ORIGINAL ARTICLE

Evaluation of functionality and quality of life in critical patients: case series report

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ABSTRACT

Hospitalization in Intensive Care Unit (ICU) usually results in decreased functionality and quality of life. Risk long-term sequelae may result from factors related to disease, treatment performed and time staying in bed. **Objective:** To evaluate the functionality and quality of life of patients who received physiotherapy in the ICU and correlate these variables after 30 days of discharge. **Methods:** A case series report study was conducted with 15 patients. Evaluation of functionality by the Functional Independence Measure - FIM (before ICU, at immediate release and after 30 days), evaluation of quality of life by Short-Form (SF-36) Health Survey (after 30 days). **Results:** The mean age was 43.20 ± 16.92 years, predominant causes of hospitalization were neurological, mechanical ventilation time was 14 (9-14) days and ICU 15.80 ± 7.16 days and all had complications. Before the ICU the patients were with full or modified independence (FIM 1=126), after discharge there was a decline to modified dependence (FIM 2=48) and after 30 days there was improvement, but functionality continued as modified dependence (FIM 3=92). The functionality areas like self-care, mobility and locomotion had major changes after the ICU and a significant improvement at 30 days; sphincter control, communication and social cognition had minor changes after the ICU and after 30 days the values approached the previous ones. The quality of life was affected 30 days after discharge with reduction in scores for all areas, the most affected ones were functional capacity, limitation by physical aspects, pain and social aspects. There were positive correlations between the areas of sphincters control, mobility and mobility (functionality) and functional capacity (quality of life). **Conclusion:** ICU negatively affected the functionality, especially at immediate release. After 30 days, there was an improvement, in part, that can be attributed to physical therapy, because all patients received this treatment in the ICU and many continued it after discharge. However, some deficits still remained, also affecting their quality of life.

Keywords: Intensive Care Units, Recovery of Function, Physical Therapy Modalities, Quality of Life

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Received on November 25, 2015.
Accepted on April 04, 2017.

DOI: 10.5935/0104-7795.20170002

INTRODUCTION

Critical patients are characterized by the presence of instability, severe prognosis and high risk of death, in which the goal of care is based on the maintenance of life.[6] The Intensive Care Unit (ICU) is the hospital facility responsible for the care of severe and/or risky patients who require constant medical care, support from a multiprofessional team and specialized equipment to maintain life.[2] In this unit, there is a high incidence of sedatives, neuromuscular blockers and support. Consequently, there are complications due to bed resting time and mechanical ventilation (MV), leading to immobility, physical deconditioning and muscular weakness. These factors contribute to the appearance of polyneuropathy and/or myopathy in critical patient's resulting in functional decline, increased care costs, reduced quality of life (QoL) and post-discharge survival.[1,3-5]

Functional independence is translated as an individual's ability to perform their daily living activities (DLA). The autonomy to perform such tasks makes it possible to live alone, however, situations such as chronic diseases, acute, traumatic or surgical pathological processes decrease or even jeopardizes this ability.

QoL is a broad, multidimensional concept encompassing many aspects of life, defined as "the individual's perception of their position in life regarding the culture and values in which they are inserted and in relation to their goals, expectations, standards, and concerns."[7] When it is referred to as health care, it is called" health-related quality of life, "thereby encompassing the level of well-being and satisfaction in an individual's life and how, from the perspective of the patient, he is affected by illnesses, accidents and treatments.[8]

As therapy progresses in intensive care, overall mortality decreases, but ICU survivors experience increased morbidity and a worse functional prognosis. The hospitalization often results in kinetic-functional changes in the post-discharge period, which lead to the inability to perform certain activities, restricting social participation. Severe weakness, physical deconditioning, deficits in self-care and mobility, poor QoL, hospital readmission and death are commonly observed up to five years after discharge from the ICU. Thus, the longitudinal follow-up of patients' progress, within the proposed objectives and the techniques used in their treatment, is extremely important. [9]

Studies show that the physiotherapeutic approach is capable of assisting in the recovery of critical patients. Early mobilization through techniques such as electrostimulation, cycle ergometer and motor kinesiotherapy has been widely used and brings benefits on weaning from the MV, length of stay in the ICU and hospital, loss of muscle function, functional capacity and QoL after hospital discharge.[1,4]

OBJECTIVE

To evaluate the functionality and QoL of individuals who received physical therapy during ICU admission, as well as to correlate these variables after 30 days of discharge from the unit.

METHODS

A descriptive, case series-type study was conducted with patients who were admitted to a General Adult ICU in Santa Maria, RS, with 10 beds, from January to April, 2015. Patients from both groups were hospitalized in the General Adult ICU for more than 72 hours, who had used invasive mechanical ventilation (IMV) for at least 48 hours, who received physiotherapeutic assistance in this unit and who agreed to participate by signing the Free And Clarified Consent Form (FCCF). Patients who returned to the ICU who had previous functional deficit and who died were excluded. Patients who were unable to respond to the SF-36 questionnaire, such as cognitive impairment due to ICU, use of tracheostomy or other situation that impaired understanding and/ or communication, were excluded from the QoL assessment.

The individuals selected had their identification data and clinical evolution (cause of hospitalization, comorbidities, IMV time, medication use, complications, length of ICU stay) collected through medical records analysis. The Functional Independence Measure (FIM) and the Short-Form (SF-36) Health Survey were used to assess the functionality and QoL of these individuals, respectively.

The FIM scale consists of a validated instrument capable of measuring the degree of request for care of third parties that a patient with a disability requires to perform their motor and cognitive tasks. It verifies the performance of the individual in 18 tasks related to self-care, sphincter control, transfers, locomotion, communication and social cognition. Each item can be classified in values from 1 (total dependency) to 7 (complete independence in performing tasks). Based on the total score obtained, it is possible to classify patients' levels of independence, with a score of 18 points referring to complete dependence (total assistance), from 19 to 60 points to the modified dependency (assistance of up to 50% in the task), from 61 to 103 points to the modified dependency (assistance of up to 25% in the task) and from 104 to 126 points to the modified or complete independence. [10,11]

Thus, the FIM was first applied after discharge from the ICU referring to the previous 30 days (FIM 1 - previous functionality) and then referring to the current moment of the patient (FIM 2 - immediate post-discharge ICU). Since it is the institution's norm to have an accompanying person after the ICU discharge, if any patient did not remember or could not answer some questions regarding the period prior to ICU admission and their companion knew their condition, then they could help answering it, which did happen in some cases, since some patients were still tracheostomized after the ICU.

After 30 days of the first evaluation, a reassessment was made with the same evaluator, through an interview for a new application of the FIM (FIM 3 - functionality after 30 days of discharge from the ICU) and the application of the SF-36, besides collecting some other information, such as the undergoing of physiotherapy and the occurence of complications during this period. These evaluations were performed by telephone if the patients were at home; or in person if they were still hospitalized or had a scheduled appointment for the same day.

The SF-36 questionnaire requires that we should answer it based on the events of the last 4 weeks, assessing the context in which we live, not only the isolated facts and the current moment. This is a multidimensional questionnaire, widely accepted in clinical practice and research, reliable and validated, consisting of 36 items that encompass functional capacity, physical aspects, pain, general health, vitality, social aspects, emotional aspects and mental health. The score of each domain can vary from 0 to 100, with 0 corresponding to the worst general health condition and 100 to the best health status.[12] For the application of this instrument it was necessary that the patient answered it without influences and could not request any help, as well. If s/he presented any impediment, the evaluation of the QoL by means of the SF-36 was not performed. For this reason, the application of this questionnaire became unfeasible after the immediate ICU discharge, since some patients were not

able to answer the questionnaire alone, and they could not ask for help, therefore it was applied only within 30 days after ICU discharge.

Statistical analysis was performed using SPSS 17.0 software. The Shapiro-Wilk test was used to verify the normality of the data distribution, the demographic variables of symmetrical distribution were presented in mean and standard deviation and the non-symmetrical variables in medians and percentiles. The FIM scores were compared in three situations (value found in pre-hospitalization, after immediate ICU discharge, and after 30 days) by the non-parametric Kruskal-Wallis test, followed by Tukey's post hoc to verify which groups differed; the mean scores of each domain of the SF-36 questionnaire and the data referring to the clinical evolution of the patients were demonstrated by descriptive statistics.

The correlations between the functionality and quality of life were performed by the Spearman correlation coefficient, which ranges from -1 (negative correlation, variables that vary in the opposite direction) to 1 (positive correlation, vary in the same direction), being a strong correlation when the coefficient was greater than or equal to 0.70; moderate correlation when between 0.30 to 0.70 and weak between 0 to 0.30. [13] A level of significance of 5% ($p < 0.05$) was accepted in all tests.

This research was approved by the Research Ethics Committee of the institution (opinion number 916.980 and CAAE 39197214.3.0000.5346) and respected the principles established by Resolution 466/12 on Research on Human Beings.

RESULTS

In the period from January to April 2015, 65 patients were admitted to the ICU, 37 died and 28 were discharged and transferred to other units of the hospital. According to the criteria of the study, 9 patients were excluded, leaving 19 that were evaluated and subsequently 4 were excluded (total prior dependence - 1, readmission - 1, death - 2), totalizing a sample of 15 patients.

The characteristics of the sample are shown in Table 1. The predominance of the male gender, mean age of 43.20 ± 16.92 years, the main causes of hospitalization in the ICU as neurological and the length of stay in this unit of 15.80 ± 7.16 days.

In the analysis of the medical records, it was verified that 7 patients (46.66%) had comorbidities, being the most frequent Systemic Arterial Hypertension (SAH), Diabetes Mellitus (DM) and smoking history. Fourteen had to perform surgical procedures during ICU admission, including decompressive craniotomies, fracture corrections, drainage of hematomas, chest drains, esophagectomies, exploratory laparotomies, thoracotomies, and tracheostomies, with the later predominating. Complications were present in all patients (100%), generally associated with infections (pneumonia and urinary tract infections such as Klebisiella, Candida albicans, Pseudomonas aeruginosa, Acinetobacter, Staphylococcus aureus), seizures and acute renal failure.

Table 2 demonstrates and compared the functional measures in the different domains and the total score, in the situations prior to ICU admission, immediate discharge and after 30 days. Significant differences were observed among all domains. Before ICU admission, patients had normal values for each domain and a total score classified as complete or modified (FIM 1= 126), after ICU immediate discharge the values were reduced, including modified dependence, requiring assistance in up to 50% of the tasks (FIM 2= 48) and after 30 days there was an increase in the score, referring to the recovery, but still comprising modified dependence, but with assistance in up to 25% (FIM 3= 92).

The areas of self-care, mobility and locomotion had greater changes after ICU stay and a significant improvement at 30 days, sphincter control, communication and social cognition had minor alterations after ICU discharge and in the next 30 days the values approached the previous ones .

The values referring to the areas of the SF-36 QoL evaluation questionnaire are shown in Table 3. It can be observed that compared to the total score of 100, all the areas that make up the QoL were affected after the ICU stay. The most affected areas were functional capacity, limitation by physical aspects, pain and social aspects. For the analysis of this variable, 2 patients were excluded for tracheostomy and 2 for cognitive deficit, and 11 patients were evaluated.

Correlations were made between all areas of the FIM scale and the SF-36 questionnaire, and the results are described in Table 4. Significant values were observed, with strong positive correlations between sphincter control and functional capacity, locomotion and functional capacity, and positive correlation and moderate between mobility and functional capacity. For these calculations, the same 4 individuals who did not answered the SF-36 were excluded, so that the functionality and QV data analyzed had the same number of subjects.

Table 5 shows information regarding the period after 30 days after discharge from the ICU, in which patients were divided into Complications (n = 10) and No complications (n = 5), to better understand the factors that influenced the recovery of patients after discharge.

DISCUSSION

The process of hospitalization in an ICU is usually accompanied by functional decline and quality of life. From hospitalization to hospital discharge, the patient undergoes a series of treatments and care, involving risks of long-term sequelae that may result from the disease, the treatment performed and the time resting in bed.[14]

The decrease in functionality after ICU discharge, especially in the immediate discharge, can be seen in this paper. A difference of 78 points corresponding to a functional loss of 62% between the state prior to hospitalization and immediate post-discharge (FIM 1 and FIM 2) was observed; after 30 days the functional loss was 27% in relation to the previous state of hospitalization (FIM 1 and FIM 3). However, the difference between immediate discharge and 30 days after it (FIM 2 and FIM 3) was 44 points, corresponding to a functional improvement of 35%. A prospective and observational study[15] in ICUs with 54 individuals observed a reduction in independence in all areas of FIM, but with a lower functional loss between admission and discharge, of 26%.

Analyzing the results, it is believed that in our sample, the increase in functionality between immediate discharge and after 30 days was due to self-care, mobility and locomotion areas, which were more affected and showed a greater improvement, and to a lesser extent, when compared to control of sphincters, communication and social cognition areas, which had less impairment, consequently a lower improvement. A similar study[6] analyzed functional independence through FIM just after ICU discharge and 30 days later in 44 patients, and significant improvement was observed for all FIM areas, except regarding the control of sphincters and communication, which got the lower scores on discharge. After 30 days the lower scores in locomotion and the smallest loss was in self-care.

The functionality of 13 patients after ICU discharge, during hospital discharge and after 6 months was verified in the study carried out by Secombe et al.[16] by the Home and Commu-

Table 1. Sample characterization (n=15)

Characteristics	Values
Gender (F/M)[a]	5/10
Age (years)[b]	43.20 ±16.92
Cause of Hospitalization	
Clinical[c]	66.60%
Neurological[c]	46.62%
TBI/Polytrauma[a]	4
SHA[a]	2
Hemorragic CVA[a]	1
Septical[c]	13.32%
Abdominal sepsis[a]	1
Pelvic sepsis[a]	1
Other[c]	6.66%
Surgicals[c]	33.30%
Exploratory laparotomy [a]	3
Esophagectomy and Thoracotomy[a]	1
Polytrauma[a]	1
Tempo de VM (days)[d]	14 (9-19)
ICU time (days)[b]	15.80 ±7.16
No. of physiotheraphy sessions at ICU[b]	31.60 ±14.33
No. of comorbities[b]	3.14 ±1.67
No. of surgeries during hospitalization[b]	2.71 ±1.50
No. of complications during hospitalization[d]	3 (2-5)
No. of medicines[b]	11.87 ±2.32

Values expressed in [a] frequency; [b] mean ± standard deviation; [c] percentage; [d] median and 25th and 75th percentile; F: female; M: male; TBI: Traumatic Brain Injury; CVA: Cerebrovascular Accident; SHA: Subarachnoid hemorrhage.

Table 2. Functional evaluation (FIM scale) in three occasions (n = 15)

Area (score)	FIM 1	FIM 2	FIM 3	P
Selfcare (6-42)	42 (42-42)	11 (9-15)*	32 (11-42) *#	< 0.0001
Sphyncter control (2-14)	14 (14-14)	3 (2-14) *	14 (6-14)	0.0023
Mobility (3-21)	21 (21-21)	4 (3-11) *	15 (5-21) *#	< 0.0001
Locomotion (2-14)	14 (14-14)	2 (2-5) *	8 (2-14) *#	< 0.0001
Communication (2-14)	14 (14-14)	12 (5-14) *	14 (13-14)#	0.0010
Social cognition (3-21)	21 (21-21)	16 (5-21) *	19 (10-21)	0.0004
Total score (18-126)	126(126-126)	48(28-76)*	92(54-123)*#	<0.0001

Values expressed in median and 25th and 75th percentile; FIM: Functional Independence Measure; FIM 1: functionality before ICU; FIM 2: functionality just after immediate discharge from ICU; FIM 3: functionality after 30 days. *Kruskal-Wallis- post hoc Tukey, p <0.05. *: difference to FIM 1; #: difference to FIM 2.

nity Care Functional Score and showed that there was no change in the score between Basic Activities of Daily Living in ICU discharge ICU and during hospital discharge, but that there was an improvement between ICU discharge and after 6 months. However, in the Instrumental Activities of Daily Living, the limitations persisted after 6 months.

In the individuals evaluated in our study, the time of MV was 14(9-19) days and the mean length of stay in the ICU was 15.80±7.16 days, the number of medicines used was 11.87±2,32, evidencing that most of the patients were receiving ventilatory assistance. Therefore, they were more restricted to bed, a fact that may contribute to an increase in complications and in the use of medicines, which directly affects independence.

A multicenter study[17] in 13 ICUs showed that among 1661 patients, 58.3% received prolonged MV, 31.1% were extubated before 7 days and 10.5% died before the 7th day in the ICU. Prolonged MV patients are often functionally deconditioned and limited. Some of the factors that contribute to the onset of neuromuscular abnormalities are: underlying diseases, severity and duration of organ failure, adverse drug effects, and long-term immobilization. Thus, weakness of peripheral skeletal muscles and respiratory muscles further affect functional loss and health-related quality of life.[18]

The critical patient's polyneuropathy is quite frequent in ICU patients submitted to MV for more than 7 days, affecting 25.3% of the individuals, which may prolong MV time and stay in the ICU. Diagnosis is complex and difficult because of the consciousness level; when it is low the patient is not able to cooperate in tests and evaluations, and it is necessary to use complementary tests to complete the clinical diagnosis.[1] In our study, this diagnosis was not present in the medical records. This fact does not demonstrate any non-compliances, but rather that there may not have been a specific evaluation for this situation. In addition, considering that most of them have some neurological impairment, it would also make the final diagnosis difficult.

A randomized, controlled clinical trial[4] conducted with a conventional physiotherapy control group (n=14) and an early mobilization group (n=14) assessed the pheripheral muscle strength (Medical Research Council) and the respiratory muscle strength (manovacuometry). Significant gains were found for these variables in the early mobilization group. In our sample, all patients received physiotherapeutic care during their stay in the ICU, totaling 31.60±14.33 sessions and 66.66% of them continued treatment after discharge. This may have contributed to the fact that losses after admission to hospital may not have been even higher, since according to the FIM evaluation, only a moderate level of dependency was revealed, preserving a certain degree of independence.

The QoL of our patients was affected after ICU admission and up to 30 days after discharge. The most affected areas were functional capacity, limitation by physical aspects, pain and social aspects, and the less affected ones were general health, vitality, limitation by emotional aspects and mental health. A cross-sectional study (19) conducted at two ICUs, comparing 36 individuals with sepsis/septic shock and control subjects, also analyzed the QoL by means of the SF-36 and observed involvement in all areas of the questionnaire in the survivors' group, except in limitations due to emotional issues. These results demonstrate that ICU hospitalization and complications interfere directly with QoL after discharge.

When correlating the functionality and the QoL after 30 days of discharge, there were

Table 3. Quality of life assessment (SF-36) 30 days after discharge from ICU (n = 11)

Areas	Score (0-100)
Functional capacity	28.18 ± 28.40
Physical aspects limitation	25 ± 40.31
Pain	52 ± 23.66
General health status	62.91 ± 10.68
Vitality	66.82 ± 16.92
Social aspects	51.14 ± 26.49
Limitation by emotional aspects	60.48 ± 44.25
Mental health	68.73 ± 20.30

Values expressed in mean ± standard deviation.

Table 4. Correlation between functionality and quality of life areas

SF-36 / FIM	Selfcare	Controle Sphyncteres	Mobility	Locomotion	Communication	Social cognition
Functional capacity	r=0.58	r =0.77	r =0.64	r =0.71	r=-0.41	r=0.00
	p=0.06	p=0.01*	p=0.03*	p=0.02*	p=0.22	p=0.99
Physical limitation	r=-0.23	r=-0.09	r=-0.22	r=-0.09	r=-0.52	r=-0.06
	p=0.49	p=0.78	p=0.51	p=0.8	p=0.1	p=0.85
Pain	r=-0.09	r=-0.04	r=-0.17	r=0.03	r=0.51	r=0.45
	p=0.79	p=0.90	p=0.61	p=0.92	p=0.11	p=0.17
General health status	r=-0.12	r=-0.20	r=0.07	r=-0.24	r=0.31	r=0.36
	p=0.72	p=0.56	p=0.83	p=0.48	p=0.35	p=0.28
Vitality	r=0.17	r=0.60	r=0.24	r=0.59	r=-0.3	r=0.26
	p=0.61	p=0.05	p=0.47	p=0.06	p=0.36	p=0.44
Social aspects	r=0.30	r=0.60	r=0.38	r=0.5	r=0.25	r=0.33
	p=0.37	p=0.05	p=0.26	p=0.12	p=0.45	p=0.32
Emotional limitation	r=-0.23	r=0.29	r=0.10	r=0.00	r=-0.32	r=-0.15
	p=0.50	p=0.38	p=0.78	p=1	p=0.34	p=0.67
Mental Health	r=0.08	r=0.43	r=0.30	r=0.17	r=-0.3	r=0.04
	p=0.81	p=0.18	p=0.38	p=0.62	p=0.37	p=0.91

SF-36: quality of life questionnaire; FIM: Functional Independence Measure; R: Spearman correlation; P * <0.05

Table 5. Reassessment after 30 days of ICU discharge (n = 15)

	Complications (n=10)	No Complications (n=5)
Cause of Hospitalization		
Neurological[a]	5	2
Septicals[a]	1	1
Other[a]	0	1
Surgicals[a]	4	1
Funcionality		
FIM 3[b]	80.90±33.75	108.2±31.05
QoL		
General health status[b]	57±8.66 (n=7)	73.25±2.50 (n=4)
In general you would say that:	Good (n=7)	Good (n=3); Very good (n=1)
Physiotherapy		
Yes[a]	7	3
No[a]	3	2
Reassesment Location		
Homr[a]	6	5
Hospital[a]	4	
Time of hospitalization[b]	41.50±17.20	39.80±21.03

Values expressed in [a] frequency; [b] mean ± standard deviation

positive correlations between the areas of the FIM concerining sphincter control, locomotion and mobility, and the SF-36 areas of functional capacity. Thus, the lower the scores of these FIM areas, the more dependent individuals will be and the lower the functional capacity scores (SF-36), the worse the QoL of the individuals, since these variables are related to each other in a directly proportional way.

The information pertinent to the post-discharge period showed that patients without complications after discharge had a higher FIM 3 score, higher score in general health status (SF-36), reported good health, had physiotherapy after discharge and everyone was at home in the reevaluation period. Thus, physical therapy proved to be beneficial, because during hospitalization it contributed for the loss of functionality and QoL not to be higher and after discharge, it assisted in the recovery process. Sacanella et al.[20] in a prospective study evaluated the functional status and QoL in 112 elderly individuals after 12 months of ICU discharge. Data were collected at the beginning of the study, in the ICU, in the ward, 3, 6 and 12 months after discharge, when only 49% remained alive after 12 months of been discharged and showed a decrease in functional autonomy and QoL compared to the initial state.

This study made it possible to analyze and quantify the functional and quality of life of patients in the ICU by obtaining data on their state prior to admission, after immediate discharge and after 30 days of discharge. We can thus better understand the factors that influenced the decline of these variables. Among the limitations found, there were medical records with incomplete information, high number of deaths during the data collection period, predominance of neurological patients in the sample, which meant that some patients needed help in answering the functional questionnaire and also made it impossible to evaluate QoL immediately after discharge and made it difficult to be done after 30 days, resulting in the exclusion of some individuals. All these factors contributed to the reduction of the sample. Therefore, it is recommended that studies with larger samples be carried out for a longer period of time and with the possibility of stratifying the patients according to the causes of hospitalizations.

CONCLUSION

Based on the results obtained, it is suggested that patients admitted to the ICU have their functionality affected immediately

after this process. It is suggested that factors such as neurological pathologies, prolonged MV use, increased ICU time, number of medicines used, presence of comorbidities and surgical procedures may contribute to this impairment. However, an improvement in this variable was observed after 30 days, approaching the baseline values, and in part this gain could be attributed to physical therapy, since all patients underwent this type of therapy throughout the ICU remaining period and a large part of them continued to undergo after discharge. Despite the fact that the individuals showed an improvement in functionality over 30 days, some deficits still remained and also affected their QoL, which was evidenced by the positive correlation between areas of functionality (sphincter control, locomotion and mobility) and QoL (functional).

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