6.965	0.778	0.438
Gender	-0.345	0.430	-0.802	0.424
Age	-0.023	0.019	-1.196	0.233
Hospitalization Days	0.048	0.032	1.517	0.131
NIMV History	-0.634	0.406	-1.561	0.121
Admission BMI	0.067	0.051	1.316	0.190
Hypertension	0.274	0.408	0.672	0.503
Diabetes Mellitus	0.709	0.461	1.538	0.126
Congestive Heart Failure	-0.180	0.541	-0.334	0.739
Coronary Heart Disease	0.349	0.685	0.509	0.611
Hemoglobin	-0.098	0.083	-1.181	0.239
Creatinine	-0.448	0.399	-1.122	0.264
BUN	-0.005	0.008	-0.601	0.549
Sodium	0.047	0.047	0.989	0.324
Chloride	0.046	0.039	1.172	0.243
Potassium	0.329	0.384	0.858	0.392
Magnesium	-0.350	0.346	-1.009	0.314
Albumin	0.047	0.035	1.335	0.184
Total Protein	-0.019	0.020	-0.929	0.354
Nutritional Support	**-1.951**	**0.507**	**-3.851**	**0.001**

NIMV: Noninvasive mechanical ventilation, **BMI:** Body mass index, **BUN:** Blood urea nitrogen.

Table 6. Regression Analysis between Frightening Experiences, Satisfaction with Care, and Other Parameters.

Frightening Experiences as the Dependent Variable	***B***	***Standard Error***	***t***	***p value***
Constant	17.423	13.842	1.259	0.210
Gender	0.126	0.854	0.148	0.882

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Age	**0.077**	**0.038**	**2.006**	**0.047**
Hospitalization Days	0.062	0.063	0.991	0.323
NIMV History	0.384	0.808	0.476	0.635
Admission BMI	-0.150	0.102	-1.478	0.142
Hypertension	0.031	0.811	0.038	0.970
Diabetes Mellitus	-0.234	0.917	-0.256	0.798
Congestive Heart Failure	1.482	1.076	1.378	0.170
Coronary Heart Disease	-0.052	1.362	-0.038	0.970
Hemoglobin	-0.152	0.165	-0.922	0.358
Creatinine	-0.133	0.793	-0.167	0.867
BUN	-0.012	0.016	-0.751	0.454
Sodium	-0.133	0.094	-1.413	0.160
Chloride	0.138	0.078	1.766	0.079
Potassium	-1.063	0.764	-1.392	0.166
Magnesium	1.730	0.688	2.512	0.013
Albumin	-0.088	0.070	-1.253	0.212
Total Protein	0.013	0.040	0.337	0.737
Nutritional Support	**4.693**	**1.007**	**4.662**	**0.001**
Satisfaction with Care as the Dependent Variable				
Constant	19.276	7.637	2.524	0.013
Gender	-0.338	0.471	-0.717	0.475
Age	-0.018	0.021	-0.844	0.400
Hospitalization Days	-0.053	0.035	-1.536	0.127
NIMV History	-0.084	0.446	-0.188	0.851
Admission BMI	0.046	0.056	0.827	0.410
Hypertension	0.089	0.447	0.200	0.842
Diabetes Mellitus	-0.414	0.506	-0.819	0.414
Congestive Heart Failure	-0.678	0.593	-1.143	0.255
Coronary Heart Disease	0.164	0.751	0.218	0.828
Hemoglobin	0.044	0.091	0.481	0.631
Creatinine	-0.001	0.437	-0.003	0.998
BUN	0.009	0.009	1.041	0.299
Sodium	0.017	0.052	0.321	0.748
Chloride	-0.059	0.043	-1.377	0.170
Potassium	0.317	0.421	0.753	0.453
Magnesium	-0.618	0.380	-1.627	0.106
Albumin	0.066	0.039	1.714	0.089
Total Protein	-0.025	0.022	-1.140	0.256
Nutritional Support	**-1.137**	**0.555**	**-2.047**	**0.042**

NIMV: Noninvasive mechanical ventilation, **BMI:** Body mass index, **BUN:** Blood urea nitrogen.

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Discussion

The laboratory results of the patients were similar at admission and discharge. When considered alongside the effects of these results on the questionnaire findings, this observation supports the idea that admission values may serve as a reliable basis for analyzing the influence of nutritional parameters, rather than relying on discharge values. Consequently, predicting questionnaire outcomes and patient satisfaction with care may be feasible as early as ICU admission. However, as indicated by the regression analysis, the role of nutritional parameters (e.g., albumin and total protein) becomes less prominent when compared to the actual presence of nutritional support. This is evident in the lack of correlation between total protein and questionnaire outcomes and the absence of a relationship between albumin levels and nutritional support, which remained a relevant factor regardless of the model or subgroup.

Hypoalbuminemia has been established as an independent risk factor for unfavorable clinical outcomes, as shown in a meta-analysis. Patients with hypoalbuminemia, especially those admitted to the ICU or general wards with a history of surgery or renal dysfunction, often experience adverse outcomes. These include increased mortality, morbidity, and prolonged ICU and hospital stays [7]. The diverse etiologies of hypoalbuminemia suggest it may be a compensatory mechanism that does not always require intervention. However, reductions in osmotic pressure, intravascular antioxidative reserve, and other protective effects justify the potential use of albumin supplementation to prevent worsening outcomes, even though hypoalbuminemia itself serves as a marker of pathological processes [7,8].

Cost-effective strategies aimed at reducing hospitalization and ICU durations are increasingly relevant as the number of patients requiring end-of-life care and managing comorbidities rises. Predictive models for estimating hospital length of stay have identified hypoalbuminemia, ICU requirements (excluding cardiovascular ICUs), advanced age, prior hospitalizations, pressure ulcers, and early mechanical ventilation as significant factors [9]. These findings highlight the potential role of variables such as mechanical ventilation, age, and comorbidities in ICU discharge evaluations, beyond traditional predictors.

Interestingly, Chen et al. reported that patients with chronic lung diseases or hypertension had shorter ICU stays compared to others, suggesting that these conditions may increase mortality to the extent that hospitalization durations are shortened [10].

Emotional and psychological outcomes for ICU patients have also been studied extensively. Rattray et al. found that anxiety, depression, and post-traumatic stress following ICU discharge were correlated with age, sex, and total hospitalization duration [11]. Similarly, Russell reported that effective communication between ICU teams and patients significantly reduced concerns about treatment, alleviating anxiety and improving patient experiences [12]. These findings underscore the importance of addressing both physiological and psychological needs during ICU care.

In our study, age, hospitalization duration, and laboratory results aligned with expectations regarding their impact on questionnaire outcomes. Correlation analyses revealed that elderly patients exhibited lower awareness, recall, and satisfaction with care, while reporting more frightening experiences—trends that were also observed with longer hospitalization durations. Renal function parameters, such as creatinine and BUN, were associated with a single negative correlation, whereas albumin and nutritional support demonstrated opposite trends. These findings validated the reliability of our regression models and the inclusion of additional parameters in evaluating ICU experiences.

Age emerged as a particularly significant factor. Although it was correlated with all four questionnaire subgroups, regression analysis revealed that frightening experiences were the only subgroup where age retained statistical significance, with elderly patients reporting more frequent frightening experiences regardless of other parameters. Similarly, gender demonstrated significance, with male patients showing lower awareness compared to females during ICU stays.

Among laboratory parameters, magnesium was the only independent factor identified in our study. Hypomagnesemia was negatively associated with awareness, highlighting its potential role in

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ICU outcomes. Magnesium is the second most abundant intracellular cation and plays a crucial role in immune regulation and homeostasis [13,14]. Francesco et al. emphasized the importance of magnesium in ICU patients, noting that hypomagnesemia is associated with increased risks of infection, sepsis, weakened respiratory muscles, and bronchospasm, which can ultimately reduce survival rates [15]. However, overcorrection leading to hypermagnesemia may result in adverse effects, including paralysis, bradycardia, respiratory failure, and cardiac arrest. Further studies are needed to clarify the optimal magnesium correction strategies and their impact on respiratory failure requiring mechanical ventilation. In our study, magnesium was negatively associated with awareness, but its effects were limited to this subgroup, whereas nutritional support influenced all four subgroups.

These findings reinforce the assumption that nutritional support is a critical factor in the ICU experience questionnaire, regardless of a patient's nutritional status prior to admission. As shown in Table 2, a limitation of this study is the similarity in laboratory findings between admission and discharge. This limitation highlights the potential influence of nutritional support within a relatively homogenous patient population and suggests that the findings may not be generalizable to patients with better or worse nutritional status at admission.

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